September 2010

WELCOME ADDRESS

Dear Colleagues,

On behalf of the Organizing Committee I am pleased to welcome you to the 5th International Meeting of the Onassis Cardiac Surgery Center which is taking place in Athens, at the Eugenides Foundation Congress Center, 16-18 September 2010.

The Scientific Program, a comprehensive review of almost all the major developments in Cardiac Surgery and Cardiology, is targeted to practicing cardiologists, cardiac surgeons and related specialists for a multidisciplinary update of our specialties. The Program will also provide substantial help to physicians-in-training to prepare for their board examinations. Special Forums reviewing topics on Critical Care, General Thoracic Surgery, Cardiac Anesthesiology, Physical Therapy and Nursing are enriching the Scientific Program. We have a very competitive selection of Oral and Poster Presentations. The Best Oral and Best Poster Presentation Awards Competition will be an exciting process worth attending.

We are very thankful to all world-renowned specialists who comprise our International Scientific Committee and who participated in the abstract grading. We are deeply appreciative to the President and the members of the *Alexander S. Onassis Public Benefit Foundation*, the main sponsor of our Meeting, who continuously support our scientific endeavors.

Mostly, we would like to thank all participants whose presence will guarantee a meaningful exchange of information for the scientific and educational aims of our Meeting and the maintenance of high quality standards of care for the benefit of our patients.

Again, Welcome to Athens and enjoy the Meeting.

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GENERAL INFORMATION

CONTINUING MEDICAL EDUCATION (CME)

Accreditation

This activity has been planned and implemented in accordance with the Essential Areas and Policies of the Accreditation Council for Continuing Medical Education (ACCME) through the joint sponsorship of the University of Miami Miller School of Medicine and Onassis Cardiac Surgery Center. The University of Miami Leonard M. Miller School of Medicine is accredited by the ACCME to provide continuing medical education for physicians.

The University of Miami Leonard M. Miller School of Medicine designates this educational activity for a maximum of 24.5 *AMA PRA Category 1 Credits*™.

Physicians should only claim credits commensurate with the extent of their participation in the activity.

Disclosure and Conflict of Interest Resolution

All conflicts of interest of any individual(s) in a position to control the content of this CME activity will be identified and resolved prior to this educational activity being provided. Disclosure about provider and faculty relationships, or the lack thereof, will be provided to the learners.

Services For The Disabled (ADA Statement)

In the Eugenides Foundation Congress Center there is access for disabled persons. You are kindly requested to indicate any special need when you fill in your registration form. If special arrangements are required for an individual with a disability to attend this conference, contact (name and phone number of presenting department) at least 15 days prior to the conference.

Registration Cancellation Policy

In cases where a course is cancelled due to insufficient registrations, a full tuition refund will be made.

EBAC CME Accreditation

The Meeting is accredited by the European Board for Accreditation in Cardiology (EBAC) for **18 CME** credit hour(s) (Day #1: 6 CME credit(s) - Day #2: 6 CME credit(s) - Day #3: 6 CME credit(s)) of External CME credits.

Each participant should claim only those hours of credit that have actually been spent in the educational activity. EBAC works according to the quality standards of the European Accreditation Council for Continuing Medical Education (EACCME), which is an institution of the European Union of Medical Specialists (UEMS).

EACCME-UEMS Accreditation

The EACCME-UEMS will accredit the meeting with CME Credit.

TECHNICAL EXHIBITION

An exhibition of modern medical technology products will be on display throughout the meeting at the Auditorium Lobby.

AWARDS

Two Scientific Awards at the amount of 1000 € each, will be given for the Best Oral Presentation and the Best Poster Presentation. The Awards are sponsored by the Alexander S. Onassis Public Benefit Foundation.

FIRST AID FACILITIES

Anyone requiring medical assistance or needing emergency care should report to the Meeting Information Desk.

LOST AND FOUND

Lost items should be handed to the Meeting Information Desk. Should you lose anything, please report to this desk for assistance.

SOCIAL EVENTS

- The Opening Ceremony and the Welcome Reception will be held on Thursday, September 16th, 2010 at the Eugenides Foundation Congress Center at 20.30 hrs.
- A Planetarium show "The Death of Stars" will be presented on Friday, September 17th, at 14h30-15h30.
  Ticket price: 6 €
- The Formal Dinner will take place on Friday, September 17th, 2010

REGISTRATION FEES

The following registration fees apply:

TYPES	On-site registration	One day registration
Physicians	460.00 €	190.00 €
Physicians (from Eastern European Countries)	270.00 €	100.00 €
Residents	170.00 €	70.00 €
Perfusionists/Physiotherapists/ Nurses/Students	120.00 €	60.00 €
Accompanying Persons	150.00 €	-

Registration fees are not refundable

Registration fees for Participants, Residents/Fellows, Perfusionists, Nurses and Students include:

- Access to the Scientific Sessions and Exhibition
- Participation to the Opening Ceremony and Welcome Reception
- Coffee, tea, refreshments during the coffee breaks
- Meeting material

Registration fees for Accompanying persons include:

- Participation to the Opening Ceremony and Welcome Reception
- One day tour to Argolis (Mycenae-Nafplion - Epidavros) with lunch

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DISCLAIMER

The Scientific Association of the Onassis Cardiac Surgery Center and the Committees of 5th International Meeting of the Onassis Cardiac Surgery Center do not hold themselves responsible for any statements made by the authors of the published abstracts and extensive summaries that are included in the Syllabus. Statements presented in this publication reflect only the opinion(s) of the author(s) and they are not endorsed by the Committees of the Meeting or by the Scientific Association of The Onassis Cardiac Surgery Center. All conclusions referring to safety and effectiveness of procedures, choice and dosage of medications are the responsibility of the authors.

SYLLABUS

Congenital Heart Disease

ANOMALOUS AORTIC ORIGIN OF THE CORONARY ARTERIES

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Introduction: Anomalous aortic origin of the coronaries (AAOCA) has been associated with sudden death in certain anatomic configurations. Recent advances in diagnostic cardiology have resulted in identification of these anomalies. Dilemmas have arisen to determine management of patients with symptomatic and asymptomatic lesions.

The purpose of this discussion is to address these therapeutic decisions and review different operations required for coronary unroofing.

Methods: Between 1998 and 2009, we performed coronary unroofing in 22 patients with AAOCA without aortic commissural detachment. In 7 patients with "left from right" AAOCA, 4 had chest pain only, 1 had syncope, 1 had myocardial infarction and 1 was asymptomatic. In 15 patients with "right from left" AAOCA, 11 had chest pain only, 4 had syncope, and none were without symptoms. Median age was 15 years (range, 5 to 42). Eight patients had concomitant procedures, most commonly patent foramen ovale closure.

Results: There were no deaths or complications. Mean cross clamp time was 53 minutes. Mean length of stay was 4 days. Postoperative evaluation included ECHO, CT angiogram, stress thallium, stress ECHO, and exercise stress test. In all patients the repaired coronary was patent with demonstrated flow. Mean follow-up was 17 months (range, 1 to 63 months).

Conclusion: We conclude that coronary unroofing is safe and effective for all symptomatic patients with AAOCA. Coronary unroofing is indicated for left from right aortic cusp no matter whether symptomatic or asymptomatic, as well as for symptomatic patients with right from left aortic cusp. The therapeutic modalities are unclear for asymptomatic patients with the same physiology.

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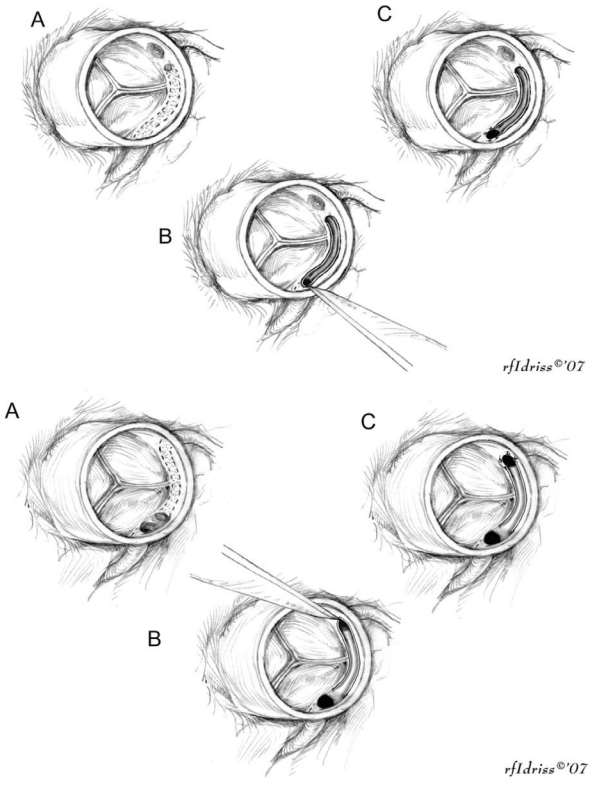

NEUROLOGICAL COMPLICATIONS AFTER CARDIAC SURGERY IN CONGENITAL HEART DISEASE PATIENTS

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In recent years mortality after surgery for complex congenital cardiac disease shows a continuous decline. There is increased concern about the long-term functional morbidities following pediatric open heart surgery, especially neurodevelopmental outcomes, with their profound personal and societal course.

The non-specific term of "neurological complications" describes a variety of adverse clinical outcomes ranging from the less common postoperative complications such as stroke and seizures to the late presenting abnormal school performance, learning disabilities and behavioral issues. Evidence is accumulating that overall outcomes are related to a number of factors and perhaps intraoperative complications may not play the most important role. MRI studies of newborns with congenital heart disease have shown that up to 40% have preoperative brain injuries, which in addition to studies describing abnormal fetal brain development and brain perfusion can lead to the assumption that congenital cardiac disease is, in many cases, accompanied by congenital brain disease.

Identifying perioperative neurological injury may be challenging. Normal findings on physical examination and diagnostic studies are poorly sensitive for long-term neurological dysfunction, and these "normal" findings have limited predictive validity. Similarly, the specificity of early postoperative findings for long term neurological and developmental abnormalities is also limited, with surprising ability of the neonatal and infant brain to withstand and recover from perioperative injury.

Nevertheless, factors such as prolonged circulatory arrest time, haemodynamic instability and degree of cyanosis are identified as major risk factors for subsequent neurodevelopmental impairment. Cardiopulmonary bypass (CPB) itself may result in brain injury due to embolism, inflammation, and ischemia resulting in impaired delivery of energy substrates (oxygen and glucose).

The neuropretective intraoperative management so far includes strategies such as minimizing the duration of deep hypothermic circulatory arrest (DHCA), intermittent cerebral perfusion or low flow cardiopulmonary bypass instead of DHCA and antegrade cerebral brain perfusion. Other neuroprotective strategies employed during open heart surgery include temperature regulation, acid-base management, degree of haemodilution, blood glucose control and anti-iflammatory regimes.

Real-time neurologic monitoring should be an integral part of neuroprotective strategies for pediatric patients requiring cardiac surgery but currently is not universally applied. Ideally monitoring should allow easy, reliable, and reproducible detection of adverse neurologic events. The monitoring modalities used so far include electroengephalographic monitoring, near infrared spectroscopy (NIRS) and transcranial Doppler ultrasound (TCD). These three techniques are complementary. NIRS is considered as offering the most clinical information, eventhough sufficient evidence is still lacking.

There is definitely room for improvement in our current understanding of neurologic function in children with congenital heart disease undergoing cardiac surgery. Improved survival of infants with congenital heart disease makes the need for indentification of the aforementioned mechanisms imperative to enable the application of neuroprotective interventions.

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Valve Disease

BEATING HEART VALVE SURGERY WITH LUNG PERFUSION/VENTILATION

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Purpose: This is a feasibility pilot study assessing the efficacy and safety of lung perfusion/ventilation during aortic valve replacement (AVR) and combined AVR and coronary artery bypass grafting (CABG) in the beating heart.

Patients and Methods: Twenty-two consecutive patients undergoing AVR with or without CABG were placed on cardiopulmonary bypass (CPB) at normothermia. At initiation of CPB, the lungs were ventilated with tidal volumes of 300-350 ml, 6 breaths per minute. This provided End-tidal C02 between 20 to 30 mmHg during CPB. The lungs were perfused via a catheter derived from the ascending aortic cannula, which was inserted into the main pulmonary artery. Flow rates were in the range of 400 ml/min, documented by Doppler flow measurements. The heart was allowed to beat, in normal sinus rhythm, with continuous and simultaneous perfusion with warm blood of the coronary sinus (mean pressure 50-55mmHg) and antegrade perfusion of each coronary ostium (right and left). A vent was inserted into the right superior pulmonary vein. Complete de-airing maneuvers were achieved using trans-esophageal echocardiography. The patients were monitored preoperatively, intra-operatively, and post operatively clinically with special attention to pulmonary function (blood gases, hemodynamics and neurological function. Daily chest Xray were obtained for the first 3 days.

Results: Mean CBP time was 87 min., with a mean cross clamping time of 55 min. Arterial blood gas pH difference ranged from 0.01 to 0.09 at the end of surgery, with a shift toward respiratory acidosis. The end- tidal CO2 ranged from 13 to 38mmHg during CBP ventilation/perfusion. There was no evidence of neurological injury or air embolization in any of the patients. Clinically relevant pleural effusions were defined as blunting of the costophrenic angle with oxygen saturations below 93% by pulse oxymetry. One patient

presented with pleural effusions prior to surgery, and was excluded from the study. Twenty-one patients did not demonstrate pleural effusions. Seven patients required post-operative nasal cannula support for 24 hours. Prolonged mechanical ventilation was defined as intubation that exceeded 24 hours after surgery. One patient required prolonged mechanical ventilation, and was extubated on post-operative day one. Seven patients were extubated in the operating room immediately after surgery. Six patients were extubated upon arrival in the cardiac surgery intensive care unit. Six patients were extubated within 2 hours after surgery.

Conclusions: Pulmonary dysfunction secondary to CPB is a major cause of morbidity and mortality after cardiac operations. During CPB, pulsatile flow to the pulmonary artery ceases, and the lungs rely on the bronchial circulation for viability. However, bronchial artery blood flow decreases with the initiation of CPB, and may be inadequate for normal alveolar perfusion. When the pulmonary circulation is restored, ischemia-reperfusion injury may occur, contributing to post-CPB pulmonary dysfunction.

The end point of our initial pilot study shows that 15 patients were extubated within 2 hours after surgery. Data obtained allowed for a more accurate prediction of 7 patients that could tolerate immediate extubation in the operative suite. These 7 patients had hemodynamic stability with minimal inotropic support, constant arterial blood gas values throughout the operative procedure and post-operative period, and an appropriate end-tidal CO2, demonstrating appropriate end organ function.

It is concluded the lung perfusion/ventilation during AVR +/- CABG on the beating heart is safe and feasible. Further studies should focus on the energetics of the lungs during CPB, utilizing more sophisticated methods of assessing lung function perioperatively.

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AORTIC VALVE REPAIR TECHNIQUES AND RESULTS

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Valve repair techniques have emerged in recent years as a viable alternative to replacement options. As benefits of mitral valve repair have been clearly established, the superiority of aortic valve repair has yet to be proven.

Nearly all aortic valve repair indications have been applied to patients with aortic regurgitation. The prognosis of symptomatic patients with aortic insufficiency is poor,for several reasons: LV dilatation with subsequent congestive heart failure (CHF), dilatation of aorta with subsequent increased risk of dissection or combination of both.[1,2] As patients considered for repair are usually young, the risk of repair failure should be weighed ageinst the benefit of avoiding anticoagulation.

Isolated Aortic Valve Repair: The aortic valve pathology that might be amenable to repair is:

1. a dilated aortic annulus
2. conjoined cusp prolapse in bicuspid aortic valves (BAV)
3. single cusp prolapse in tricuspid aortic valves, and
4. aortic valve cusp perforation from endocarditis

Various techniques required for these regurgitant lesions are used to create (AV) competency in aortic valve with their geometry affected by different types of pathology.

Annular Dilation: This type of AR is caused by a aortic annulus dilatation with lack of central cusp coaptation. Reduction annuloplasty, mostly done by closure of subcommisural triangles corrects the problem by providing a bigger area of cusp coaptation.

Bicuspid Aortic Valve: The largest series published on aortic valve repair for bicuspid aortic valve is attributed to Cleveland Clinic.

Long term results of aortic valve repair in patients with insufficient bicuspid aortic valve remains unclarified. As competent bicuspid aortic valves can achieve good durability, which has been confirmed by relatively large population of patients with aortic stenosis of bicuspid aortic valves in their sixties and seventies, heterogenicity of patology that causes valve regurgitation makes the choice of surgical technique difficult.

Cusp Prolapse in Tricuspid Valve: This type of AR is caused by the prolapse of one or more cusps with the elongated free margin, rupture or fenestration This can occur by rupture of a small fenestration. The usual way how to deal with this pathology is free edge plication, usually combined with annuloplasty.

Cusp Perforation: This type of AR is caused by infective endocarditis or iatrogenic perforation. The best way to restore the valve competency is patch repair with autologous pericardium.

The most common indications for aortic valve repair are dilated annulus, bicuspid aortic valve (BAV) and cusp prolapse of trileaflet valves. Annuloplasty is the most common procedure, and widely accepted. Repair of the bicuspid aortic valve has been burdened by concerns about durability, although some specialized centers are able to publish very acceptable results.

Repair of The Aortic Insufficiency Caused By Dilation Of The Aortic Root: Dilation of the aortic root is one of the the most common causes of aortic insufficiency Older patients with ascending aortic aneurysm may develop aortic insufficiency by stretching the commisures after dilatation of the sinotubular junction, with relatively normal sinuses of Valsalva. Another mechanism is dilation of the aortic sinuses, followed by sinotubular junction and aortic annulus at the end . This mechanism is common in patients with Marfan syndrome.

Ascending Aortic Aneurysm With Aortic Insufficiency: In patients with ascending aortic aneurysm, normal or minimally dilated aortic sinuses, and moderate or severe aortic insufficiency,

the aortic valve repair is usually done by adjusting the diameter of the sinotubular junction with or without interpositum graft. The freedom from aortic valve replacement at 10 years exceeds 95%, which makes this method an excellent alternative to valve replacement.

Aortic Root Aneurysm: There are two main methods of aortic valve repair in aortic root aneurysm: valve reimplantation method, promoted by T. David, and remodelling method which was initially described by Yacoub .Although both authors published very good durability of repair, most comparative studies suggest that the reimplantation of the aortic valve provides a more stable aortic valve function than the remodeling of the aortic root.

Conclusion: Aortic valve repair techniques have recently become an emerging alternative to conventional valve replacement. Beside the fact that they are challenging technically and still not standardized like the repair techniques in mitral valve surgery, comparative advantages of a coumadin –free, low gradient native valve encourages surgeons to refine techniques that will certainly become important, and for some pathology probably preferred option in the near future.

SURGICAL DECISIONS IN MITRAL VALVE SURGERY TODAY

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Mitral valve repair is the 'Gold Standard', reducing operative mortality, improving long term survival and reducing valve related morbidity. Nevertheless mitral valve repair rates for degenerative valve disease vary widely. Complex repairs are required in up to 56% of patients and have a lower long term durability compared to single segment posterior mitral leaflet prolapse repairs.

Surgical techniques other than quadrangular posterior mitral leaflet resection are therefore essential. These include papillary muscle repositioning and Goretex neochordae implantation. The Goretex loop technique being the more reproducible in the latter, applicable to both the anterior and posterior leaflets as well as multiple segments.

In degenerative mitral valve disease a concern is the risk of systolic anterior mitral leaflet motion, which can though be easily avoided. In part this can be related to the type of annuloplasty ring selected.

SURGERY FOR ISCHEMIC MITRAL REGURGITATION

Ulrik Hvass, MD
Paris, France

Surgery for ischemic mitral regurgitation started with Dr. Bolling's pioneering work. Undersizing the mitral ring became the standard surgical approach. Decades later, it appeared that a significant percentage of patients did not evolve favourably, presenting recurrent mitral regurgitation and little or no regression of adverse remodelling. A recent study also claimed that the mitral surgery did not affect prognosis. Are we back to square one?

Not exactly, because patients have been separated into good and poor responders. The Leyden algorhythm gives echographic landmarks that tend to segregate the two groups. Good responders have a LVEDD < 6 and a LVESD < 54 mm. An undersized mitral ring giving an adequate height of leaflet coaptation gives satisfactory results. Poor responders, meaning 30 to 50% of the cases, need some other type of surgery.

A variety of interventions have been devised, addressing the LV that is the culprit muscle leading to adverse remodelling and mitral regurgitation.

Among these, the papillary muscle sling technique allows to correct lateral and downward displacement and to plicate the posterior LV wall.

Using this technique, we will evaluate long-term stability of mitral repair and reverse remodelling in patients with severe ischemic left ventricular dysfunction (LVD) and functional mitral regurgitation (FMR).

New Developments

ANESTHETIC CONTRIBUTIONS TO CARDIAC SURGERY DEVELOPMENTS

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Cardiothoracic anesthesiologists have morphed from administrators of anesthetics along with invasive hemodynami monitoring and intervention to invasive cardiologists and echocardiographers. It is this ability to evolve to an acute care, perioperative clinician with focus on hemodynamics and respiratory function, that allowed cardiothoracic anesthesiologists to follow step-by-step their surgical and cardiology colleagues. In the new era, during which many interventions take place outside of the conventional confines of the cardiac operating room, anesthesiologists find themselves playing the role of co-ordinator among different specialists, traditional anesthetist, intensivist, cardiologist and echocardiographer.

Surgical aortic valve (AV) replacement (AVR) is the accepted treatment for symptomatic aortic stenosis (AS). Alternative methods of AVR have challenged the traditional treatment and renewed interest in the management of patients with severe AS. While operative mortality is low in the ideal candidate, it is limiting in the older patient with multiple comorbidities, in whom bleeding, stroke and even death (4-18%) occur with increased frequency. The alternative to surgery, percutaneous balloon aortic valvuloplasty is not used routinely because of fast restenosis, usually within 6 months, and complication rate.

Transcatheter AV implantation (TAVI) is a potential treatment for the high-risk patient, aiming at relieving stenosis at least to a degree comparable to surgical AVR. TAVI is performed by replacing the stenosed AV with a bioprosthetic valve (which comes only in two sizes: 23 mm or 26 mm diameter) mounted

on an expandable stent (14 mm or 16 mm long, respectively), which is deployed after correct positioning through the calcified native aortic valve. The presence of the stent prevents restenosis, as compared with balloon valvuloplasty. Deployment of the catheter-mounted AV prosthesis is either antegrade (via the left ventricular apex, accessed via thoracotomy) or retrograde (via the aorta, accessed percutaneously via the iliac vessels). The major benefits of TAVI are avoidance of complications related to sternotomy, cardiopulmonary bypass and aortic cross-clamping. Acute improvement of cardiac function has been recorded immediately post TAVI. The surgical steps include position of the delivery catheter across the stenosed native AV, valvulotomy with inflation of balloon, positioning of the delivery system across the aortic annulus followed by deployment of the prosthesis. The access route and direction of deployment depends mostly on patient's comorbidities: extensive atheromatosis of the aorta and small caliber femoral or iliac vessels argue for antegrade deployment (left thoracotomy), while poor respiratory status, chest radiation or previous thoracotomy argue for retrograde deployment (percutaneous approach via the femoral vessels). Peri-implantation visualization of the vessels, aorta and prosthesis is by combining fluoroscopy with and without radiographic contrast agents and TEE.

The anesthesiologist's contributions to the success of TAVI include i) administering a general endotracheal anesthetic in a patient with severe AS (although in some centers retrograde TAVI is done with MAC and fluoroscopy), ii) tailoring the perioperative medications so that tracheal extubation is facilitated at the end of procedure, iii) anticipation of procedural steps and hemodynamic changes (rapid ventricular pacing and defibrillation during valvuloplasty and prosthesis deployment being the most severe ones), iv) hemodynamic monitoring and management as in any cardiac surgical procedure, v) performing a thorough transesophageal (TEE) examination before and after TAVI as well as, during TAVI.

The procedure is performed in a "hybrid" operating room, which is a combination of angiographic suite and cardiac surgical theatre. The possibility of extensive repair or reconstruction of peripheral large arteries, aortic dissection necessitating immediate surgical repair, hemodynamic derangements, hypothermia during a long procedure and repetitive use of TEE make general endotracheal anesthetic the preferred anesthetic. The anesthetic set-up is as in any cardiac surgical case and should include invasive monitoring with peripheral arterial and central venous and pulmonary artery catheters in addition to standard ASA monitors.

The patient receives a general endotracheal anesthetic with a single lumen endotracheal tube, even if TAVI is performed via thoracotomy. Anesthetic medications are tailored towards emergence and tracheal extubation intraoperatively and a warming device (under body forced-air mattress) is used to maintain normothermia. Blood products are not ordered but red blood cells are available, to replenish any blood loss encountered during dissection of the femoral vessels and catheters placement. The anesthesiologist's role should include communication with all participating specialists (cardiologists, interventionists, surgeons, nurses, control room personnel) and ensure that vital information flow is maintained; i.e., timely administration of antibiotics and sampling of ACT and hematocrit, and that the sequence of events is known and announced to all.

There are critical points during TAVI, during which the anesthesiologist is called to participate. These are re-evaluation of the aorta and accurate measurement of the AV annulus before incision, evaluation of cardiac function before, during and after the procedure, hemodynamic management during the three periods of rapid ventricular pacing (when testing, during valvulotomy and during prosthesis deployment), evaluation of prosthesis immediately after implantation and surveillance for any potential complications (aortic dissection, heart failure, pericardial effusion). For all these tasks, integration of data from invasive monitors and TEE is mandatory.

The most hemodynamic challenges happen during and following rapid ventricular pacing and close observation of hemodynamics (and TEE) should provide information for subsequent pacing maneuvers. Proper position of the pacing wire in the right ventricle and adequate capturing is tested briefly in the beginning of the case. The speed of hemodynamic recovery will provide clues on how the patient will tolerate the subsequent pacing periods. If heart rate and rhythm and invasive pressures recover rapidly and cardiac and valvular function remains unchanged (as estimated with TEE), probably there will be no trouble during future pacing. However, it is prudent to maintain or even increase systemic afterload prior to rapid pacing, to ensure adequate diastolic coronary perfusion pressure. It is obvious, that rapid testing will cause more hemodynamic changes in the patient with aortic insufficiency; in those cases, vasoactive support with inotropes and vasodilators may be prudent. For these reasons, external defibrillation pads are applied on the patient's chest in the beginning of the case as well as, arrangements are made on who will be solely responsible for defibrilltion/pacing if neeeded.

Although in many centers a cardiologists is present and performs the TEE exam during the procedure, in others (including Weill Cornell Medical Center) two anesthesiologists share the anesthetic and hemodynamic management and perform the TEE exam. The following table displays the utility of TEE during TAVI.

TAVI is a newer technique, lacking long-term follow-up for valve performance and morbidity and mortality. In the most recently published 2-year follow-up study of 88 patients who underwent TAVI, the aortic valve area increased from 0.66±0.16 cm2 to 1.73±0.24 cm^2, and the incidence of aortic regurgitation was 17%, with the majority being posterior para-prosthetic leaks, occurring at the sites of aortic annulus calcification. Apart from acute, intraoperative mishaps (in one case series of 36 patients there were 2 acute aortic dissection and 4 deaths), the usual complications associated with surgical AVR can also occur after TAVI. These range from persistent hypotension due to acute cardiac failure induced by rapid ventricular pacing (and/or coexisting aortic insufficiency or mitral regurgitation), acute renal failure, cerebrovascular accidents (which are embolic in nature) and arrhythmias (atrio-ventricular block necessitating insertion of pacemaker). Thus far, the most frequent complication, irrespective of ante- or retrograde approach has been vascular injury, necessitating surgical repair of the femoral vessels (veins and/or arteries).

Structure	Assessment	Comment
Aortic annulus	measurement of diameter evaluation of calcification	18 - 21 mm: require a 22 mm prosthesis 22 - 25 mm: require a 26 mm prosthesis calcification is desired, as it facilitates "anchoring" of prosthesis
Aorta	evaluation of atheromas guidewire placement evaluation for dissection position of prosthesis across annulus	mobile atheromas, particularly in arch, may be a contraindication to femoral (retrograde approach) "distal" implantation may obstruct coronary ostia
Aortic valve	Aortic stenosis? Aortic insufficiency (AI)? Localize and quantitate	measure pressure gradients and aortic valve area pre- and post-insertion Severe AI during rapid ventricular pacing will dilate LV Post-implantation: mild AI is normal in posterior annulus central AI is associated with failure of implantation
Mitral valve	is there mitral regurgitation (MR)?	may be problematic during rapid ventricular pacing ("flush" pulmonary edema") should decrease after successful deployment of prosthesis new MR may be caused by too "proximal" implantation
Left ventricular function	EF, regional wall motion abnormalities (RWMA)	monitor throughout (especially if patent coronary grafts are in place); new RWMA may indicate occlusion of coronary ostium
Right ventricular function	pacing wire placement is there tricuspid regurgitation?	monitor for worsening function
pericardial space	is there new or worsening effusion?	may be caused by vessel or cardiac injury

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TRANSCATHETER AORTIC VALVE REPLACEMENT: STATE OF THE ART AND PERSPECTIVES

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Introduction: In aortic valve stenosis (AS), life expectancy after the onset of symptoms is reduced to 2 to 3 years. This disease is the most frequent valvular disease of the adult, concerning about 6% of the population above 65 years of age. The incidence increases enormously with age explaining the growing number of patients concerned with the aging population. The recognized treatment is surgical aortic valve replacement (AVR) which offers excellent short and long term results, the patients resuming normal life expectancy. The peri-operative mortality is < 6% but increases to above 10% in very old patients or in patients with coronary artery disease requiring associated by-pass surgery. It can be much higher in case of associated cardiac or non cardiac diseases (depressed myocardial contractility, lung diseases, diabetes, renal failure etc.). It is known that one third of the patients who should require AVR are not operated on because of increased surgical risk, old age or other reasons. The goal of transcatheter aortic valve implantation (TAVI) is to offer an alternative live saving treatment to these patients. The principle of TAVI consists in replacing the diseased native aortic valve using catheter based techniques.

Background: The development of this technology by our group has been a 20 years long odyssey. In 1999, we created the first models of transcatheter balloon expandable valve, using a stainless steel stent containing an equine pericardial valve. This valve was conceived to be implanted in within the aortic annulus in the subcoronary position, at a distance of the mitral valve and interventricular septum. This model was thoroughly tested in the laboratory and in the sheep model. On April 16th, we performed the first in man aortic valve implantation in a 57y-old patient who was dying from end-stage and inoperable aortic stenosis. This first case was followed in our center by two prospective studies (I-REVIVE and RECAST trials), where TAVI was performed on compassionate basis using the antegrade transseptal approach.

In 2004, Edwards Lifesciences (Irvine, California) acquired our start-up company (Percutaneous Valve Technologies) and a number of changes in the stent design and tissue valve were made (Cribier-Edwards valve, then Edwards Sapien valve made of treated bovine pericardium). Two sizes were available (23mm and 26mm in diameter) whereas the technique of retrograde transfemoral approach was made feasible by the development of specific delivery systems (RetroFlex catheter). Simultaneously, a new approach was developed, the transapical approach, where the valve is implanted directly from the apex of the left ventricle using mini invasive surgery. These two approaches covered all needs.

A number of feasibility trials were then supported by Edwards Lifesciences in Europe USA, and Canada concerning both approaches, including several hundred of patients, all at high risk for AVR or having contra-indications to surgery. These studies did demonstrate the feasibility of the procedures, offering excellent short term results with an acceptable mortality and complication rate. Symptomatic improvement of the patients was spectacular and lasting.

Current Results: Since In 2007, after CE mark and commercialization in Europe, the number of patients, centers and investigators grew up exponentially. The post-market SOURCE registry (1038 patients, 100% in database) was initiated which results at one year were presented at the last Euro PCR meeting in May 2010. The acute results are steadily improving with a success rate of > 95% with 3% stroke, 1% myocardial infarction, 7% rate of pace makers. The mortality rate at one month is 10%. The survival rate at one year is > 70%. These results are definitely promising and explain the enthusiasm currently observed in the community worldwide. The last remaining issue is the valve durability on long term which remains unknown and prevent to use the procedure in younger and less sick patients.

In USA, the PARTNER-US trial (23 centers, 1300 patients) was started in 2008 as an IDE double arm randomized study of TAVI vs surgery in high risk patients (Cohort A) and TAVI vs medical treatment (Cohort B) including balloon valvuloplasty, in non surgical patients. The main end-point is the mortality at one year. The first results will be known in October 2010 (Cohort B) and the full results in the course of 2011.

The last remarkable improvement is the new valve, the Edwards Sapien XT valve with its new NovaFlex delivery system. This new device was CE marked in May 2010 and is currently commercialized in Europe, replacing the previous Edwards Sapien Valve. The stent frame is now made of Cobalt Chromium which allows a reduction in struts diameter with the same radial force. The connection of the leaflets to the stent has been improved, offering optimal hemodynamics and potentially a better device durability. The delivery system for the transfemoral approach has been considerably refined, decreasing the introducer size by about 2mm in diameter (18 and 19F) and making the vascular access easier and safer Actually, the Edwards Sapien XT valve has all the characteristics of the Carpentier Edwards Perimount surgical valve, which long term results are considered optimal (the most used surgical valve) with > 15 years without deterioration.

Finally, in 2004 was launched a concurrent valve, the CoreValve, which mechanism of action are totally different which use a self expanding nitinol stent containing a porcine pericardium valve. The stent is anchored in the supra-coronary position in the aorta and within the aortic annulus. The valve is implanted retrogradely from the femoral artery, and via the subclavian artery in patients not suitable for the transfemoral approach. This valve offers similarly good acute results but is associated with a high rate of permanent atrio-ventricular blocks requiring permanent pacemakers in about 30% of the cases due to its low insertion below the aortic annulus level.

In 2010, about 20 000 patients have been treated worldwide with the two valves. The transfemoral approach, whenever feasible, can be performed as a stent-like procedure with the CoreValve as well as with the new Edwards Sapien XT valve (local anesthesia). The quality of training and proctoring is fundamental for the success of the procedure as the need for a selection of high volume centers and Valve Team in each center.

Perspectives: At the present time, the technique is proposed to a selected group of patients at high risk for surgery as indicated in the published Recommendations of the European Societies of Cardiology and Thoracic Surgery. The question of whether we should plan an extension of the indications to younger and less sick patients is in the air. This should be assessed on further controlled registries and randomized trials. It is too early to answer the question of future extension of indications to any patients with aortic stenosis. We definitely need more data about the durability of the device to extend TAVI to good surgical candidates.

Conclusions: In spite of unbelievable difficulties to convince people of the interest of the concept in the nineties, the innovation is now here to stay and has definitely open a new and revolutionary field in interventional cardiology. This is very well shown by the number of publications and communications on this topic in international meetings. The technique has finally the great advantage of bringing a therapeutic solution to thousand of patients that were previously left untreated.

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Aortic Aneurysms

INTRAOPERATIVE BLOOD SALVAGE

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The management of cardiac surgical patients entails a complex balance between two extreme situations anticoagulation and the restoration of normal hemostasis at the end of procedures. These two opposing processes are addressed carefully and modified with respect to preoperative disease state, duration of cardiac surgery, duration of extracorporeal circulation and the desired hemostatic outcome.

Blood conservation, blood salvaging, bloodless surgery and blood management are just some of the terms used to describe these new trends in cardiac surgery.

A number of studies involve patients undergoing cardiac operations have revealed the efficacy of blood conservation techniques.

Surgery on the thoracic aorta is considered as a very invasive procedure. Large amounts of blood transfusion are usually unavoidable. In addition, an increasing number of patients receive anticoagulants and antiplatelet drugs preoperatively and there is an increased risk if they appear for emergency surgery.

Nowadays the risk of aortic surgery has greatly improved the mortality rate is decreased and the incidence of stoke minimized. It is time to address the risks of blood transfusion with greater care than in the past.

Recent literature on intraoperative blood conservation during cardiac surgery is focused on 6 strategies.

1. **Acute Normovolemic Hemodilution (ANH):** Studies have shown that ANH is a safe and effective blood conservation method for elective procedure, even in aortic surgery, aimed at reducing allogenic blood transfusions; however several studies failed to demonstrate the efficacy of ANH.
2. **Tolerance of Anemia:** It represents the most cost – effective measure saving the exposure to allogenic blood transfusion. It is now acceptable that the decision to transfuse a patient should not be solely based on a hemoglobin or hematocrit level -the so- called transfusion trigger – but should be based on the clinical scenario and the patient's co morbidities.
3. **Cell Salvage:** Intraoperative cell salvage is shown to significantly decrease allogenic packed red blood cell usage, in addition the sell salvage did not increase the number of patients transfused with fresh frozen plasma and platelets.
4. **Antifibrinolytic Drugs:** the use of antifibrinolytic agents during aortic surgery has decreased the incidence of bleeding and mediastinal reexploration during surgery with CPB and circulatory arrest.
5. **Surgical Technique:** the core component of a successful blood conservation program includes meticulous surgical technique. Tissue or fibrin sealants and topical hemostatic agents can help to reduce surgical bleeding, but these should not be used *in lieu* of scrupulous surgical hemostasis.
6. **Point of Care Coagulation tests:** are now available and allow for the rapid, bedside assessment of the coagulation system. The goal is to avoid empiric transfusions and encourage a targeted transfusion strategy for acquired hemostatic abnormalities.

It is also well known that the use of controlled hypertensive anesthesia and maintenance of normothermia during the operation contribute to hemostasis.

In conclusion, the success of any blood conservation program in cardiac surgery requires a multidisciplinary multimodality approach throughout the perioperative period. Transfusion protocols, guidelines and clinical audit have been issued by several international organizations in order to minimize the amount of allogenic and blood products transfusions.

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COGNITIVE DYSFUNCTION AFTER OPEN HEART SURGERY

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Postoperative cognitive dysfunction is defined as the decline in a variety of neurophysiological parameters associated with memory, executive skills, concentration and speed of processing. Cardiac procedures were suspected and consequently studied for a high incidence of postoperative cognitive dysfunction which seems to occur as a complication in approximately 20%-40% of patients undergoing this type of surgery. The incidence is similar in intracardiac and CABG procedures and no significant differences have been found in the late cognitive decline when off-pump surgery was compared to procedures using extracorporeal circulation techniques.

Cerebral microembolization, cerebral or systemic inflammation, cerebral hypoperfusion, cerebral hyperthermia, cerebral edema, blood-brain barrier dysfunction, genetics and pharmacologic influences are considered as contributing factors. Although the impact of surgery and anesthesia on accelerating long term cognitive decline remains controversial, acute and intermediate decline are well-defined and affect postdischarge ability to provide self-care resulting in possibly severe adverse health outcomes. The diagnosis of postoperative cognitive dysfunction remains challenging given the lack of standardized diagnostic criteria, underestimation of the baseline cognitive status, the possibility of potential learning effects from repeated exposure to cognitive tests and lack of relevant control groups. However a variety of perioperative neurophysiologic monitoring techniques have been developed aiming to minimize neurologic injury. Epiaortic scanning, transcranial Doppler, Near-infrared reflectance Spectroscopy, Cerebral oximetry, Electroencephalogram, Quantitative electroencephalogram and Auditory evoked potentials are the main methods incorporated in a multimodality CNS monitoring designed to appropriately evaluate CNS functional status and minimize perioperative potential adverse cerebral events.

Postoperative cognitive dysfunction remains a serious concern for the anaesthesiologist faced with an ageing population presenting for cardiac surgery. There is little information on the impact of percutaneous interventional procedures althought available data support comparable longterm neurocognitive performance in patients undergoing CABG surgery with CPB and percutaneous coronary interventions.

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CEREBRAL PROTECTION DURING AORTIC ARCH SURGERY

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Presently the techniques of cerebral protection during surgery of the aortic arch can be divided into the ones that are aimed at suppressing the metabolic demand of the central nervous system and the ones that are aimed at maintaining the metabolic supply during the time of exclusion of the cerebral vascularization.

Deep Hypothermia Associated with Circulatory Arrest (DHCA): In 1975, Griepp et al. have proposed to use Deep Hypothermic Circulatory Arrest during the replacement of the aortic arch. The technique has obvious advantages. It necessitates no brachio-cephalic cannulation, and it can be used in almost any circumstances with a regular CPB circuit. Its main advantage, however, is to allow total circulatory arrest and, thus, the possibility of performing an "open" bloodless replacement of the aortic arch without cross-clamping the vessel.

Conversely this method has some worrisome drawbacks. It requires a long time to lower the patient's temperature and a longer time to raise it back to its physiological value. It has been held responsible for important coagulation and inflammatory disorders and, consequently, for a high rate of morbidity and mortality.

But the most important unresolved question is the limit of time allowed for the circulatory arrest. It is proven that after 45 minutes the risk of permanent neurologic disorders becomes significant.

Retrograde Cerebral Perfusion Through the Superior Vena Cava at Deep Hypothermia (RCP): In order to improve the protective efficacy of deep hypothermia, Ueda and al. have proposed, in 1992, the use of retrograde perfusion of oxygenated blood through the superior vena cava associated with deep hypothermia. This technique has rapidly gained a wide acceptance and has been used routinely in many centers. However, the efficiency of retrograde cerebral perfusion remains controversial either on experimental or clinical grounds.

Antegrade Selective Perfusion with Cold Blood: "Cold Blood Cerebroplegia": In order to benefit from the advantages of deep hypothermia while avoiding its drawbacks, Guilmet and our group have proposed as early as 1986, the technique of Selective Antegrade Cerebral Perfusion with cold blood (10 to 12°C) while maintaining the patient's core temperature in moderate hypothermia (25°C to 28°C).

A regular CPB circuit is modified by addition, beyond the oxygenator, of a heat exchanger usually dedicated to cold blood cardioplegia and a roller pump. By means of the heat exchanger, blood derived from the oxygenator can be cooled down to 10 to 12°C. When the rectal temperature reaches 26 to 28°C, cannulas are inserted in the innominate and left carotid arteries. The brachio-cephalic arteries are then cross-clamped, and selective cold perfusion is initiated. The main CPB is discontinued and the aortic arch opened. During circulatory arrest selective perfusion of the cerebral and coronary arteries is maintained at a flow rate of about 7 ml/min/ kg.

Selective Antegrade Cerebral Perfusion in Moderate Hypothermia: Kazui's Technique: A few years later Kazui and co-workers have proposed a similar technique in which, however, the brain perfusion and the CPB were carried out at the same level of moderate hypothermia. This method differs from the technique described by Guilmet in the temperature of the cerebral perfusate and the mode of cannulation of the supra-aortic vessels.

After cannulation and heparinization, the core temperature (naso-pharyngeal) of the patient is lowered to 25°C. This generally corresponds to rectal temperature of 28°C. When this temperature is reached, CPB is discontinued. Balloon cannulas are introduced into the innominate and left common carotid ostia. A total flow of 10 ml/kg is perfused through both cannulas. When the distal anastomosis on the aorta is completed, CPB may be resumed through a lateral branch of the aortic prosthesis. Doing so the duration of circulatory arrest in the lower part of the body is reduced to the time of the distal anastomosis.

Results: Between April 1986 and November 2009 we have used SACP associated with moderate core hypothermia (25°C.) in 249 patients, including 71 patients (27%) operated on in emergency, mainly for acute type A dissection. Sixty-six patients had already undergone one or several procedures on the thoracic aorta. In 217 patients the brain was perfused with cold blood (Guilmet's technique) and in the remaining 32 patients the brain was perfused at the core temperature (Kazui's technique). Mean duration of CPB, cerebral perfusion and distal circulatory arrest were 121 minutes (65-248), 53 minutes (15-90) and 34 minutes (10-57) respectively. The overall hospital mortality was 16% (40 pts)

(10% in elective surgery and 22% in emergency surgery). Fatal new neurologic injuries were observed in 12 patients (5%) but only in 3% patients after elective surgery. Non-lethal new neurologic disorders have been observed in 12 patients (7% of survivors) and, again, only in 3% patients operated on electively. In the 32 patients operated on according to the Kazui technique there were 2 deaths (6%) and 2 transient new neurologic disorders (6%). Emergency, age superior to 65 and extension of the aortic repair to the descending aorta were the risk factors of mortality and neurologic disorders on multivariate analysis. No correlation could be established between the duration of CPB, distal circulatory arrest and cerebral perfusion and the rate of mortality or neurologic complications.

Conclusion: Several techniques are presently available that allow the surgeon to perform the aortic repair with a fair certainty of success. Whatever the modifications described Selective Antegrade Cerebral Protection provides the cerebrum with its basic oxygen and metabolic demands and preserves the energetic components of the neurons. Clinically, perfusing the brain either with cold blood (10-12°C) or at moderate hypothermia (23 to 25°C) has proved to be equally efficacious. The safety provided by SACP during a non-limited time of arch exclusion makes it, presently, the "gold standard" in brain protection during arch surgery.

ENDOVASCULAR VERSUS OPEN SURGICAL REPAIR OF THORACIC AORTIC DISEASE: A METAREGRESSION ANALYSIS

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Background: The role of thoracic endovascular aortic repair (TEVAR) vs. open surgery remains unclear. Meta-regression guides uptake of new technologies by utilizing evidence from existing trials.

Objective: Does TEVAR reduce death and morbidity compared to open surgical repair for thoracic aortic disease?

Methods: All data from controlled trials of TEVAR vs. open repair of thoracic aortic pathologies was ascertained from medical databases plus conference abstracts up to October 2008, and combined through meta-analyses. Metaregression was performed to evaluate the impact of baseline risk factor imbalances, study design, and thoracic pathology.

Results: Forty-one studies involving 4918 patients were included [4 multiCenter (MC) studies, 46 single-Center studies (SC), 4 registries]. Characteristics were balanced except for age (TEVAR patients were average 1.3 years older than open repair patients (p=0.001)). Due to significant heterogeneity across study designs, results were analyzed by study type.

Death at 30 days was reduced for TEVAR vs. open surgery in MC trials (OR 0.24, 95%CI 0.13 to 0.44) and SC studies (OR 0.52, 95%CI 0.38 to 0.73), but did not reach significance in registries (OR 0.30, 95%CI 0.09 to 1.04). Survival differences did not persist at 1 year and 3 years. Paraplegia was reduced for TEVAR vs. open surgery in MC studies (OR 0.44, 95%CI 0.23 to 0.84) and SC studies (OR 0.46, 95%CI 0.29 to 0.74), and was insufficiently reported in registries. Stroke was reduced in MC studies (OR 0.46, 95%CI 0.25 to 0.85), but not in SC studies or registries. Arrhythmias, myocardial infarction, transfusion, renal insufficiency, and overall ischemic events were reduced for TEVAR vs. open surgery, but aortic reinterventions did not differ. Metaregression by baseline age imbalance and aortic pathology did not materially change these results. Analysis by type of stent showed non-commercial stents tended to have worse outcomes vs. commercial stents.

Conclusion: Current data suggest that TEVAR, regardless of type of pathology, reduces early death and ischemic events including stroke, paraplegia, renal insufficiency, and myocardial infarction compared with open surgery. Sustained benefits on survival have not been proven.

New Developments

EPIDEMIOLOGY OF CARDIOVASCULAR DISEASE IN EUROPE AND GREECE

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Cardiovascular disease (CVD) is one of the leading causes of death in both men and women in Greece, and is a major cause of death throughout the world. Data from the Hellenic Statistical Service suggest that the number of deaths due to CVD increased from 14,603 per 100,000 in 1971 to 31,797 per 100,000 in 2001 (i.e., a relative increase by 117%). Moreover, during 1970-1990 Greece was the only country in the context of the European Union that showed an increase in coronary heart disease (CHD) mortality, although the all-cause mortality was reduced and, as a result, life expectancy was increased. Results from the 5-year follow-up (2001-2006) of the ATTICA Study showed that the age-adjusted annual incidence of CVD was 2.2% in men and 1.2% in women. As for comparison, the annual incidence of CVD in a Japanese study (i.e., a well-known low-risk population) was 2.1%, while according to the National Health and Nutrition Examination studies the annual age-standardized CVD incidence rate in US was 2.25% in late 1990s. In the following Table the prevalence of hypertension, hypercholesterolemia, obesity, diabetes, smoking and physical inactivity, both at baseline and follow-up examinations of the ATTICA study, are presented.

As it can be seen during 2001-2006 the prevalence of hypertension, hypercholesterolemia and diabetes increased in both males and females ($p<0.01$). Specifically, there were observed 8.8 male and 10.2 female new cases with hypertension per 100 individuals (p for gender differences < 0.001), 23.7 male and 17.7 female new cases with hypercholesterolemia per 100 individuals ($p < 0.001$), and 5.8 male and 5.3 female new cases with diabetes per 100 individuals ($p < 0.001$). Prevalence of obesity reduced in males by 0.7% (p=0.66), but increased in females by 2.4% (p=0.10). However, prevalence of obesity is time dependent, thus incidence should be taken into account as a more accurate measure. In addition, the overall 5-year incidence of obesity was 21.8% in men and 11.9% in women. Physical inactivity increased in both males and females by 10.3% and 11.4%, respectively ($p<0.01$), while 30.4 per 100 males and 29.4 per 100 females that were physically active at baseline examination

became sedentary during the follow-up period. Regarding smoking habits there was a reduction in current smoking in both genders, a fact that could have been biased by the large proportion of smokers lost to follow-up examination. However, further data analysis showed that 27.5% of males and 24.5% of females stopped smoking, while 21.7% of males and 24.7% of females initiated smoking during the studied period. The aforementioned changes in the prevalence of CVD risk factors were independent from the age of the participants, meaning that an increase was observed in all age-groups.

These figures may confirm the hypothesis that Greek population is no longer a low-risk population for CVD, as it was in the 1960s. However, it should be underlined that the extrapolation of these finding in the Greek general population should be done with conscious, since the Attica region does not represent the whole area of the country. Nevertheless, the presented findings underscore the need for immediate action from public health care professionals in order to prevent the upcoming CVD epidemic that may cause serious problems to the health system and to the economy of the country.

Table. Prevalence and 5-year incidence of CVD risk factors (hypertension, hypercholesterolemia, diabetes, obesity, smoking and physical inactivity) in both baseline and follow-up examinations of the ATTICA study participants.

	Year of examination		5-year incidence
Males	2001	2006	2001-2006
Study's participants, n	1514	1044	
Prevalence (%) of:			
Hypertension	36.6	46.5	8.8 per 100
Hypercholesterolemia	39.9	57.2	23.7 per 100
Diabetes	8.0	12.8	5.8 per 100
Obesity	20.8	20.1	21.8 per 100
Smoking (current)	47.2	38.9	16.8 per 100
Physical inactivity	58.7	69.0	30.4 per 100
Females			
Study's participants, n	1528	1057	
Prevalence (%) of:			
Hypertension	23.7	34.0	10.2 per 100
Hypercholesterolemia	35.2	48.3	17.7 per 100
Diabetes	5.8	10.4	5.3 per 100
Obesity	15.9	18.3	11.9 per 100
Smoking	39.6	36.9	19.9 per 100
Physical inactivity	61.8	73.2	29.4 per 100

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MYOCARDIAL PRECONDITIONING

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The heart possesses the ability to protect itself against the consequences of ischemia. In 1986, Murry and colleagues reported for the first time that short episodes of ischemia and reperfusion before a sustained ischemic event – ischemic preconditioning – reduced infarct size. Preconditioning represents a potent and consistently reproducible method of protection against ischemia. It reduces not only infarct size but also diminishes post-ischemic cardiac dysfunction and arrhythmias. A typical feature of the phenomenon of preconditioning is that there needs to be a delay (washout period) between the preconditioning trigger and the actual ischemic event. Ischemic preconditioning typically consists of two windows of cardioprotection: an *early phase* that occurs immediately and produces a strong protection but has a limited duaration of about 2 hours, and a *late phase* or second window which occurs about 24 hours after the initial stimulus, induces less protection, but lasts for as long as 3 days.

Although the mechanisms involved in myocardial preconditioning still remain to be fully elucidated, several steps have been identified. Signaling substances trigger, through activation of receptors, several intracellular signaling pathways. These pathways mainly involve a posttranslational modification of proteins (translocation and phosphorylation). Protein kinase C plays a central role as intracellular mediator, but thyrosin kinase and mitogen-activated protein kinases are also involved. During the early phase of preconditioning, the cellular memory is believed to be related to translocation of protein kinase C from cytosol to the different cellular membranes, which results in a more rapid activation of protein kinase C during the prolonged ischemic period. Several structures have been involved as end-effectors. However, the majority of experimental findings now indicate that preservation of mitochondrial function which occurs as a consequence of mitochondrial K_{ATP} channel activation (opening) is of pivotal importance for the cardioprotective effect against ischemia. Prevention of MPTP opening is believed to have a key role in the protection offered by the preconditioning stimulus. This results in preservation of mitochondrial function during reperfusion, thereby preventing the activation of necrotic and/or apoptotic pathways. During the late phase of preconditioning, cellular memory is thought to be related to the synthesis or activation of proteins that have a cytoprotective effect, such as the induction of several anti-oxidant enzymes, or the synthesis of heat-shock proteins that are involved in the stabilization of the cytoskeleton.

Ischemic preconditioning also occurs in humans and a number of ischemic preconditioning protocols have been applied in the setting of cardiological interventions and coronary artery bypass surgery with various results. Although the clinical application of an ischemic preconditioning protocol might help to reduce the consequences of myocardial ischemia-reperfusion injury, it should be noted that rendering an already diseased myocardium transiently ischemic implies the inherent risk to further jeopardize myocardial function and cell survival.

Besides the classical stimulus of short term ischemia, there are several other stimuli that may induce a preconditioning-like effect. Aside from physical stimuli such as rapid pacing and hyperthermia, several pharmacological agents have been identified that may induce a preconditioning effect. Ischemic preconditioning can indeed be either abolished or mimicked by the use of pharmacological agents that either block or stimulate specific steps in the intracellular cascade of events. This has led to the concept of pharmacological preconditioning. However, the current available pharmacological compounds capable of inducing preconditioning in the clinical setting have serious side-effects such as occurrence of hypotension (adenosine), arrhythmias (adenosine, K_{ATP} channel openers), or possible carcinogenic effects (protein kinase activators), precluding their routine use.

Volatile anesthetics are also able to precondition the myocardium. Apart from the volatile anaesthetic agents, opioids have also been shown to exhibit a preconditioning effect. The mechanisms involved in anesthetic preconditioning strongly resemble those involved in ischemic preconditioning.

In contrast to the experimental setting, where anesthetic preconditioning consistently resulted in a protective action against posischemic myocardial dysfunction and damage, the results of clinical studies using a preconditioning protocol are less straightforward. A main drawback of transposing the experimental data on preconditioning to a clinical setting, is the necessity for a predictive well-defined period of myocardial ischemia. Cardiac surgery offers such an experimental setting, reason why all the currently available clinical knowledge is mainly based on studies in cardiac surgery patients. While some of these studies showed either biochemical or functional signs of myocardial protection with various preconditioning protocols, others failed to observe such protective actions. The possible reasons for these variable responses seem to be related to the actual preconditioning protocol used. It was indeed recently demonstrated that protective actions (lower postoperative troponin release and/or better preservation of myocardial function) were only apparent when an intermittent administration protocol was applied instead of a continuous administration. A more consistent cardioprotective was observed when the volatile anesthetic was administered throughout the entire period of cardiac surgery. In such cases a consistently reduction of postoperative troponin release and better preservation of myocardial function was observed compared to a total intravenous anesthetic regimen. In addition, recent data seem to indicate a lower incidence of perioperative myocardial infarction, in-hospital mortality, and even one-year mortality in this subset of patients when a volatile anesthetic regimen was used. These observations were primarily obtained in coronary surgery patients. Outside this setting, data are less obvious. Volatile anesthetics have been shown to exhibit protective properties in aortic valve surgery but not in mitral valve surgery. Also during percutaneous coronary interventions no protective effects have been observed.

Organ protection can also be achieved by an ischemic trigger to a tissue distant from the organ intended to be protected. This phenomenon is termed remote preconditioning. Several studies have indicated that an ischemic trigger to a limb (transient occlusion of bloodflow to the arm or the leg) was associated with less myocardial damage in the setting of cardiac surgery.

MANAGING BLEEDING WITHOUT APROTININ

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Introduction: In the majority of patients, who have cardiac surgery with cardiopulmonary bypass (CPB), native platelets, natural procoagulants and plasma inhibitors are sufficient to sustain wound clotting after heparin is neutralized by protamine. Nevertheless, CPB increases postoperative wound bleeding and the need for transfusion of blood products.

Blood losses were 27% higher in the on pump group versus off pump in a randomized controlled trial of 200 first-time CABG patients. In a meta-analysis of 52 studies mean blood losses ranged from 750-1250 mL in placebo treated cardiac surgical patients. Reoperations, complex procedures and many aortic operations with or without deep hypothermia are associated with increased postoperative bleeding. Bleeding is a frequent, adverse event during and after implantation of circulatory assist devices.

Causes of Bleeding: Blood contact with non-endothelial cell surfaces in the surgical wound and CPB circuit initiates clotting by generation of thrombin. Thus standard, unfractionated heparin, which can be reversed by protamine, is required for CPB. Heparin accelerates inactivation of thrombin, which is the enzyme that converts fibrinogen to fibrin. During CPB thrombin is generated continuously in the wound and circuit, as proved by the steady increase in prothrombin fragment F1.2. This marker is produced when prothrombinase converts α-thrombin to thrombin and peaks at the time protamine is given.

Thrombin stimulates endothelial cells to produce tissue-type plasminogen activator (t-PA), which binds fibrin and cleaves plasminogen to initiate fibrinolysis. D-dimer is a protein marker of fibrinolysis and steadily increases during cardiopulmonary bypass. The simultaneous production of thrombin and fibrinolysis is the definition of consumptive coagulopathy, which is the hallmark of disseminated intravascular coagulation. D-dimer concentrations also peak at the time protamine is given.

Thrombin is primarily generated in the surgical wound during cardiac surgery using CPB; the amount generated in the perfusion circuit is relatively small. The wound is also the primary site of extensive fibrinolysis. Tabuchi found 23.5 times more fibrin split products in the surgical wound than in simultaneous samples of perfusate. High concentrations of fibrin and fibrinogen degradation products are also present in blood shed after wound closure.

Blood contact with non endothelial cell surfaces activates platelets. During CPB platelet numbers and function decrease; bleeding

times increase; and platelet transfusions may be required when bleeding is excessive. This essay does not address the important role of platelets, but intentionally focuses on methods to control fibrinolysis to reduce postoperative bleeding.

Aprotinin and Lysine Analogs: Aprotinin and the lysine analogs, tranexamic acid (TA) and epsilon amino caproic acid (EACA), inhibit fibrinolysis by different mechanisms. In well designed, randomized studies of first time CABG operations, which are rarely associated with severe bleeding, both drugs are effective and neither is superior to the other. However, in some patients, but not all, who have re-operations, complex procedures, aortic operations or circulatory assist device implantations, neither aprotinin nor the lysine analogs satisfactorily control bleeding Both drug types reduce bleeding compared to placebo, but the belief of many surgeons that aprotinin is more effective than the lysine analogs has never been verified by a well designed study. Aprotinin is no longer available because of toxicity concerns and recently TA, but not EACA, have been connected to increases in postoperative seizures. EACA has been widely and safely used in total doses up to 30 gm and the upper limits of safe doses are not known. These events and facts prompt a reassessment of the use and merits of EACA to control postoperative fibrinolysis in patients who have cardiac surgery with CPB.

Typically, EACA is given in a loading dose before incision; is added to the pump prime; and is infused during extracorporeal perfusion in dosing schedules similar to those used for aprotinin. High concentrations of anti-fibrinolytic drugs circulate when clot formation, thrombin generation and fibrinolysis are minimal. These front loaded dosing schemes are not synchronous with the progressive generation of thrombin and plasmin during CPB and do not attempt to inhibit fibrinolysis in the wound. Several studies report reduced postoperative bleeding when either aprotinin or a lysine analog is used in the surgical wound.

Logic dictates a revision of dosing protocols to better match administration of anti-fibrinolytic drugs with the location and timing of plasmin activity. Systemic doses of EACA should be *back-loaded* and peak at the time F1.1 and D-dimer peak, which is when protamine is given and hemostasis is desired. Perhaps more important the surgical wound—the major source of fibrinolysis—should be topically and aggressively treated with EACA at the same time. Once CPB ends, the wound is the only source of fibrinolysis. However, following wound closure systemic D-dimer levels remain elevated for many hours indicating that fibrinolysis continues in the closed wound. Thus logically EACA should continue for 12 or so hours after CPB has ended.

Edmunds LH Jr. Managing fibrinolysis without aprotinin. *Ann Thorac Surg*. 2010;89:324-31.

POLYPILL FOR CVD IN 2011 - HAS ITS TIME COME?

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Wald and Law proposed the benefit of the Polypill in primary prevention of cardiovascular disease in 2003. The concept was simple and attractive. All the main component drugs (namely aspirin, statin, ACEI, B-Blocker) are available generically and therefore it is inexpensive to treat most of the CV risk factors. Combining them in one pill could reduce heart disease and stroke by 80%. This approach unsurprisingly has enormous appeal and considerable implications for global health as CVD is the leading cause of death worldwide. There are still ongoing concerns on the Polypill. Although the idea is to reduce the number of pills to be consumed, individual regimens cannot be tailored. Polypill also risks giving too few medications, or too many, in which case exposing patients to side effects otherwise could be averted. The recent TIPS study showed that individual drug components in a Polypill could fulfil their roles and was tolerable; combined pill was almost as effective as the individual pills with no increase in side effects. The major attraction of the Polypill is its simplicity and low cost, promising compliance. Such appeal could have broad applicability in areas of the world with limited access to medical treatment. Fewer consultations will be needed to initiate this pill ensuring lifelong cardiovascular prevention. Whether Polypill can reduce CHD and stroke mortality by 80% and or add 11 more event free years to everyone above 55 years as predicted by Wald and Law in 2003 remains to be seen but the initial results raise hope – especially in the Developing world, when cost and burden of disease remain a concern. In conjunction with paramount lifestyle changes the Polypill could one day substantially reduce the burden of cardiovascular disease worldwide (perhaps).

Ongoing Polypill Trials for primary and secondary prevention

Study (n=patient)	Primary/secondary prevention	No of drugs
The Indian Polypill Study (TIPS) (n=2000)	Primary	5
Red Heart Pill Pilot Study (n= 700)	Primary	4
IMPACT (n=600)	Primary	4
INDIAN Study (n=250)	Secondary	4
SPANISH study	Secondary	3

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LECTURE

EPIDEMICS IN ANTIQUITY, BYZANTIUM AND RENAISSANCE

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Infectious diseases were world wide and for many centuries the leading cause of death. As today the world becomes through global traveling and globalization a global village, infectious diseases could become by natural transmission much more threatening. Therefore the knowledge of the history of epidemics in the past becomes mandatory.

The Black Death was for example in the fourteenth century the equivalent of a nuclear war of today. In Constantinople of the year 1347 up to ten thousand persons were dying daily due to the plague. The equivalent for Athens of today would be 100,000 deaths per day and for New York 200,000 deaths daily. In the coming 10 years the plague killed in Europe 20 million persons. One third of Europe's population vanished. The equivalent for today would be 120 million dead Europeans in less than ten years. Just by these simple numbers one can imagine the insufficiency of the state infrastructures and the chaotic situation that was created. Despite the difficulty of the management of the deaths in massive graves, or throwing them into wells up to the top, or toss them into the rivers or the sea, the entire economy collapsed. It was nobody there to milk the cows, nobody to collect the wheat or even to bring water to the sick or to the tied animals.

And Black Death was not the only major epidemic. Spallpox, Typhus, Cholera, Tuberculosis, Malaria, Schistosomiasis and many others can be followed back to the prehistoric Aera.With the new gen identification methods we can nowadays identify pathogens that caused several diseases centuries ago. For example the Plague of Athens in the Peloponnesian war was recently identified as Typhus exathematicus due to Rickettsia prowazeki. The genes of the pathogen were identified in the pulpa of the teeth of dead persons on a massive grave of that time.

Although belief in religions and supernatural causes and cures of diseases was predominant among ancient people, many cultures realised that some illnesses could be transmitted or even prevented by nonreligious means. Empedocles (5th c. B.C.) turned for example with success the waters of a river into the swamps around the city of Selinunt in order to clear the region from malaria. A thanksgiving commerative coin in honour of Asklepios proves the success.

Indians and Chinese learned also very early that purposely contracting a mild case of some diseases could confer a resistance to subsequent occusences of illness. This seemed to indicate that disease could be passed from person to person without divine intervention.With a similar method and 20 years before the discovery of Jenner inoculation of small pox by a Byzantine method published in the Philosophical Transactions of London in 1714 by Pylarinos & Timonis saved Washingtons army. Washington fell with an immunised army into Philadelphia in the middle of a disastrous epidemic of small pox thus being able to liberate the USA. On a letter to the Congress he states : "Immunization of the army was a big success".

Words like isolation, passport, quarantine, Roosy place, Lazarets etc. have also their roots into epidemics.

In this lecture emphasis will be put in the early epidemics of Antiquity and Byzantium up to the Fall of Constantinople in 1453.

Thoracic Surgery Forum: What's New in Thoracic Surgery

CONGENITAL DISORDERS OF THE LUNG

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Congenital lung malformations are rare. To understand the mechanisms of these abnormalities it is necessary to have a basic knowledge of the successive stages of the embryonal development of the respiratory system (1). From complete lung agenesis to cystic lesions, these abnormalities, although rare can be a source of important morbidity and mortality in infants and children.

The majority of *non inherited congenital lung disorders* present in the form of cystic lesions in both children and adults (2).

Bronchopulmonary abnormalities are on the one spectrum of those lesions and most likely to be encountered in a thoracic surgeon's practice. Such lesions are cystic adenomatoid malformation, simple pulmonary cyst, bronchogenic cyst and congenital lobar emphysema (2,3,4,5).

Vascular pathologies are on the other spectrum, and include the arterio-venous malformations (6), while combined abnormalities involving both parenchymal and vascular elements concern the different types of sequestrations (2).

Acurate diagnosis of such lesions is difficult, despite advancements in diagnostic investigations, including prenatal ultrasound (7). In addition, as these abnormalities are rare, it is extremely difficult to determine their incidence with any degree of precision. Bronchopulmonary lesions may coexist, suggesting overlap at different stages of embryonal development, hence the importance of always seeking an anomalous blood supply to these disorders (2,8).

Indications for surgery in congenital lesions of the lung are not uniformly accepted, nevertheless symptomatic lesions require surgical excision (9). Extend of resection depends on the nature of the pathology, with lobectomy or lesser resections to be suitable treatments (9,10). The possibility of malignant differentiation should always be in mind (11,12,13).

From the *inherited disorders of the lung*, cystic fibrosis is the most common lethal recessive disease among Europeans and the most common genetic cause of infant mortality. Thus more than any other pulmonary disease of childhood has been given much attention in recent years. Cystic fibrosis is a challenge to treat but gene therapy is emerging as a more than just a theoretical possibility.Since patients with the disease have a life expectancy at approximately 30 years, it is in this setting that lung transplantation has become an alternative (14,15).

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LUNG VOLUME REDUCTION SURGERY

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Aim: Our study's objective is to present the effect that Lung volume reduction surgery (LVRS) improve dyspnea, pulmonary function,and quality of life in selected patients with severe emphysema.

Material-Method: Over 15 years (January1995-May2010), we performed lung volume reduction surgery in 20 patiens (19 men and 1 woman) in the thoracic department of hospital <<Metaxa and Sotiria (B)>>Athens-Grecce. Director Mr. Antipas.

Patients selected on the basis of severe hyperinflation with air trapping,disease heterogeneity,and pulmonary function.Spirometric inclusion criteria consisted of an FEV1 of 15-40% of predicted,residual volume(RV) in excess of 200% of predicted,total lung capacity(TLC) greater than 120% of predicted and RV:TLC ratio over 60%.

In 8 cases we performed unilateral thoracotomy,in 11 cases bilateral thoracotomy not simultaneous but after one month and in one case median sternotomy.

Functional assessment,including pulmonary function tests,room air arterial blood gas analysis,dyspnea index and 6-minute walk distance,was obtained before the operation and 6 months after the operation.

Results: There was one death from ARDS.Three patients required ventilation for longer than 24 hours.At 6 months significant improvements($p<0.001$) were seen in forced expiratory volume in 1 sec (1.02L after vs 0.73 before)and in forced vital capacity(2.74L after vs 2.14 before) .Lung volume measures,in particular residual volume,fell signigicantly.Total lung capacity(6.78L after vs 7.82 before) and residual volume (4.04L after vs 5.46 before). ($p<0.001$).

Arterial blood gas analysis revealed that carbon dioxide tension fell significantly ($p<0.001$) (38.9mmHg after vs 42.2mmHg before) and oxygen tension augment (70.2mmHg after vs 62mmHg before).

Six minute walk test results improved(959 feet after vs 754 before),and symptomatic benefit was confirmed by significant improvement in the dyspnea index.

Conclusions: In selected patiens with severe empfysema,lung volume reduction surgery offers significant improvement in pulmonary mechanics and functional impairment.

PATHOLOGY OF THE DIAPHRAGM

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The diaphragm is the major muscle of ventilation. It is a dome-shaped musculofibrons sheet that separates the thoracic cavity from the abdominal cavity.

To better understand the surgery of the diaphragm (and phrenic nerve), especially the new methods and techniques for diaphragmatic incision, we make a reference to the anatomy, embryology and pathophysiology of this muscle.

Diagnostic imaging of the diaphragm is challenging due to its thin structure and complex shape. Abnormalities that affect the diaphragm are often first detected on chest sectional imaging studies, primarily computed tomography (CT) and occasionally magnetic resonance imaging (MRI), which can depict structural defects and intrinsic and adjacent pathology in greater detail. Fluoroscopy is the primary radiologic means of evaluating diaphragm motion, although MRI and ultrasound can also image this function.

To apply new safe surgery techniques of the diaphragm, it is important to illustrate the normal appearance of it, the evaluation of abnormalities in shape, position and structure; and the role of imaging in specific conditions, including congenital and acquired hernias, diaphragm paralysis, and diaphragm masses.

Disorders of the diaphragm can be related to impairment in either of these functions, with most of them having radiologic manifestations. Both intrathoracic and intra-abdominal disease processes can alter the normal radiologic appearance of the diaphragm. Abnormalities are usually first detected on chest radiographs, often incidentally in asymptomatic patients, and many require further characterization by other imaging studies for definitive diagnosis. CT, MRI, and fluoroscopy are the most frequently useful additional studies, while ultrasound, Barium contrast studies, and liver-spleen scintigraphy are occasionally helpful. Selection of the most appropriate radiologic examination in a given clinical situation can facilitate the diagnosis of diaphragm abnormalities.

Diaphragmatic imaging is a subject that is not frequently considered in the practice of general thoracic surgery. Nonetheless, in recent years standard imaging techniques have been augmented considerably to provide superb imaging by CT and MRI. In addition, dynamic MRI enables real-time imaging of diaphragmatic function and pathology. Congenital diaphragmatic hernias are classified as: (1) posterolateral (Bochdalek), (2) retrosternal anterior (Morgagni), (3) septum transversum (central), (4) esophageal hiatal. Traditionally, newborns with CPLDH are taken to the operating room emergently after expeditions resuscitation. Neck lines should be avoided, preserving the vessels the vessels for possible ECHO. Either a transabdominal subcostal approach or a transthoracic approach is preferred by most for left-sided lesions, whereas a transthoracic approach may be more useful for right-sided hernias. Foramen of Morgagni hernias have been repaired through subcostal, paramedial, and mid-line incisions.

Eventration is a condition in which all or a portion of one hemidiaphragm is permanently elevated yet retains its continuity and normal attachments to the costal margins. This congenital anomaly has a left-side predominance with a marked decrease in muscular fibers (Wright et al, 1985). Eventration is differentiated from hernia by the unbroken continuity of the diaphragm in the former. By contrast, diaphragmatic paralysis is an acquired condition in which the diaphragm, even if somewhat atrophic, is still muscular.

Diaphragmatic paralysis is generally related to pathologic involvement of the phrenic nerve. Although different, eventration and diaphragmatic paralysis often produce the same physiologic disturbances.

It is important to distinguish eventration from diaphragmatic paralysis and choose the indicated surgery technique for both of these conditions.

Although there are few papers reporting the results of surgical plication of the diaphragm for congenital eventration, the operation can be life-saving in newborns and infants. In these cases, the indication for surgery is nearly always respiratory failure, and the results show that operative treatment should be undertaken promptly. In adults, great caution is recommended before plicating the diaphragm for acquired elevation. In these cases it is important to rule out other possible causes of dyspnea and sometimes small measures such as rehabilitation, conditioning, proper respiratory hygiene, and weigh loss lessen dyspnea and orthopnea and help avoid unnecessary surgery. If the patient has predominantly digestive symptoms, one has to be even more careful in recommending surgery before an appropriate period of observation and medical treatment.

Dr. Deslauries and his colleagues have made a significant contribution in clarifying the circumstances of diaphragmatic paralysis and eventration. They point out the severe physiologic and often life-threatening impairment of the pediatric population and the need for early diaphragmatic plication. Of greater interest to the adult thoracic surgeon is the significant improvement

that can be obtained by diaphragmatic plication in symptomatic adult patients. There is a growing literature clearly documenting improved lung function after diaphragmatic plication.

The process of breathing, though seemingly simple, requires several components, all of which must function and appropriately interact in order to achieve adequate ventilation. Included are upper and lower motor neurons, the diaphragm and other muscles of ventilation, as well as the lungs themselves. Injury or involvement of any singular component with disease may completely or permanently interfere with the process of ventilation. Selected individuals with respiratory failure, who would otherwise have been dependent on mechanical ventilation, have regained independence through diaphragm pacing.

When applied to carefully selected patients, the success of long-term phrenic nerve pacing has been shown unequivocally by patients who pace for several years without interruption. For quadriplegia patients, this diaphragm pacing represents their only source of ventilation.

However, emphasis must be placed on the importance of proper selection for pacing candidates. Patients with equivocal indications, who fail to meet the prerequisites for pacing, often fail during pacing, after having invested considerable emotional, physical and financial effort and resources. Conversely, patients with the proper indications and with adequate medical and social support may enjoy the benefits of successful pacing both in terms of quality of life, medical condition, and financial costs, and may do so for extended periods.

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GENOMICS IN CARDIOVASCULAR DISEASE

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Introduction: Cardiovascular disease (CVD), involve complex interactions between genetic (inherited susceptibility) and environmental (potentially modifiable) factors. Although the genetic factors, alone, may not be able to give a clear and direct explanation of these diseases or their underlying mechanisms, understanding them will be essential in understanding the details of CVD.

Genetic patterns of CVD involve both Mendelian and multifactorial patterns of inheritance.

Mendelian Cardiovascular Disorders: Elevated Levels of Low-Density Lipoprotein Cholesterol and Coronary Artery Disease. Low-density lipoprotein (LDL) is the major cholesterol-carrying lipoprotein in plasma and is the causal agent in many forms of coronary heart disease. Four monogenic diseases elevate plasma levels of LDL by impairing the activity of hepatic LDL receptors, which normally clear LDL from the plasma. These are, Familial hypercholesterolemia, Familial ligand-defective apolipoprotein-100, Sitosterolemia and Autosomal Recessive hypercholesterolemia.

Hypertension: Hypertension imparts an increased risk of stroke, myocardial infarction, heart failure, and renal failure; many clinical trials have shown that reductions in blood pressure reduce the incidence of stroke and myocardial infarction. Multiple environmental and genetic determinants complicate the study of blood-pressure variations in the general population. In contrast, the investigation of rare mendelian forms of blood-pressure variation in which mutations in single genes cause marked extremes in blood pressure has been very informative. These mutations, which impair renal salt handling, provide a molecular basis for understanding the pathogenesis of hypertension.

The blood-clotting system requires precise control of factors within and outside the coagulation cascade to prevent fatal bleeding or unwanted thrombosis. A common variant in the factor V gene, (Arg506Gln), prevents the degradation of factor V and promotes clot formation. This substitution, also known as factor V Leiden, has an allele frequency of 2 to 7 percent in European populations and has been observed in 20 to 50 percent of patients with venous thromboembolic disease. Factor V Leiden has incomplete penetrance and variable expression. Approximately 80 percent of persons who are homozygous for the mutation and 10 percent of those who are heterozygous will have thrombosis at some point in their lifetime. Factor V Leiden increases the risk of myocardial infarction, stroke, and venous thrombosis in men. In a subgroup of patients, thrombosis is associated with coinheritance of gene mutations that modify the factor V Leiden phenotype. Identification of gene modifiers is an area of active research and is essential for distinguishing, among persons who are heterozygous for factor V Leiden, the 10 percent in whom serious thrombosis will develop from the 90 percent who will have no symptoms.

Hypertrophic Cardiomyopathy: Familial hypertrophic cardiomyopathy is a heterogenous disorder. Approximately 35% of cases have been shown to be caused by one or more than 70 mutations in the gene encoding beta myosin heavy chain (MYH7).

Cardiac Arrhythmias: The primary arrhythmogenic disorders are caused by mutations involving ion channels. Long QT syndromes, Brugada syndrome and catecholaminergic ventricular tachycardia are distinct clinical entities that result from unique ion channel mutations.

Multifactorial Disorders: The majority of CVD including atherosclerosis and acute coronary syndrome are multifactorial processes that include inflammation, endothelial dysfunction and vascular reactivity. They result from the interactions of many genes with the environment. The genetic component of any multifactorial disease is difficult to determine. Although more than 1400 genes for approximately 1200 Mendelian traits have been identified only about 10 to 50 causative genetic variants have been identified for complex diseases. Some of the most interesting results of the genetic association studies on multifactorial diseases are the reported difference by sex, race, and ethnicity in both pathobiology of CVD and hypertension, along with response to drug treatment in these diseases. Several meta-analysis on genetic association studies have indicated significant associations between genetic variants and CVD. For example, a meta analysis conducted on 30 case control studies on the association of APO B gene showed that a variation of SpIns/Del polymorphisms significantly increased the risk of an MI and coronary artery disease. The Ins/Ins genotype has significantly higher LDL levels of cholesterol.

microRNAs in Vascular Diseases: Although multiple growth factors have been shown to regulate angiogenesis and vascular development, little is known about the complex upstream regulation of gene expression and translation. MicroRNAs (miRNAs) are an emerging class of highly conserved, non-coding small RNAs that regulate gene expression on the post-transcriptional level by inhibiting the translation of protein from mRNA or by promoting the degradation of mRNA. More than 500 human miRNAs have been identified so far, and increasing evidence indicates that miRNAs have distinct expression profiles and play crucial roles in various physiological and pathological processes such as cardiogenesis, haematopoietic lineage differentiation, and oncogenesis.

Bone Marrow-Derived Progenitor Cells In Acute Coronary Syndromes: Two hypotheses explain the role of adult progenitor cells in myocardial regeneration. Stem cell plasticity which involves mobilization of stem cells from the bone marrow and other niches, homing to the area of tissue injury and transdifferentiation into functional cardiomyocytes. Alternative hypothesis is based on the observations that bone marrow harbors a heterogenous population of cells positive for CXCR4 - receptor for chemokine SDF-1. This population of non-hematopoietic cells expresses genes specific for early muscle, myocardial and endothelial progenitor cells (EPC). These tissue-committed stem cells circulate in the peripheral blood at low numbers and can be mobilized by hematopoietic cytokines in the setting of myocardial ischemia. The significance of autologous stem cells mobilization in terms of cardiac salvage and regeneration needs to be proved in humans but it seems to be a reparative mechanism triggered early in the course of acute coronary syndromes.

Molecular and Clinical Diagnosis: Genetic diagnosis — that is, primary classification on the basis of the presence of a mutation, with subsequent stratification according to risk — is not widely available for the diagnosis of monogenic cardiovascular disorders. Today, physical examination and routine testing, such as echocardiography to detect hypertrophic cardiomyopathy or

electrocardiographic analysis of the long-QT syndrome, establish clinical diagnoses. Genetic diagnoses are then made by research-oriented genotyping of selected pedigrees. Current initiatives focus on the natural history of monogenic disorders in large numbers of patients with specific mutations, in order to identify persons at high risk for cardiovascular events, asymptomatic carriers in whom pharmacologic interventions will retard or prevent disease, and nonaffected family members whose concern about their health can be addressed. With regard to complex traits in more common cardiovascular diseases, current research is identifying functionally significant variations in DNA sequences that can establish a molecular diagnosis and influence patients' outcome.

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THORACIC ANEURYSM ENDOLUMINAL TREATMENT

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The 'Text and Colour Atlas' published by Stanley Crawford in the early eighties was considered the 'Holy Bible' for those surgeons encountered in the treatment of thoracic aortic aneurysms.

Three decade past since and with the new millennium, a revolutionary method was added in the treatment of thoracic aneurysmal disease, that of the endoluminal approach. It started for the abdominal aortic aneurysm, and continued with the thoracic ones. It is an evolving, promising method and so far the early results are encouraging.

At first glance it looks simple. You just go through one of the common femoral arteries with your introducing system all the way up the aorta to deploy your stent-graft at the proper level excluding thus the thoracic aneurysm from the general circulation.

Is it always a piece of cake, a straightforward procedure?

Baron von Moltke wrote three centuries ago 'All strategic plans cease to exist during the first three hours of the conflict.'

Our battle begins as soon as the aneurysm is diagnosed. The appropriate steps needed for a successful endoluminal approach follow later. First you need a spiral CT aortography of the thoracic abdominal aorta and iliac arteries. Detailed measurements for the aneurysm size, proximal and distal neck are needed to define exactly the landing zone of the stent-graft.

Secondly, the location of the aneurysm is crucial. Ascending aorta - aortic arch - descending aorta and a combination of those areas determine the outcome for the procedure. For the time being aneurysms located at the ascending aorta are treated only with the traditional surgical techniques. The aortic arch with these crucial arterial branches presents a challenge we face today, but we can deal with it using our new hybrid approaches (a combination of open and endovascular technique). The whole length of the aortic arch can be bypassed with an endoluminal stent-graft and simultaneous bypass grafts from the ascending aorta to the arch branches. The descending aorta can easily be managed with the deployment of the appropriate straight stent-graft.

Last but not least apart from the detailed measurements and the selection of the graft we will have to add two very crucial factors: the appropriate angiographic suite and of course the 'right stuff' consisting of a surgeon, an interventional radiologist and an anesthetist. If you take the above under consideration you can end up with a satisfactory result, meaning hospitalization, perioperative morbidity and mortality in combination with minimal invasive surgery. Endovascular and hybrid treatment of thoracic aortic aneurysms is a method with good short and mid-term results. Speaking about long term results, well it remains to be seen.

REGENERATIVE MEDICINE: DISCOVERY OF TODAY = PRATICE OF TOMORROW

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Regenerative medicine has begun to define a new perspective of future clinical practice. The U.S. Department of Health and Human Services report "2020: A new Vision" highlights that regenerative medicine is the vanguard of 21st century healthcare. Patients and society increasingly expect that regenerative medicine will lead to repair of diseased organs, injured tissues or congenital anomalies. From pioneering success with bone marrow transplants for select hematological disorders that are now standard of care, to the most recent advances in bioengineered stem cell platforms that provide unlimited sources of autologous pluripotent progenitors and broaden the scope of individualized diagnosis and therapy, National Institutes of Health and National Academies recognize regenerative medicine as a most promising core component of modern medical practice. Without the contribution of personalized products and services emerging from regenerative medicine technology, experts caution that healthcare will face an escalation in inefficient treatments and a rising global cost. Aimed on functional restoration of damaged tissues, not a mere abatement or moderation of symptoms, regenerative medicine offers a "disruptive innovation" strategy uniquely poised to add value and transform healthcare by providing tailored, curative solutions for the unmet needs of our patients.

Tissue repair nay provide a sustained therapeutic advantage in a spectrum of conditions ranging from congenital diseases to acquired, age-related pathologies. Applied in the management of cardiovascular diseases, the rapidly developing regenerative medicine armamentarium promises significant human health benefit with tangible outcomes for increased quality of life and improved patient care building on breakthroughs in stem cell biology paired with successes in transplant medicine. Maximizing potential return mandates, however, an integrated roadmap across the translational continuum of discovery-development-regulation-use to ensure optimal application of regenerative medicine algorithms in practice.

In cardiovascular medicine and surgery, a spectrum of natural stem cell sources, ranging from embryonic to adult progenitors, has been identified with unique potentials for tissue repair. The accessibility and applicability of the regenerative armamentarium has been further expanded with stem cells engineered by nuclear reprogramming. Through strategies of replacement to implant functional tissues, regeneration to transplant progenitor cells or rejuvenation to activate endogenous self-repair mechanisms, the overarching goal of cardiovascular regenerative medicine and surgery is to translate stem cell platforms into practice and achieve cures for diseases limited to palliative interventions. Harnessing the full potential of each platform will optimize matching stem cell-based biologics with the disease-specific niche environment of individual patients to maximize long-term management. Emerging discovery science with feedback from clinical translation is poised to transform medicine offering safe and effective stem cell biotherapeutics to enable personalized solutions for each patient.

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EVOLUTION OF TECHNOLOGY IN CARDIOVASCULAR MEDICINE

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Robotic technology in Cardiac Surgery has revolutionised operating for surgeons to provide less operative pain, shorter hospital stays and improved quality of life. As surgeons are constantly trying new techniques, Robotic Cardiac Surgery now encompasses mitral valve surgery, coronary revascularisation, Atrial Fibrillation Surgery, pacing lead implantation, congenital cardiac operations, cardiac tumours resection and diaphragmatic pacing. Robotic technology very gradually becoming more affordable and some Centers are investing in training surgeons in these techniques. As a result, robotic cardiac surgery has developed into a rapidly evolving speciality with exciting new possibilities within the multidisciplinary management of cardiovascular disease.

Through its application and use in all of the above procedures, robotic cardiac surgery is rapidly growing in its use and recently new bio-inspired robotic systems have been introduced. Patient quality of care is improved by less tissue trauma and the absence of sternal bleeding, offering all of the advantages of minimally invasive surgery. For the surgeon, the true 3D visualisation, tremor elimination and multi-jointed, microinstrumentation may produce excellent outcomes. Improvements in accuracy, largely through the introduction of augmented reality and perceptual docking as well as falling costs of robotic devices, will only improve techniques, promising sophisticated and innovative applications for robotics in future cardiac operations.

RISK FACTORS AND RESULTS ON REDO CABG

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Introduction: As the population ages, our increasing number of patients with previous Coronary Artery By-pass Grafting (CABG), in particular those patients where only saphenous vein grafts were used, will require subsequent myocardial revascularization. The aim of this study is to identify risk factors and evaluate the results of redo CABG.

Material-Methods: Between 1993 and 2009 a total of 6398 had a CABG. Of them 322 were re-operation using standard CPB with moderate hypothermia and with cold blood ante- and retrograte cardioplegia for myocardial protection. The ratio male/female is 23,7. Mean age of 67,8 +/- 5,3 years. The mean free interval time from the first operation was 13,9 +/- 8,6 years. Redo CABG with AVR, MVR or other combined procedures were performed on 56 patients received more than one arterial graft. In 25 (7,8%) patients endarterectomy of the LAD was required.

Results: The mortality for CABG alone was 15 out of 266 patients (5,6%) and 7 out of 56 patients (12,5%). In 55 patients (17,0%) required IABP. Incomplete revascularization in extensive CAD, prolonged CPB time, low LVEF, global ischaemia, major arrhythmia and CVA were the most significant risk factors in our study.

Conclusion: Myocardial revascularization after previous CABG appears to be safe and offers relief of symptoms and a prolonged life span. Although this operation is safe overall, incomplete revascularization, advanced age, combined operation and a decreased LVEF increase the surgical risk.

THE NEW EUROSCORE

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Cardiac surgeons are familiar with the European System for Cardiac Operative Risk Evaluation (EuroSCORE) as the world's most widely used cardiac surgical risk model1. Recently, doubt has been cast on the validity of this model, now more than ten years old, for risk assessment in the second decade of the third millennium. It is worthwhile to pause and reflect a little on where we are now in relation to risk assessment.

Why use a risk model? Risk assessment is now an essential part of cardiac surgery. The main reasons for using a risk model are to assessing the risk for the patient to evaluating the quality of care provided by the institution.

What makes a good risk model? The validation of a risk model depends on the assessment of two features: calibration and discrimination. Calibration is the accuracy of the model for predicting risk in a group of patients while discrimination refers to the model's ability to distinguish between low risk and high risk patients and is measured by a statistic called the 'area under the receiver operating characteristic (ROC) curve'. If this is 0.5, the model does not discriminate at all. Good discrimination begins at 0.7 and rarely exceeds 0.85.

It is possible for a risk model to have good calibration but poor discrimination, and vice versa. Discrimination is more important than calibration. A model can be recalibrated or adjusted as practice improves, but if the model is built on the wrong risk factors, its discrimination cannot be improved.

Calibration: EuroSCORE was first published in 1999. It is now ten years old, and is based on data that are even older. Since the introduction of EuroSCORE, there has been a quantum improvement in cardiac surgical survival which occurred in the first two to three years of the new millennium. Evidence suggests that mortality has approximately halved, despite gradual worsening of the risk profile of patients. This improvement in appears to have happened across the entire spectrum of heart operations and may have arisen out of the Hawthorne effect. Most recently published studies which were multi-institutional3,4 found overprediction to be the main problem, but there is an inherent publication bias with institutions which identify underprediction being less likely, willing or able to publish.

Discrimination: EuroSCORE remains powerful in discriminating between low-risk and high-risk patients: to this day the area under the ROC curve in many studies is around 0.8 or higher. Despite this, there are probably areas for improvement. Most notable are that the model ignores the size of the intervention in many cases, has abrupt cut-off points for some continuous variables (like pulmonary hypertension, renal function, recency of myocardial infarction and others). It also ignores hepatic disease, obesity and diabetes.

The new EuroSCORE: The time has therefore come improve and renew EuroSCORE so that it can be fit for purpose in cardiac surgery of the future. We are now embarking on a major study to update the model and to refine the risk factors and their assessment so as to improve not just calibration, but also discrimination.

We could do this in two ways. One way is to use recent data from the many databases of cardiac surgery that exist throughout the world. Another is to collect new data. Most databases are unfortunately not validated and we are not able to verify their quality. One reason for the success of EuroSCORE is that it was built on a robust and "clean" database, collected by volunteer Centers. We would like to keep that standard, and will therefore collect new data and invite all cardiac Centers worldwide to participate.

What will be different? Data collection has been made simpler. In 1995, we asked for around a hundred data points on each patient. The original risk model has already discarded most of these factors as unhelpful in risk assessment. Conversely, evidence from studies suggests that new risk factors should be added and old ones refined. This time, we asked for only around 45 data points and for the majority of patients only about 20 data points will apply. Most data are familiar to anyone who already uses EuroSCORE, with a few additions and refinements. These will be in the areas of diabetes, obesity, renal and liver function, and the weight of the proposed intervention. Data collection is online (via a dedicated website) and confidential (guaranteeing patient, Center and surgeon anonymity to all participants).

The website has been constructed and is currently being tested by pilot Centers. Once we are certain that it is both robust and user-friendly, data collection will begin (this is imminent). The exact time period for collecting data is not yet fixed, because that will depend on the number of Centers participating. The more Centers that participate, the quicker the data collection will be completed. More than 350 Centers from more than 60 countries have committed to the project, meaning that a powerful model will be built from 12 weeks' data. No additive model will be made, but the new model is expected to be either logistic or based on neural networks. At the time of writing this summary, data collection is beginning and a full update on progress will be provided.

MEASURING CARDIOVASCULAR DISEASE RISK: THE CHALLENGE OF SCORING SYSTEMS IN CARDIAC SURGERY

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The past 20 years there was an increasing interest in the development of statistical functions (models) that predict future cardiovascular disease (CVD) events at individual level (i.e., Framingham Heart Study score sheet, ESC SCORE, PROCAM etc). These models can predict absolute and relative risk based on baseline factors levels, like age, sex, clinical status, or various biological markers. Moreover, predictive scores have also been used in cardiac surgery practice. In particular, the EuroSCORE has been proposed in the late 1990s and it is in use until nowadays in many countries. It is a simple algorithm where weights for particular risk factors are added in order to give an approximate percent predicted mortality of a patient undergoing a cardiac surgery. However, this effort of measuring the risk of cardiac events or complications has so far not been very successful, since several investigators have reported large differences in the estimation of the absolute risk among different populations. In particular, predictive models that have been derived from USA or north European populations seem to overestimate by approximately 2 to 4 times the incidence of cardiovascular events in south European and Japanese populations. A potential explanation could attribute to several geographical, cultural, social, behavioral (nutritional, psychological) and genetic variations between the investigated populations, as well as to various methodological and statistical issues regarding the estimation of these predictive models.

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SPECKLE TRACKING ECHOCARDIOGRAPHY

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The echocardiographic assessment of cardiac function is one of the most important tests performed in the care of cardiac patients. Current echocardiographic methods to assess cardiac function have limitations, however. The most commonly used measure of systolic function is ejection fraction, which is based solely on volumes of the left ventricular cavity and is not a direct measure of contractility. These volumes can be significantly affected by loading conditions. Likewise, the current assessment of diastolic function using mitral inflow and annular velocities obtained by Doppler echocardiography also is affected by loading conditions, and only provides an indirect assessment of diastolic function.

In contrast, a new method called speckle tracking echocardiography has been developed to more directly and quantitatively assess cardiac systolic and diastolic function. This technique operates on the principle that each segment of tissue has a characteristic pattern of bright spots or waveforms during ultrasound imaging, which are termed speckles. These unique ultrasound speckle patterns can be tracked from frame to frame. By tracking these speckles, one can calculate the lengthening or shortening of a myocardial segment, allowing for measurement of myocardial strain or strain rate, in addition to displacement and velocity of an individual myocardial segment.

Strain is defined as the percent change in length of a myocardial segment compared to its initial length (usually defined at end diastole). The rate of change in length of the segment is defined as the strain rate. Strain and strain rate parameters of the left ventricle can be evaluated in three directions: longitudinally (shortening parallel to the long axis of the ventricle), radially (thickening perpendicular to the wall in the short axis view), and circumferentially (shortening along the circumference in the short axis view). These parameters provide quantitative regional information on the contraction or relaxation properties of an individual myocardial segment. Measurements from multiple segments can also be averaged to provide a global measure of left ventricular function. Unlike tissue Doppler derived parameters, strain and strain rate measurements obtained from speckle tracking are angle-independent, and therefore can be measured in any direction within the imaging plane. As such, these measures are well-suited to assess cardiac function in many disease processes.

Speckle tracking echocardiography has been applied to many clinical applications. Multiple studies have shown its utility in detecting abnormalities in regional myocardial contraction in patients with coronary artery disease. Speckle tracking echocardiography has also been applied to stress echocardiography, where its use is attractive because it may allow a quantitative approach that is less affected by observer subjectivity. In addition, speckle tracking echocardiography has been useful in detecting abnormalities in cardiac contraction in patients with valvular heart disease, hypertrophic cardiomyopathy, hypertensive heart disease, and congestive heart failure. It has also been used to predict outcome in patients with heart failure.

Finally, we have been developing new speckle tracking echocardiography techniques to assess diastolic function. The evaluation of diastolic function is a particularly important problem, since approximately half of all heart failure patients have preserved ejection fraction and likely have heart failure on the basis of diastolic dysfunction. Currently, there is a need for a better measure of diastolic function in order to better understand the disease, diagnose patients accurately, and develop new therapies. Using a new speckle tracking technique that utilizes the raw radiofrequency ultrasound data, we have been able to diagnose patients with diastolic dysfunction using a straightforward global strain rate measurement. This method has potential to improve our understanding of diastolic heart failure in the future.

LECTURE

PREVENTION AND REGRESSION OF MYOCARDIAL REMODELING

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Myocardial remodeling (REM) is an unfavorable process which follows any insult of the myocardium by factors and situations which compromise its integrity. Major examples are myocardial infarction but also valvular diseases, cardiomyopathy, hypertension, obesity, diabetes mellitus and others. Its main characteristic is the perpetuation of a vicious circle which involves development of dilatation and finally cardiac failure. The initial response of the myocardium to counteract these mechanisms is the hypertrophy of part or its whole. However this hypertrophy which initially is adaptive and considered as physiological, finally becomes maladaptive and pathological, leading to heart insufficiency. The remodeling myocardium regresses to the fetal phenotype in which the heavy myosin chain which predominates is myosin b versus myosin a which predominates in the adult myocardium. Moreover, ANP and BNP are overexpressed in the myocardium. Fetal myocardium is more resistant to ischemia but cannot cope sufficiently with situations of increased stress, cannot be preconditioned and is more prone to develop hypertrophy and failure.

The main modality to avoid REM is early correction such as early intervention in myocardial infarction together with cardio protection during primary angioplasty with drugs or post conditioning. Unfortunately despite these measures, 30% of patients with anterior myocardial infarctions, even after primary angioplasty, eventually develop REM. Also the correction of valvulopathies before maladaptive hypertrophy is produced. In far advanced remodeling, surgical procedures such as LVAD or Dor operations and cardiac resynchronization or the infusion of progenitor cells are being employed. However it is evident that the wider adaptication of practical pharmaceutical interventions would be the preferred approach. Here it must be mentioned that the great majority of post myocardial Infarction patients receive angiotensin converting enzyme inhibitors, angiotensin receptor blockers, b blockers, statins, and aldosterone antagonists. Other drugs considered for additional application are thyroid derivatives, valproic acid, erythropoietin, antioxidant substances such as curcumin and resveratrol, doxocyclin, AICAR, metformin. Thus the continuation of cardiac protection is cardiopreservation against cardiac remodeling and heart failure.

Interactive Video Presentations

TRANSCATHETER AORTIC VALVE IMPLANTATION FROM THE LEFT SUBCLAVIAN ARTERY TO A PATIENT WITH PREVIOUS CORONARY ARTERY BYPASS SURGERY AND LEFT INTERNAL MAMMARY TO THE LEFT ANTERIOR DESCENDING ARTERY

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Introduction: Medtronic's CoreValve system was designed to allow the implant of a replacement heart valve in patients with aortic stenosis who are at high or prohibitive surgical risk. The system enables a catheter based implant via a peripheral blood vessel, traditionally the femoral artery. A significant subset of patients, however, has compromised peripheral arteries, which prevents the use of the femoral approach. Uniquely, the delivery system of the CoreValve device is small enough to allow an alternative approach via the subclavian artery beneath the collar bone.

Case Presentation: This case describes a transcatheter aortic valve implantation, with Medronic- Core Valve self expanding valve prosthesis, in a 77 year old male with severe symptomatic (dyspnea, NYHA Class III) aortic stenosis via the left subclavian artery. This approach was considered due to lack of femoral vessel access. The patient was rejected for conventional surgical aortic valve replacement due to high risk of mortality (Logistic Euroscore 30,2%). The risk factor profile included hypertension, dyslipidemia, and diabetes and he had coronary artery bypass graft surgery before 24 years with left internal mammary (LIMA) on left anterior descending artery (LAD), and 3 venous grafts on first diagonal branch, on obtuse marginal and on right coronary artery. Transthoracic echocardiography showed a severely calcified tricuspid aortic valve with a mean gradient of 33 mm Hg, calculated valve area 0.8 cm^2 and moderate impaired left ventricular function (ejection fraction of 40%) with mild aortic regurgutation. A coronary angiogram showed patency of LIMA, occlusion of all of the saphenous vein grafts, total occlusion of the left anterior descending and right coronary arteries and severe stenosis of the obtuse marginal branches. Angiography and CT scan of iliac and femoral arteries showed severe peripheral vascular disease, with multiple stenotic areas, excessive tortuosity and calcification. With tranfemoral access not suitable for large femoral sheath placement, we evaluated the feasibility of subclavian approach. The CT scan showed mild calcification and no significant stenosis of the left subclavian artery, with a linear course and a minimal lumen diameter of 7 mm.

Therefore a valve implantation with the Medronic Core Valve system, through the left subclavian artery was planned. This was a pretty challenging case, demanding attention and gentle management of the large sheath (18 F) in order to avoid affecting the fragile LIMA causing a severe complication.

The implantation was performed under general anasthesia with intubation and mechanichal ventilation, using transesophageal echocardiography during the procedure in the catheterezation laboratorary. Cardiac surgeon exposed and isolated the left subclavian artery just bellow the subclavian bone and a homograft was placed and sutured in the artery in order to secure the vessel from dissection or rupture throughout the procedure. Following valvuloplasty of the the stenotic aortic valve with a 22 mm diameter balloon under rapid ventricular pacing, a 26 mm Core Valve prosthesis was carefully advanced and successfully deployed by fluoroscopic guidance. After successful valve positioning, angiography of the ascending aorta and left subclavian artery was performed to assess the degree of aortic regurgutation, the patency of the subclavian artery, and rule out complications such as dissection. Heparine was administered to maintain an activated clotting time of > 250 s throughout the procedure. Finally, the subclavian artery was restored by direct suture and finally subcutaneous and cutaneous tissues were sutured. The procedure lasted approximately 90 minutes.

The patient was extubated within the next hours after the procedure, remained at the hospital for the next 7 days and there was no need for pacemaker implantation. At 6 months follow up, no major adverce cardiac and celebrovascular event occurred and remains asymptomatic with good prosthesis function as assesed by echocardiographic examination.

Conclusion: The combination of unique valve design and controlled deliverability have contributed to the success of the Medtronic Core Valve system using the subclavian artery approach to patients for whom a femoral approach is not possible even in challenging situations as we described with LIMA artery to the LAD.

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IMPLANTATION OF A NEW, SUTURELESS, BIOLOGICAL AORTIC VALVE

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In the last years transcatheter aortic valve implantation has gained interest in clinical practice, especially in elderly and/or in critically ill patients considered at high risk for conventional aortic valve replacement. By Introducing such technologie, it was hypothesised that this elderly and frail population would run a lower procedural risk.

However available data demonstrate that even in experienced centers percutaneous valve implantation remains a risky procedure.

Further more, this therapeutic option is not feasible in patients with small peripheral vessels, heavily diseased aorta, low implantation of coronary arteries.

Finally concern has been raised regarding the longevity of transcatheter aortic valves due to pericardial damages after crimping on the delivery catheter.

For this type of patients a sutereless aortic valve, implantated surgically was proposed.

In this Video I would like to present you the tips and Pitfalls for the implantation of the Perceval S aortic valve, based on our experience.

The Perceval S Aortic Valve: The Perceval S prosthetic valve comprises a functional component in bovine pericardium fixed in a metal cage made from Nitinol. The cage design is characterized by two ring segments, on the proximal and distal ends, and connecting elements designed to support the valve. The functional valve component is identical to the Sorin Pericarbon bovine pericardium valve, fixed into the cage by sutures. In correspondence with each valve sinus, the Perceval S ring has three loops through which guide threads are passed to aid prosthetic positioning.

Surgical Procedure: The heart was exposed via a median sternotomy. After systemic heparinization, the patient was placed on Extra Corporeal Circulation in the usual manner. The aorta was cross-clamped and cardioplegia administered. A transverse aortotomy was made 1 cm distal to the sinotubular junction, so as to leave a free edge for closure of the aortotomy after implantation of the device.

The diseased, native aortic valve was removed and the aortic annulus decalcified. Three guiding threads were used (mono-ply 5/0) as reference for accurate alignment of the inflow section of the prosthesis with the insertion plane of the native leaflets. These threads were positioned in the lowest part of the native leaflet insertion line for each valve sinus. At the prosthesis level, each thread was passed into a slot corresponding to the median part of the prosthetic sinus.

The release device was inserted into the aorta to the point where it was blocked by pulling the previously positioned thread guides. The valve prosthesis, loaded into the delivery device, was released in two phases: first, the inflow section was opened, after which the outflow part was opened. Full release of the prosthesis was obtained only after the latter procedure.

When the prosthesis had been completely deployed the thread guides were removed. In order to optimize the area of contact between the prosthesis and the aortic annulus, a post-dilatation was performed using a balloon catheter at a pressure of 4 atmos. Aortotomie was closed by the means of a running 5-0 polypropilene suture. Associated procedures and termination of operation were then performed in a standard manner.

Results: Aortic cross- clamp and extra corporeal time was shortened compered to standart aortic remplacement procedures. No migration or dislogement of the valve occured. No severe paravalvular leaks were documented during the follow-up.

Conclusion: Our preliminary results confirms the safety and efficacy of this new sutureless biological valve. In this high-risk subset of patients, shortening of aortic cross- clamp and extra corporeal circulation times may reduce mortality and morbidity. Associated procedures are possible during the implantation of this sutureless valve and broadens the spectrum of indications for its use. Nonetheless, further experience is required to determine the potential clinical benefits of the Perceval S valve.

Critical Care Forum

PROPHYLAXIS FROM AND TREATMENT OF MULTIRESISTANT GERM-MICROEPIDEMICS; 35 YEARS OF EXPERIENCE

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In February 1981 a patient from Libya with a MRSA – Infection entered the University Hospital Zurich (USZ). As the USZ was at that time not yet well prepared for epidemics of this sort, MRSA spread around causing in less than 10 months MRSA infections in 112 patients. The mortality was at the beginning of the epidemic extremely high (8/12 pts = 66%). With concerned actions of the Infection Control Committee, the perfect collaboration of the administration by building new Intensive Care Units, isolation rooms etc, the epidemic was slowed down in 1982 (49 pts) and disappeared in 1983 (11 pts). The mortality was also lowered pretty soon down to 25% (2/8 pts) and later on to 5% (1/20).

MRSA – transmission was identified to pass from the USZ personnel to patients or family of the patient, from patient to patient, from family to patient and from patient to family and from partner to partner. The hospital reservoirs were mainly the hands and noses of carriers or the infected persons but also the inanimate surrounding. Isolation, one to one nursing, hand washing, gloves, masks, plastic-aprons etc, were the most important prophylactic measurements.

When arriving in 1993 in Greece, MRSA accounted for more than 60% of all staph. aureus isolates. By treating all personnel contaminated with MRSA, screening all new hospital members for MRSA before signing their working contract, treating the carriers with Mupiroxin and isolating all pts coming from other hospitals for 48th, the Onassis Cardiac Surgery Center with approx 1800 open heart operation per year stayed for 17 years MRSA free (0.03 %).

A *pseudomonas aeruginosa* epidemic (n=12) causing death of one heart transplant patient, in less than 48h could be eliminated by changing the flux of the drainage pipes of the hand washing sinks of one of the Operation theatres! The source of the infection was in the pipelines and the incorrect flux was bringing air bubbles into the surface of the sink, thus contaminating the hands of the OR-team.

A *Vancomycin resistant enterococcus* (VRE) epidemic (n=5) was stopped by prohibiting the use of Vancomycin up to the disappearance of the epidemic (<3 months).

Three epidemics due to Acinetobacter baumanii and Klebsiella KPC (n=22) were eliminated by cohorting the infected pts. Extreme geographical isolation of the infected pts was mandatory. Disinfection of the isolation rooms was achieved by spraying ionised H2O2 (HO-) after the end of the epidemic. It was the only way to prevent reappearance. Usual surface disinfection was not only insufficient but acinetobacter was extremely happy to grow within alcoholic solutions!

A mycological isolation of *Aspergillus* on heart valve material of three different patients - then were all operated in the same operation theatre had its cause in not changing on time the air filters of this particular OR. By changing the air filters and fiberoptic spraying of the air channels, the Aspergillus disappeared from the air of the OR and the antimycotic treatment of these three patients, that would have been treated for 6-24 months, could be stopped without consequences.

In conclusion these few examples show that in hospital epidemics often need alternative approach. To identify the source "criminalistic" methods have to be applied in order to identify the cause and to eliminate the causing source.

CDC measures are definitively mandatory but alternative thinking and approach is required.

ANTIMICROBIAL PROPHYLAXIS IN CARDIAC SURGERY

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Introduction: Antimicrobial prophylaxis in cardiac surgery has been demonstrated to decrease the incidence of postoperative infections. Infections are associated with substantial morbidity, mortality, prolonged hospital length of stay and hospital cost. During the last decades, the duration of antibiotic administration has been progressively shortened from several days to a single dose administration[1]. The choice of optimal antibiotic, the dose and the time of proper administration have been studied but there is still debate. Duration[2] of the regimen, timing[3] for preoperative administration, the antibiotic family to use, adherence to international guide lines or single institution protocols, seem to need further investigation.

Methods: *Duration:* A review article on the evolution of perioperative antimicrobial prophylaxis that include four randomized studies, comparing seven different regimens between 1980 and 1995[1]. An overview study of the Society of Thoracic Surgeons (Part I)[2] on a large group of single dose, randomized and non studies have been taken in consideration. *Antibiotic choice*: Part II of the above mentioned overview has been evaluated. *Timing*: large multicenter (29 hospitals) collaborative study that correlates the risk of surgical site infection with the timing of antibiotic administration in patents underwent cardiac, hip/knee arthroplasty and hysterectomy[3].

Results: *Duration:* 1. Single dose antibiotic prophylaxis seems to be effective in cardiac surgery but there is need for farther confirmation. It is recommended in circumstances that the surgeon consider optimal. 2. There is no doubt that resistance to antibiotic prophylaxis increases as the duration of administration increases but there is no definitive scientific evidence that it happens if this is less than 48 hours. 3. There is no advantage in order to prevent postoperative infections, if the antibiotic regimen is administered more than 48 hours. *Antibiotic choice:* Numerous publications report as antibiotic of choice a cephalosporin of first or second generation. The emergence of methicillin-resistant MRSA and coagulase-negative MRCNS led to use glycopeptides in high risk patients. *Timing:* When cephalosporin or other short infusion antibiotic had been administered within 30 min prior to incision, the infection risk was 1.6%. Earlier administration from 31 to 60 min was correlated with a higher risk of 2.4%.

Conclusions: *Duration:* There is scientific evidence that perioperative antimicrobial prophylaxis of 48 hours is effective in order to prevent postoperative infections. Regarding shorter administration of 24 hours or single dose, there is some evidence that has equal effectiveness as 48 hours but there is need of additional research in order to confirm it. Prolongation of duration above 48 hours does not seem to have additional effect in preventing postoperative infections. *Antibiotic choice:* The first choice for perioperative antimicrobial prophylaxis in non high risk cardiac surgery patients, is a cephalosporin of first or second generation as the most common microorganism involved in colonization of surgical sites, is staphylococcus. *Timing:* There is a strong relationship between the timing of short infusion antibiotic prophylaxis and the incidence of surgical site infection. A substantially lower risk occurred within the 30 minutes prior to incision.

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EMPIRICAL TREATMENT PROTOCOLS IN THE POSTOPERATIVE PERIOD

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Introduction: The incidence and severity of infections after open heart surgery increases over the last decade and influences decisively the outcome. The importance of pre-existing risk factors, the role of appropriate antimicrobial treatment, the change in epidemiologic characteristics of the patient's population are recognized as main contributors. Critically ill patients after extended surgical procedure are also at high risk for postoperative infections. The evolution of antimicrobial therapy offers a real opportunity to avoid the negative consequences of infections in the postoperative period but its correct use is uncertain in real life.

Methods: From the inception of the Onassis Cardiac Surgery ICU we have noted, in common with international trends, that the patient's mean age has increased, the women who underwent cardiac surgery are significantly more, re-operations, the severity of pathology and the incidence of co-morbidities are responsible for essential changes in the characteristics of patient's population. The postoperative infections constitute a major contributor to patient injury, mortality and health costs. Despite evidence of effectiveness of antimicrobials, the inappropriate timing, selection and excessive duration of administration of antimicrobial prophylaxis and treatment play a principal role in the deterioration of clinical situation. In the ICU after open heart surgery, infections related to procedures and to low output syndrome (LOS) are the most important with most possible incidences being the catheter related infection, the bacteraemia and the ventilator-associated tracheobronchitis (VAT). Endocarditis and mediastinitis represent severe postoperative complications with low incidence according to our experience, due to the adoption of early and apptopriate prophylaxis, hospital hygiene and treatment protocols.

Results: We suggest the early and appropriate empirical treatment protocols in the postoperative period, in patients with pre-, intra- and post-operative risk factors.

Preoperative risk factors are obesity, cardiac cahexia, precedent infection or hospitalization, diabetes mellitus with organs-targets impaired, chronic renal failure, chronic obstructive disease, pulmonary hypertension and principally heart failure with NYHA classification III or IV.

Intraoperetive risk factors constitute the urgent surgery, the long duration of extracorporeal circulation, the bleeding, the use of Left and Right Internal Mammary Artery (LIMA and RIMA) in patients with diabetes mellitus.

As postoperative risk factors we recognize multi-transfusion, metabolic acidosis due to LOS or to ischemic bowel, open chest for >24 hours, prolonged mechanical ventilation support, dependence on inotropes or high dosage of vasopressors such as norepinephrine and pitressine, the Multiple Organs Dysfunction Syndrome (MODS).

Our priority is to differentiate Sepsis from Systemic Inflammatory Reaction Syndrome (SIRS) by using the case history and unspecific clinical signs and estimating the change with time of paraclinic parameters such as C-Reactive Protein (CRP), Procalsitonine (PCT), metabolic acidosis and concentration of lactate, high temperature pattern and duration. The positive blood cultures and possibly the identification of pathogen genetic material by the use of new technology, named 'Septifast' are independent negative prognostic markers. Early focus identification by clinical, laboratory and radiologic examination is of major importance for a promising therapy, followed by immediately initiated procedures for source control and an adequate anti-infective drug therapy. The use of antimicrobial regimens with extended spectra and potent activity against both Gram-positive and Gram-negative bacterial pathogens are warranted. Anaerobes have to be treated in conditions of LOS for avoiding the abdomen related infections. Fungal infections play a great role for immunocompromized patients and antifungal prophylaxis has a place after a week to 10 days of antimicrobial treatment. Aerosolized antibiotic therapy may provide an efficacious means of treating respiratory tract infection when targeted at mechanically ventilated patients with proximal airway infection, VAT with or without ventilator-associated pneumonia (VAP) and with highly resistant organisms. Antibiotic choice and duration vary also according to the infection severity. Hospital infections due to multiple-drug-resistant (MDR) organisms are associated with poor patient outcomes and increased healthcare cost. At the local hospital level, we adopt the development of a multidisciplinary MDR control programme with the goals to optimize local surveillance of MDR organisms, improve local infection-control practices and control local antimicrobial use. In our practice:

- For Gram-positive treatment
  - We use linezolide, when we believe that respiratory tract is a possible focus

    - We prefer Daptomycine in patients with prosthetic valve or permanent pacemaker and certainly in gram-positive bacteraemia
    - Our choice is Vancomycine (continuous infusion) in patients without renal failure
- For Gram-negative treatment
    - We use piperacilline + tazobactame in all patients, except those with severe hypernatraemia or allergy. Meropeneme or Doripeneme have a role in these cases.
- In Gram-positive bacteraemia we adopt double antimicrobial regimen with rifampicin or aminoglycoside as second agent in patients without liver or renal impairment accordingly.

The empiric antimicrobial regimen is double consisting of vancomycine and piperacillin+tazobactame (empirical treatment protocol for patients undergoing coronary artery bypass grafting, CABG) or of daptomycine and piperacillin+tazobactame (empirical treatment protocol for valve replacement, VR) and starts immediately after the clinical suspicion for postoperative infection with maximal dosage for 24 hours which decreases thereafter according to renal and liver function for a period of 7 to 10 days, respectively. Addition of metronicazole is proposed for 48 to 72 hours in LOS. We adapt the antimicrobial treatment to the results of cultures and we intend to de-escalate the therapy after clinical amelioration and laboratory recertification with negative cultures and normalization of other parameters indicative of infection. The duration of antimicrobial therapy is at least 2 weeks for VAT or VAP, 4 weeks for bacteraemia related to catheters or procedures in patients with prosthetic valve or permanent pacemaker or implantable defibrillator/cardioverter, longer than 1 month in patients with endocarditis or mediastinitis. Surgical therapy is also necessary in some cases of endocarditis and mediastinitis and has to be realized in the correct period of time.

The best antimicrobial agent in these haemodynamically compromised patients remains the good left and right ventricular ejection fraction with independence from inotropic support. Otherwise, the inappropriate cardiac output predisposes and prolongs the conditions of multiple organs dysfunction and provokes the postoperative infection and sepsis.

Conclusion: Standardized treatment protocols including supportive and adjunctive therapy and the use of modern anti-infective agents may lead to a decrease in postoperative mortality and morbidity due to sepsis after cardiac surgery. The haemodynamic stabilization and improvement correlates with the efficacy of antimicrobial therapy and secures the postoperative outcome. A good prognosis is possible when treatment protocols that incorporate all known beneficial therapies and local conditions are applied in a timely fashion.

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Cardiac Anesthesia Forum

THE PAST OF CARDIAC ANESTHESIA IN GREECE

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Background & Aim: The development and evolution of cardiac surgery in Greece has followed the international trends. Greek anaesthesiologists responded with success to the evolution of a new surgical discipline in their country.

Methods: In an effort to trace the pioneers in cardiac anaesthesia in Greece the related Greek literature was reviwed and personal interviews were conducted. The history of cardiac surgery between 1950 and today was divided in four periods.

Results and Discussion: The first period between 1950 and 1965 cardiac surgery was performed by general or thoracic surgeons with an interest in cardiac surgery. The names of the first cardiac anaesthesiologists, such as Dr Iakovidou, the late Dr Kouremenos and Dr. Panagou, are rarely mentioned in the initial publications of surgical procedures performed in Athens and Salonica.

The second period between 1965 and the mid seventies is characterized mainly by valve and congenital surgery in the few state cardiac surgery departments. The most distinguished cardiac anaesthesiologists of this period are Dr Kamvyssi, Dr Papadopoulou and Dr Philipidou as well as Dr M. Patelis and Dr V. Potouridou.

The third period, when CABG surgery started in 1974, is marked by the presence of the late Dr E. Kotsonopoulos, the late Prof. Makris, Prof. D. Lappas, Prof. M. Giala, and Dr H. Tsamparlaki.

In the fourth period, since 1985 when the National Health System started and up to the present time, cardiac surgery expanded in the private as well as the state sector to reach a high standard when the Onassis Cardiac Surgery Center opened in 1993 as a special cardiac surgery Center and the University Departments of cardiac surgery were developed. Most anaesthesiologists of this period are still in practice.

Conclusion: The development of cardiac surgery in Greece owes a great debt to the dedication and conscientiousness of the first Greek anaesthesiologists, who readily responded to this new challenge.

CARDIAC ANESTHESIA: THE PRESENT

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Since 1950, the cardiac anesthesia cooperates with the cardiac surgery for more than fifty years, accompanies the current trends and all the dramatic changes in the field of anesthesia and surgery, which have occurred all over the world.

Actually *the cardiothoracic anesthesia* is a subspeciality of the medical practice of *anesthesiology* devoted to the preoperative, intraoperative, and postoperative intensive care of adult and pediatric patients undergoing cardiothoracic surgery and related invasive procedures. The responsibility of a cardiovascular and thoracic anesthetist is: a) to supervise "bypass" (or heart-lung) machine and to keep the patient "asleep", b) to monitor and to control the patient's vital signs during the operation and c) to provide organ protection such as neuroprotection, myocardial, gastrointestinal and renal protection, blood conservation strategies and port access surgery. Nowadays the expansion of the practice of fast-tract recovery after cardiac surgery, the extensive involvement of the anesthesiologist in cardiovascular monitoring and diagnosis using transesophageal echocardiography, the anesthetic management for off-pump (OPCAB) and minimal invasive (MIDCAB) coronary artery bypass graft surgery procedures, the endovascular valve and aortic surgery, and the implantation of assist device as destination therapy are just a few examples of the added new dimension to our subspecialty.

The *Cardiac Anesthetists*, today, not only provide anesthesia care for *cardiac surgery* but also they have specific role in providing anesthesia care for patients having complex cardiac disease like valvular heart disease, adult congenital heart disease, congestive heart failure etc. undergoing non-cardiac surgery. As the patients with coronary artery disease or any other cardiac disease presenting for non-cardiac surgery, they are at increase risk for serious perioperative complication including myocardial infarction, arrythmia, pulmonary edema and heart failure. The cardiac anesthetist is able to support and to give expert opinion to the junior colleagues during intraoperative *hemodynamic instability* or *cardiac arrest* by evaluating heart function with the help of TEE and advanced *hemodynamic monitoring*.

In the field of the education, these days, the information is available not only from textbooks, journals and professional meetings but also from the *Internet*, which is a pool of rapid source of information for all of us.

During the last century, at the decade of 80ies, the anesthesiologists who were involved with the cardiac anesthesia organised a committee named *European Association of Cardiothoracic Anesthesiologist* (EACTA) with the scope to be a scientific forum in Europe. The aim of the EACTA is to organize international scientific disscusions, to promote the education with related topics in the field of cardiothoracic anaesthesia, surgery, cardiology and extracorporeal circulation technologies. EACTA also promotes international exchange with all the countries in Europe and from time to time with USA, by organizing or participating in some international meeting on cardiovascular and thoracic anesthesia.

The Cardiothoracic Anesthesia and Intensive Care is a specialty which, due to its nature, is linked to many other Specialties. In recent years, EACTA has created a formal link with the European Society of Cardiology (ESC) and the branch of European Association of Echocardiography (EAE). Since the beginning of the new century, EACTA and EAE have been developing a joint program for European Accreditation in Transesophageal Echocardiograpy (TEE). Today, EACTA and EAE have developed the European examination in TEE and the consequent achievement of European Certification released by the EACTAECHO and the EUROECHO after completion of a practical training. Simultaneously, EACTA started the organization of its own ECHO course with a yearly event usually taking place in September.

Cardiac Anesthetists for all the EU countries qualified as expert at TEE after the European examination in TEE.

The *Journal of Cardiothoracic and Vascular Anesthesia* (JCVA) was published at 1987, and today is the official journal of EACTA. The JCVA is international in scope, but primarily aimed the anesthesiologists who deal with patients undergo cardiac, thoracic anad vasular surgical procedures.

In conclusion, cardiac anesthesia is an engrossing, challenging, and rewarding subspecialty of anesthesiology and progress can be seen, if we compare present with past and if all of us look forward to the future.

CARDIAC ANESTHESIA: THE FUTURE

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The last 50 years, the growth of cardiac surgery has been spectacular and its positive impact on the treatment of congenital and acquired heart disease is tremendeous. Together with the advances in surgical techniques, anesthesia has made an important evolution both with regard to anesthetic agents used as with regard to the use of all kind of monitoring devices. Thanks to these developments, the incidence of morbid and fatal outcomes that are attributable to anesthetic management is low. Yet there is still room for improvement and future directions of research and clinical improvement will include the application of organ protective strategies, the importance of maintaining body homeostasis and probably the further introduction of minimal invasive techniques.

Such technical and strategic innovations should be applied in a well-planned and effective matter since in most instances they will be associated with increased costs. Indeed, the impact and the implementation of new approaches in cardiac surgery and anesthesia will also depend on our ability to demonstrate the value of what we are doing through a thoughtful development of the evidence-based practice of anesthesia.

Cardiac Rehabilitation Forum

METHODS OF EXERCISE TRAINING IN CHF

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Exercise training is nowadays considered one of the therapeutic tools for patients with chronic heart failure (CHF). Specifically, aerobic exercise training has been shown to induce several beneficial effects in exercise capacity, neuro-hormonal axis alterations, endothelial and skeletal muscles dysfunction, to have anti-inflammatory effects and improves quality of life and survival of CHF patients.

Exercise training effects in these patients have been mainly studied by using low to moderate intensity aerobic exercise and this is the modality of exercise training that is currently recommended by the European Society of Cardiology and American Heart Association Guidelines for CHF patients.

However, alternative modalities of exercise training have been proposed in the last decade in order to maximize the beneficial effects of exercise in all types of CHF patients, including aerobic high intensity exercise training, strength training, electrical muscle stimulation, inspiratory training, dance therapy, and idrotherapy.

It is well known that exercise has dynamic effects to human organism in close relationship with adaptations developed in several organs and systems both in acute phase of exercise and in chronic exercise training programs. This dynamic character of exercise varies with intensity, duration and frequency of exercise. Based on this concept it has been proposed the application of high intensity exercise with main purpose the maximum efficacy of rehabilitation programs in healthy subjects as well as in CHF patients.

Recent studies have demonstrated that a training program at high intensity aerobic interval exercise (~90% VO_2 peak) induces a greater improvement in exercise capacity and myocardial performance rather than a program with constant exercise at a lower intensity (~50% VO_2 peak) at equal amount of work.

The main principle of interval aerobic exercise training is based on alternating periods of high intensity exercise with periods of low intensity exercise allowing the organism to replenish the energy dept and to continue the high intensity exercise by the interval modality. However, the precise exercise prescription requires a symptom-limited cardiopulmonary exercise test.

The myocardial cell plasticity and its dynamic adaptations both in acute exercise and chronic exercise training through the increase in frequency, amplitude, systole force and myocardial cell lengthening allow the activation of the mechanism Frank-Starling and thus the cardiac output increase and the peripheral tissue perfusion required during exercise.

Recent experimental studies in animals with ischemic heart failure show that a two-months of high intensity aerobic interval exercise training induces a significant reverse "remodelling" with myocardial function improvement (↓ left ventricular hypertrophy, left ventricular dilatation, ↑ contractility, diastolic function) comparing to low intensity aerobic exercise training indicating the important role of exercise intensity to maximize the efficacy of training programs.

Researchers from Scandinavia have recently applied this modality of exercise training in small groups of CHF patients, patients with coronary heart disease and with metabolic syndrome demonstrating that high intensity aerobic interval exercise training is safe and well-tolerated for all patients with significant improvement of myocardial function and functional capacity in comparison to those patients exercising at low intensity continuous training programs.

Previous studies held in our Cardiopulmonary Rehabilitation Center of the 1st Critical Care department in collaboration with the Heart Failure Unit of the 3rd Cardiology department confirm the interval training as an alternative modality of training in CHF patients. Furthermore, we have recently demonstrated that the addition of strength training at the interval aerobic training programs confers greater improvement in muscle strength, exercise capacity and endothelial function of CHF patients than interval training alone. Similar results have been previously emerged with the use of strength training in combination to continuous training indicating the significant role of strength training as a complementary additional training program in CHF patients.

Other studies have found several beneficial effects of inspiratory training in terms of exercise capacity, quality of life and inspiratory muscle strength in CHF patients, especially those with reduced maximum inspiratory muscle strength. The additional effects of inspiratory training to aerobic exercise training are still under investigation.

Interestingly, electrical muscle stimulation has been used as an alternative modality of exercise training and more specifically in a subgroup of patients with more severe CHF, unable to perform the aerobic exercise training (cycling, jogging, ecc.). Further studies are needed to validate its role in exercise prescription of CHF patients.

The promising results mainly from the first studies that have applied high intensity aerobic interval exercise training in CHF patients as well as the other alternative modalities of training (inspiratory training/electrical muscle stimulation) are of great interest and make absolutely necessary the establishment of new larger prospective studies that will control the efficacy, safety and the prognostic role of such kind of training programs in CHF.

TRAINING PATIENTS WITH VENTRICULAR ASSIST DEVICES

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Shortage of donor organs combined with efficacy of mechanical circulatory support has resulted in the expanding application of ventricular assist devices (VAD) to bridge patients to heart transplantation (HTx) or to destination therapy and in some cases to recovery [1]. A maximal benefit in aerobic capacity due to VAD support has been reported to occur at 12 weeks post-implantation [2]. However, exercise capacity was still reduced when compared to HTx or to normal predicted values [3, 4]. Mancini et al., and Foray et al., showed that peak oxygen consumption (peakVO_2) and the 6-min walking test distance in VAD recipients, respectively, were comparable to mild heart failure (HF) [5, 6] while perceived dyspnea during submaximal workloads remained similar to more severe HF [5]. Thus, the symptoms of HF may not be fully

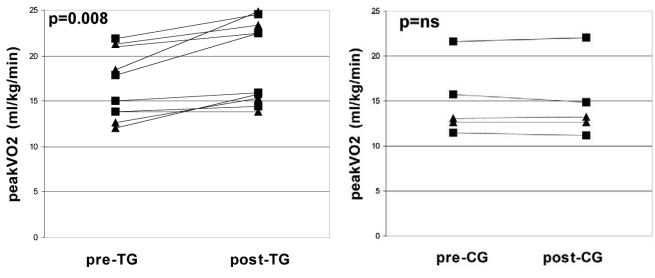
restored after VAD support. Even more, the long waiting time for HTx, or the use of VAD for permanent assisting might be associated with deterioration of functional status.

Rehabilitation has been offered to VAD recipients only during the immediate post-operative phase in which improvement may be attributed to VAD support [2] and studies investigating the potential beneficial effects of exercise training, late post-implantation and in addition to the benefits derived from mechanical circulatory support alone are lacking. It is possible that similarly to patients with HF [7] physical training could contribute to a further improvement in exercise capacity and quality of life of this population.

Recently, we investigated the physical training-induced changes in exercise tolerance, pulmonary function and quality of life in patients supported with VAD (Berlin Heart) bridged to HTx, to take over the work of the left ventricle (LVAD) or both left and right ventricles (BiVAD) and implanted 6.3±4 months before the initiation of the training program [8]. Fifteen VAD recipients of mean age 38.3±15.9 yrs, were randomized at a ratio 2/1, to a training (TG, n=10) or control group (CG, n=5). Both groups were advised to walk 30-45 min/day, while TG also underwent a 10-week combined aerobic/inspiratory muscle training program.

Baseline peakVO_2 assessed by treadmill cardiopulmonary exercise testing was 37±6% of the normal predicted value. Physical training was safe and resulted in a significant increase in peakVO_2 by 15% (19.3±4.5 vs. 16.8±3.7 ml/kg/min, p=0.008) (Fig.1), VO_2 at ventilatory threshold by 26% (p=0.01), a decrease in ventilation (VE)/carbon dioxide (CO_2) (VE/VCO_2) slope by 10% ((p=0.009) and an increase in the 6-min walking distance (p=0.005) in the TG only. Inspiratory muscle strength (Pimax, p=0.005), and endurance (sustained Pimax, p=0.005) as well as quality of life assessed by the Minnesota Living with Heart Failure questionnaire (p=0.005) were significantly improved in the same group. No significant changes were noted in the CG. Improvement in exercise capacity was independent of baseline characteristics such as age, type of VAD (LVAD or BiVAD) or classification according to Interagency Registry for Mechanically Circulatory Support (INTERMACS) scale.

In conclusion, physical training may improve the functional status of patients with ventricular assist devices late post-implantation and independent of device support. Our single-center findings may initiate larger multicenter studies in order to confirm and further investigate the benefits of exercise training in the growing population of patients with mechanical circulatory support.



(a) Training Group (b) Control Group

Figure 1. Individual values of peakVO_2, pre- and post-training in patients with VAD (LVAD [▲], BiVAD [■]) in the (a) Training group and (b) Control group. Nine out of the 10 patients in the Training Group improved their peakVO_2 with training.

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MODIFYING PSYCHOSOCIAL RISK FACTORS IN CARDIAC REHABILITATION

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Psychosocial factors that promote atherosclerosis and acute cardiac events can be divided into two general categories: emotional factors and chronic stressors. Emotional factors include affective disorders such as depression and anxiety disorders as well as anger and hostility. Chronic stressors include factors such as low social support, low socioeconomic status, work stress, marital stress and care giver strain [1].

Observational studies indicate that psychosocial risk factors strongly influence the progress of coronary artery disease. Because psychosocial risk factors are highly prevalent and are associated with unhealthy lifestyle, cardiologists may play a critical role in modifying these factors. Management approaches include routinely screening for psychosocial factors, referring patients with severe distress to behavioral/psychiatric specialists and directly treating patients with milder forms of distress with brief targeted interventions.

A number of behavioral and medical interventions (exercise training, nutritional counseling, relaxation, stress management, social support, health information) have been evaluated for their ability to reduce adverse cardiac events among patients presenting with psychosocial risk factors. Although the efficacy of psychosocial interventions alone remains unclear, however participation

in multi-factorial cardiac rehabilitation programs demonstrates a reduction in cardiac events during follow-up.

Although cardiologists are routinely advising patients on life-style behavior such as overeating and physical inactivity, they are less likely to assess and treat psychosocial risk factors due to their limited familiarity with effective strategies and recommendations. However, on one hand may be not the function of cardiologists to serve as mental health professionals, on the other hand, the strong association between psychosocial risk factors and coronary artery disease suggests that cardiologists need to be active in managing this important aspect of patient care [2,3].

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EXERCISE PRESCRIPTION IN CARDIAC PATIENTS

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Introduction: Cardiovascular disease (CVD) is the leading cause of death and a major cause of disability worldwide.[1] Heart attacks and strokes kill about 12 million people every year (7.2 million due to ischaemic heart disease and 5.5 million to cerebrovascular disease). In addition, 3.9 million people die annually from hypertensive and other heart conditions.[1] In the United States, CVD accounted for 34.4 percent of the 2.4 million deaths in 2003 and remains a major cause of health disparities and rising health care costs.[2] In 2006, health care spending and lost productivity from CVD exceeded $400 billion.[2] Cardiovascular disease is also the main cause of death in the European Union, killing over 2 million people per year and costing the EU economy over 192 billion euros annually.[3] Nevertheless, there has been major progress, especially during the last two decades, in both primary and secondary prevention, and this has resulted in significant decreases in cardiovascular morbidity and mortality rates.[4,5]

In many countries, personalised rehabilitation programmes after surgical or non-surgical myocardial reperfusion have become an important part of a multifaceted approach aimed at treating coronary artery disease and helping the patient to achieve complete social and professional rehabilitation. These programmes are based on a planned, progressive and controlled increase in physical activity, with a view to restoring the functional capacity of the circulatory system and dynamically improving the patient's physical condition.

Throughout each programme complete medical and psychological support is provided, while the patients are fully informed about both their disease and the results and benefits of long-term exercise. In addition, emphasis is placed upon the importance of modifying risk factors, such as by giving up smoking, changing dietary habits, checking blood pressure, reducing total and LDL cholesterol, etc. The exercise programme is designed individually for each patient, taking into account their history, personal characteristics, the clinical picture, and all the laboratory and test results. Cardiovascular rehabilitation programmes are usually divided into two categories or split into four stages:

Outline of Cardiac Rehabilitation Programmes 6-10:

Stage I: Early mobilisation and adaptation to exercise

- In-patient care. Strictly supervised (one to one) exercise program
- Respiratory physical therapy
- Maintenance of cardiorespiratory and muscle function at satisfactory levels.
- Initially interval and later continuous activities at a low total volume of exercise, for 10 to 20 minutes, with an intensity of 2-4 METs, and with an HR limit during effort ≤ H_{Rrest} + 30 bpm.
- Stage duration: 4 - 5 weeks

Stage II: Gradual improvement of cardiorespiratory function

- Early out-patient. Supervised exercise in rehabilitation Center
- Continuous aerobic exercise with an intensity of 4-6 METs or 60%-75% of VO_{2peak}, and an HR of 65%-80% of HR_{max} or 60%-75% of $HR_{reserve}$
- Flexibility and stretching exercises, light resistance exercises
- 20 → 35 min of exercise/session, 3 sessions/week
- Stage duration: 2 - 3 months
- Target of VO_{2peak}: 6-7 METs

Stage III: Dynamic enhancement of cardiorespiratory capacity

- Out-patient. Supervised or independent exercise in rehabilitation Center
- Continuous aerobic exercise with an intensity of 6-8 METs or 70%-80% of VO_{2peak}, and an HR of 75%-85% of HRm_{ax} or 70%-80% of $HR_{reserve}$
- Vigorous interval exercise with an intensity up to 85% of VO_{2peak}, and an HR up to 90% of HRmax or up to 85% of $HR_{reserve}$
- Flexibility and stretching exercises
- Muscle strengthening – resistance training program. 1-2 sets of 10-15 repetitions, using 8-10 upper and lower limb exercises, to moderate fatigue (up to 50-60% of MVC)
- 40 → 50 min of exercise/session, 3-4 sessions/week
- Stage duration: 3 - 4 months
- Target of VO_{2peak}: ≥ 8-9 METs

Important note: The energy expenditure should reach 300 kcal per exercise session and more than 1800-2000 kcal per week beyond the patient's usual daily activities. Thus, apart from the recommended 3-4 exercise sessions/week, additional daily exercise is needed, for example brisk walking for at least 30-40 minutes/day.

Stage IV: Long-term maintenance of physical fitness

- Long-term out-patient, independent exercise
- Continuous aerobic exercise with an intensity of 75%-85% of HR_{max},
- 70%-80% of $HR_{reserve}$ or 70%-80% of VO_{2peak}

- 30-40 min of exercise/session, 3-4 sessions/week
- Regular participation in recreation and sport activities
- Lifelong exercise

Abbreviations:
HR_{rest}: resting heart rate
HR_{max}: actual heart rate maximum
$HR_{reserve}$: heart rate reserve = (HR_{max} - HR_{rest})
MET: metabolic equivalent of the task
MVC: maximal voluntary contraction
VO_{2peak}: actual maximum O_2 uptake

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PAST, PRESENT AND FUTURE OF CARDIAC REHABILITATION

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Cardiac Rehabilitation (CR) programmes were first developed in the 1960s when the benefits of ambulation during prolonged hospitalisation for coronary events had been documented. Exercise was the primary component of these programmes. They were predominantly offered to survivors of uncomplicated myocardial infarction and initiated at a time remote from the acute event. Concern about the safety of unsupervised exercise after discharge led to the development of highly structured rehabilitation programmes that were supervised by physicians and included electrocardiographic monitoring. The safety and benefits of moderate-intensity exercise training programmes were intensively investigated in supervised programmes. More recent data clearly indicates that unsupervised or home-based programmes are also safe and effective in appropriately selected patients. Furthermore, favourable effects of exercise training have also been demonstrated in patients with large myocardial infarctions, left ventricular dysfunction and even in heart failure.

During the past three decades, changes in the delivery of rehabilitative care for cardiac patients have reflected changes in demography and characteristics of the patients, and predominantly reflect changes in clinical care. In the early years of CR, most patients enrolled in exercise training programmes were those who had recovered from uncomplicated myocardial infarction. In subsequent years, post-infarction patients with complications were also included and considered for more limited and gradual exercise rehabilitation. Many patients who currently receive rehabilitation services are recovering from CABG, PTCA or other forms of myocardial revascularization. With ageing of the population, cardiac rehabilitative care is now provided to a sizeable number of older-patients, many of whom have severe and complicated coronary illness and serious associated pathologies. Furthermore, many patients once considered to be too high risk for structured rehabilitation programmes, such as patients with residual myocardial ischemia, compensated heart failure, serious arrhythmias, and implanted cardiac devices (pacemaker, ventricular resynchronisation, ICD) currently derive benefit from more gradual and more protracted and often supervised exercise training. This is combined with education, counselling, behavioural strategies and other psychosocial interventions and vocational counselling strategies to assist the patient to achieve coronary risk reduction and other cardiovascular health-related goals.

CR is now considered a multifactorial process that includes clinical assistance and optimised therapy to relief symptoms and achieve clinical stability, exercise training, education and counselling regarding risk reduction and lifestyle changes, the use of behavioural interventions, vocational counselling, and adequate follow-up. These services are an essential component of the contemporary management of patients with multiple presentations of coronary heart disease and with heart failure and should be integrated into a long-term comprehensive care of all cardiac patients.

The progressive ageing of the population, the increasing accuracy of diagnostic procedures and the spreading use of potent cardiovascular drugs for the treatment of acute coronary syndromes and heart failure will lead to an estimated increase in the prevalence of ischemic heart disease of about 30%, even with a predicted decrease in incidence rate of 25%. The population is clearly becoming older and sicker, and the prevalence of serious comorbid conditions such as diabetes mellitus and cerebrovascular diseases among patients admitted for acute coronary syndromes is striking. The demographics of patients undergoing surgical coronary revascularization and valvular interventions are changing rapidly as well. This population is characteristically older, more commonly female, advanced in age, likely to have

three-vessel disease or abnormal LV function, comorbidity, and more complications. In addition, because of the ageing of the population, the number of patients with chronic heart failure and the health care impact of this syndrome is growing. All of these patients have a great need for cardiac care, clinical assistance, and psychosocial support after the acute phase.

Importantly, with continuing shortening of length of stay, the amount of time spent in the hospital during the acute event is no longer adequate to verify clinical stability, to perform a comprehensive risk stratification, to promote functional recovery, and to acquire the skills required to monitor exercise activity or to cover the educational material adequately. For these reasons, we see a greater need for structured residential CR programs, especially for high risk patients and those more incapacitated, to facilitate the transition to an independent life at home and the adherence to an individualised long-lasting outpatient program for clinical monitoring, lifestyle changes and effective secondary prevention.

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Nursing Forum

Nursing Management: Targeting Quality of Patient Care and Staff Satisfaction

NURSING CARE VIA PROTOCOLS

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Introduction: Clinical guidelines and care protocols are intended to provide information, based on an appraisal of the current best evidence of clinical and cost-effectiveness, regarding therapeutic interventions for given conditions. Nowadays, nursing science is undergoing a continuous and dynamic development. More specifically, the nursing education with the introduction of nursing process in the everyday clinical practice and the development of nursing research provides nursing with evidence based data. Simultaneously, the technological development along with the turn to the provision of safer and better quality care lead to a new need for more systemization, rationalism and update of nursing care.

Objectives: To explore how nurses contribute to the development, implementation and audit of protocol-based care. Protocol-based care refers to the use of documents that set standards for clinical care processes with the intent of reducing unacceptable variations in practice. Documents such as protocols, clinical guidelines and care pathways underpin evidence-based practice throughout the world. To explore and present the experience from the use of nursing protocols in the "Onassis" Cardiac Center from its onset until today was a challenge.

Methods: An interpretative systematic review of recent nursing literature was conducted. Data was obtained through CINAHL, PUBMED and Web of Science from 2000 to 2010.

Results: Most papers were descriptive, offering practitioner knowledge and positive findings about a locally developed and owned protocol-based care. The majority were instigated in response to clinical need or service re-design. The context and the multiple purposes of protocol-based care influenced the development process. Implementation and sustainability were rarely mentioned. There were notable gaps in the literature about the engagement of patients in the decision-making process and the impact of new roles on inter-professional relations. Concerning "Onassis" Cardiac Center the nursing care is protocol based. Especially in the adult and pediatric cardiosurgical intensive care unit, the whole nursing care is based on structured protocols and clinical pathways or guidelines.

Conclusions: Documents that standardize clinical care are part of the history of nursing as well as contemporary evidence-based care and expanded roles. According to our findings and our experience, nursing care via protocols is vital for the provision of safe and high quality care. Protocols offer a well structured frame for clinical use, allowing nurse's autonomy through nursing process and enhancing homogeneity of care. Extensive clinical experience and higher education is acknowledged through this process since it's a dynamic process that presupposes critical thinking and decision making.

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LECTURE

ANCIENT GREEK VOTIVES PERMITTING EXACT MEDICAL DIAGNOSIS

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Illustrations of medical subjects like illness, trauma, bleeding or therapeutic issues are generally seldom depicted on vases or votives. However in the last two decades this subject has been enlightened by M Grmek, D. Gourevitch and the speaker. They have added a lot of new knowledge to Hollaenders classical work of 1930's. Grmek and Gourevitch have focused mainly on illnesses, the speaker on traumatism. Through these two works 412 illustrations of medical subjects have been published; 27 of which are in common. At least another 100 unpublished are in the collection of the author.

Through this extensive material one can conclude that the first European illustrations of medical subjects go back to 1500 B.C. Since then votives depicting illnesses trauma or therapeutic issues can be followed through the centuries.

A big percentage of the votives were in Antiquity over-painted. Unfortunately most of these colors have vanished by the time or washed out by incorrect cleaning. This makes very often diagnosis impossible. However and in contrast to to-days votives many of these votives are depicting very naturalistic several diseases, making easy for us to establish an exact diagnosis, like: Lymphoedema, Phocomelia, Acromegaly, Alopecia, Strabismus, Exophthalmus, Morbus Claude Bernard-Horner, Torticollis, Cyphosis, Cyphoscoliosis, Morbus Recklinghausen, Hernias, Breast atrophy, Breast cancer, Mastectomy, Hand abscesses, Malformations of the extremeties like Club foot or Hexadactily, Varices, Gangrene, Bandages and many others.

Last but not least and specially from the depictions of traumatism one can conclude that most of the artists, who painted or depicted them, had extensive knowledge of anatomy, knowledge that disappeared in the centuries to come.

Heart Failure: Knowledge-Experience-Evidence

CARDIAC FAILURE PATIENTS TELEPHONE INTERVENTION PROGRAM BY SPECIALIZED TRAINED NURSE AND THE IMPACT ON THE OCCURRENCE OF PATIENT READMISSIONS AND CARDIAC MORTALITY RATE

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Introduction: Hospital readmission in chronic heart failure (HF) is often due to preventable factors, such as failure to seek prompt medical attention when symptoms worsen. A telephone intervention program by trained nurses has been found to reduce the admissions for worsening HF. We assessed the effectiveness of nurse telephone calls for patients discharged with a HF diagnosis. Primary endpoints included all cause mortality and admission to hospital for worsening HF.

Method: We prospectively studied 100 randomized outpatients with stable chronic HF (NYHA III and IV) and optimal drug treatment. The 50 patients (Team A), average age 63.8±13.8 (mean ±SD) received the telephone intervention and the other 50 patients (Team B), average age 63.4±12.0 (mean±SD) received the usual care. A liaison nurse telephoned to the Team A within seven days of hospital discharge and then at least weekly for one year.

Results: The patients in the Team B, the usual care group, were more likely to be admitted for worsening heart failure than the patients in the Team A (log-rank test, p=0.01). There were no significant differences in mortality, (5 patients) in Team A and (6 patients) in Team B with (log-rank test, p=0.804).

Conclusion: The telephone intervention program by trained nurses was effective in reducing the one of the two primary endpoints through a significant reduction in admissions to hospital for heart failure and can decrease costs and improve quality of life.

L-VAD ASSOCIATE INFECTIONS: 3 YEARS SURVEY IN A CARDIOVASCULAR HOSPITAL

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The heart is the most vital organ of the human being. For this reason, its function as well as its failure (the complex clinical syndrome that can appear as a consequence of a functional or structural abnormality of the heart that obstructs the capability of the venrtricle to fill up with or provide blood), has become the most studied subject of medicine. A way to confront heart failure is the mechanical support of the heart function. However, this solution has the problem of infection as its most important side-effect. The study of infections in patients with mechanical support of their hearts is believed to contribute to the on time prognosis and confrontation of dangerous situations and to the reduction in immortality of patients with a mechanical support of their heart, caused by infections.

Purpose: The purpose of this study is the consideration of the reasons and implications of infections that appear in patients with a mechanical operation of their hearts.

Methodology: The present study has been conducted at the Onassis Cardiosurgery Center from May 2005 up to May 2008, observing and recording the frequency of infections in 29 patients that had been previously undergone a surgery for mechanically supporting their heart function. A special protocol of recording infections (proposed by KEELPNO) has been used.

Statistical analysis: The mean values and standard deviations have been used to describe quantitavie values. Furthermore, the student's t-test has been used to compare the days of mechanical support in the hospital and in the Intensive Care Unit, depending on the existence of an infection. The Pearson correlation factor has been used for identifying the connection of the number of infections to the number of colonizations, as well as to the number of days with mechanical support. The statistical program SPSS v13.0 has been used for the analysis.

Results: 75,9% of the patients had an infection, whereas the mean number of infections was 2,6 (±2,7) with e median value of 2. The total number of infections was 74.

The mean number of infections for men was 2,6±2,8 and for women 2,5±2,1. So, no particular connection of the number of infections to the sex has been found (Student's t-test, p=0.968). Additionally, no particular connection of the number of infections to the patient's age has also been found (r=0.01, p=0.960).

The mean duration of mechanical support was 309 days (±198 days). The mean duration of hospitalization was 177,8 days (±132,4). Additionally, the mean duration of staying in the Intensive Care Unit was 52,1 days (±56,1). The most common type of infection is the operational infection. The most common microbe was *Staphylococcus epidermidis* (23,0%). The 89,7% of patients had colonization.

Conclusion: Infections are an important problem in patients that have a mechanical support of their heart and constitute a major implication of such an operation, since they appear in about 75% of the patients. Furthermore, the sex makes no difference in the probability of infection neither does the patient's age. The most probable type of infection is the iperational infection. The most common microbe is *Staphylococcus epidermidis*.

NURSES HAVE A SPECIAL GIFT . . . I SAY THIS FROM THE DEPTH OF OUR HEART

Kostas Gribilas
Athens, Greece

I am present here today to remind you that I am blessed to be amongst you all, because in my chest beats the heart of Doujon Zammit.

It is vital that we all are aware that it is not difficult for our lives to change. You do not decide, but in one moment all can change. Everything you knew up until that moment does not matter. Everything you knew up until that point does not exist and you have no choice but to deal with the unexpected.

For 30 years, I lived a so called 'normal' life, like all of you and one day, or actually one night everything changed in just one moment. In just one second all was deleted. Nothing from the

past had any value or importance. Hearing the doctors words " Heart Failure" shocked me to the core of my soul. My only option to survive was to have open heart surgery and have a technical heart placed on mine. Whilst I had the technical heart, I still endured many problems and from one moment to the next came the end of my 'normal' life. Just like that, unexpectedly, came a new heart which now beats in my chest.

251 days filled with unbearable pain, fear, desperation, queries as to what is actually happening, anger, depression, moodiness. There were also moments of happiness. Unique moments which have been engraved in my soul forever.

411 days have passed since I was first admitted at the Onassis Hospital. I have to publically admit that my cardiologist, Dr. Gouziouta was right, that when I was discharged from the hospital for the first time, she said that my 'marriage' with Onassio was a fact. I adhere all the directions I am given to follow and with God's help many years will pass before we are to be 'divorced'.

I owe not one, but a thousand thank you's to Doujon's parents. Not one, but a thousand thank you's to Dr Alivezatos and his team. Not one, but a thousand thankyou's to the nursing staff at Onassio..... To you, I owe you all individually. You are more than professionals, you are my family. I thank you all from the depths of OUR heart. -Kosta Gribilas

The Carotid Debate

CAROTID ENDARTERECTOMY AND SYNCHRONOUS CORONARY ARTERY BYPASS GRAFTING CAN BE DONE WITH LOW RISK

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Background: reports indicate that the stroke/death rates of carotid endarterectomy (CEA) plus coronary bypass (CABG) average 7.2% (3%-17.4%). Citing unacceptable results, some physicians do not advocate CEA+CABG. We have previously reported that the institutional outcomes of synchronous CEA+CABG play an important role in the decision making process, when pts with concurrent carotid and coronary diseases, seek medical advice.

Aim: to update our series of CEA+CABG and determine whether the results would justify the continuation of our policy of recommending CEA+CABG. Outcome measures were ≤30 day stroke/death rates.

Method: Data on 181 consecutive CEA+CABG, done from 1995 to 2010, were prospectively collected and retrospectively analysed. There were157 males (24 females) mean age 67 yrs. Carotid indications: 135(74.5%) asymptomatic pts (>80% stenosis) and 46(25.5%) symptomatic pts (>50% stenosis). Contralateral stenosis/occlusion was noted in 77 (42.5%) pts. CEA was done with patch in 143(79%)pts, eversion CEA in 33(18%)pts, under general anesthesia and prior to cardiopulmonary bypass. All patients received iv heparin and in 35(20%) pts, a carotid shunt was used. Cardiac indications: angina stable in 128(70%), unstable in 53(30%), 135(74.5%) had 2-3 vessel disease and 56(31%) had left main disease. Six (3.5%) pts had emergent operations and 7(4%) pts had redo operations. Mean pump time was 64±22min and mean cross-clamp time was 95±17min. Mean number of bypasses 2.8.

Results: There were 3(1.8%) ispilateral, nonfatal strokes due to carotid thrombosis in one and arhythmogenic embolism in 2 pts. Three (1.65%) deaths were due to multiple organ failure in 2 pts and respiratory failure in 1 pt. The latter pt was re-explored for wound henatoma due to carotid suture line leakage. The stroke/death rate was 3,45%.

Conclusions: 1. Synchronous CEA+CABG can be done with low risk. 2. We will continue to recommend these combined procedures to our parents. 3. In addition to citations, institutional review of CEA+CABG results is necessary before denying the patients the benefits of these synchronous procedures.

CAROTID ANGIOPLASTY AND STENTING COULD BE ALTERNATIVE TO CAROTID ENDARTERECTOMY IN PATIENTS UNDERGOING CABG SURGERY

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Background: Although there are studies reporting that carotid endarterectomy (CEA) is recommended before or concomitant to coronary artery bypass grafting (CABG) in patients with significant carotid stenosis, however controversies still exist. Carotid artery stenting (CAS) has been recently introduced as an alternative revascularization therapy in high-risk patients.

The aim of this study was to demonstrate whether CAS is safe and efficient, as an alternative treatment to carotid CEA, in candidates for CABG surgery.

Method: Fifty-two (52) patients with severe carotid and coronary artery disease were studied. The mean age was 67 years; 93% were males. Within 1 week of the CAS intervention all patients underwent CABG surgery. A brain-protection filter device was used in all CAS interventions. Balloon PTA and stenting was performed in all subjects. Adjunctive therapy with heparin was used during the procedure and clopidogrel was started immediately after cardiac surgery. Patients were assessed neurologically before and after the procedure (immediately after the CAS, at 24h, at 30 days, at 3 and 6 months). The primary end point was the incidence of TIA, stroke, or death at 30 days.

Results: Internal carotid artery lesions of >80%, were reduced by CAS to <20% in all cases, achieving a procedural success of 100%. There were no neurological complications, such as TIA and stroke, or death, up to 6 months follow-up.

Conclusion: Our results show that CAS with brain protection is feasible and safe and could be a good alternative to CEA in patients undergoing CABG surgery.

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CAN WE PREVENT VENTRICULAR REMODELING?

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How could we prevent but also enhance regression of ventricular remodeling.

It must not be forgotten that even with today's therapeutic progress a lot of hypertensive patients, with valvular heart disease and foremost myocardial infarction finally do evolve into heart failure having already undergone a step into the stage of Ventricular Remodeling. Especially after an acute anterior myocardial infarction it is estimated that 30% of patients eventually develop remodeling, despite primary angioplasty and all the big 4 families that is angiotensin converting enzyme inhibitors or ARBs, β- blockers, statins and aldosterone antagonists.

It may sound commonplace, but the best way to prevent remodeling is to intervene early. Thus hypertension should be treated as early as possible. Currently, even concentric remodeling without heart failure and probably dys-synchronization around 30% of patients with hypertension might present an early indication of impending remodeling.

Valvular heart disease must be operated earlier especially mitral regurgitation as shown by recent publications. Of course the main thrust is after myocardial infarction. We have not made enough progress of the protection of the myocardium during PCI. Fortunately post conditioning both local by deflating the balloon, a difficult process for many interventionists, or remote post conditioning holds promise. Other medications such as opioids may help in diminishing ischemia reperfusion injury although adenosine is not being widely used. A lot of medications are being currently evaluated to prevent or help regress remodeling. Some of the most prominent and clinically used ones are erythropoietin for which there are conflicting reports, metabolic drugs such as metformin, AKAR, or exenatide, valproic acid and some of the widely used antioxidants such as 4-hydroxybiopterin, curcumin, or resveratrol. No large scale human studies are available.

Another approach is the electrical – mechanical approach. Thus early application of CRT may prevent remodeling in incipient cardiac dilatation due either to cardiomyopathy or ischemic heart disease. LVAD is a last step approach, might it help, and if its application becomes easier it may be placed earlier. The injection of progenitor cells has been shown to have promise when given early in large anterior infarcts.

There is no doubt that what we need is a concerted approach of interventional medical and other techniques.

With this in mind we may be able to hope that the incidence of remodeling and ensuing heart failure will decrease.

CURRENT PHARMACOLOGICAL AGENTS FOR PREVENTION ATHEROSCLEROSIS PROGRESSION

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Increasing knowledge of the atherosclerotic process as well as atherosclerotic plaque composition and morphology has lead to the identification of vulnerable plaques that lead to acute coronary syndromes. There is growing evidence for atherosclerotic plaque regression which makes an aggressive targeted therapeutic response based on achieving plaques regression necessary in order to reduce the significant mortality and morbidity associated with coronary heart disease.

Plaque Progression: It is the rapid progression of 'vulnerable' atheromatous plaques leading to denudation of the overlying endothelium with subsequent plaque rupture and thrombotic occlusion of the coronary artery which cause acute coronary syndromes. The key determinant of the vulnerability to such rapid progression and thrombogenicity is plaque composition, whereby unstable plaques are characterised by larger lipid rich cores with high concentrations of inflammatory cells and a thin fibrous cap. More stable, plaques progress slowly and comprise of a smaller lipid core, reduced inflammatory process and a fibrous, calcified cap.

Plaque Regression: There have been many studies demonstrating plaque regression using animal models. These animal studies have subsequently been translated to human studies. It has been shown that by controlling risk factors that promote progression, atheromatous plaques can be stabilised. Therefore, it follows that a more aggressive approach with targeted therapies aimed specifically not only at the lipid pool, but also reducing endothelial damage and inhibiting the inflammatory process can potentially lead to regression. There have been a number of clinical trials demonstrating the valuable role of statins (HMG-CoA reductase inhibitors) in both primary and secondary cardiovascular prevention. The benefits of statins have been attributed not only to the potent inhibition of cholesterol biosynthesis but also due to their pleiotropic properties, which include both anti-inflammatory, anti-platelet effects and the enhancement of nitric oxide production. The ability of statins to inhibit these thrombogenic and immunosuppressive responses is crucial to plaque stabilisation and regression.

Statin Treatment and Plaque Regression: Intravascular ultrasound (IVUS) is the most frequently used technique to reliably quantify, localise and determine plaque composition. It allows good axial resolution (80μm for a 20-40MHz IVUS transducer) and three dimensional resolution of soft tissue allowing close correlation with plaque histology. However, it is limited by its invasive nature and exposure to radiation. In addition not all atheromatous plaques are amenable to IVUS interrogation. In the Reversal of Atherosclerosis with Aggressive Lipid Lowering (REVERSAL) study 502 patients with known coronary heart disease and LDL-C levels between 125-210mg/dl were recruited and randomised to receive either an intense lipid lowering therapy (atorvastatin 80mg) or a moderate therapy (pravastatin 40mg) daily for 18 months. Treatment resulted in greater reductions of LDL-C in the atorvastatin group (to 79 mg/dl vs 110mg/dl in the pravastatin group) and a significant median reduction in plaque

volume i.e. 0.4% in the Atorvastatin group. The ASTEROID trial (A study to Evaluate the Effect of Rosuvastatin on Intravascular Ultrasound-Derived Coronary Atheroma Burden) (rosuvastatin 40mg/d over a two year period) showed a significant reduction in atheroma volume (6.8%) on IVUS ($p<0.001$).

Other Therapeutic Approaches: There is growing evidence that the combination of niacin and statins may have a complementary beneficial effect on lipid profile and may have a beneficial effect in plaque regression. Recombinant Apo A-I Milano, a recombinant HDL mimetic leads to significant coronary atherosclerotic regression as measured by IVUS and may represent another interesting therapeutic option. ACE inhibitors have recently been proposed as useful agents for CAD egression. In the MORE (MultiCenter Olmesartan atherosclerosis Regression) study, hypertensive patients with carotid atherosclerosis demonstrated regression based on CIMT measurements following a two year period on Olmesartan therapy compared to atenolol, despite similar lowering of blood pressure.

Conclusions: Therapeutic agents aimed at atherosclerotic plaque regression have the potential to significantly reduce the mortality and morbidity associated with coronary heart disease. Further advancements in imaging techniques will aid the understanding of this disease process and support future advancements in regression. Whether regression actually translates to reduced clinical outcomes still needs to be determined and requires further larger scale evaluation.

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10th Cardiovascular MRI Workshop

CMR: Introduction - Main Applications In Cardiology and Cardiac Surgery

SAFETY ISSUES WHEN USING CARDIOVASCULAR MAGNETIC RESONANCE: CARDIOVASCULAR DEVICES AND CONTRAST AGENTS

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General Magnetic Resonance Safety Principles: Cardiovascular magnetic resonance (CMR) is an increasingly attractive imaging modality for the evaluation of patients with cardiovascular disease that displays important inherent safety advantages, namely its non-invasive nature and the absence of exposure to ionizing radiation, or potentially nephrotoxic iodinated contrast agents. However, there are several potential hazards associated with magnetic resonance (MR) scanning of specific cardiovascular devices and implants and the utilization of gadolinium-based MR contrast agents. The potential risks associated with MR scanning of cardiovascular devices arise from distinct mechanisms related to the exposure to the scanner's static main magnetic field, the gradient magnetic fields and the radiofrequency (RF) energy.[1-3]

The most commonly used static magnetic field strength for clinical MR scanning is 1.5 to 3 Tesla (T). The higher the static magnetic field of the MR system, the greater the resultant forces (translational attraction and torque) on ferromagnetic or weakly ferromagnetic materials. The MR environment may be unsafe for patients with certain biomedical implants or devices, primarily due to movement or dislodgment of objects made from ferromagnetic materials (ferromagnetic objects can become projectiles when introduced into the scanner area, and that could lead to significant patient injury). Furthermore, device dysfunction or damage may be caused as a result of interactions with the strong static magnetic fields. Most, but importantly not all, currently implanted cardiovascular devices are either nonferromagnetic or weakly ferromagnetic.

During MR imaging, the localization of the signals in the body is achieved by short-term spatial variations in magnetic field strength, generated by the gradient coils and termed gradient magnetic fields. These rapidly changing magnetic fields can induce electrical currents in electrically conductive devices and may directly excite peripheral nerves.

The last, but not least, MR factor related to safety is RF energy i.e. electromagnetic energy transmitted as a RF pulse from dedicated coils in order to excite the body nuclei. The primary biologic effects associated with exposure to RF energy are related to its thermogenic qualities and the consequent potential tissue heating. Besides, certain metallic devices, such as leads, can act as an "antenna" and concentrate RF energy, which leads to excessive local heating.

Before every CMR examination, all patients should undergo a thorough screening procedure for cardiovascular and other implants and devices, in the form of a questionnaire, which is completed and signed by the patient, and then should be thoroughly reviewed and cross signed by the MR technologist or physician. MR screening forms are available for download at several Web sites.

Heart Valve Prostheses: With respect to clinical MR procedures, there has never been a report of a patient incident or injury related to heart valve prostheses. Numerous prosthetic valves and annuloplasty rings have undergone testing for MR safety at magnetic field strength of 1.5 and 3 T.[2,4,5] Heating and induced currents do not appear to be problematic for these implants. Since the magnetic field–related forces exerted on prosthetic valves and annuloplasty rings are deemed minimal compared with the force exerted by the beating heart, the presence of a prosthetic heart valve or annuloplasty ring that has been formally evaluated for MR safety should not be considered a contraindication to an MR examination at 3 T or less any time after implantation.6 This includes the Starr-Edwards model Pre-6000 heart valve prosthesis, which had previously been suggested to be potentially hazardous for a patient in the MR environment. Prosthetic valves cause localised artifact but this rarely affects image interpretation. MR examination of patients with sternal suture wires is generally considered to be safe.[6]

Coronary Artery Stents: Coronary artery stents, have been evaluated in several ex vivo studies, in terms of magnetic field interactions and heating, and there do not appear to be any safety issues for these implants.[2,4] More recent ex vivo studies conducted on several of the more commonly used coronary drug-eluting stents, demonstrated a lack of ferromagnetic interactions at 3 T that would pose a risk for stent migration.[7,8] From the clinical perspective, in the light of published data,[9-12] the recommendations are for CMR to be performed at 3 T or less any time after coronary stent (including drug-eluting stents) implantation.[6] In terms of image quality, local artifact remains an issue for coronary stents, whereas the degree of in-stent stenosis cannot be assessed reliably.

Peripheral Vascular Stents, Aortic Stent Grafts, And Cardiac Closure And Occluder Devices: According to the current recommendations regarding peripheral vascular stents, aortic stent grafts, and cardiac closure and occluder devices, MR examination at 3 T or less can be performed immediately after implantation for nonferromagnetic materials, whereas for weakly ferromagnetic implants the timing of MR examination at 3 T or less should be determined on a case-by-case basis. Thus, in patients with chronic conditions in which it makes little difference whether the scan is performed at a given time or weeks later, it may be prudent to defer MR examination until ≈6 weeks after device implantation.[6]

Pacemakers and Implantable Cardioverter-Defibrillators: In regard to effects relating to clinical CMR applications, pacemakers and implantable cardioverter-defibrillators (ICDs) currently present the largest MR safety problem.[13] Potential adverse interactions

between pacemakers and MR include reed switch malfunction, asynchronous pacing, rapid atrial pacing, rapid ventricular pacing, induction of ventricular fibrillation, inhibition of pacing output, programming changes, damage to the pacemaker circuitry, battery depletion, movement of the device and lead heating. In patients with ICDs, in addition to affecting pacing function, MR environment may adversely affect tachyarrhythmia therapies. Notably, deaths associated with MR examination of patients with pacemakers/ICDs have been reported.

Recent investigations conducted using ex vivo techniques, laboratory animals, and patients demonstrated that certain "modern" (manufactured in year 2000 or later) pacemakers and ICDs with features including decreased ferromagnetic components, more sophisticated circuitry, and improved electromagnetic interference rejection capabilities, are not adversely affected by MR, especially if procedures are performed under highly specific conditions.[14-20] Of note, there are few current data on the performance of MR examination of pacemaker-dependent patients, and most of the reports in the literature refer to patients with pacemakers undergoing noncardiac MR scans.

According to the recent recommendations[6,21] for the performance of MR imaging in patients with pacemakers or ICDs, the presence of a pacemaker or ICD should still be considered a strong relative contraindication to routine MR examination. Patients who have a pacemaker or ICD should not undergo an MR study if an alternative diagnostic test is available. MR examination of non–pacemaker-dependent patients is discouraged and should only be considered in cases in which there is a strong clinical indication and in which the benefits clearly outweigh the risks. With respect to pacemaker-dependent patients and ICDs, MR examination should not be performed unless there are highly compelling circumstances and when the benefits clearly outweigh the risks. Scanning should only be performed at extremely experienced centers with expertise in MR imaging and electrophysiology, after written informed consent of the patient and under the attendance of a physician with advanced cardiovascular life support and pacemaker/ICD expertise and the involvement of a person with expertise in MR physics and safety.

Other Devices and Implants: Safety evaluation of several hemodynamic monitoring and temporary pacing devices has been carried out. Thus, patients with pulmonary artery hemodynamic monitoring/thermodilution catheters (such as the Swan-Ganz catheter) that have conductive wires should not undergo MR examinations, whereas patients with nonferromagnetic pulmonary artery catheters that contain no electrically conductive pathways in the catheter may undergo MR examination. Besides, scanning of patients with temporary transvenous pacing leads is not recommended. However, retained temporary epicardial pacing wires are believed to be MR safe.[6] Hemodynamic support devices such as intra-aortic balloon pumps, left ventricular assist devices and right ventricular assist devices, due to their high ferromagnetic material content, should be considered absolute contraindications to MR examination.[6]

It should be emphasized that when doubt remains as to the MR safety of any biomedical implant and device, consulting a more detailed source of information, such as dedicated Web sites (www.MRIsafety.com), reference manuals, or the manufacturer's product information when available, is mandatory.

Safety of Gadolinium-Based Mr Contrast Agents: Intravenously administered contrast agents are used routinely for MR examinations. The MR contrast media contain gadolinium, a particularly powerful paramagnetic metallic element, which is bound to a chelating agent. Gadolinium-based MR contrast media have been used clinically for many years. Adverse events associated with these agents typically are minor (e.g., nausea); severe effects such as allergic reactions or tissue necrosis as a result of extravasation are rare. In addition, gadolinium-containing contrast agents are believed to be less nephrotoxic than iodinated contrast agents used in radiography.[22]

Recently, there is a growing concern about the association of gadolinium-based MR contrast agent administration and a disorder named nephrogenic systemic fibrosis (NSF). NSF, formerly known as nephrogenic fibrosing dermopathy, is a systemic disorder characterized by widespread tissue fibrosis that involves predominantly the skin but also affects systemic organs such as the liver, heart, lungs, esophagus, diaphragm, and skeletal muscle. It is associated with severe physical disability and death when multisystem disease supervenes and it is known to occur only in patients with renal disease–generally in those requiring dialysis. The exact cause/trigger for NSF is still obscure. Recent literature suggests that exposure to gadolinium-based contrast media is the leading suspect. The speculative mechanism is that impaired renal excretion of gadolinium prolongs the half-life and enhances the chance for dissociation of gadolinium ions from its chelate, allowing increased tissue exposure and resulting in a fibrotic reaction. Notably, among the gadolinium chelates, gadodiamide is the agent that is most commonly associated with NSF.[23,24]

With respect to CMR safety, the association between gadolinium exposure and the development of NSF is of particular importance, since gadolinium-contrast enhanced MR studies such as MR angiography, myocardial perfusion imaging and delayed enhancement imaging for myocardial viability assessment are increasingly used in a broad spectrum of cardiovascular disease. Especially the delayed contrast-enhanced MR imaging technique currently represents the new gold standard in the identification of irreversibly damaged myocardium.[25] Therefore, the link between gadolinium and NSF obligates CMR specialists to ensure safety regarding the use of MR contrast agents in patients with advanced renal failure. Dialysis patients are clearly at risk and should avoid gadolinium exposure at all costs. It is also prudent to avoid gadolinium administration in patients with acute kidney injury and those with stage 4 chronic kidney disease (glomerular filtration rate less than 30 mL/min). If an MR study with contrast is absolutely required, then a nongadodiamide contrast agent using the lowest possible dosage is preferable.[23,24]

Conclusions: The rapidly evolving role of CMR and the proliferation of cardiovascular devices and implants require a heightened awareness by the cardiology and MR community to continually review and update their policies and procedures pertaining to clinical MR safety. Strict compliance to the current MR safety guidelines and a multidisciplinary, collaborative approach in the management of safety issues related to biomedical implants and contrast agents are necessary in order to perform safe and uneventful CMR studies.

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CARDIAC MAGNETIC RESONANCE IN THALASSEMIA

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Chronic transfusions are able to treat chronic anemia in patients with TM, but they induce significant iron load, as the human body does not have any mechanisms for excreting excess iron. Excess iron is deposited in the different organs, but susceptibility to iron-induced damage differs in between organs, with the most susceptible organs being the heart, the liver and the endocrine glands.

Inside the cardiac cells, the excess iron induces oxidant damages, resulting in lipid peroxidation, protein denaturation and DNA alteration. It also impairs myocardial contractility and normal rhythmicity, while inducing fibrotic changes in the heart.

Cardiac failure due to iron overload remains the most common cause of death in patients with transfusion-dependent thalassemia major (TM) accounting for almost ¼ of total deaths from this disease.

Cardiac function in thalassemia patients monitored conventionally remains "normal" until clinical symptoms develop with relatively high subsequent mortality. Furthermore, it is of note,

that iron-induced cardiomyopathy is reversible if intensive chelation treatment is instituted. Thus, early detection of myocardial iron overload is important.

Serum ferritin and liver iron concentration are not indicative of cardiac iron load. Quantification of myocardial iron by cardiac biopsy is challenging because of safety considerations and sampling error, partially due to the heterogeneity of iron deposition.

MRI detects iron indirectly, by the paramagnetic effects of stored iron in the form of ferritin and hemosiderin. Interaction with nearby hydrogen nuclei in tissue water produces changes in the MR signal intensity, susceptibility variability and shortens relaxation times T1, T2, and T2*. Of the different methods studied, measurement of the relaxation time T2* has become the reference method for evaluating cardiac siderosis. The technique has been adapted for acquisition in a single breath-hold, minimizing motion artifacts from myocardium. Cardiac MR T2* technique has been shown to be a highly sensitive, non-invasive modality with very good reproducibility and the advantage of shorter acquisition times.

Cardiac T2* relaxation time is inversely related to myocardial iron content, with lower T2* times representing higher myocardial iron content. Normal cardiac T2* values range from 52 ± 16 msec (applicable only to 1.5 Tesla scanners). A strong correlation between myocardial T2* values (<20 msec) and impaired left ventricular systolic and diastolic function has been shown. Patients with T2* <10 msec are at high risk for developing cardiac dysfunction.

Cardiac MR T2* is also an ideal noninvasive tool for the monitoring of the myocardial iron content and LV function during iron chelation therapy. Longitudinal data suggest that myocardial. T2* times and LV function improve in parallel in response to intensive chelation therapy. Increasing T2* times are accompanied by improvements in LVEF and abatement of heart failure.

In conclusion, as cardiac death remains the major cause of mortality in patients with TM, monitoring of cardiac iron load and cardiac function is essential in the longitudinal follow-up of thalassemic patients. Cardiac MR T2* has been shown to be a sensitive, reliable and easily-applicable technique for evaluating cardiac iron load.

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WHAT IS LGE? CLINICAL VALUE FOR THE CARDIOLOGIST

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CMR is the most reliable imaging way to detect and quantify the scar tissue, due to irreversible myocardial damage (viability study). Following acute ischemic injury, the myocardial distribution volume of extra-cellular gadolinium-based contrast agents is increased, because of the presence of sarcrolemmal rupture and abnormal wash-out kinetics. In chronic myocardial infarction, the presence of fibrotic tissue increases the distribution volume of the contrast agents. The resulting differences in contrast distribution between normal and injured myocardium can be delineated using T1-sensitive inversion-recovery CMR sequence. Imaging within the first few minutes after contrast administration is the method of choice to delineate microvascular obstruction (MVO), which prevents contrast delivery to the infarct core and thus results in low signal on T1- weighted imaging (1). Acutely injured and chronically infarcted tissue without MVO retains contrast agent and therefore appears bright (bright is dead in these type of images) (2-3). The preferred imaging time for scar detection is between 10 and 20 minutes after contrast agent administration, when the differences between scar, normal myocardium and blood pool are maximal. This method is referred to in the literature variably as late gadolinium enhanced CMR (the currently preferred term), late contrast enhanced, delayed contrast-enhanced or hyperenhancement CMR. It has become the reference standard for the in vivo assessment of myocardial viability because of its very high spatial definition and high contrast to normal myocardium, which allows a detailed assessment of the spatial distribution of scar. Because of its high spatial resolution late gadolinium enhanced CMR can detect infarction in as little as 1ml of tissue, substantially less than other in vivo methods. The technique has been extensively validated in animal models showing excellent agreement with histology and has been applied in numerous recent human studies (1-4). It is also of special value the detection of the right ventricle (RV) infarction. RV function is difficult to be assessed reliably with most imaging modalities, while it is extremely easy to CMR cine imaging. RV infarction can be detected by late gadolinium enhancement and the extent of scar tissue is linearly related to the severity of RV dilatation at 6 months followup (5). Kumar et al. found in 37 patients that acute RV infarction is more frequently detected by late gadolinium enhancement than by ECG and echocardiography (6). Finally, Larose et al. have shown that RV ejection fraction measured by CMR is an important predictor of prognosis afterAMI (7). In 147 consecutive patients studied late after MI, RVEF <40% was strongly associated with mortality (hazard ratio 4.02), independent of patient age, LV infarct size and LVEF (7). It is also of special value, that CMR is more sensitive in detecting subendocardial myocardial infarction than SPECT or PET. LGE is the most reliable index to detect myocardial necrosis both in acute and chronic CAD and the extent of scar on CMR predicts the potential for functional recovery after revascularisation (8-12). Recently the application of LGE for the detection of myocardial necrosis has been descridbed in vasculitis and other autoimmune diseases (13, 17).

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CMR In Diabetes – Cardiac Involvement in Diabetes. CMR Evaluation

STRESS CMR IN DIABETES

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Diabetes mellitus is one of the well established risk factors for coronary artery disease. Indeed, diabetic patients may develop myocardial ischaemia at stress due to either epicardial coronary stenoses or microvascular dysfunction. Cardiovascular Magnetic Resonance (CMR) using the cine and late gadolinium enhancement techniques provides a comprehensive assessment of regional/global ventricular function and viability.[1] Furthermore, CMR can be used to identify the presence of ischaemia in these patients using either vasodilators such as adenosine and dypiridamole to assess perfusion or dobutamine to assess regional wall motion.

Dobutamine stress CMR (DSCMR) is performed in a manner analogous to dobutamine stress echo[2]. Dobutamine is infused intravenously during 3-minute stages at dosages of 10, 20, 30 and 40 μg/kg/min. If the target heart rate [(220-age) x 0.85] is not reached, additional atropine doses are administered (maximal dose 1.0 mg i.v.). At each stress level, 3 short-axis (basal, mid-equatorial and apical) and 3 long axis (2-, 3-, 4-chamber view) cines are acquired. These are compared to the rest cine images (which were acquired before dobutamine) for evidence of new or worsened wall motion abnormalities. A pathologic response is characterised by stress-induced wall motion abnormalities (hypokinesis, akinesis, or dyskinesis) in at least one segment that was graded normal at rest. The diagnostic accuracy of DSCMR is similar with dobutamine stress echo, however, the application of DSCMR is particularly advantageous in patients with poor acoustic windows[2]. Recently, the prognostic role of DSCMR in patients with IHD has been demonstrated[3]. To date there are no DSCMR studies performed on entirely diabetic cohorts.

In first-pass perfusion CMR, the dynamic passage of a bolus of gadolinium-based contrast agent is followed through the cardiac chambers and the myocardium. Most CMR Centers prefer adenosine as the stressor agent because it is generally well tolerated, easily controlled and safe[4]. After 3-4 minutes of adenosine infusion at a rate of 140μg/kg/min, an intravenous bolus of gadolinium (0.05 – 0.1 mmol/kg) is injected through a peripheral vein in the antecubital fossa, and a set of at least three short-axis slices (one basal, one equatorial and one apical) is acquired every cardiac cycle during the first pass of the contrast.[5] Images are analysed qualitatively (visually) for the presence of perfusion defects (dark areas). This technique has high diagnostic accuracy and according to a recent meta-analysis sensitivity and specificity are 91% and 81% respectively. Recently, MR-IMPACT, a multiCenter-multivendor trial compared CMR perfusion with single-photon emission computed tomography (SPECT) in 234 patients and showed

at least equivalent diagnostic performance of CMR (area under the receiver operator characteristic curve 0.86 for CMR vs 0.75 for SPECT, p=0.12).[6] Vasodilator perfusion CMR provides also prognostic information in patients with ischaemic heart disease[3]. To date there are no perfusion CMR studies performed on entirely diabetic cohorts.

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CMR EVALUATION OF VIABILITY IN DIABETES

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In the next two decades the prevalence of diabetes mellitus (DM) is expected to affect more than 300 million patients worldwide. It is also known that diabetic patients experience more diffuse and extensive coronary artery disease, left ventricular dysfunction and silent ischemia in comparison to nondiabetic patients. Silent ischemia and small myocardial scars are associated with significant cardiac events, including recurrent myocardial infarction and death.

Late gadolinium enhancement (LGE) imaging with contrast-enhanced cardiac magnetic resonance (CMR) can detect and characterize small myocardial scars that are missed by the majority of other cardiac imaging modalities such as ECG, 2D echocardiography, conventional wall motion and nuclear scintigraphic techniques.

DM is also associated with cardiomyopathy which is independent of hypertension, coronary artery disease and other heart disease. Diabetic cardiomyopathy is associated with metabolic alterations, cardiac autonomy neuropathy, insuline resistance, small vessel disease, myocardial necrosis and fibrosis. LGE imaging could play a role in the detection of these structural changes in the early and later stages of the disease but further research is needed.

In conclusion, according to studies, LGE by CMR can provide strong prognostic information for major adverse cardiac events (MACE) and may serve as an important noninvasive risk-stratifying tool in diabetic patients.

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MRI IN DIABETES

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Vascular and coronary artery disease are highly prevalent in patients with diabetes mellitus. Even in the absence of epicardial coronary atherosclerosis, microvascular disease and cardiomyopathy are frequently encountered in diabetics.

The clinical value of cardiovascular MRI in patients with diabetes can be schematically separated in the following areas

1. **Evaluation of the Vascular Lumen and Wall Integrity:** Using various including contrast-enhanced and non-contrast MR angiography, the lumen of large and medium size vessels can be accurately visualized. Aortic, carotid, iliofemoral pathology (e.g. aneurysms, atherosclerosis, dissection etc) can be accurately assessed. Moreover, imaging of the vessel wall using multispectral MRI can provide useful information on the consistency of atheromatous plaque and help in deciding optimal therapy for these patients.
2. **Assessment of Left and Right Ventricular Systolic Function:** Similar to non-diabetic patients, the left ventricular ejection fraction is a powerful predictor of outcome. Cardiovascular MRI is the most accurate method for measurement of ventricular volumes, mass and ejection fraction, and thus offers significant advantage, particularly in the overweight and obese.
3. **Assessment of Myocardial Scarring and Fibrosis:** Currently cardiovascular contrast-enhanced MRI with delayed imaging is considered as the reference standard for imaging of myocardial scarring and fibrosis, Data from the nuclear literature suggest that a considerable proportion of diabetic patients have unrecognized myocardial infarctions. In these as well as in symptomatic patients with known coronary disease the extent of myocardial scar and remaining viability may be important prognostic parameters.
4. **Evaluation of Myocardial Ischemia:** Cardiovascular MRI has recently been shown to be superior, or at least as good as nuclear scintigraphic techniques, for evaluation of myocardial ischemia with pharmacologic vasodilator stress. In particular in diabetics in whom the pharmacological tests may

be preferable due to other comorbidities, stress MRI may have enhanced clinical value.

As MRI can provide all the above information in a single study, without exposure to ionizing radiation, iodinated contrast and risk for nephrotoxicity, cardiovascular MRI is a robust diagnostic tool that significantly aids in the diagnosis, risk stratification and optimal therapy selection in patients with diabetes.

CMR Evaluation of LV Function – Metabolism and Peripheral Vessels in Diabetes

EVALUATION OF DIABETIC CARDIOMYOPATHY BY CMR

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Diabetic Cardiomyopathy is defined as the changes induced by diabetes mellitus in cardiac structure and function in the absence of other cardiac pathologies. As the prevalence of obesity and diabetes affects younger individuals the possibility of increased incidence of diabetic cardiomyopathy is a reality.

Diagnostic methods that can correctly identify this disease early can help implement early therapies. Diabetic cardiomyopathy induces changes in cardiac structure that include the development of myocardial hypertrophy, fibrosis and fat droplet deposition. Early changes in cardiac function are manifested as diastolic dysfunction that with time leads to systolic dysfunction.

MRI is a non-invasive method that is very important in accurate assessment of myocardial mass and ventricular function of all myocardial segments. It provides precise numerical information concerning tissue characterization, allowing differentiation between normal and pathological states.

With the use of contrast-enhanced agents and late gadolinium enhancement imaging allows the assessment of myocardial damage, scar tissue, fibrosis and inflammation.

In experimental diabetic models using high resolution MRI imaging, increased LV wall volume to body weight ratio was found suggestive of LV hypertrophy.

Cardiac metabolic changes often appear in asymptomatic stages of diabetic patients.

H-magnetic resonance spectroscopy can detect high content of myocardial triglyceride levels that are found to be associated with impaired LV diastolic function.

Alterations in high energy phosphate metabolism that can be assessed with P-magnetic resonance spectroscopy measuring the phosphocreatine to ATP ratio. Studies have shown decrease in this ratio in diabetic patients and decreased ratio to be associated with LV diastolic dysfunction.

Cardiac MRI is a promising tool for the early detection of diabetic cardiomyopathy. Further research in this area is certainly required.

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Multimodality Imaging in Diabetes

ECHO IN DIABETES

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Over the years, the existence of a diabetic cardiomyopathy distinct from ischemic heart injury has been confirmed. Diabetes mellitus can provoke cardiac damage at different levels, leading to a variety of pathological entities including coronary macrovascular disease, autonomic dysfunction, diabetic cardiomyopathy, and coronary microvascular disease (1,2). These syndromes can often overlap and potentiate each other.

In particular, diabetes mellitus induces both structural and functional coronary microvascular abnormalities which are associated with coronary endothelial dysfunction and impairment in coronary flow reserve, even in the absence of epicardial coronary artery disease. The coronary microangiopathy component can amplify the effects of coronary macroangiopathy. Sometimes the evidence of coronary microangiopathy is associated with signs of left ventricular diastolic dysfunction while the systolic function is well preserved. Contractile impairment and heart dysfunction in chronic diabetes may also be caused by remodeling and calcium-handling abnormalities, with defects in sarcoplasmatic reticulum and sarcolemmal calcium transport due to the accumulation of lipid metabolites in the cellular membrane.

In diabetic patients, the integration of ultrasound assessment (3-5) can identify different stages of disease well before clinical overt cardiomyopathy. Early in the natural history of diabetes, various degrees of metabolic damage can result into abnormal increased myocardial echogenisity (detectable by tissue characterization) and to abnormal subendocardial function (detectable by cyclic backscatter variation). These alterations can be associated with abnormal global systolic and diastolic indices, such as those derived by Doppler or tissue Doppler imaging, when conventional two-dimensional echo still gives normal values of ejection fraction. As the disease progresses, a reduced inotropic reserve can be observed during exercise. At an advanced stage, wall motion abnormalities—at first regional, and later global—occur even at rest. Somewhere in between, a reduction in coronary flow reserve can be detected, usually in patients with some degree of diastolic or systolic dysfunction and microangiopathic involvement.

Echo in Pre-Clinical Diabetic Cardiomyopathy: Diagnosing pre-clinical diabetic cardiomyopathy early through cardiac ultrasound is not only important but may also turn out to be essential for the appropriate clinical evaluation of new therapeutic approaches.

According to clinical studies, diabetes upregulates the renin-angiotensin system, which may contribute to the development of

a dilated cardiomyopathy, whereas angiotensin II may lead to local oxidative damage, activating cardiac cell death. These advances in the basic understanding of cellular mechanisms underlying diabetic cardiomyopathy might be adjunctive to the disease treatment.

Any clinical study aimed at assessing the prevention of dilated cardiomyopathy should probably consist of a target population of diabetic patients with early, incipient cardiomyopathy. Clinically overt dilated cardiomyopathy may already be beyond the point of no return of advanced structural myocardial alterations—hardly reversible with any form of treatment. Furthermore, multidirectional analyses of longitudinal, circumferential, and radial function have allowed a better understanding of regional LV myocardial functional changes in patients with subclinical diabetic heart disease.

Cardiovascular imaging utilizing ultrasound technology could provide the ideal technique for the early detection of subtle changes and monitoring of the natural history and the effects of therapeutic interventions over time. Still research goes on as the debate remains over which parameter is the most appropriate: tissue characterization, noninvasively assessed coronary flow reserve, tissue Doppler, diastolic or systolic function, regional or global function, baseline assessment, or evaluation during stress. Clinical data indicate that myocardial structure and function (decreased peak strain and strain rate) are altered before the development of myocardial systolic dysfunction in the hearts of patients with diabetes.

In conclusion, the use of ultrasound will inevitably increase as it assesses diabetic cardiomyopathy with a relatively inexpensive biohazard-free technology that can also detect subtle structural and functional heart alterations and evaluate the efficacy of therapeutic interventions in these patients through serial follow-ups.

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SPECT IN DIABETES

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Diabetes is a major risk factor for coronary artery disease (CAD) which is increasing in prevalence. Patients with diabetes without previous myocardial infarction or cardiovascular disease have been shown to have a similar prognosis as patients without diabetes but with prior myocardial infarction or cardiovascular disease (1). Based on these group and population-based data, diabetes is considered a CAD risk equivalent.

CAD is often asymptomatic in diabetic patients until the onset of myocardial infarction or sudden cardiac death. Therefore, there has been substantial interest in the early detection of asymptomatic CAD by screening of diabetic patients (2). In addition, performing accurate risk stratification in asymptomatic or mildly symptomatic diabetic patients is an important health priority. Recent studies have shown that CAD can be detected noninvasively in a significant number of diabetic patients. Inducible ischemia has been shown to be associated with worse cardiac outcomes (3). An important clinical question is whether there is additional clinical benefit for routine screening of asymptomatic diabetics for CAD. Several retrospective studies have examined the value of screening asymptomatic diabetic patients using SPECT myocardial perfusion imaging (MPI) (4,5,6). These studies showed that 25% to 50% of asymptomatic diabetics have abnormal myocardial perfusion studies. Studies comparing individuals with and without diabetes have demonstrated that diabetes is associated with increased mortality among patients with findings of ischemia on SPECT MPI. Furthermore, mortality was found to be associated with the degree of myocardial ischemia (7).

The recently published long-term follow-up from the Diagnostic Imaging in Asymptomatic Diabetics (DIAD) study (8) had as its aim to answer the question of screening of asymptomatic diabetics. In 1123 asymptomatic individuals with type 2 diabetes, SPECT-MPI screening was compared to usual care. While rates of hard cardiac events were low in both the SPECT-MPI (2.7%) and the usual care (3.0%) groups, SPECT-MPI was able to successfully discriminate those with higher likelihood of cardiac events based upon moderate or large perfusion defects versus those with a very low likelihood of future cardiac events based upon normal perfusion or small perfusion defects (2.4% vs. 0.4%, P = 0.001). Despite these findings, however, SPECT-MPI screening was not associated with an improvement in cardiac outcomes, and the DIAD investigators concluded that ''routine screening for inducible ischemia in asymptomatic patients with type 2 diabetes cannot be advocated.''

Within the DIAD trial, there was a stepwise increase in cumulative cardiac events among those with increasing SPECT MPI abnormality. In fact, among patients with at least moderate ischemia, the hard cardiac event rate was 12% vs. 2% in the normal scan group. However, only 33 (8%) of the 561 patients within the scan group had a moderate perfusion defect or greater, making this a trial of primarily nonischemic patients. Importantly, this low frequency of ischemia may help explain why the annual hard cardiac event rate was surprisingly low at 0.69%. Despite the low event rate, stress SPECT MPI was able to risk stratify the population.

Another important prospective study, the sub-analysis of the MERIDIAN study (9), examined the prognostic value of stress SPECT MPI in 319 patients with mild angina pectoris. Perfusion defects were present in 65% of patients, including 46% with reversible defects. Among the patients, 54% had no ischemia, 26% moderate ischemia, and 8% severe ischemia. During a mean

follow-up of 2.2 ± .6 years, there were 14 initial hard cardiac events (6 deaths and 8 non-fatal myocardial infarctions). Annual event rates according to the degree of ischemia were 0.8% for no ischemia, 1.5% for moderate ischemia, and 5.8% for severe ischemia (statistically significant differences).

From the standpoint of nuclear imaging, the most positive aspect of this study is that SPECT ischemia could effectively and accurately risk stratify these diabetic patients. It is interesting to compare the results of this study to the DIAD trial. The event rate was higher in this study (annual death/MI approximately 2%) than in DIAD (0.69%). There were several differences in clinical characteristics that identified the DIAD patients as lower risk rather than just the simple difference in symptom status (asymptomatic vs mildly symptomatic) between these two study populations. The DIAD study excluded patients with a prior history of CAD or abnormal ECG. In contrast, among patients screened for the MERIDIAN trial, 29% had prior MI, 27% prior PCI, 18% prior CABG, and 50% ECG abnormalities. In addition, the MERIDIAN patients were older than those in DIAD (mean age 65 years vs 60 years) and included more males (63% vs 53%). The major value of the MERIDIAN trial data is the demonstration of accuracy of SPECT imaging for risk stratification in a prospectively identified patient population. In both this study and DIAD, SPECT MPI accurately identified low-risk patients whose annual hard event rate was <1%.

The major goal of noninvasive testing in diabetic patients should be to identify those with high-risk anatomical CAD. The use of SPECT myocardial perfusion imaging cannot be recommended in all asymptomatic or mildly symptomatic diabetic patients; however, myocardial perfusion imaging should be recommended in higher risk diabetic patients for definitive diagnosis of coronary artery disease as well as for risk stratification.

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THE ROLE OF COMPUTED TOMOGRAPHY CORONARY ANGIOGRAPHY (CTA), IN PATIENTS WITH DIABETES MELLITUS

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Type 2 diabetes is associated with accelerated atherothrombosis and high rates of cardiovascular morbidity and mortality. The overall prevalence of CAD has been reported to be as high as 60% in patients with diabetes referred for stress testing. Patients frequently have asymptomatic coronary artery disease (CAD) and prognosis is substantially poorer compared with their non-diabetic counterparts

Early identification of patients with diabetes and coronary artery disease (CAD) is essential for early the initiation of appropriate treatment, which may affect favorably an otherwise poor outcome.

With the advent of 64-slice computed tomography angiography (CTA), the direct, noninvasive visualization of CAD has become feasible . CTA has emerged as a safe, noninvasive, patient-friendly diagnostic modality to detect the presence of coronary atherosclerosis. carrying high sensitivity and specificity for the detection of significant (>50% luminal narrowing). The diagnostic potential is large because it allows not only the detection of significant coronary stenoses but also the presence of non-obstructive calcific and noncalcific (lipid or fibrous) plaques.

Computed tomography coronary imaging can detect early subclinical coronary artery disease especially in the subgroup of patients with diabetes mellitus without symptoms as well as high-risk symptomatic , which might impact on prevention , progression of coronary artery disease or monitor the effectiveness of lifestyle changes or pharmacological treatment of coronary atherosclerosis. The coronary calcium score has been shown to carry predictive value over and above traditional risk factors, and CT assessment of the total coronary plaque burden (combination of extent and severity of obstructive and nonobstructive plaques) might provide more powerful prediction for them.. Relevant published literature with CTA reports CAD to be observed in 80% of asymptomatic patients with type 2 diabetes mellitus. Furthermore, the majority of patients showed diffuse involvement of all three coronary arteries.

Conclusion: Coronary calcium scoring and CTA when indicated, are superior methods of cardiovascular risk stratification that can accurately identify high-risk asymptomatic diabetic patients.

INTRAVASCULAR ULTRASOUND UTILITY AND DIABETES

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Almost 80% of diabetic mortality can be attributed to cardiovascular disease. Furthermore, over 50% of patients with newly diagnosed type 2 diabetes show signs of coronary heart disease (CHD).[1-3] Angiography is used to determine lumen diameter and it is only in the later stages of CHD that the lumen narrows. The technique best used to detect the extent of atheroma in vessel walls is intravascular ultrasoound (IVUS). IVUS has been established as an important tool in the understanding of pathophysiology of atherosclerosis and in the optimization of percutaneous coronary interventions (PCI).[4] However, the issue of IVUS utility in the contemporary clinical practice is still the subject of considerable ongoing investigation and continuing debate.

IVUS is used both for lumen and vessel measurements and all measurements during are taken "leading edge to edge".[5] In vein grafts, wall morphology and plaque characteristics are different than the native coronary arteries. The following measurements are commonly reported after stent placement: stent CSA, minimum stent diameter, maximum stent diameter, stent symmetry, and stent expansion. IVUS is also used for stent imaging. Stents are strong reflectors of ultrasound and appear as echogenic points or arcs along the circumference of the vessel. In addition, IVUS can be used to evaluate the correct stent placement in regard to the strut location and the adjacent vessel wall. Strut apposition refers to the proximity of stent struts to the arterial wall. Good apposition is defined as the close contact between stent strut and the arterial wall. Mallaposition is the condition when the stent struts are not sufficiently close to the arterial wall, and blood flow between the struts and the arterial wall is not precluded.[5]

There is one grey area regarding the use of IVUS use in acute coronary syndromes: IVUS detection of thrombus is unreliable since echolucent plaques and thrombi have similar echogenicity. By IVUS, a thrombus is usually recognized as an intraluminal mass, often with layered, lobulated, or pedunculated appearance. Despite the absence of definitive IVUS features of vulnerable plaques, it can provide indirect hints on whether a plaque is vulnerable or not. Autopsy studies have demonstrated that unstable coronary lesions are usually lipid-rich with a thin fibrous cap.[5-7] Accordingly, in IVUS studies hypoechoic plaques without well-formed fibrous cap are presumed to represent potentially prone to rupture atherosclerotic lesions.[8] In patients studied after an acute coronary syndrome, IVUS can reveal an ulceration or a rupture (an ulceration with a tear detected in a fibrous cap). IVUS occasionally reveals suboptimal results due to edge dissections and stent malapposition and underexpansion, after "successful" stent implantation. Dissections can be classified according to IVUS findings in intimal (limited to intima or atheroma), medial (extending to media), adventitial (extending through the EEM), intramural hematoma (an accumulation of blood within the medial space, displacing the internal elastic membrane inward and the external elastic membrane outward), or intrastent (separation of neointimal hyperplasia from the stent struts, usually after treatment of in-stent restenosis).[5,8]

Despite some uncertainties in its everyday implementation, IVUS is particularly useful in the evaluation of left main and transplant coronary artery disease. Regarding the left main, IVUS may be useful in accurately evaluating the CSA (a stenosis area of > 50% or a lumen CSA < 9 mm^2 has been proposed as significant.[9] There are two main determinants of the final stent CSA: vessel size and implantation technique. IVUS guidance can be used to optimize final stent implantation results, mainly because of bigger balloons (greater balloon-to-artery ratio) or higher inflation pressures.[9] After IVUS-guided overdilation, minimal stent lumen CSA and diameter have been shown to increase by as much as 11% to 80%. We have previously shown that increased stent expansion correlates with reduced one-year event rates and, in particular, an arithmetically lower one-year mortality.[10] This finding does not seem to hold true in saphenous vein grafts.[11] Accordingly, other studies have showed that stent overexpansion results in larger final lumen dimensions that are maintained at follow-up, despite greater lumen loss due to exaggerated intimal hyperplasia in response to the greater vessel wall trauma. Various cut-off values directly correlating final CSA with TLR have been proposed.[11,12] In conclusion, IVUS can be useful tool in the routine practice in interventional cardiology especially in diabetics since it can identify early disease, and may help in minimizing complications and achieve better acute and long term outcome.

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ROLE OF MULTIMODALITY IMAGING IN THE EVALUATION OF DIABETES

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In view of the increasing number of diabetic and metabolic syndrome patients worldwide, the identification of those patients who might benefit from specific targeted treatment, i.e. revascularization has become a very important issue. As with every diagnostic evaluation, the pretest probability needs to be taken into account, the possible benefit for the patient, the possible harm done by the investigation and the subsequent diagnostic and therapeutic actions, as well as the financial and cost-effectiveness implications.

It is clear that diabetic patients have a very high prevalence of localised atherosclerotic coronary artery disease and are at high risk for developing ischemia and myocardial infarction. On the other hand many of these patients have diffuse coronary as well as microvascular disease which are less amenable to PCI and even bypass surgery and might benefit more from pharmacologic treatment.

In view of these considerations the identification of coronary artery lesions alone invasively but also non-invasively by CTA seems inadequate to make the right clinical decisions. At least the presence but also the impact of ischemia needs to be documented. Since often multi vessel disease is present, a quantitative, rather than a relative, measurement of decreased perfusion is preferred. This is also supported by the fact that only large ischemic territories require revascularisation on a prognostic basis and this evaluation can become problematic with diffuse disease if a non-quantitative method is employed.

Several modalities are possible, i.e. echocardiography, SPECT, PET, MR and CT, at rest and after/during exercise of pharmacologic stress, but the habitus and concomitant disease may preclude some of them. Nearly all modalities can provide a more or less quantitative evaluation but in clinical practice most of them are used qualitatively. Combined with the large numbers of patients which could be screened, this implies enormous financial investments which are possibly out of proportion to the clinical benefit.

In this presentation some background information will be provided about the specific pathology of diabetic coronary artery disease and the implications for ischemia and morphology imaging; also the implications for the imaging cascade which often takes place will be discussed.

PAPILLARY FIBROELASTOMA OF AORTIC VALVE

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Routine trnansthoracic US of a 43-year old woman with hypertropfic cardiomyopathy revealed a mobile echodense mass at the right cusp of the aortic valve. Two days later transesophageal US confirmed the entity and surgical removal of the tumor was recommended. A preoperative CTcoro was performed for the evaluation of the coronary arteries and a hypodense lesion of the right cusp of the aortic valve was found Histopathological evaluation indeed revealed the mass to be a papillary fibroelastoma.

Papillary fibroelastomas are benign lesions that account for less than 1% of all primary cardiac tumors and represent the majority of valve tumors. The occasional detection during life has been made possible by the increasing use echocardiography and MDCT.

The etiology of these lesions remains unclear, but is thought that they may derive from the endocardium itself.

Because the tumors are small (usually <1cm in diameter) , are largely asymptomatic. Occasionally they may give rise to emboli leading to transient ischemic attacks and cerebral infarction. Aortic valve papillary fibroelastomas have also been reported to cause intermittent occlusion of the coronary ostia giving rise to angina, myocardial infarction, or sudden death.

ABSTRACTS

BEST ORAL PRESENTATION AWARD COMPETITION

BOPC01-SIMPLE DETERMINANTS OF SIX-MINUTE WALK TEST PERFORMANCE IN HEART FAILURE PATIENTS

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Introduction: The six-minute walk test (6-MWT) is a simple and safe measure used to evaluate functional capacity in chronic heart failure (CHF). The purpose of this study was to identify, routinely made clinical measures associated with 6-MWT performance and establish a reference equation to predict 6-MWT performance.

Methods: 71 CHF patients (82% males; mean age 76 ± 9 years), enrolled in a chronic disease assessment programme completed the 6-MWT. Multinomial logistic regression was performed to determine the factors associated with poor performance (≤300 m) in 6-MWT. Thresholds values identified for dependent (total distance 300 m) and independent variables (age >/<75; stature >/<1.72 m; BMI >/<25 kg • m-2; LVEF >/<45 mm; step length >/<0.63 m). Odds ratios (ORs) with 95 % confidence intervals (CI) were calculated.

Results: Mean distance walked was 305 ± 123 m. In regression analysis, 42% of variance in walking distance was accounted for by age: Distance walked (6-MWT) = 762 + (-6 × age), m. Logistic regression analysis showed that independent predictors of poor performance were: BMI ≥ 25 kg · m-2 (OR = 13.6, 95% CI = 1.6 – 118) and age ≥ 75 years (OR = 4.8, 95% CI = 1.3 – 18) (Table I).

Table I. Logistic regression predicting likelihood of achieving less than 300m in 6-MWT

	Odds Ratio	95.0% C.I.for Odds Ratio		P value
		Lower	Upper	
Gender (male vs female *)	0.79	0.14	4.40	0.784
Age (older vs younger *)	4.84	1.29	18.20	0.020
Stature (short vs tall *)	1.23	0.31	4.85	0.763
BMI (overweight vs. normal weight *)	13.61	1.56	118.47	0.018
Stride length (short step / long step *)	0.73	0.22	2.41	0.609
LVEF (poor LVEF / normal LVEF *)	0.55	1.16	1.91	0.349

BMI = body mass index; LVEF = left ventricular ejection fraction

* The referent value (OR = 1) in each variable respectively is: female; younger; tall; normal weight; long step; normal LVEF).

Conclusion: Clinical variables such as ventricular function are unrelated 6MWT performance in CHF patients. However, age and BMI are independent predictors of performance and should be accounted for when the 6MWT is used to assess heart failure patients' functional capacity. These variables appear particularly important when walk test performance is used to categorise patients according to known prognostic cut points.

BOPC02-IS TRANSFUSION SAFE FOR CABG PATIENTS?

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Introduction: Approximately half of the patients undergoing CABG require an allogeneic transfusion.[1] This is due to the haemodilutional effect of cardiopulmonary bypass and peri-operative bleeding.[2] The aim is to achieve haemostasis and increase oxygen delivery.[1,2,3] However, there is wide variability who to transfuse.[2,3] Transfusions have been linked with various adverse reactions[1,2,3] and hospital mortality.[2] Our aims were to assess: patient characteristics predisposing to blood transfusion and short-term complications.

Methods: Retrospective review of all patients, who had undergone first time CABG between January and March 2009. The study was based in a national cardiothoracic Center in Scotland, UK. The data was extracted from TOMCAT®, a national audit database. Statistical analysis was performed using unpaired t-test.

Results: 170 patients undergoing first time CABG were identified, of whom 141 were males. The patients' age range was between 42 to 83 years, with the mean being 64. The majority of the procedures were elective (132/170). 44.7% (76/170) of the patients were transfused. Patient characteristics predisposing to transfusion included: older age, female sex, lower haemoglobin level on admission and urgent/emergency cases. Transfused patients were more likely to suffer from a complication (44.7%, 34/76) compared to those who were not transfused (14.9%,

14/94). There was a statistically significant difference (p = 0.005) in the mortality between the transfused group 6.58% (5/76) and the non-transfused group 0% (0/94).

Conclusions: The risks of blood transfusion can sometimes outweigh its benefits – a transfusion protocol has to be developed in an international level in order to minimise risks to patients.

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BOPC03-OUTCOME FOLLOWING AORTIC VALVE REPLACEMENT IN OCTOGENARIANS

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Objectives: The ageing of the population has resulted in an increasing number of elderly patients undergoing cardiac operations. We reviewed our experience in patients over the age of 80 undergoing primary aortic valve replacement (AVR) with or without CABG.

Methods: Between 2000 and 2008, 345 patients (226 male) ≥80yr underwent primary AVR in our unit. The notes of these patients were retrospectively reviewed and follow-up information was obtained from their general practitioners. They had a mean age of 82.9±2.3 years and a median logistic EuroSCORE of 13.4 (IQR 9.4, 19.1). Isolated AVR was performed in 161 patients (45.5%) and 184 (51.6%) patients underwent combined AVR and CABG.

Results: Hospital mortality occurred in 17 patients (4.9%), which was significantly lower than the mortality predicted by logistic EuroSCORE (16.2%, p<0.01). Hospital mortality was comparable between patients undergoing isolated AVR and those undergoing additional CABG (4.3 vs. 5.4% respectively). Actuarial survival at 1 and 5 years was 90.1±1.6% and 77.2±2.9% respectively.

Conclusions: Aortic valve replacement can be undertaken safely in octogenarians and the current risk is significantly lower than what is predicted with conventional risk-scoring systems. Advanced age per se is not an important factor when assessing a patient's suitability for surgical vs. transcatheter aortic valve implantation (TAVI).

BOPC04-INTRACORONARY LEVOSIMENDAN PREVENTS MYOCARDIAL ISCHAEMIC DAMAGE AND ACTIVATES SURVIVAL SIGNALLING THROUGH KATP CHANNELS AND NITRIC OXIDE

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Introduction: Levosimendan has been reported to exert cardioprotection through KATP channel-opening and modulation of programmed form of cell death. Moreover, its vasodilating and preconditioning effects have been found to involve nitric oxide (NO). In this study we examined the cardiac effects of different doses of intracoronary levosimendan on ischaemia/reperfusion injuries, and the involvement of KATP channels and NO.

Material and Methods: The experiments were performed in a total of 56 anaesthetized pigs. In 21 pigs, 1.5, 5 and 12 μg min-1 levosimendan was infused into the coronary artery at the onset of reperfusion and the effects on cardiac function, infarcted area, and on apoptosis/autophagy were examined. In addition, the activation of Akt and ERK, members of the so-called reperfusion injury salvage kinase pathway, was analyzed. The findings were compared with those obtained in further 14 pigs where the highest dose levosimendan was infused after glybenclamide and L-NAME.

Results: The intracoronary levosimendan administration caused dose-related beneficial effects on cardiac function, reduction of infarcted area, inhibition of apoptosis and activation of autophagy. Moreover, a dose-related increase of ERK and Akt expression has been observed ($P < 0.05$). These responses were completely prevented by glybenclamide ($P > 0.05$) and significantly reduced by L-NAME ($P < 0.05$).

Conclusions: The results of this study show that intracoronary levosimendan reduces cell death induced by ischaemia/reperfusion in a dose-dependent manner and activates survival signalling through KATP channel-opening and NO.

BOPC05-ENDOVASCULAR TREATMENT FOR ACUTE TRAUMATIC AORTIC INJURY: MID-TERM RESULTS

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Introduction: Conventional surgery of acute thoracic aortic trauma is associated with significant morbidity and mortality. During the last decade endovascular intervention has been applied as an alternative treatment of thoracic aorta injuries. We demonstrate the feasibility and safety of endovascular repair of thoracic aortic trauma accompanied by mid-term results.

Methods: From 2002 to 2009, 43 patients (42 males) underwent endovascular repair of thoracic aortic injuries in our institution. The diagnosis was established by spiral computed tomography (CT) with contrast enhancement and/or angiography. All patients underwent CT scan at the third day, at 3, 6 and 12 months after the implantation and annually thereafter.

Results: Successful stent-graft deployment was achieved in all patients with complete exclusion of the lesion. Access for stent-graft deployment was the femoral artery. Postoperative CT scanning confirmed successful management of the lesion in each patient. There were no procedure related deaths, paraplegia or stroke. Two cases of endoleak required additional treatment. Two patients died in the short term follow up period, due to injuries

not related to the thoracic aortic trauma. In no case conversion to open surgery was required. Follow-up from 2002 to 2010 for 27 patients showed no evidence of endoleaks or stent-graft migration.

Conclusion: Transluminal placement of endovascular stent-graft is a technically feasible procedure with good outcome and low rate of complications. Mid-term results show reduced morbidity and mortality. In the challenging management of traumatic rupture of the aorta, endovascular approach dominates and soon will be the treatment of choice for most patients.

BOPC06-DIFFERENTIAL EXPRESSION OF COLLAGEN TYPE V AND XI ALPHA-1 IN HUMAN ASCENDING THORACIC AORTIC ANEURYSMS

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Introduction: The molecular mechanisms leading to ascending thoracic aortic aneurysm (ATAA) in the aged population remain unknown. We hypothesized that alterations in expression levels of specific fibrillar collagens occur during the aneurysmal process.

Methods: Surgical samples from ascending aortas from patients with tricuspid aortic valves with degenerative ATAAs (n=25), were subdivided by maximal diameter of the aneurysm: small: 5-6cm, n=9; medium: 6-7cm, n=8 and large: >7cm, n=8 and were compared with non-aneurysmal aortas (n=7). Samples were analyzed for mRNA and protein levels of collagen types I, III, V and α1(XI).

Results: Quantitative real-time RT-PCR showed that collagen type V and collagen α1(XI) were significantly and linearly increased in small, medium and large ATAAs respectively as compared to control ($P<0.001$ for both). There was no change in the mRNA expression levels of collagens type I and III. Western blot analysis demonstrated that collagens type I and III were significantly decreased in ATAAs and that this decrease was linearly correlated with the size of the aneurysm ($P<0.001$ for both). In contrast, collagens α1(XI) and type V were significantly increased and this increase was linearly correlated with the size of the aneurysm ($P<0.001$ for both).

Conclusions: We report for the first time the involvement of collagen α1(XI) in the normal adult human thoracic aorta and its increased expression in ATAAs. We provide a potential mechanism for the generation and progression of the aneurysmal enlargement.

ORAL PRESENTATIONS

Valves – Tissue Engineering – Reperfusion Injury

OP01-SURGICAL MYECTOMY IN HYPERTROPHIC CARDIOMYOPATHY: INITIAL EXPERIENCE AND EARLY RESULTS

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Introduction: The presence of obstruction to the left ventricular outflow tract (LVOT), at rest or with provocation, is of great clinical and prognostic importance in patients with hypertrophic cardiomyopathy (HCM). Significant obstruction associated with symptoms refractory to maximum medical management justifies intervention.

Methods: Since February 2007, 12 patients (66% female, mean age 61.5±13.11 years) with HCM underwent extended surgical myectomy. A transesophageal echocardiogram was obtained pre- and post-operatively in all the patients.

Results: Mean interventricular septal thickness decreased from 2.24±0.28mm preoperatively to 1.53±0.23mm postoperatively. Mean LVOT peak gradient was reduced from 76.75±24.13 mmHg to 18.25±5.99 mmHg. NYHA status improved from 3.33±0.49 to 1.5±0.52. Thirty-day mortality was zero. There was no instance of iatrogenic ventricular septal defect. One patient developed complete AV block requiring a permanent pacemaker. A new LBBB developed postoperatively in six patients. At a mean follow-up period of 11.25±11.73 months, all patients were alive. Freedom from hospitalization for heart failure symptoms has been 91.7%.

Conclusions: Extended surgical myectomy is a safe and effective method for the treatment of patients with obstructive HCM and refractory symptoms. The short and mid-term results are excellent.

OP02-SURVIVAL AND FREEDOM FROM AORTIC VALVE REPLACEMENT AFTER AORTIC CUSP EXTENSION VALVULOPLASTY WITH TRICUSPIDIZATION IN INFANTS AND CHILDREN

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Objective: Increased awareness of aortic valve replacement(AVR) limitations and encouraging early outcomes of emerging aortic cusp extension valvuloplasty (ACEV) techniques have been redirected attention to such techniques in the management of patients with aortic insufficiency (AI) or stenosis (AS). Durability and freedom from AVR after ACEV are not, yet, well defined during infancy and childhood. A study was undertaken to analyze outcomes.

Methods: From July 1987 to December 2008, 78 patients younger than 10 years of age underwent ACEV in the form of pericardial cusp extension with tricuspidization (when it was indicated by valve anatomy) [ACEV-T]. Sixteen patients (20.5%) were younger than 1 year of age. From available follow-up data, 27 had bicuspid aortic valve, 34 congenital aortic valve stenosis, 14 congenital or acquired combined AI/AS and 3 post-surgical AI or AS. Forty-two patients had balloon valvuloplasty or surgical valvotomy prior to ACEV. Median follow-up was 12.4 years (0.1 to 21.6). Long-term mortality and freedom from AVR were studied.

Results: There were no early or late deaths. Z-values of left ventricular(LV) end-diastolic dimension, aortic annulus, aortic sinus diameter, sinotubular junction diameter and LV wall thickness prior to AVR were 3.8+/-2.95, 2.1+/-1.15, 4.2+/-1.22, 1.78+/-1.24, and 2.92+/-1.31, respectively. During follow-up period 23 of 78 ACEV(29.5%) had Ross operation and 8(10.2%) other AVR. Mean time to AVR was 4.52+/-1.97 years. In 16 of 31(51.6%) AVR took place within 2 to 5 years and in 41.9% 6 years after ACEV-T. Actuarial freedom from AVR at 1, 5, and 10 years was 97.3+/-2.0, 71.3+/-5.8, and 55.6+/-6.9, respectively.

Conclusion: ACEV with tricuspidization is a safe and effective surgical option in infants and children. It allows expeditious LV remodeling with satisfying long-term durability and freedom from AVR. On selective strategy basis, ACEV-T represents a reliable and durable approach in infants and children with congenital or acquired abnormal aortic valve.

OP03-DOES THE RISK OF PERMANENT PACEMAKER IMPLANTATION INCREASE IN HIGH-RISK PATIENTS THAT UNDERGO ISOLATED AORTIC VALVE REPLACEMENT?

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Introduction: Aortic Valve Replacement is an operation which is frequently associated with conduction abnormalities that may lead to a Permanent Pacemaker (PPM) Implantation. The purpose of this presentation is to identify the risk of PPM implantation to patients undergoing isolated Aortic Valve Replacement that are considered to be high risk.

Methods: This is a single Center retrospective analysis. Within 82 consecutive months 742 isolated Aortic Valve Replacements (AVR) were performed. Redo operations as well as infective endocarditis operations were not included in the study. Patients with previous PPM were also excluded. 71 of these patients had logistic Euroscore ≥20 and therefore were considered high risk (9.6%). The patients of the high-risk group were predominantly female (57.7%) with a mean age of 75.7 years.

Results: 44 out of the 742 patients (5.9%) post isolated AVR required PPM insertion during their index admission. From the high-risk subgroup, 7 out of the 71 patients required PPM insertion (9.9%). For this group of patients 11.4% of stenotic valves, 5.9% of regurgitant valves and 10% of mixed valves required PPM.

Conclusion: Permanent Pacemaker Implantation is more common in patients who are considered high risk. It appears also that for this patient group aortic stenosis increases the risk for PPM implantation.

OP04-MITRAL VALVE SURGERY IN THE PRESENCE OF EXTENSIVE CALCIFICATION OF MITRAL ANNULUS. 12-YEARS EXPERIENCE

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Objective: The aim of this study is the report of long term results of patients who underwent decalcification and patch-reconstruction of the mitral annulus during mitral valve surgery.

Methods: Between 1996 and 2008, a total of 109 consecutive patients with a mean age of 65 ± 14 years (Mean euro score: 18.6%) underwent mitral valve surgery in the presence of extensive calcification of mitral annulus. In 53 cases (49%), a mitral valve repair was performed after decalcification and patch-reconstruction of the mitral annulus. The remaining 56 patients (51%) received a mitral valve prothesis. The mean follow up time was 8 ± 4 years.

Results: The 30, 60 and 90 day mortality was 8.2% (n=9), 12% (n=13) and 13% (n=14). The actuarial survival rates at 5 and 8 years were 79 ± 3% and 67.3 ± 1% respectively. Echocardiographic follow up was complete. 47 patients (64%) had normal mitral valve function, 21 (29%) showed a mild and the remaining 5 patients (7%) a modereate mitral valve insufficiency. Mean and max. transvalvular gradient were 5.2 mmHg and 10.8 mmHg respectively. Mean LV-EF was 58%. The freedom of reoperation at 8 years was 91.7% ± 3%. We found concomitant and redo procedures, NYHA class IV as well as age older than 65 years to be associated with a significant increased relative risk for perioperative death.

Conclusions: Decalcification and patch-reconstruction of the mitral annulus during mitral valve surgery can be performed in this high risk patient group, with acceptable and stable clinical longterm results.

OP05-PAPILLARY MUSCLE SLING AS AN ADJUNCTIVE PROCEDURE FOR SURGICAL LEFT VENTRICULAR REMODELING

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Introduction: Remodeling of left ventricle using papillary muscle sling technique could create a possibility of improving mitral valve competence.

Methods: We analyzed 31 cases of left ventricular remodeling according to Hvass technique and one case of right ventricle papillary muscle approximation. 26 patients had left ventricular aneurism and 6 - valvulopathies of diverse etiology. All the patients had NYHA III-IV, pulmonary hypertension (SPRV 50–70 mmHg), mitral insufficiency (II-IV gr.) and dilated mitral fibrous annulus (38 – 46 mm).

Papillary muscle sling was performed with a piece of Gor-Tex 4-0 vascular prosthesis.

Results: In all of patients ejection fraction increased from 39 ± 8% till 49 ± 5% after the surgery. Left ventricular diastolic volume decreased from 254 ± 81 ml before the intervention to 173 ± 40 ml after. There was obtained the regression of mitral valve insufficiency up to I – II grade and the decreasing of annulus fibrosis diameter to 28,6 mm.

One patient developed the rupture of postero-medial papillary muscle (12th day) and underwent successful mitral valve replacement.

After right ventricular remodeling the cavity size dropped from 40 mm to 28 mm. Also was practiced annuloplasty, which assured complete tricuspid valve competence.

In the early postoperative period one patient died due to cardiac and renal failure.

Conclusions: Hvass technique with the approximation of papillary muscles for left ventricular remodeling offers benefits by decreasing its diastolic volume, considerable improvement of cooptation and regression of mitral regurgitation with increasing ejection fraction of ventricle.

OP06-REGIONAL CHARACTERISATION OF STRESS AND STRAIN DISTRIBUTIONS IN THE NATIVE MITRAL VALVE APPARATUS USING COMPUTATIONAL MODELLING: IMPLICATIONS FOR RECONSTRUCTION STRATEGIES

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Introduction: This project's aim was to develop 3D fluid solid interaction (FSI) computational models of stress and strain distributions in natural mitral valve during normal function, with a view to optimising the conditioning of recellularised scaffolds suitable for mitral leaflet and chordae reconstruction.

Methods: Mitral leaflets and chordae were dissected from porcine hearts. Histological sections were stained with Sirius red and Millers elastin stains to determine collagen and elastin alignment. Chordae and circumferential and radial leaflet samples were subjected to uniaxial tensile loading. The 3D valve geometry at the end of diastole was obtained by silicone rubber moulding of the atrial and ventricular chambers, followed by CT scanning.

Results: Collagen in the anterior leaflet was orientated circumferentially. Commissural chordae featured more densely packed collagen fibres compared to a looser arrangement in the strut chordae. Significant differences were found in the biomechanics between the

circumferential and radial, and the posterior and anterior, leaflet groups. The commissural chordal group displayed a significantly increased stiffness compared to the strut group. The histological, mechanical and geometrical data were used in 3D FSI computational models of the valve apparatus. The simulations predicted significant variations in the regional stress and strain distributions in the mitral components.

Conclusion: The 3D FSI models predicted significant differences in the stress and strain distributions between anatomical sites on the mitral valve leaflets and between chordae. The results indicated the need for regional differentiation of mitral valve treatments in terms of mitral component reconstruction.

OP07-TISSUE ENGINEERING OF THE MITRAL HEART VALVE LEAFLET

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Introduction: A major clinical need exists to provide a living equivalent to the mitral valve leaflet for mitral reconstruction. This study aimed at assessing the recellularisation potential of decellularised porcine pericardium, as scaffold for tissue engineering mitral leaflets.

Methods: An acellular porcine pericardium scaffold was produced using hypotonic, hypertonic, sodium-dodecyl-sulphate (SDS) and nuclease washes, and sterilized with peracetic acid. Putative porcine mesenchymal stem cells (pMSC) were isolated from bone marrow using a Percoll gradient and characterised using flow cytometry, following 2 passages. They were verified to be CD29+, CD44+, CD45-, CD90+ and SLA-DR+, indicating a mesenchymal stem cell phenotype. pMSC of passage 2 were seeded onto decellularised pericardium at densities of 2×10^4, 1×10^5 and 2×10^5 cells/cm^2 and incubated at 37°C in 5% CO_2 in air. After 24 h culture, samples were examined using SEM. Remaining samples were cultured for 1, 2, 3 and 4 weeks and examined histologically.

Results: Haemotoxylin and eosin staining of the decellularised pericardium demonstrated cell removal. The scaffold induced no toxicity on cells, as assessed by standard assays. After 24 h culture the seeded samples demonstrated good cellular attachment. After 1 week, pMSCs had formed at continuous monolayer on the seeded surface, at all cell densities. Following 2 weeks, cells had penetrated more deeply into the tissue. By weeks 3 and 4, pMSCs had re-cellularised the majority of the scaffold.

Conclusion: This study demonstrated the ability of pMSCs to recellularise acellular pericardium and provides a strong basis for future tissue engineering strategies.

OP08-LONG-TERM GROWTH AND FUNCTIONALITY OF TISSUE-ENGINEERED AUTOLOGOUS, LIVING VASCULAR GRAFTS IN A LARGE ANIMAL MODEL: THE LAST STEP TOWARDS HUMAN APPLICATION?

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Purpose: Living autologous vascular grafts with the capacity for regeneration and growth may overcome the limitations of contemporary artificial prostheses. Particularly in congenital cardiovascular surgery, there is an unmet medical need for growing replacement materials. We investigate long-term functionality, growth capacity and safety of tissue-engineered living pulmonary-arteries in a growing lamb-model.

Methods: Vascular-cells were sequentially seeded on biodegradable scaffolds (diameter 18±1mm) and were grown in-vitro for 21days using biomimetic-conditions. The fabricated tissue-engineered vascular grafts (TEVGs) were surgically implanted as main pulmonary-artery (PA) replacements in lambs (n=15; 28.4±5.6kg) using cardiopulmonary-bypass and followed up for 220weeks. During this period, the animals more than doubled their body-weight (60.1±9.7kg).

Results: All implantation procedures were performed uneventfully. Trans-oesophageal echocardiography at 20/50/80/100 and 220weeks displayed excellent functionality and computed tomography–angiography did not detect any signs of degeneration such as calcification, thrombus-formation, stenosis, aneurysm or suture-dehiscence. In regard to wall-tension, shear-stress and flow-velocity, 3D-CT Reconstruction analysis demonstrated sufficient and stable results over the whole follow-up period. Functional growth was confirmed by help of CT volume-measurements which displayed a significant volume increase of the TEVG from an initial volume of 6.4ccm early after implantation up to 13.2ccm after 220weeks. Histology showed tissue-formation reminiscent of native PA. Biochemical analysis revealed cellularity and proteoglycans and increased collagen-contents in all TEVGs, analogous to those of native vessels.

Conclusions: Our results provide systematic evidence of growth, functionality and safety of TEVG in a full growth animal-model over a long-term period. These findings provide the experimental basis to enter into future clinical-trials.

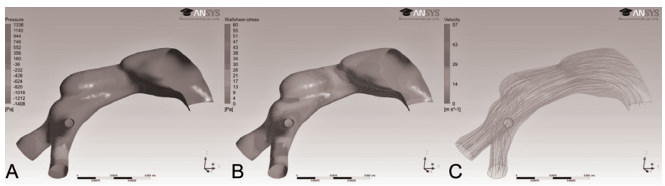

Figure 1: 3D-CT Reconstruction analysis

3D-CT Reconstruction analysis displays systolic wall-pressure (Pa) (A), wall shear-stress (Pa) (B) and velocity-coded streamlines (m/s) (C) in the pulmonary-trunc. The flow-pattern is smooth and the wall stress remains low during systoly. The low shear-stress and the absence of turbulences indicate that no significant wall-irregularities, as e.g. atherosclerosis or scars, are present.

OP09-DEEP HYPOTHERMIC CIRCULATORY ARREST IN NEONATES AND ITS EFFECTS ON RENAL MORPHOLOGY

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Introduction: Renal failure after open-heart surgery is even in the neonatal age a serious complication with high morbidity and mortality. The aim of the study was to identify the effects of deep hypothermic circulatory arrest (DHCA) on renal morphology in a neonatal animal model.

Methods: The kidneys of newborn piglets were examined after deep hypothermic circulatory arrest (DHCA; n=5) and compared with the morphology of normal neonatal kidneys (control; n=4) regarding tubular dilatation, vacuole formation, leucocytic infiltration, epithelial destruction, and interstitial edema. The severity of the tissue damage was scored by a 4-grade system (from 0 for normal morphology, up to 3 for severe damage).

Results: The score of injury of the renal tissue was regarding tubular dilatation and vacuole formation after DHCA statistically significant higher if compared to the normal neonatal renal tissue (DHCA vs. control 1.2 ± 0.6 vs. 0.4 ± 0.2 ($p<0.05$) and 1.4 ± 0.6 vs. 0.5 ± 0.1 ($p<0.05$), respectivelly). The differences regarding leucocytic infiltration, epithelial destruction, and interstitial edema were without statistical significance.

Conclusions: In comparison to the normal neonatal kidney tissue significant alterations of the morphology were found after DHCA.

Thoracic Surgery

OP10-CORONARY ENDARTERECTOMY OF THE LEFT ANTERIOR DESCENDING ARTERY: AN INCREASING REQUIREMENT FOR COMPLETE REVASCULARIZATION OF DIFFUSE CORONARY DISEASE

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Background-Methods: Patients presenting for coronary artery bypass grafting with diffuse disease are a growing occurrence. Complete revascularization of a severely atheromatic left anterior descending artery requires endarterectomy concomitant to the extended arteriotomy and anastomosis of the LITA. We present our experience with this procedure in 86 consecutive patients.

Patients-Methods: Between 2005 and 2010 86 consecutive patients underwent CABG with extended arteriotomy and endarterectomy of the LAD. All of these cases were performed with the use of standard cardiopulmonary bypass, moderate hypothermia and cold blood antegrade and retrograde cardioplegia with hotshot. All patients received aspirin as well as asenokoumarol for the first 3 postoperative months. They were all followed-up with regular outpatients visits as well as echo and scintigraphy and if indicated coronary angiogram.

Results: Mean patient age 65,48(40-82) years, male/female ratio 6,81. Comorbidities: DM 28/86 (35,55%) [type I (n=3), type II (n=25)]. Extended anstomosis of LITA to LAD in n=84 and with vein patch for LAD reconstruction in n= 2. Mean graft number 2,46 (1-4) [x1(n=8), x2 (n=39), x3 (n=36) και x4 (n=3)]. In 19/86 (22,09%) fRITA was also anstomosed to the left coronary system. Mean CPB time 120,03(46-347)min. Mean CxC time 96,31(35-171)min. IABP was utilized in 6 patients (pre-op n=2 and post-op n=4). Immediate post-op complications: AF 30/86 (4,88%), VF 2/86 (2,32%), PPM 1/86 (1,16%), paralytic ileus 1/86 (1,16%), small bowel ischaemia requiring surgery 1/86(1,16%), CVA 1/86 (1,16%) and STEMI 2/86 (2,32%). Mean post-operative stay in ICU 2,04 (1-7) days and total hospital stay 8,88 (5-69) days. 30 day mortality 1,16%. There were no deaths at mean f-u of 2,3 years (0.5 – 5).

Conclusion: Endarterectomy and reconstruction of the LAD with extended anastomosis of the LITA is a low-complication technique. It offers a safe alternative to conventional bypass surgery achieving more complete revascularization in diffuse atheromatous coronary disease.

OP11-INTRAOPERATIVE RADIOFREQUENCY THERMAL ABLATION IN MINIMAL INVASIVE THORACIC SURGERY: 4 CASES REPORTS

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Objective: Radiofrequency ablation applies thermal energy with a catheter delivery system, resulting in coagulation necrosis. Percutaneous Radiofrequency thermal ablation is frequently used for primary and secondary malignant lung tumors, but few reports exist regarding its intraoperative use for lung tumors. We report our experience with intraoperative radiofrequency ablation for the treatment of pulmonary malignant tumors.

The objectives of this study were to determine perioperative morbidity, mortality, early outcomes and feasibility of RFA for malignant pulmonary tumors in patients not considered candidates for conventional thoracic surgery. Specific end points were description why we used the intraoperative method in every case, frequency of complications, technical details of the protocols, tumor response after RFA treatment, and overall survival.

Methods: We evaluated the results of intraoperative radiofrequency ablation in minimal invasive thoracic techniques (VATS and mini thoracotomy) for 4 patients with primary and secondary lung cancer not considered surgical candidates. Indications for radiofrequency ablation were pulmonary malignant tumors in patients with medical comorbidities, prohibitive pulmonary reserve, or refusal of conventional thoracic surgery.

Results: Thoracic surgeons performed radiofrequency ablation by mini thoracotomy (3) and VATS in (n=1) patients (3 male and

1female) under general anesthesia in the operating room. Age was range from 40 to 77 years, hospital length of stay was range from 5 to 20 days. Procedure-related morbidity, mortality was 0%, No intraoperative or perioperative related to technique complications were noted. No immediate or delayed hemorrhage or hemoptysis has been noted. Local recurrence rate documented in ¼ patients, overall survival range from 19 days to 4 years, quality of life was improved ¾ patients, new disease recurrence was documented in 1 patient in pulmonary site and in 2 patients in extrapulmonary sites. Death with progressive metastatic disease occurred in 2/4 patients during follow-up. 3/4 patients were treated preoperatively with chemotherapy and1/4 with radiotherapy and 2/4 were treated in the past with surgical removal part of the lung parenchyma.

Conclusion: This pilot study demonstrates the feasibility of intraoperative radiofrequency ablation for peripheral and central lung tumors. It is a safe intraoperative technique with minimal perioperative complications. Central tumors responded poorly compare to peripheral ones. Additional trials are needed to determine safety and efficacy.

OP12-CONTINUOUS NERVE BLOCK AND SURGICAL – SITE PAIN RELIEF IN OPEN THORACOTOMY

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Objective: These are a variety of drugs used to treat postoperative pain. These are commonly narcotics and local anesthetics. Our purpose is to analyse the results of the continuous nerve block and surgical – site pain relief in open thoracotomy, against narcotics, local anesthetics and non-drug alternatives.

Material–Method: From January 2005 until March 2010 we treated 1350 patients that underwent an open thoracotomy with the following methods: 450 (n= 33,33%) with pain relief medicines (narcotics). 300 (n= 22,22%) with local anesthetics. 450 (n=33,33%) with continuous nerve block and surgical – site pain relief. 150 (n=11,115) of them were treated with non – drug alternative (cold – therapy, massage, tens, and relaxation techniques).

Results:

- In the treatment of severe pain, narcotics may be the most appropriate source of relief.
- Narcotics enter the bloodstream and can have a variety of negative side effects (difficulty in breathing = 30%, physical and mental dependency =15%, blood disorders =8%, sluggishness=9%, etc.)
- The benefits by using local anesthetics (regional or local anesthesia), is that the sort –term numbing of the surgical area may allow your surgeon to operate without giving general anesthesia and they also have less side- effects.
- The benefits by using continuous nerve block and surgical site pain relief include: a) direct pain relief without the side effects of narcotics. b) constant pain relief reduces intense pain spikes. c) quicker return to moving around, walking and normal activities. d) earlier hospital release.
- The non – drug pain relief methods weren't so efficient for our patients and we finally compinate them with drugs.

Conclusions:

- The continuous surgical –site pain relief, in our study demonstrated better method than the others.
- The system only supplies (adjunctive) pain relief and may not be 100% effective when used alone.

OP13-SURGICAL TREATMENT OF METASTASES OF MALIGNANT MELANOMAS IN THE LUNG

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Goal: To analyse the results from the surgical treatment of malignant melanomas in the lung.

Material – Method: From January 2005 until January 2010, we treated in our clinic 9 patients with metastases of malignant melanoma in the lung (7 with metastases in the lung and 2 in the bronchus). Metastases in the lung are mostly parenchymal and the patient's progress depends on their number and on whether they can be resected. The endobronchial metastases are far rarer.

Results:

- There were no perioperative or postoperative complications.
- In the case of the melanoma developed in the bronchus, the diagnosis was based on the histological picture.
- Postoperatively, all patients are followed-up in an oncology center, and two of them receive adjuvant treatment.

Conclusions:

- The metastases of malignant melanomas in the lung are mostly related to the parenchyma; the endobronchial cases are far rarer.
- The investigation must always follow the direction of the metastatic disease, especially in case of the unpredictable and most aggressive progress of the malignant melanoma.

OP14-THE PERIOPERATIVE CLINICAL PROGNOSTIC VALUE OF NT-PRO BNP IN MITRAL VALVE SURGERY. A SINGLE CENTER PROSPECTIVE STUDY

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Background: Plasma Natriuretic Peptides (NPs) have been demonstrated to assist the diagnosis and prognosis of patients with heart failure. The present study sought to determine the clinical prognostic value of amino-terminal pro-BNP (NT-Pro BNP) in patients undergoing Mitral Valve (MV) surgery.

Patients and Methods: Preoperative and postoperative values of NT-Pro BNP (day1-7) were measured in a cohort of 75 patients

who underwent MV surgery. 30-day mortality and prosthetic MV paravalvular leakage were determined as non-optimal clinical outcome (NOCO). General Linear Models (GLMs) and Receiver Operating Characteristic (ROC) Curve Analyses were implemented in the statistical section.

Results: Preoperative lnNT-pro BNP multivariate ANOVA revealed adjusted left atrium (LAi) diameter ($p<0.001$) for Mitral Stenosis (MS), Atrial Fibrillation (AF) ($p=0.006$) and adjusted Left Ventricle End Diastolic Diameter (LVEDDi) ($p<0.001$) for Mitral Regurgitation (MR), AF ($p=0.005$) for Mixed MV Disesase (MMVD), and New York Heart Association (NYHA) class ($p=0.001$) for the entire cohort of patients (ECOP) as significant preoperative factors respectively. Mean postoperative NT-proBNP value, adjusted for the baseline NT-pro BNP effect ($p<0.001$), was dependent on the ischaemic cross clamp time ($p<0.001$) and the duration of cardiopulmonary bypass ($p<0.001$). Logistic regression analysis of the NOCO identified the mean postoperative lnNT-Pro BNP as a significant predictor of the outcome (OR=5.19, $p=0.031$). Mean postoperative NT-Pro BNP ROC curve analysis of the NOCO showed an area under curve (AUC) 76%, $p<0.017$ (optimal cut-off point 2222 pg/ml, sensitivity=1.0, specificity=0.50) for the ECOP, while the MR group had an AUC 88%, $p=0.031$ (optimal cut-off point 3477 pg/ml, sensitivity=1.00, specificity=0.75).

Conclusion: The postoperative measurement of NT-Pro BNP can be a useful biomarker of the perioperative clinical outcome after MV surgery.

OP15-INCIDENCE AND RISK FACTORS FOR STERNAL WOUND INFECTIONS IN CORONARY BYPASS SURGERY

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Background: Sternal wound infection (SWI) is a well known and among the most severe complication after cardiac surgery. This study aimed at determining the prevalence and predictors of SWI after CABG surgery.

Methods: 739 patients undergoing CABG in our center (641 CABG only and 98 CABG in combination with other, mainly valve, surgery) were prospectively included and followed-up two months postoperatively. SWI was defined according the CDC system. Risk factors for SWI were analyzed with logistic regression analysis.

Results: The overall incidence of any SWI was 7.6% (56 patients). Multivariable analysis identified the following significant independent risk factors: length of postoperative stay in days (OR=1.14, $p<0.001$), increased BMI in kg/m2 (OR=1.10, $p=0.005$), duration of operation in minutes (OR=1.005 $p=0.009$), diabetes mellitus (OR=1.94, $p=0.030$), and increased age in years (OR=0.97 $p=0.046$).

Conclusion: Although often underestimated, the incidence of SWI after CABG surgery remains high. Its' impact in terms of clinical and financial outcomes is substantial and therefore identifying the risk factors account for SWI could be of great clinical value. Patients with high SWI risk should alert the physicians for extra prophylactic measures.

Platelets – Minimally Invasive Techniques

OP16-SALVAGE USE OF ACTIVATED RECOMBINANT FACTOR VII IN THE MANAGEMENT OF POST CPB BLEEDING -A COMPREHENSIVE CASE SERIES OF TEN PATIENTS FROM A REGIONAL CENTER

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Background: Refractory post CPB bleeding continues to cause concern for cardiac surgeons and intensivists. Massive post operative haemorrhage following CPB is multifactorial and not fully understood and is also associated with increased mortality and morbidity. Activated recombinant factor VII has emerged as possible salvage medication in refractory post cardiac surgical bleeding. This observational study sought to identify the pattern of use of rFVIIa in cardiac surgery, its effectiveness and risk.

Methods: Study involved retrospective case review of ten patients from medical records undergoing variety of cardiac surgery procedures and who developed life threatening bleeding during surgery or after surgery despite conventional medical therapy including transfusion of blood and blood products and received rFVIIa at a regional Center from August 2007 to April 2009.

Results: All ten patients received two consecutive doses of rFVIIa (average dose 10mg) at one hour interval. Seven (70%) patients reexplored for excessive mediastinal bleeding before receiving rFVIIa. No surgical bleeding points noted in these patients. Two patients (20%) died in ITU from problems not related to bleeding and thromboembolism. Survivors discharged home successfully. There was significant decrease in bleeding following administration of rFVIIa. Blood loss 6 hours prior to treatment with rFVIIa was 1758.89±170.93mls and blood loss 6 hours post treatment was 325.56±50.47mls (p value <0.05). Blood and blood products used 6 hours pre and post administration of rFVIIa were15.0±0.7U and 3.8±0.5U respectively (p value <0.05). No adverse reactions or complications noted related to rFVIIa.

Conclusion: In our limited study, use of rFVIIa in refractory post surgical bleeding was significantly reduced blood loss, and use of blood and blood products. We conclude that rFVIIa can be used satisfactorily and safely as a rescue therapy in the management of post cardiac surgical bleeding.

OP17-MINIMALLY INVASIVE TRANSAPICAL AORTIC VALVE IMPLANTATION: THE INITIAL 20 PATIENTS

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Introduction: The aim of the study is to evaluate the initial results of minimally invasive transapical aortic valve implantation (TA-AVI) in high surgical risk patients suffering of severe symptomatic aortic valve stenosis.

Methods: Since June 2008, 20 patients (45% female, mean age 77.55±5.96 years) underwent TA-AVI with the Edwards Sapien prosthesis using fluoroscopic and echocardiographic visualization. Logistic EuroSCORE and STS score for mortality was 28.1±10.34% and 17.5±9.19%, respectively. Previous cardiac surgery consisted in: CABG in five, aortic valve surgery in three and mitral valve surgery in one patient.

Results: All valves were implanted successfully with good hemodynamic function. There was no prosthesis migration or coronary artery obstruction observed. No patient required conversion to median sternotomy or cardiopulmonary bypass. One patient experienced transient ischemic attack in the immediate postoperative period. Echocardiography revealed trivial to mild paravalvular incompetence in 4 patients. No patient developed complete heart block. Thirty-day mortality was zero. At a mean follow-up period of 10.76±7.9 months, seventeen patients (85%) were alive. Patients improved in NYHA class, from 3.65±0.49 preoperatively to 1.65±0.49 postoperatively.

Conclusions: Minimally invasive TA-AVI can be performed safely with excellent short and mid-term results in high risk patients. The learning curve of the procedure did not cause of any adverse outcomes. Transapical aortic valve in a surgically implanted valve (TA-VinSIV) implantation constitutes a feasible and effective technique.

OP18-MINIMALLY INVASIVE VALVE SURGERY

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Background: Heart valve surgery is commonly performed through a full midline sternotomy. Despite the generally good healing of this incision it remains one of the biggest preoperative concerns for the patient and it often delays his full recovery. Small thoracotomies may completely replace the sternotomy with good surgical results and smaller trauma. We describe our first results with this technique.

Methods: Between December 2007 and September 2009, 136 patients were operated through right anterolateral mini-thoracotomies of 4-5 cm. Indications for surgery were mitral valve repair (n=60), mitral valve replacement (n=10), aortic valve replacement (n=56), tricuspid valve repair (n=5) and atrial septal defect closure (n=5). Mean age was 62±18 years, LVEF of 60±8% and mean NYHA class III (87.5%). For 15.6% of the patients was a redo surgery.

Results: Mean clamping time was of 86+28min and cardiopulmonary bypass time of 123±30 min. No paravalvular leakage (valve replacement) and very low incidence of residual leakage (valve repair) were discovered postoperatively. The 30 day mortality was of 2.7% and the postoperative bleeding rate of 6.2%. The mean blood transfusion quantity was of 1.7 erythrocytary concentrate per patient. The mean ICU time was of 1.2±1.1 days.

Conclusion: This minimally invasive technique for valve surgery is feasible in the every day use without a higher risk for the patient and for the same good surgical results as the one with the full sternotomy. The transfusion rate is smaller and the psychological and cosmetic result superior. However it requires a stiff learning curve and though a special training.

Interventional Cardiology – Heart Failure

OP19-DETRIMENTAL EFFECT OF INTRAORTIC BALLOON PUMPING ON LEFT VENTRICULAR TORSIONAL MECHANICS IN INTACT AND INFRACTED MYOCARDIUM. EXPERIMENTAL STUDY

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Introduction: The role of torsion on left ventricular (LV) contractility is considered pivotal. The aim of this study was to evaluate the effect of intaortic balloon pumping (IABP) on LV torsion in intact myocardium and after an experimental acute anterior myocardial infarction (AMI).

Methods: In 9 healthy pigs LV torsion was calculated by measuring LV basal and apical rotation from basal and apical short-axis epicardial planes with speckle tracking technique using EchoPAC platform. LV torsion was compared between baseline and during IABP in intact myocardium and 2 hours post LAD ligation.

Results: At baseline, ejection fraction was (54±7%) which reduced significantly after IABP (ejection fraction: 43±7%, p=0.001), torsion did not change significantly. LV torsion and ejection fraction 2 hours after acute AMI did not reduce significantly.

Conclusions: IABP exerts adverse effect on LV contractility in intact myocardium but not on torsional deformation in intact and infracted myocardium.

OP20-COMBINED AEROBIC/RESISTANCE/INSPIRATORY MUSCLE TRAINING IN PATIENTS WITH CHRONIC HEART FAILURE. THE IDEAL EXERCISE PROGRAM FOR CHF?

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Introduction: Aerobic training (AT) improves functional capacity in chronic heart failure (CHF) patients Resistance training (RT) may offer an additive benefit while high-intensity inspiratory muscle training (IMT) improves dyspnea and exercise capacity. We investigated the benefits of a combined Aerobic/Resistance/Inspiratory (ARIS) training program in CHF.

Methods: Fifteen patients, age 51±7 yrs and Left Ventricular Ejection Fraction 28±8% were assigned in 3 groups of 5, exercising 3/week for 12 weeks: (i) ARIS group: 30 min AT using a bike at 70-80% of maximal heart rate (HR)/15 min RT of the quadriceps at 50% of 1 repetition maximum combined with upper body exercises using light weights/20 min IMT at 60% of sustained maximal inspiratory pressure (SPimax), (ii) AT group: bike exercise for 45 min at 70-80% of maximal HR and (iii) a no training (NT) group. Patients underwent cardiopulmonary exercise testing, quadriceps strength measurement with dynamometer,

inspiratory muscle strength (Pimax) and endurance (SPimax) by an electronic manometer connected to computer software and quality of life (QOL) using the Minnesota questionnaire.

Results: ARIS group improved peakVO2 (26.2±2.4 vs. 22.2±3.2 ml/kg/min, p<0.05), anaerobic threshold (21.5±4.2 vs.17.9±3.4 ml/kg/min p<0.05), quadriceps strength (0.54±0.1 vs. 0.35±0.1 Nwm/kg, p<0.05), Pimax (114±22 vs.74±17 cmH2O, p<0.05), SPimax (592±179 vs. 351±112 cmH2O/s/103, p<0.05) and QOL (30±5 vs. 36±5, p<0.05). AT group tended to improve peakVO2 (23.1±4.6 vs. 20.6±4 ml/kg/min, p=ns) while NT group did not improve.

Conclusion: Combined Aerobic/Resistance/Inspiratory training improved lower limb muscle strength, inspiratory indices, exercise tolerance and quality of life and may offer maximal exercise benefits in CHF.

OP21-COMPARISON OF ELECTROCARDIOGRAPHIC TO ECHOCARDIOGRAPHIC GUIDED PROGRAMMING OF CARDIAC RESYNCHRONIZATION THERAPY

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Introduction: The aim of our study was to investigate the relation between cardiac resynchronization device (CRT) settings optimization guided by echocardiography and by QRS interval width.

Methods: Twenty consecutive patients (pts) mean aged 64±12 years with heart failure, ischemic or dilated, who underwent an implantation of a CRT device were enrolled. The AV interval was optimized by measuring aortic velocity time integral (VTI) at different AV delay intervals (110, 130 and 150 msec) using continuous-wave Doppler. At the optimal AV delay, interventricular delay (VV) optimization was performed by measuring the aortic VTI at 7 different settings: simultaneous right and left ventricle output, left and right ventricle pre-excitation. The ECG-optimized VV interval was defined according to the narrowest achievable QRS interval.

Results: In 15 pts (75%) echocardiography optimization led to changes in either AV or VV delay (4 only AV, only VV in 8, both in 3). The echocardiographic-optimized VV interval was LV +40 ms in 6 pts, LV +20 ms in 10 pts, simultaneous in 4 pts. LV delay increased in 7 pts (range of changes 10msec to 40msec) and decreased in 4 (20 to 40 msec). AV delay changes were applied in 7 pts. Echocardiographic optimization significantly improved diastolic filling and cardiac output (p<0.05) compared to ECG programming. Concordance was not found between echocardiographic and ECG-programming.

Conclusion: Echocardiography and ECG- based CRT programming do not seem to be in concordance. Echocardiography helps optimize the diastolic and systolic settings resulting in acute cardiac output improvement.

OP22-ONE-YEAR PROGNOSIS IN PATIENTS WITH MARKEDLY REDUCED LEFT VENTRICULAR FUNCTION: ASSOCIATION WITH RESULTS OF ENDOMYOCARDIAL BIOPSY

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Introduction: Some patients (pts) with dilated cardiomyopathy (DCM) has viral persistence and/or inflammation in their endomyocardial biopsy (EMB) specimens. EMB is still not routinely used in the evaluation of heart failure pts.Aim of our study was to examine the proportion of viral persistence and/or inflammation and 1 year prognosis in all pts admitted for evaluation of NICHF by analysing EMB specimens in our department.

Methods: 85 patients with clinically suggested DCM underwent coronary angiography and right ventricular EMB. EMB specimens underwent immunohistological assessment.PCR was performed to detect the genomic sequences of various viruses and othe pathogens.All pts had markedly reduced LVEF(25±7%), increased NT-proBNP values and symptoms of heart failure .

Results: In 41 pts viral genome was detected as follows: Chlamydia Trachomatis (n=25),Chlamydia psittaci (n=1), HSV-6 (n=1), Coxsackie B3 (n=2) and CMV (n=1).Coinfections with Chlamydia trachomatis and either HSV-1/HSV-2 or HSV-6 were present in 10 biopsy specimens while coinfection with ParvoB-19 and HSV-1/HSV-2 in 1 biopsy specimen. Inflammation (>14 lymphocytes or macrophages/mm², WHF criteria) was observed in 19 pts. Patients were divided into 4 groups: group 1 consisted of pts without any inflammation or virus detection (n=30), group 2 of pts with autoreactive myocarditis (virus-negative, but inflamed myocardium) (n=13), group 3 of virus-positive pts without inflammation (n=29) and pts with virus-positive inflammed myocardium formed group 4 (n=12). All major cardiovascular events [MACE; cardiovascular death (n=3),assist device implantation (n=8), heart transplantation (n=2) and re-hospitalisation due to cardiac decompensation (n=5)] during one year were recorded (n=18).When pts were divided according to viral status, patients without virus detection tended to have fewer MACE compared to patients with virus persistence.

Conclusion: Viral persistence in pts with NICHF was associated with increased MACE. Data from endomyocardial biopsy in pts with reduced left ventricular function is of prognostic relevance.

Diabetic Cardiovascular Disease

OP23-LONG-TERM DUAL ANTIPLATELET TREATMENT IN DIABETIC PATIENTS TREATED WITH SIROLIMUS-ELUTING STENT IMPLANTATION

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Introduction: We investigated the influence of long-term dual antiplatelet treatment (APLT) on clinical outcome of patients (pts) with diabetes mellitus (DM) and coronary artery disease, treated with sirolimus-eluting stent (SES) implantation.

Methods: We assessed 267 consecutive DM pts (male 83%, mean age 64±9 years) after SES implantation and dual APLT treatment for 12 months. Long-term (5 years) clinical follow-up (FU), obtained in 264/267 (99%) of them; 119 (45%) pts were

on single APLT (SAPLT) and 145 (55%) on dual APLT (DAPLT). Adverse events on clinical FU were considered death (D), myocardial infarction (MI), cerebrovascular accident (CVA), and their combination as hard end-point (HEDP).

Results: There was no difference in gender, age, risk factors profile, history MI, previous CABG, unstable angina on presentation, extent and location of coronary artery disease, and systolic left ventricular function, between the two groups. Clinical FU at 5 years showed total mortality 8.4% vs. 11.7%, cardiac D 3.4% vs. 7.6%, MI 2.5% vs. 2.8%, CVA 2.5% vs. 3.4%, and HEDP 9.2% vs. 15.9% between pts in SAPLT and DAPLT respectively (p:ns). The incidence of late stent thrombosis (LST) was 1.7% in SAPLT (mean time 34±28 months) and 6.9% in DAPLT (mean time 33±20 months), (p=0.07). Non-cardiac operation required 22% of pts in SAPLT and 15% in DAPLT (p:ns); 85% in both groups discontinued APLT before operation and there was one LST (in DAPLT group).

Conclusion: Long-term DAPLT in DM pts treated with SES implantation is not associated with better clinical outcome or lower risk of LST.

OP24-POST-ISCHEMIC CARDIAC REMODELING IS ACCELERATED IN DIABETIC RATS: SIMILARITIES TO CLINICAL AND TISSUE HYPOTHYROIDISM

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Aim: This study investigated whether postischemic cardiac remodeling (REM) is accelerated in diabetic (DM) rats with possible involvement of thyroid hormones (TH) signaling in this response. Changes in TH signaling occur during REM after acute myocardial infarction (AMI) and contribute to cardiac dysfunction.

Methods: DM was induced in male Wistar rats by streptozotocin injection (35mg/Kg i.p.) for 30 days. DM rats were subjected to AMI by coronary artery ligation (DM-AMI, n=9), while control rats were either sham-operated (SHAM, n=10) or subjected to AMI (AMI(1), n=10).. Another group of animals were made hypothyroid by propyl-thiouracil administration for 3 weeks and then subjected to AMI (HYPO-AMI, n=6) while untreated rats subjected to AMI served as controls (AMI(2), n=6). Two weeks after AMI, echocardiography analysis was performed in all groups.

Results: Data are shown in the following table

	LVEDD (mm)	LVEDS (mm)	EF%
SHAM	6.5 (0.1)	3.8 (0.2)	76 (2.6)
AMI(1)	7.7 (0.2)*	5.7 (0.2)*	52 (1.5)*
DM-AMI	8.5 (0.2)**	7.0 (0.3)**	39 (2.1)**

*p<0.05 vs SHAM, **p<0.05 vs SHAM and AMI(1).

No changes were found in circulating TH. In AMI(1), TRα1 and TRβ1 expression was not different vs SHAM while in DM-AMI, both TRα1 and TRβ1 were decreased 1.7 and 1.9 fold respectively vs SHAM, p<0.05. In addition, EF% was markedly reduced [24 (0.9) in HYPO-AMI vs 36.2 (1.0) in AMI(2), p<0.05], while LVEDS was 8.3 (0.2) for HYPO-AMI and 7.5(0.1) for AMI(2), p<0.05. LVEDD equally increased in the 2 groups.

Conclusion: REM is accelerated both in hypothyroid and diabetic hearts. Tissue hypothyroidism which occurs in DM after AMI may account for this response

Coronary Artery Disease – Congenital Heart Disease

OP25-EARLY AND LATE OUTCOME AFTER AORTIC VALVE REPLACEMENT IN PATIENTS WITH PREVIOUS CORONARY ARTERY BYPASS GRAFTING AND PATENT GRAFTS: RESULTS IN 96 PATIENTS

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Aim: We set out to study the early and late outcome in patients undergoing aortic valve replacement (AVR) with previous coronary artery bypass grafting (CABG) plus patent grafts.

Methods: Between January 2001 and October 2009, 96 patients (80 male) with previous CABG (79 patients) ±concomitant surgery and patent grafts underwent AVR. The median age of the patients was 75 years and the mean logistic Euroscore was 25.56±1.77. Median time since previous operation was 9 years. The left internal mammary artery (LIMA) was used in 68 patients (70.8%) and remained patent in 67 cases (98.5%).

Results: In-hospital mortality was 8.3% (n=8) less than predicted by either mean EuroSCORE or mean logistic EuroSCORE. Isolated AVR was performed in 59 patients (61.45%). LIMA was dissected and isolated (clamped or blocked with balloon) in 58 patients. The median hospital stay was 16 days. Seventeen patients (17.7%) had pulmonary complications, 12 patients (13.6%) had deterioration of renal function. Seven patients (7.3%) required permanent pacemaker and 13 patients (13.5%) were re-explored for bleeding/tamponade. Six LIMAs were damaged and required additional procedures. On multivariate analysis, cardio-pulmonary bypass (p=0.03) and aortic cross-clamp time (p=0.02) were identified as independent predictors of hospital mortality. Actuarial survival at 1 year was 86.6±0.04 % and at 5 years was 72.7±0.06 %.

Conclusions: In-hospital mortality of AVR following CABG with patent grafts is significantly lower than predicted by logistic Euroscore and can be performed with excellent early and late outcome. Medium term mortality could well compare to results achieved and published for catheter-based approaches. Open surgery for redo aortic valve replacement should still be considered the standard even in these high risk patients.

OP26-SUPPORTING HEMODYNAMICS IN THE SETTING OF ISCHEMIA AND REPERFUSION: T3 VS PHENYLEPHRINE

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Adrenergic agonists are used to support hemodynamics in low cardiac output syndromes. However, their use may be harmful in acute coronary syndromes. T3 has long been realized to possess inotropic action. We investigated the effects of T3 on reperfusion injury in an experimental model of ischemia-reperfusion (I-R) versus phenylephrine (PHE, an α1-adrenergic agonist).

Methods: Rat hearts were perfused in a Langendorff preparation and subjected to 30 min of (I) and 60 min of (R). T3 (40μg/L) was administered during R in T3-treated hearts, n=8, while untreated hearts served as controls, CONT, n=10. PHE was administered during (R) at 1 μM or 50 μM, PHE(1), n=7 and PHE(50), n=9 and compared to untreated normal hearts, NORM, n=10. Contractility was assessed by left ventricular developed pressure (LVDP in mmHg) and left ventricular end-diastolic pressure (LVEDP in mmHg).

Results: Data are presented in the following table:

	LVDP	LVDP%	LVEDP at (R)
CONT	119 (2.2)	38.9 (3.5)%	71.6 (5.4)
T3	117 (2.4)	58.7 (4.0)%*	55.0 (4.5) *
NORM	114 (3.3)	38.5 (4.1)%	64.5 (5.4)
PHE(1)	119 (3.9)	29.5 (3.5)%**	77.0 (4.5)
PHE(50)	122 (3.2)	51 (5.1)%	67.3 (4.7)

* p<0.05 vs CONT, ** p<0.05 vs PHE(50)

In T3-treated group, levels of phospho-p38 MAPK were reduced 1.5 fold (p<0.05 vs CONT). In PHE(1) hearts, phospho-p38 was increased 1.8 and 1.9 fold vs NORM and PHE(50) hearts, respectively, p<0.05. No changes were found in phospho-JNKs between all groups.

Conclusion: T3 administration at (R), in contrast to PHE improves postishemic recovery of function via suppression of p38 MAPK. T3 seems to combine an inotropic with anti-apoptotic action.

OP27-THE EFFECT OF DRUG-ELUTING STENTS IN ELDERLY (>70 YEARS) DIABETIC PATIENTS: COMPARISON TO YOUNGER PATIENTS

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Introduction: The elderly (EL) constitute a rapidly expanding part of our population and cardiovascular disease becomes more prevalent with increasing age. In this prospective study, we assessed the results after drug eluting stent (DES) implantation in diabetic (D) EL, as compared to younger (YO) pts.

Methods: A total of 610 consecutive pts that had been treated with DES were classified in 2 groups according to age: 1) YO pts (N=429, age ≤70 years); 2) EL pts (N=181, age >70 years). Clinical outcome at follow-up (FU) (median 29 months) was obtained in 98% of pts. Adverse events at FU were considered death, myocardial infarction (MI), cerebrovascular accident (CVA), bypass surgery (CABG), target (TLR) and non-target (non-TLR) lesion revascularization.

Results: EL group had more women (30% vs. 16%, p=0.001), a higher incidence of hypertensive (85% vs. 77%, p=0.03), with previous CABG (25% vs. 14%, p=0.001), and ejection fraction <40% (15% vs. 9%, p=0.05) compared to YO pts. The clinical success rate was high (>99%) in both groups. At FU, a higher rate of death (10.3% vs. 2.8%, p<0.001), CVA (4.6% vs. 0.7%, p=0.003), and combined death/MI/CVA (15% vs. 6%, p<0.001) was observed in EL pts; YO pts had a higher rate of non-TLR (19% vs. 11%, p=0.02). Definite and probable stent thrombosis was similar in both groups, but possible, was higher in EL pts (p=0.02).

Conclusion: The long-term effectiveness of DES in EL D is lower due to an increase risk for death or CVA, compared to YO pts.

OP28-DIASTOLIC DYSFUNCTION PRECEEDS WALL MOTION ABNORMALITIES IN DOBUTAMINE STRESS ECHOCARDIOGRAPHIC STUDIES

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Introduction: Diastolic dysfunction is known to preceed systolic abormalities in the ischemic cascade. Aim of our study was to evaluate if early diastolic indices deterioration can predict latent wall motion abnormalities during dobutamine stress echocardiographic studies.

Methods: One hundred forty-eight patients without previously known coronary artery disease underwent a transthoracic stress echocardiographic study with intravenous dobutamine infusion at 5, 10, 20, 30, 40 μg/kg/min. If 85% of the maximal predicted heart rate was not achieved 1 mg of atropine was administered. Wall motion score index (WMSI) (1=normokinesia, 2=hypokinesia, 3=akinesia, 4=dyskinesia) was calculated following the 16-segment model at baseline, low dose (10 μg/kg/min) and peak dose dobutamine. E/e'septal, E/e'lateral and E/e'median (E/e'septal+e'lateral/2) were measured at the same stages. Ischemic response was considered an increase in WMSI of at least 3 implicating at least 3 myocardial segments.

Results: Ischemic response was present in 65 patients (44%).

E/e'median >12 at low dose dobutamine could predict the ischemic response in peak dose dobutamine with a sensitivity of 82.5% (53/65), a specificity of 87.9% (73/83), positive predictive value of 69.3% and a negative predictive value of 84.8%.

Conclusion: Diastolic dysfunction seems to preceed wall motion abnormalities during dobutamine stress echocardiography. Studying simple diastolic indices at low dose dobutamine can predict an ischemic response with a relatively good diagnostic accuracy.

OP29-EXTERNAL SAPHENOUS VEIN SUPPORT PREVENTS GRAFT OCCLUSION IN CABG SURGERY

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Background: The most promising therapy for patients with advanced ischemic-heart disease is coronary-artery bypass grafting (CABG). The mainly used graft-materials are autologous saphenous-veins. However, they are prone to occlude at high rates, causing infarctions and the necessity for high-risk redo-surgery. Recently, a Nitinol-based external vein support mesh (eSVS™) was developed and tested in animals. It revealed superb patency and long-term lack of intimal hyperplasia in supported grafts. We report the first in-the-human implantations in patients undergoing CABG.

Methods: In a prospective, randomized clinical multiCenter trial, from 2008-2009 we have performed the first in-the-human implantation in 20 patients with 3-vessel coronary-artery disease after informed consent. Either the Right-Coronary (RCA)- or the Circumflex-Artery (CX) were included as target-vessels in the randomization process. One of these two vessels received an eSVS™, the other one received a regular SVG only.

Results: The supported grafts displayed a superb surgical handling and did not kink. Early-postoperative 64-slice CT-angiography proved patency, while the endpoint is 9 month angiographic patency. So far, 6 patients underwent the one-year angiographic follow-up and all eSVS™ supported grafts displayed patency whereas two out of six regular SVGs were occluded.

Conclusion: The eSVS™ improves SVG patency by significant downsizing of SVG and mimicking compliance of arterial conduits. Its long term superb patency proven, this new device may have vast prospects for patients destined for bypass-surgery. It could spare them the arterial-harvest, reoccurrence of cardiac-events, as well as redo-surgery. Further it would allow for complete revascularization without compromise and with the quality of arterial-grafts.

OP30-IS EMERGENCY SURGICAL MYOCARDIAL REVASCULARIZATION CONSIDERED SUFFICIENT FOR ACUTE CORONARY INSUFFICIENCY

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Introduction: Emergency myocardial revascularization (EMR) for acute coronary insufficiency (ACI) is associated with increased morbidity and mortality. To evaluate the effectiveness of our surgical protocol for EMR, we reviewed our 10-year experience with coronary artery bypass operation.

Methods: From 1995 to 2005 4727 adult cardiac operations were performed in our department. Of them 3340 were isolated coronary revascularizations. EMR for ACI was performed in 34 patients (1.02%). Patients with clinical manifestation of ACI were considered those with ECG changes and hemodynamic instability.

Unstable angina was present in six patients. Seven patients had an evolving myocardial infarction and two had infarct related mechanical complications. ACI was diagnosed during angioplasty in 17 patients and during routine catheterization in 2 patients. Prompt EMR was performed upon presentation of ischemia and unstable hemodynamic condition. Intraaortic balloon pump was preoperatively placed in 31 patients and intaoperatively in 3. Cardiopulmonary bypass (CPB) was used in 32 patients. Intraoperative myocardial protection protocol included cold (4°C) blood cardioplegia retro and antegrade fashion. Leukocyte depleted myocardial reperfusion protocol was used in all patients. Two patients were operated on without CPB (OPCAB). Arterial grafts were used in 17 patients (50%). Six patients were transferred in the ICU with an open chest to control hemodynamic instability and/or increased bleeding.

Results: Operative mortality was 1 patient (2.9%) who died the 4th postoperative day of multiple organ failure and sepsis after EMR without CPB. Overall ICU stay was 2.5-8.5 days. Major postoperative complications were: low cardiac output syndrome (n=12), acute renal failure requiring dialysis (n=6), peripheral vascular ischemia (n=3), bleeding requiring exploration (n=6).

Conclusions: The prompt myocardial surgical revascularization with integrated myocardial protection techniques is considered efficient option with satisfactory results.

OP31-HYBRID PROCEDURES FOR CONGENITAL CARDIAC LESIONS

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Introduction: We herein present an alternative treatment in 7 patients with congenital heart disease employing the hybrid approach. The goal is to provide optimal therapy by minimizing the potentially harmful effects of methods that accompany conventional surgical procedures.

Methods: From June 2006 to February 2010, 7 patients age 4 months to 56 years old with congenital heart disease underwent hybrid procedures for complex cardiac lesions. Two patients underwent beating heart closure of a muscular ventricular septal defect (VSD) with an occluding device. Also a patient with supra-aortic, main and branch pulmonary artery (PA) stenosis underwent conventional surgical patch augmentation of the ascending aorta and the main pulmonary artery, while the branch PA stenoses were treated by intraoperative stenting. Four patients with tetralogy of Fallot (TOF) and branch PA stenosis underwent conventional pulmonary valve replacement and patch augmentation of the the main pulmonary artery, while the branch PA stenoses were treated by intraoperative stenting.Of these one had in addition intraoperative VSD closure with an occluding device.

Results: There were no deaths. One patient had an open chest closure the first postoperative day. Another developed

postoperative pneumothorax. Median ICU and hospital stay were 1 and 5 days respectively. At follow up of 2-48 (median 5) months, all patients remain well and free from further interventions.

Conclusion: Patients with muscular VSD can currently be treated with the hybrid approach. Residual VSD closure with an occluding device in reoperations can significally reduce the operative time. Intraoperative pulmonary artery stenting in addition to conventional surgical repair can be performed safely and may be complementary in patients with complex lesions.

OP32-EFFECT OF REVASCULARIZATION OF SEVERELY STENOTIC OR OCCLUDED LEFT ANTERIOR DESCENDING ARTERY ON THE STABILITY OF THE OP-CABG FOR MULTI-VESSEL CORONARY ARTERY DISEASE

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Objective: Aim of the study is to determine if revascularization of severely stenotic or occluded (95 to 100%) left anterior descending artery (LAD) may confer higher haemodynamic stability during off-pump coronary artery bypass grafting procedure (OP-CABG) of multivessel coronary artery disease (M-CAD), compared to a less important lesion (70 to 90%) of the LAD.

Methods: From January 2007 to January 2010, 107 patients underwent OPCABG for M-CAD. Univariate and multivariable regression statistical models were computed to analyze the combined end-point of death /perioperative myocardial infarction /conversion to on-pump procedure /postoperative low output syndrome, and prolonged postoperative mechanical ventilation time (>12 hours).

Results: There were no operative deaths. Perioperative myocardial infarction was 2.8% (3/107). Combined end-point was 18.7% (20/107). Predictors of combined end-point were less important stenotic lesion (70 to 90%) of the LAD (p=0.027, OR 14.0), mean number of grafts per patient (3.0±0.8 vs 2.3±0.8, p=0.029, OR 3.1), lower value of left ventricular ejection fraction (0.48±0.13 vs 0.55±0.9, p=0.004, OR 1.1). Less important stenotic lesion of the LAD predicted also a prolonged postoperative mechanical ventilation time (p=0.043, OR 3.8).

Nursing Forum Oral Presentations - New Trends in Cardiac Nursing

NF01-CONFRONTATION INTERVENING OF DYSLIPIDEMY

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H LDL ablation/removal represent one very promissory method who the last years make terrene therapeutic confrontation patients ultracholesterol. The first meeting act out in the beginning to the 90 which and note some decrease to the LDL rate 50%.

Since plethora studies published until today, which appear through importantly melioration dyslipidemic profile to the patients as such and the superior clinic resultant with the action of these method.

The method Dali consist in out body transmission of the blood to the patient filter detainer LDL that contents specially globules polyacrylamide. The polyacrylic acid tie exclusively the LDL, the Lp (a) fibrinogen. Afterward become transfer venous blood from air detector and the end drainage system. All day along duration session make continuous control and adjustment who regard one course parameters which reference to have steady hemodynamics state, absence allergic reaction etc. Occasionally watch with the termination of the LDL removal one semilquid filter bed in the surface of the filter, who is the portion of the removal mass LDL.

With this technique apart the decrease LDL cholesterol has report and one plethora another favorable actions, like reduction the CRP, the chilomicro but in the long run has note wear light melioration endothelial function epicardial vessels as upgrading microcirculation coronary web.

As effect of the reported favorable results of the method for lipidemic profile of the patients are the reduction angina episodes, the melioration the duration of the exercise, decrease the interventional methods confrontal coronary disease (pottery, bypass) decrement the cardiac acid coronary episodes and the hearth mortality.

The sessions LDL removal don't fill in only act accompany antilipidemic action (provided is tolerant).

The results who have performance of the mass patiens are specially invitingly for the continuation of them treatment and the us results are comparable one to one abroad centers who the methods practice.

NF02-PERCUTANEOUS AORTIC VALVE REPLACEMENT IN THE CATH LAB: WHERE DO PROGRESS AND EXPERIENCE LEAD US AFTER 120 SUCCESSFUL TRANSPLANTS AT THE ONASSIS CARDIAC SURGERY CENTER

S. Karagianidis, Sp. Linardos

Introduction: The percutaneous aortic valve replacement has now become a solid reality for today's cardiovascular laboratories. The case selection, initially, concerns patients with aortic stenosis and severe heart failure, who can not undergo surgery because of the high peri-operative risk. In the Onassis Cardiac Surgery Center (OCSC), more than one hundred twenty percutaneous aortic valve replacement surgeries have been performed with high success rates. It should also be noted that it is the only Center in Greece and one of the few worldwide that applies both existing models with their alternatives: transfemoral Core valve, Edwards, subclavian and transapical.

Object: The valve application technique is a modern miracle of mechanics and technology application to humans. Besides the presentation of this application, object includes showing the advantages of this technique over the traditional operative method, as well as a more general comparison. The unnecessity of general anesthesia in many of these cases, as well as the reduced operating time are some of the features that make this new technique a serious alternative in the treatment of aortic valve disease. The nurse's participation is also determinative while assuming a new role in these operations. A complex role in a new spectrum of action. It is important that this new role is described and entrenched.

Conclusions: The first very encouraging results of the transfemoral aortic valve replacement application show that, in the future, a universal application is possible with multiple benefits for both the patient and the health cost.

NF03-SUBSTANCE P AND NPY PLASMA LEVEL AS POTENTIAL NURSING ASSESSMENT INDICATORS IN CORONARY CRITICAL CARE ADULTS

E. Kletsiou, E.D.E Papathanasoglou, E. Bozas, E.K Iliodromitis, M. Anastasiou–Nana, M Giannakopoulou.

NF04-ECG CHANGES IN STRESS ECHO AND THEIR PROGNOSTIC VALUE IN CORONARY ARTERY DISEASE: NURSE EVALUATION

A. Motsi

The coronary heart disease is the leading cause of death in the modern developed world. Stress echo is a non-invasive technique for diagnosis of coronary artery disease.

The aim of our study was to relate the changes in the electrocardiogram during the test, with the anatomical and fuctional characteristics of the left ventricle and to investigate the prognostic significance of the arrhythmias or ST-T changes in patients suffered from coronary disease.

Our study revealed the relationship between ECG changes and the detection of ischeamia during stress echo in patients suffered

from CAD. Treatment with b.blockers can prevent arrhythmias or ST-T changes without impairment of the metod accurancy. The electrocardiogram showed no prognostic assessment to be possible.The stress echo is an internationally accepted non-invasive method for its meaning in diagnosis and prognosis of CAD.Studies have highlighted the electrocardiogram as a core functionof stress echo. They have study and analyze the findings during examination taking into account various factors associated with the coronary artery disease. Its prognostic significance is important, and the scholar may take into account various factors that affect the define (left ventricle fruction, medication, previous intervention reperfusion, risk factors).

The nursing approach during the load is equally crucial. The expert staff monitoring the ECG findings may correlate with the symptoms of the test and prevent adverse events. The rapid developments in science, research, technology and staffing to comprehensive health care personnel in the health sector offers perspectives for the desired effect: the treatment of disease.

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NF05-ACUTE MYOCARDIAL INFARCTION: DIFFERENCES IN KNOWLEDGE BETWEEN MEN AND WOMEN

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Introduction: Patient outcome after Acute Myocardial Infarction (AMI) has been associated with demographic[1,2] and socioeconomic factors[3]. Awareness of heart disease and its symptoms is necessary for prompt identification of AMI symptoms and quick seek of medical assistance, which is critical in minimizing morbidity and mortality post-AMI[4].

Aim: The investigation a) of the ability and Knowledge of patients' post-AMI, to identify the clinical signs and symptoms of a recurrent episode of AMI. 2) of the risk factors of Coronary Heart Disease (CHD) and the correlation of this knowledge with their gender.

Material and Methods: One hundred and four (104) patients (80 males - 24 females) who were admitted through the emergency department and hospitalized for AMI from June 1st 2007 to June 30th 2009, comprised the study population. Data were collected through a telephone interview with the patients, using a questionnaire including 46 questions (15 of them referred to patients' demographic characteristics). Answers were categorized as "right" or "false". Data were analyzed with SPSS 13.0 statistical software (SPSS Inc, Chicago, IL, USA). To compare the variables we used non-parametric tests (Mann – Whitney test, Kendall's tau test and Kruskal-Wallis test). Statistical significance was set at .05

Results: The questionnaire's Cronbach's alpha was 0.688. The majority of patients were male (76.9%), 40-59 years old (53.8%) and they were of higher education (51%). Correlation between patients' gender and their knowledge about the side effects of analgesics, the anticoagulation therapy, the nicotine substitutes and the time needed (sec) in recalling their physician's telephone number is shown in Table 1.

Conclusions: The results of the study suggest the necessity of individualized educational interventions related to patient's sex. It is very important for the physicians and nursing staff to offer a follow up feedback to the patients' knowledge before their discharge and at least after two months.

Table 1. Correlation between patients' gender and knowledge post-AMI.

Questions	Response	Gender				Kendall's tau_p
		Male		Female		
		N	%	N	%	
What do you know about side effects of analgesic drugs (opioids)?	False	40	50	18	75	-0,212* p=0,031
	Right	40	50	6	25	
Do you know the drug of choice for anticoagulation therapy?	False	29	36,3	3	12,5	-0,213* p=0,031
	Right	51	63,8	21	87,5	
Do you know the nicotine replacement products?	False	11	13,8	9	37,5	-0,254* p=0,010
	Right	69	86,3	15	62,5	
Do you know your physician's telephone number? (report time required in recalling it (sec)	10-29 sec	42	52,5	6	25	0,232* p=0,018
	>30 sec	38	47,5	18	75	

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NF06-RESPIRATORY FLORA IN CARDIOLOGIC PATIENTS AFTER ENDOTRACHEAL INTUBATION.

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Introduction: Increasing research interest over the past few years has focused on the possible role of direct tracheal colonization[1,2], as well as the potential role of the endotracheal tube itself in the colonization process[2]. Many of the risk factors for respiratory tract colonization and nosocomial pneumonia overlap; they include patient-related conditions, infection control–related problems, intervention related alterations in host defenses, and bacterial exposure[3]. The aim of the present study was to monitor flora of respiratory system for bacteria and fungi during the first 24 hours after intubation and before the extubation of patients who were admitted in Coronary Care Unit (CCU) of Onassis Cardio Surgical Center (OCC). *Individual objectives* were to compare changes of respiratory flora with the appearance of ventilator associated pneumonia (VAP) and, to estimate incidence of flora colonization of respiratory system of intubated patients in the Coronary ICU of OCC.

Materials and Methods: *Patients:* From January 2006 to November 2008 we studied 39 patients admitted to our CCU who receive mechanical ventilation (MV) and were without pulmonary infection. At the time of entry, the following data were recorded: age; gender; duration of hospital stay; location before ICU admission (emergency department, hospital ward, or transfer from another hospital); and the primary reason for ICU admission (Coronary disease, Heart failure and arrhythmia). We also recorded the history of COPD and other comorbid conditions; acute renal failure; APACHE II (acute physiology and chronic health evaluation), CPIS (Clinical pulmonary infection score) and NYHA Class (New York Heart Association Functional Class).

Sample Collection: From each patient two samples of bronchial excretions were taken for culture. The first sample was obtained during the first 24h of tracheal intubation and the second sample, before the extubation.

Result: A total of 39 patients were evaluated (mean age, 67.8 ±11.9 years). Thirty patients (76,9%) were men. The average duration of MV was 7 (5-11) days. The mean APACHE II score of the entire study population was 19,3±2,3, and the mean CPIS score was 3,7±1,3 (Table 1). The patients had been admitted to the CCU because of Heart failure (n=18), AMI (n=13) and Arrhythmia (n=9).

Table 1: Clinical Characteristics of 39 Patients

Characteristics		N	%
Diabetes mellitus	No	19	48,7
	Yes	20	51,3
Renal failure	No	25	64,1
	Yes	14	35,9
Level of Albumin	>4,5mg/dl	12	31,6
	≤4,5mg/dL	26	68,4
Albumin (mean ± SD)		3,3±0,6	
Cardiac index (mean± SD)		2,3±0,4	
In LVEF (mean ± SD)		32,6±10,7	
NYHA CLASS	2	2	5,3
	3	19	50,0
	4	17	44,7
APACHE II Score (binary)	<18	14	40,0
	>18	21	60,0
APACHE II Score (mean ± SD)		19,3±2,3	
CPIS (mean± SD)		3,7±1,3	

Table 2: Microbial colonization according the risk factors

Risk factors		Microbial colonization		P (Mann-Whitney test)
		No	Yes	
		N(%)	N(%)	
Duration of IABP[(in days) (median(interquartile range)]		3(3-4)	6,5(6-8)	0,009
Duration of Central Venus Catheter[(in days) (median (interquartile range)]		5,5(2-8)	11(7-14)	0,004
Duration of stay in ICU after intubation [(in days) (median (interquartile range)]		4,5(3-6)	8,0(6-13)	0,001
Intubated for	48 h	5(35,7%)	0(0,0%)	0,010 ‡
	>96 h	9(64,3%)	18(100,0%)	
Duration of enteric nutrition [(days) (median (interquartile range)]		6,0(4-8)	8,0(6-13)	0,048
Presence of sedation for 48h		5(35,7%)	0(0%)	0,010 ‡
Presence of sedation for >96 h		9(64,3%)	18(100%)	
CPIS(mean ± SD)		2,5±0,9	4,6±0,8	<0,001**
APACHE II Score (binary) <18		8(61,5%)	5(38,5%)	0,047*
>18		4(25,0%)	12(75,0%)	

* x^2 test

**Student's t-test

‡ Fisher's exact test

Seven (17,9%) of the patients were colonized by potential pathogens in their lower airways during the first 24h of intubation. 14 patients (35.9%) did not have tracheal colonization before extubation, and the rest 18 patients (46,2%) were colonized by potential pathogens microorganism before the day of extubation. The most frequently isolated organisms were *Acinetobacter spp.* (24%), *methicillin resistant Staphylococcus aureus* (24%), *methicillin sensitive Staphylococcus aureus* (16%), *Escherichia coli* (12%), *Candida albicans* (12%), *Enterobacter spp.* (8%), *Serratia marcescens* (4%). Two (5,2%) of the patients that didn't have initial colonization, developed VAP during the study period. Risk factors for colonization with potential pathogens in bronchial excretions was found to be; Duration of stay in CCU; Intubated for >96h; Duration of IABP ; Duration of Central Venus Catheter ; Duration of enteric nutrition; Presence of sedation for >96 h; CPIS score 4,6±0,8 and APACHE II Score >18 (Table 2).

Conclusion: In our study, two of 18 patients with tracheal colonization had VAP, compared to none of 14 patients who did not have tracheal colonization. These data support those of other authors who have found that tracheal colonization precedes pulmonary infection. On the other hand, the presence of tracheal colonization by itself does not appear to be a unique condition for VAP to occur, in as much as only a minority of patients with colonization has VAP diagnosed. The knowledge of risk factors for colonization of lower airways in cardiologic patients is necessary in order to develop strategies for prevention or interrupting colonization by potential pathogens.

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NF07-NURSING EVALUATION AND SUPPORT OF PSYCHOLOGICAL STATUS OF THE PATIENT AT THE POST-MYOCARDIAL INFARCTION PERIOD

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Background: According to the World Health Organization, depression is currently the fourth leading cause of disability worldwide, and its incidence is increasing rapidly. It is projected that depression will be the second leading cause of death by the year 2020. Cardiovascular disease, which is currently the leading cause of death and morbidity in the industrialized world, it is projected to become the number 1 single cause of mortality by 2020. Moreover, there appears to be an interaction between the two diseases that augments their respective importance when they are combined. The purpose of this review is to investigate 1) the existing guidelines and tools for nursing evaluation of the psychological status of the cardiac patient and 2) the management of the psychological problem and the support provided to the cardiac patient by the nursing staff.

Methods: The critical analysis of Greek and international scientific articles which were published at MEDLINE database during the past 10 years. The key words that we used were: acute myocardial infarction, depression psychological evaluation, nursing care, psychological assessment.

Results: Adverse psychological factors are common in persons with cardiovascular disease, with up to 50% of survivors of myocardial infarction having evidence of significant depressive disorders. Cardiovascular healthcare providers, and especially nurses, are in an important position to indentify and help individuals with co-existing cardiac disease and psychological distress, because they are often among the first to see the patients during and after a cardiac event. Studies indicate that less than 25% of persons with cardiovascular disease and probable depression could be identified correctly by healthcare workers. Standardized tools are available to help identify individuals with psychological distress. Moreover, in some articles it is recommended the use of a handful of basic, open-ended questions to help clinicians in that role. The nursing role in the psychological support seems to be of great importance and includes the development of an individualized plan of action, depending on the severity of the psychological problem.

Conclusions: Research has clearly linked the presence of depression with several types of adverse outcomes in patients with cardiovascular disease. Individuals presenting with either the classic diagnostic symptoms of major or minor depression or with predictive characteristics should undergo with further testing with use of a validated psychometric instrument. Nursing stuff has a key role not only in the early recognition and assessment of the psychological status of the cardiac patient, but also in providing psychological support and treatment to these patients.

NF08-ACUTE RENAL FAILURE AFTER CARDIOTHORACIC SURGERY OPERATION: THE OCSC EXPERIENCE

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Background: Acute renal failure (ARF) after cardiac surgery is well recognized as a complication with higher rates of mortality and morbidity. Generally occurs in 1 to 10% of patients.

Objectives: Assess the incidence of acute renal failure in patients underwent cardiac surgery; determine the factors associated with long-term outcomes and mortality rates.

Methods: A study was conducted among patients underwent cardiac surgery over the period 1/1/07 and 31/12/07 in our hospital. Records from 1718 patients were retrospectively evaluated. Significant risk factors, including age, complex procedures, low cardiac output, gastrointestinal complications, chronic renal insufficiency, and sepsis were also taken into account.

Results: From January 2007 to December 2007, 1718 patients underwent cardiac surgery in our hospital; 68 of 1718 patients (3,98%) had acute renal failure requiring continuous renal replacement therapy (CRRT) or intermittent hemodialysis (IHD). 817 therapies were applied among those 68 patients either as renal replacement or renal support from 8 nurses in 24 hour basis. In-hospital mortality was 30,8% (21 of 68); 2 patients established chronic renal failure (2,94%) ; Cure was in 45 patients (66,1%).

Conclusions: Patients with ARF can be treated with IHD or CRRT and the choice is based on patients' needs. Dialysis prescription should incorporate the unique characteristics of each patient, especially in a cardiac intensive care unit that acute renal failure is increasingly seen as part of multiple organ dysfunction syndrome in critically ill patients. In the long-term surviving patients are not likely to require further renal support.

NF09-PATIENT COMPLIANCE TO LIFE STYLE CHANGING INSTRUCTIONS AFTER OPEN HEART SURGERY

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Introduction: In recent decades Cardiac Surgery carries great progress and has achieved improved treatments for a great number of diseases. The surgery is undoubtedly the first and major step towards healing and follows the change of lifestyle. Scientific knowledge of nursing staff and the effort to better educate patients after leaving hospital may help patients to comply with the new way of living and reduce complications after surgery.

Purpose: The purpose of this study was to investigate the degree of compliance of patients who had undergone open heart surgery after consulting about their way of living.

Material and Method: The study population comprised of 184 patients who had undergone scheduled heart surgery at the Onassis Cardiac Surgery Center in 2007 and 2008. Of the 184 patients that participated in the study, 145 (79%) were men. The time period that patients were 'followed' was 12 months after surgery. The information obtained through medical records and through telephone communication.

For the collection of data it was used a specially designed questionnaire based on a similar questionnaire of a study that carried out in Harokopio University. Basic condition for completing the questionnaire was the free consent of patients.

Statistical Analysis: The statistical package SPSS (version 16.0.) was used for data analysis.

Results: The patients, 12 months after surgery, questioned whether or not had complied to instructions given by the doctor and nurse liaison. Regarding smoking, 49% of patients were smokers before surgery, have stopped smoking a year after. Regarding exercise, 51% of the study population reported level of exercise that is inadequate and of course there was also a significant percentage of 20% reported that they exercised at all. 35% of the sample followed a completely healthy diet. Also, 58% of respondents appear to be oriented towards healthier diet, but not fully comply. While, only 7% of the sample studied, reported that they do not care about the correct dietary habits. With regard to the correct reception of medicines, 12% of the study population reveals that they do not take their medications systematically. The factors: gender and age appear to affect significantly the allocation of patients to comply with the instructions of doctors and nurses.

Conclusion: The contribution of nurses to patient education is crucial; as patients undergo a major surgery and need special guidance and education from healthcare professionals. The establishment of cardiac rehabilitation and educational programs is necessary and is an important strategy in health section.

NF10-SOCIAL, FAMILY AND VOCATIONAL REHABILITATION PATIENTS AFTER CARDIAC SURGERY

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Introduction: The improvement of intraoperative methods, improved technical support, and increasing experience yielded a significant reduction of surgical mortality of 1.5%. In the past, assess the effectiveness of interventions were made purely on clinical indicators, now days we could use own subjective assessment of patients' quality of life.

Purpose: This study aims to investigate the extent of patients after a major surgery like a heart surgery, which is particularly stressful and sinister procedure in the lives of themselves and their families return to their social, family and professional obligations.

Material-Method: Our sample was 62 patients who underwent heart surgery at the Onassis Cardiac Surgery Center. The M age is 59 years. Data collection was semi directions interviews. The quantitative analysis of material obtained from the transcript of the interviews was the method of content analysis.

Results: After analyzing the ratio of patients appears that the majority of patients aged 30-50 years, returning quickly to their work, social and family life. Noteworthy is the repetition of fear for the future, and uncertainty. Patients aged 50-60 to avoid return to work and have family problems. Patients in this age group are very depressive and frequently used expressions depreciation. Patients older than 60 years removed from their professional life, trying to enjoy "how many years they have left." Women have particular problems with their appearance and sexuality. In contrast, men exhibit an exaggerated indifference, trying not to think about the seriousness of the situation. They are more prone to abuses of all kinds.

Conclusions: The rehabilitation of patients is done without any institutional help, while totally missing bodies and structures to help patients the critical initial period when trying to gradually return to their previous pace of life. Patients are not alone to face their fears and ignorance. Lacking both psychologists and other allied health disciplines such as physiotherapists, which would provide valuable assistance to the rehabilitation effort Although the surgery removes the immediate threat of death, the daily life of patients after cardiac surgery is full of fear for the state of health and irreparably shaken out a psychic level.

NF11-NURSING CARE OF CHILDREN TREATED WITH INHALED NO AFTER OPEN HEART OPERATION

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Introduction: Inhaled nitric oxide (iNO) is a selective pulmonary vasodilator that improves oxygenation and assists management of pulmonary hypertension in children after operation for congenital heart defects. In the literature there is limited data concerning nursing care of pediatric patients treated with iNO, the

management of its complications, weaning time and the effect of iNO on survival.

Objective: To study the short-term effects of inhaled nitric oxide in infants and young children with congenital heart disease, to describe the special needs of their nursing care and to record iNO's complications.

Patient & Methods: Data from 25 infants and children aged 0-6 years old, undergone an open heart operation from August 2007 untill February 2009, was gathered with a structured form. Demographic data along with clinical characteristics and data concerning iNO nursing care were evaluated before, during and after the iNO therapy.

Results: The mean age of our sample was 160.1 days. The mean duration of treatment with iNO was 58.35 hours (Range: 8-871 hours). The main indication for iNO treatment was pulmonary hypertension (58.82%) and in the most cases treatment started from the operating room (89.5%). In four cases (16%) iNO treatment was ended due to patient's death. The mean value of the highest pressure of iNO used was 16.1 ppm (SD:3.87) and the mean pressure of iNO just before the end of the treatment was 3.98 ppm (SD: 2.21). The overall duration of extracorporeal circulation was positively associated with prolonged iNO therapy and increased weaning period ($p<0.05$). Prolonged iNO therapy was also significantly associated with the complexity of operation. ICU nurses stated lack of specialized training but they acknowledged empirical data. Their knowledge concerning the theoretical background was limited and was positively associated with their higher education and years of experience. Nevertheless, they were able to recognize symptoms of possible implications and in the majority of cases their interventions were evidence based.

Conclusions: The present study shows that in infants with congenital heart disease that survived after open heart operation, inhaled nitric oxide reduced pathologically increased pulmonary vascular resistance without affecting systemic circulation and without important side effects associated with brief exposure. The iNO treatment requires special knowledge and skills from nursing personnel along with increased monitoring. Clinical experience and theoretical background were acknowledged. Even though inhaled nitric oxide is effective in decreasing pulmonary pressure, it does not appear to improve the survival rate following repair of congenital heart disease in those with associated severe pulmonary hypertension. A randomized trial between the use and non-use of inhaled nitric oxide is warranted to determine its exact role in influencing survival in patients with residual pulmonary hypertension following surgical repair.

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BEST POSTER PRESENTATION AWARD COMPETITION

BPPC01-RANDOMIZED TRIAL OF A SHORT-ACTING BETA BLOCKER, LANDIOLOL, FOR REDUCTION OF POSTOPERATIVE ATRIAL FIBRILLATION IN PATIENTS UNDERGOING OFF-PUMP CORONARY ARTERY BYPASS GRAFTING

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(A short-acting beta blocker, landiolol, reduces perioperative cardiac marker release.)

Background: Atrial fibrillation (AF) after cardiac surgery is associated with increased risk of complications, length of stay, and cost of care. We used short acting beta-adrenoceptor antagonist, landiolol, and examined correlation between administration of landiolol and postoperative AF.

Methods and Results: Eighty-eight consequtive off-pump coronary artery bypass grafting patients were enrolled. Patients were randomized to landiolol (n=44) or non-landiolol (n=44) groups. In the landiolol group, we administered landiolol from the beginning of the operation to post operative day two. The primary end point was incidence of AF; secondary end points were postoperative cardiac marker (troponin I, creatine kinase (CK) MB isoenzyme) and C-reactive protein(CRP) variations. Landiolol significantly reduced the incidence of AF versus non-landiolol group (14% versus 34%, P=0.04). And also landiolol reduced postoperative peak CRP level versus non-landiolol group (12.5±3.8 versus 15.3±4.1mg/dl, P=0.02).

BPPC02-HEART TRANSPLANTATION AS AN END-STAGE TREATMENT FOR VENTRICULAR ASSIST DEVICE (VAD) INFECTIONS DUE TO MULTI-DRUG RESISTANT NOSOCOMIAL PATHOGENS

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Purpose: Heart transplantation (HTx) remains the gold standard for refractory heart failure treatment. Due to severe donor shortage in Greece, VADs are increasingly used as a "bridge" to transplant. Driveline exit site, pump pocket infections, as well as endocarditis, remain the major complications despite progress in VAD application.

Traditionally, HTx is contraindicated in the presence of active infection, although HTx may be appropriate treatment for life-threatening VAD infections due to multi-drug resistant (MDR) pathogens.

Methods: VAD patients were monitored for local and systemic signs of infection, while blood and exit site cultures were performed weekly.

Results: From February 2003 to September 2009, 6 out of 65 patients developed uncontrollable VAD related infections (9.23%), five of which were successfully transplanted. One patient with Acinetobacter baumanii VAD endocarditis underwent VAD replacement with a Berlin Heart Excor BiVAD, yet he died of uncontrollable sepsis before a donor became available.

Conclusions: Aggressive antibiotic treatment is not adequate in VAD infection due to MDR nosococomial pathogens. Heart transplantation, even at a pre-terminal stage, may offer reasonable chances of success.

Patients' Characteristics

Patients	Infection Sites	MDR Pathogen	Treatment/ Outcomes
HeartMate XVE 22y.o	Pocket Infection/Peritonitis/ Endocarditis	Acinetobacter baumanii	Tygecycline/Colimycin Transplanted- Alive and well
Berlin Heart Excor BiVAD 45 y.o	Pocket Infection/ Septicemia	Stenotrophomonas maltophilia	Tygecycline/TM/SMX Transplanted- Alive and well
Berlin Heart Excor BiVAD 19y.o	Endocarditis	Klebsiella pneumoniae/ Ps.aeruginosa	Colimycin/Garamycin/ Tygecycline/Doripenem Transplanted/- Alive and well
Novacor 23 y.o	Septicemia/Endocarditis	Acinetobacter baumanii	Tygecycline/ Colimycin Died
Berlin Heart Excor BiVAD 46 y.o	Mediastinitis	Candida parapsilosis	Voriconazole/ Amphotericin B Transplanted- Alive and well
Berlin Heart Excor BiVAD 17 y.o Excor BiVAD 17 y.o.	Pocket Infection	Klebsiella Pneumoniae/ Staphylococcus MSSA	Tygecycline/ Garamycin Colimycin Transplanted- Alive and well

BPPC03-GENETIC POLYMORPHISM ON TYPE 2 RECEPTOR OF ANGIOTENSIN II, MODIFIES CARDIOVASCULAR RISK AND SYSTEMIC INFLAMMATION IN HYPERTENSIVE MALES

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Introduction: Angiotensin type 2 receptor (AT2R), plays a crucial role in blood pressure regulation and atherogenesis. AT2R

gene is located on chromosome X and the biological effect of polymorphism A1675G in this gene needs to be further specified. We examined the impact of A1675G on the risk and the severity of coronary artery disease (CAD), and the expression of proatherogenic inflammatory molecules in hypertensive patients.

Methods: The study population consisted of 146 with CAD (102 with hypertension) and 266 age-matched individuals without CAD (114 with hypertension). The presence of A1675G polymorphism on AT2R gene was determined by PCR. Serum levels of C-reactive protein (CRP), fibrinogen, interleukin-6 (IL-6) and soluble vascular cell adhesion molecule-1 (sVCAM-1) were measured in all the participants.

Results: The G allele was associated with decreased risk of CAD among hypertensives (odds ratio (OR) (95% confidence interval (CI))): 0.4 (0.2–0.9), P = 0.01) and less aggressive angiographic CAD (P < 0.001). The G allele was associated with lower IL-6 (median (25–75th percentile): 1.4 (0.6–3.8)), sVCAM-1 (621 (476–799)), CRP (1.2 (0.6–1.7)), and fibrinogen (369 (320–416)) vs. A allele (IL-6: 2.4 (1.1–4.5) P < 0.01, sVCAM-1: 702 (548–925) P < 0.05, CRP: 3.5 (2.0–6.1) P < 0.001, and fibrinogen: 407 (348–514) P < 0.01). The effect of A1675G on serum IL-6, sVCAM-1, and fibrinogen was driven by its effect among hypertensives (IL-6 3.1 (2.1–5.6 in A vs. 1.2 (0.3–3.4) in G P < 0.001, sVCAM-1: 890 (560–1000) in A vs. 556 (377–788) in G P < 0.01, and fibrinogen: 408 (354–510) in A vs. 369 (324–418) in G P < 0.001) whereas it had no effect among nonhypertensives.

Conclusions: Genetic polymorphism A1675G on AT2R gene affects cardiovascular risk and the severity of atherosclerosis by modifying systemic inflammation, especially in hypertensive males.

BPPC04-LONGEVITY, ATHEROSCLEROSIS AND METABOLIC DISORDERS IN A ROMANIAN GROUP OF LONGEVIVE PATIENTS

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Background: Longevity is due to various genetic and external factors. The role of cardiovascular, metabolic risk factors as well as cognitive disorders is well known. We evaluate a group of longevive patients admitted to our center.

Material and Method: The group consists of 98 longevive patients (90-99 years), 68, 3% women si 31,6% men.

We evaluated anthropometrical parameters (BMI, height and weight), their way of life (smoking, alcohol habit), biochemical parameters. Patients have a global examination (clinical, ecocardiography and electrocardiography) and also a psychological evaluation was done through psychometric tests. T test, partial correlation and liniar regression were used.

Results: There were statistically significant difference by gender ($p<0.05$) in the favor of women. The highest prevalence of disease belongs to cardiovascular disease and atherosclerosis, followed by athrosis, osteoporosis and metabolic disease. Cognitive disease and neurological disease were lower represented in whole group, regardless of gender. Psychometric tests were correlated with age were found ($p<0.05$), and significant correlations were found between HDL and age ($p<0.01$) in women and between total cholesterol and age ($p<0.05$) in men. No significant differences of clinical parameters were found by gender.

Discussions: The majority of longevive patients have a polipathology marked by atherosclerosis and metabolic disorders. Further studies need to be done to evaluate role of metabolic disorders in longevity.

POSTER PRESENTATIONS

Aortic Aneurysm - Arrhythmias

PP01-DISSECTING AORTIC ANEURYSM IN WOMAN WITH PREDISPOSING RISK FACTORS

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Introduction: The purpose of the study is clinician's awareness, the early identification of the symptoms of dissecting aortic aneurysm (especially in individuals with predisposing risk factors) and the differential diagnosis from the acute coronary syndromes, in order to achieve rapid and effective treatment.

Methods: A 57-year-old woman, with systemic hypertension, type 2 diabetes mellitus, thiroiditis and dyslipidaemia, presented to a hospital emergency department with left-sided chest pain, dyspnea, hypertensive peak and neurological signs (paraplegia).

Results: Electrocardiography showed left ventricular hypertrophy and chest radiography showed some widening of the upper mediastinum. Echocardiography showed dilatation of the ascending aorta (5.1 cm), aortic root 4.5 cm, ejection fraction 75 % with left ventricular hypertrophy, aortic insufficiency 2-3/4, AR PHT = 430msec, E> A, E / E '= 9 and minimum pericardial effusion. The spiral chest CT scan revealed parietal thrombus of the ascending and descending thoracic aorta. This was treated directly with intravenous antihypertensive drugs and surgical treatment. Surgery revealed an aneurysm of the ascending aorta. The patient underwent successful replacement of the ascending aorta. She had an uneventful postoperative course and was discharged after surgery under medication treatment and instructions.

Conclusion: Despite significant progress in diagnostic techniques, the overall hospital mortality is still high enough. This requires alertness of health professionals and direct drug treatment to maintain the mean arterial pressure around 60-75mmHg. The most effective treatment is surgery; however, the prevention and the control of risk factors, both with medical treatment and healthy life style can achieve spectacular results.

PP02-RISK FACTOR ANALYSIS AND LONG-TERM SURVIVAL IN 398 CONSECUTIVE MODIFIED BENTALL OPERATIONS

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Background: Replacement of the aortic valve and aortic root in a variety of pathological conditions is commonly performed by the modified Bentall procedure.

We present 17 years experience of this technique with long-term follow-up.

Methods: From September 1993 to December 2009, 393 consecutive patients were operated on in our unit with the modified Bentall procedure that entails aortic root and valve replacement with composite valved graft and re-implantation of the coronary ostia as "buttons."

Results: Male to female ratio was (174/42). The mean age was 58,46 months. The aortic pathology requiring aortic root replacement was chronic aneuryms in 299 patients, chronic dissection in 21 patients, acute aortic dissection in 37 patients while in 25 the procedure was performed as a bail-out due to intraoperative adverse events during aortic valve and/or root surgery. There were 68 emergency and 331 elective cases. In 64 cases combined procedures were performed and 33 patients were re-sternotomies. Deep hypothermic circulatory arrest was utilised in 38 patients for replacement of the distal ascending aorta and aortic arch. Multivariate analysis of peri-operative death revealed statistically significant correlation with urgency, later vs earlier surgical era (2000) and size of implanted graft (<23mm). Peri-operative survival was 93.5% (97,4% for elective cases and 87% for emergencies). Post-operative complication rate was 8%.

Major event free actuarial survival was 82,6% at mean follow-up of 8 years and 78,7% at 10 years.

Conclusion: The modified Bentall operation with the button technique is a safe, reproducible technique with good post-operative and long-term results.

PP03-SYMPTOM STATUS OF PATIENTS WITH NEUROCARDIOGENIC SYNCOPE AND CARDIOINHIBITORY RESPONSE TO TILT TESTING AT LONG TERM FOLLOW-UP

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Introduction: Patients with neurocardiogenic syncope have an excellent prognosis; however, controversy exists regarding the role of permanent pacing in symptom relief of patients with cardioinhibitory response to tilt testing. We sought to investigate the symptom status of those patients at long term follow-up.

Methods: Forty patients with history suggestive of vasovagal syncope in the absence of structural heart disease and cardioinhibition without (type 2A) or with asystole more than 3 seconds (type 2B) at tilt testing comprised the study population and telephonic follow-up was performed.

Results: Thirty-six patients (male/female 22/14, age 45.7±16.8 years) were contacted and evaluated with a mean duration of follow-up 4.9±1.9 years. At the time of initial evaluation the median number of lifetime episodes of syncope was 6 (range 3 to 40). Twenty patients had 2A response and 16 patients had 2B response.

At the time of follow-up, the vast majority of patients (34/36) reported improvement of their symptom status with no (25) or milder (9) symptoms with one case of minor injury, while they received no medical treatment besides reassurance and education (24), treatment with either beta-blockers or serotonin reuptake inhibitors (7) or permanent pacing (3). Two patients, one under treatment with beta-blocker and one with permanent pacemaker, had persistent severe symptoms.

Conclusion: Our registry of patients with neurocardiogenic syncope and cardioinhibitory response to tilt testing demonstrates their good prognosis in terms of syncope recurrence and quality of life and underscores the efficacy of conservative treatment with pacing limited as a last resort choice.

PP04-SURGICAL TREATMENT OF VENTRICULAR TACHYCARDIA ASSOCIATED WITH POST INFARCTION LV ANEURYSM BY DOR PROCEDURE, ENDOCARDIAL RESECTION AND CRYOABLATION

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Background: The aim of this study is to examine the efficacy of Dor procedure combined with endocardial resection plus Cryoablation and CABG for the surgical treatment of VT.

Methods: A retrospective study of all patients operated for monomorphic VT associated with post infarction LV aneurysm over a period of seven years (2002-2009).

Results: The study included seven patients with monomorphic VT with a mean age of 69.1 years (57-80). The EF was 30% ± 5.7% (25-40%) and all patients were symptomatic. Two patients also had moderate to severe mitral valve regurgitation. The patients underwent LV reconstruction by Dor procedure, endocardial resection plus CABG and Cryoablation guided by intraoperative electrophysiological mapping.

Two patients underwent mitral valve repair and another 2 with a history of AF, underwent modified Maze procedure with radiofrequency. Mean added EuroSCORE was 10.8% ± 3% (7-14) and Logistic EuroSCORE 23.8% ± 13% (7.6-35.4). CPB time ranged form 125 to 280 minutes (mean of 196 ± 51) and cross clamp time from 91 to 135 minutes (mean 114+18). The mean hospital stay was 15.6 days.

Two patients were supported with IABP and one patient died on the second postoperative day due to acute pancreatitis & MOF (operative mortality 14.2%).

All the patients underwent postoperatively electrophysiological study and three patients received implantable cardiac defibrillator (ICD). Mean follow-up was 46.5 ± 29 months (7-89) and was completed for all patients.

All the patients are alive and there are no episodes of recurrence of VT or activation of the ICD.

Conclusion: Direct VT surgery combined with Dor procedure in this specific group of patients with symptomatic drug refractory VT of LV origin can be an effective treatment with very good results.

PP05-IMPACT OF NON-FLUOROSCOPIC NAVIGATION FOR ACCESSORY PATHWAY ABLATION IN PEDIATRIC AND YOUNG ADULT CONGENITAL PATIENTS

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Introduction: Because of the concern of long-term effects of ionizing radiation in growing organisms, reduction of fluoroscopy is highly desirable in pediatric patients undergoing catheter ablation. The most common indication for catheter ablation in children is an accessory pathway (AP). The purpose of this study was to assess the impact of the use of a non-fluoroscopic navigation system in pediatric patients and young adults with congenital heart disease undergoing AP ablation.

Methods: We compared the fluoroscopic exposures of two groups of pediatric patients who underwent consecutive catheter ablation procedures for APs. Group A consisted of 74 pts (35.7%) in whom fluoroscopy alone was used and group B consisted of 133 (64.3%) pts in whom a non-fluoroscopic system (NavX™ St Jude Medical) was used to minimize fluoroscopic exposure. One way ANOVA was used to compare fluoroscopy times between groups A and B and also between subgroups defined by AP location (right, left or septal). A p value of 0.05 was considered significant. Access to the left atrium was achieved by transseptal approach in all but 2 pts in whom a retrograde approach was used.

Results: There were 74 pts in group A (0.3 to 33 yrs, mean 11.8± 4.4) and 133 pts in group B (5 to 35 yrs, mean 11.1± 3.4). Congenital heart disease was present in 15 pts in each group. Fluoroscopy time was 6-135 (39.7±32.7) min in group A vs 0.4-54.3 (8.5±7.9) min in group B (P<0.001). When assessment of fluoroscopic exposures was performed based on AP location, significant reduction was observed regardless of AP location (see table).

Conclusions: The use of a non-fluoroscopic system in all pediatric and congenital patents undergoing AP catheter ablation resulted in significant reduction of fluoroscopy exposure regardless of AP location.

Table

AP location	Group A	Group B	P-value
Right	n=6 23.83±19 9-57 min	n=14 7.49±7.64 0.4-29 min	0.012
Left	n=18 32.5±19.18 12-82 min	n=36 9.31±6.29 2.58-31.16 min	<0.001
Septal	n=18 48.5±41.77 6-135 min	n=49 8.42±9.46 0.4-54.3 min	<0.001
Multiple AP	n=2 74.50±43.13 44-105 min	n=7 7.86±4.70 2.3-16 min	0.002

PP06-CRYOABLATION OF AV NODAL REENTRANT TACHYCARDIA IN CHILDREN AND ADOLESCENTS: COMPARISON OF EARLY VS LATE ERA

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Introduction: Radiofrequency ablation of AV nodal reentrant tachycardia (AVNRT) has been highly successful both in children and adults, but carries a risk of AV block. Cryoablation may be a safer form of therapy in pediatric patients.

Methods: Data were obtained retrospectively from 59 consecutive pediatric patients who underwent cryoablation for treatment of AVNRT from 11/2004 – 2/2010. The NavX system was used for catheter navigation.

Results: 59 (31male and 28 female) patients, aged from 8 to 18 (12,22±2,64) yrs underwent cryoablation for AVNRT. General anesthesia was used in 52. Number of cryolesions was 1-20 (5.74±3.62). Procedure time was 100 – 270 (175±40) min and fluoroscopy time 1 - 21 (4.74±4) min. There were no major complications. Initial success was 57/59 (96.6%). There were 8 recurrences (13.5%), 7 of them in the first 24 procedures (29%) that were performed in the first half of the study period and 1 in the remaining 35 (2,9%) that were performed in the second half of the study period. Six patients with recurrence underwent a new cryoablation procedure with a cumulative success rate 55/59 (93.2%).

Conclusion: Outcomes of cryoablation for AVNRT in children are good without major complications and with virtually no risk of AV block. There is a marked reduction in the recurrence rate with increased experience, with current success rates approaching those of radiofrequency ablation.

Congenital Heart Disease

PP07-DIAGNOSIS AND MANAGEMENT OF CONGENITAL VASCULAR RING. A SIX YEAR EXPERIENCE

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Introduction: Vascular rings are uncommon congenital anomalies causing tracheoesophageal compression resulting in noncardiac morbidity. The purpose of this study is to review our experience in the management of this clinical entity.

Method: The medical charts of 1015 patients treated in our institution between 2002 and 2008 were reviewed. We identified 8 patients (4 boys and 4 girls) with congenital aortic arch anomalies. Median age was 6.5 months, range 2 months to six years. Median weight was 7.15 kg. Most of the patients presented with respiratory distress symptoms and stridor. Two patients presented with dysphagia and choking episodes. Diagnosis was established by barium studies, bronchoscopy, echocardiogram, angiogram, computed tomography and magnetic resonance imaging in all cases. Surgery was accomplished by left thoracotomy in all patients.

Results: Operative mortality was nil. One patient developed postoperative pneumothorax . Postoperative recovery was rapid with a median ventilation time of 15 hours, a median intensive care unit stay of 27 hours and postoperative time to discharge of 7 days. At median follow up of 12 months, all patients remain well and asymptomatic.

Conclusion: Our results suggest that early repair of congenital aortic vascular ring is safe and effective and provides complete symptomatic relief in all patients.

PP08-FUNCTIONAL SINGLE VENTRICLE AND TRISOMY 21: IS COMPLETION FONTAN A JUSTIFIED STRATEGY IN THESE PATIENTS?

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Objectives: There is scarcity of data regarding management of children with trisomy 21 syndrome (T21S) and a functional single ventricle (FSV). A review of patients with T21S with FSV was conducted to identify factors that may contribute to improved outcome.

Methods: From September 1998 to August 2008, we identified 11 (5 males and 6 females) FSV patients with T21S among 148 who had undergone Bidirectional Glenn (BDG) and 139 Completion Fontan (CF). Mean age at BDG was 32.3+/-14.1 weeks and at CF 27.9+/-12.3 months. All patients had unbalanced complete atrioventricular canal. Two had subaortic stenosis.

Results: There were no hospital deaths. One mortality occured prior to CF. No CF were taken down. Pulmonary artery banding (PAB) was the initial procedure in 9 patients and aortopulmonary shunt in 2. Two had Damus-Kay-Stansel operation. PAB was adjusted for pulmonary artery pressure(PAP) 20% of systemic. All patients with previous PAB progressed to pulsatile BDG. Median Follow-up was 59 months (18to99). 8 of 10 survivors after BDG underwent successful CF and 2 awaiting CF. Three CF were fenestrated. Aspirin and warfarin was used postoperatively. There were no arrhythmias, sinus node or AV node dysfunction after CF.

Conclusions: Trisomy 21 syndrome has been reported as a significant determinant factor of mortality in patients with FSV, mainly, due to persistent high PAP. This study shows that single ventricle pathway repair in patients with T21S is feasible and can produce encouraging results. Early tight PAB and continued pulmonary vascular maturation due to pulsatile BDG may contribute to this outcome. Careful patient selection for CF is warranted.

PP09-BEATING HEART REPLACEMENT OF THE PULMONARY VALVE USING STENTED BIOPROSTHESIS IN PATIENTS WITH SURGICALLY CORRECTED TETRALOGY OF FALLOT

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Introduction: We present our intermediate results with pulmonary valve (PV) replacement with oversized stented bioprosthesis

using the beating heart technique in patients with surgically corrected Tetralogy of Fallot (SCTOF).

Methods: From September 2005 to December 2009, 52 patients (aged from 9 years to 63 years old, males: females, 34:18) by now with SCTOF underwent PV replacement after a period ranged from 4 to 35 years from the anatomic correction. Our choice of prosthesis was the stented bioprosthetic Aortic Magna (Edwards, Lifesciences) valve. Forty two valves were size 27mm, eight 25mm and two 23mm. The operation was performed with the beating heart technique under normothermic extracorporeal circulation. Concomitant surgical procedures included tricuspid valve annuloplasty (n =31), resection of aneurysmal outflow tract patches (n=23), augmentation of stenotic pulmonary arteries (n=12) and right ventricular remodeling (n=11).

Results: There was one perioperative death (%) and one patient (%) developed atrial flutter. Mean hospital stay was 9 days. Cardiac echocardiography during the latest follow-up (6 months to .. months after the operation) revealed bioprosthesis without significant stenosis or regurgitation (n=47) mild 5. Significant decrease of the right heart dimensions was also observed (n=52). 50 patients are in NYHA I and 2 patients are in NYHA I-II, up to day.

Conclusion: The use of the new bioprosthetic valves using the beating heart technique provide excellent immediate and short-term outcome. Further follow-up is necessary to evaluate the durability of this valve in the pulmonary position.

PP10-EARLY RESULTS WITH THE USE OF BIODEGRADABLE RING FOR ATRIOVENTICULAR VALVE REPAIR

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Introduction: We describe our early results with the use of biodegradable ring for atrioventricular (AV) valve repair in patients with congenital heart diseases.

Methods: 36 patients (aged from 11 months to 63 years old, 14 males and 22 females) underwent cardiac surgery for congenital heart diseases during the period of March 2006 – December 2009.

8 patients underwent mitral valve annuloplasty, 26 tricuspid valve annuloplasty and 2 combined. All patients underwent A-V valve annuloplasty using the biodegradable ring Kalangos (Biorring SA, Lonay, Switzerland). The sizes of the ring for the mitral and tricuspid position were 16-26 mm and 26-34 mm respectively. Mean follow-up was 31 months.

Results: Success of implantation was 100%. There were no perioperative or postoperative complications related to the pocedure. Mean operative time for ring placement was 7 min. Mean hospital stay was 8 days. Latest transthoracic echocardiography during the follow-up showed trace mitral valve regurgitation (MVR) in 7 and mild in 2; trace tricuspid valve regurgitation (TVR) in 15, mild in 10 and mild to moderate in 1 patient. Furthermore, there was a significant decrease of the left ventricular dimensions in patients with MVR and significant decrease of the right heart chambers size in patients with TVR. All patients are currently in excellent clinical status (NYHA I: 32 and NYHA I-II: 4) without symptoms.

Conclusion: The use of biodegradable ring for AV valve annuloplasty is a safe, quick and reliable technique with excellent short term results. Further follow-up is needed in order to evaluate the long term results.

PP11-SURGICAL CLOSURE OF PATENT DUCTUS ARTERIOSUS IN PREMATURES WITH LOW BODY WEIGHT.

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Introduction: The heamodynamically significant, prolonged patency of ductus arteriosus is related to higher mortality and morbidity in prematures mostly due to respiratory complications. However, low body weight and early gestation age increase the risk of surgical procedure as well.The aim of the study was to evaluate the early results of surgical PDA closure in premature infants with low body weight.

Methods: The study included 30 prematures (15girls, gestation age: mean 28.0±2.8weeks, range: 22-33) scheduled for isolated closure of PDA, who weighted no more than 2000g at the surgery day (mean: 1173±418g, range: 460-2000g, 9 prematures weighted less than 1000g). An additional congenital heart defect was detected in 5 infants. 24 prematures presented respiratory insufficiency at the time of hospital admission, in 12 of them respiratory distress syndrome was diagnosed. 15 prematures had history of intracranial hemorrhage (14 intraventricular hemorrhages, 1 intracerebral hemorrhage). Patients were operated within 5-53 days after birth.

Results: All patients survived the perioperative period. 30-days mortality was 6,7% (2 non-cardiac deaths). 9 children (30%) required inotropes administration after surgery. One patient was discharged home, the remaining were transferred to neonatal departments (mostly to the intensive care unit - 26 patients). 24 children required mechanical ventilatory support at discharge from cardiac surgery department. Postoperative echocardiography did not show signs of residual flow in PDA.

Conclusion: Surgical closure of PDA in prematures with low body weight is safe and effective procedure. Postoperative respiratory insufficiency, which is often observed, is by and large related to preoperative patient status.

PP12-POSTOPERATIVE INHALED NITROUS OXIDE IN CONGENITAL CARDIAC SURGERY

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Objective: Inhaled nitrous oxide (NO), has been introduced in the postoperative management of cardiac surgery patients with pulmonary hypertension. Herein we present our experience with inhaled NO for postoperative support in paediatric patients undergoing cardiac surgery for congenital heart disease.

Methods: From 5/2007-2/2010, 22 patients, age 19 days-8 years (median 8.5 months) with congenital cardiac malformations

and pulmonary hypertension (PHT) underwent corrective or palliative surgery in our unit. Principal diagnoses included total anomalous pulmonary vein connection (TAPVC) in 5 patients, large or multiple ventricular septal defects (VSD) in 10, anomalous coronary artery from pulmonary artery (ALCAPA) in 1 patient, sinus venosus with partial anomalous pulmonary vein connection (PAPVC) in 1, interrupted arch in 1, complete atrioventricular canal (CAVC) in 2 and complex congenital heart disease (2). Nineteen patients underwent complete repair, 2 had a Glenn procedure and 1 pulmonary artery banding (PAB). All patients received postoperative inhaled NO at 15±4ppm for median 53 hours, one of them following 5 days of successful extracorporeal membrane oxygenation (ECMO) support. In addition, inotropic support was established including milrinone at mean dose 0.5±0.05mcg/kg/min for median 5 days duration.

Results: There were 1 early death due to acute heart failure and 2 late deaths in this series of patients. One of these patients died 2 months after surgery from multiple organ failure and the other 4 after months in another hospital following further cardiac surgery. None of the patients developed methemoglobin toxicity. All patients except one experienced postoperative hemodynamic and respiratory stability. Nineteen patients were successfully extubated at 21-364 (median 96) hours. Median ICU and hospital stay was 8 and 14 days respectively.

Conclusion: Adjunct postoperative treatment with Inhaled nitrous oxide proved successful along with other supportive measures in achieving hemodynamic and respiratory stability in patients with congenital heart disease and PHT undergoing surgery.

Coronary Artery Disease

PP13-OFF-PUMP SURGERY IN PATIENTS WITH LEFT-MAIN DISEASE: IS COMPLETE REVASCULARIZATION POSSIBLE?

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Purpose: Coronary-artery bypass grafting remains the gold-standard for patients with Left-Main disease (LMD). Critics argue that off-pump coronary-artery bypass grafting (OPCAB) comes at the price of less complete revascularization. We evaluate feasibility and safety of OPCAB in patients with LMD, in addition to complete-revascularization.

Methods: From 2002-2008, 1174patients with significant LMD (≥50%) underwent surgery. Patients received either OPCAB (n=650/55%) or on-pump CABG (n=524/45%). In OPCAB patients, proximal anastomosis either was performed using the less-invasive Heartstring Proximal Seal-System (n=507/87%) or no proximal anastomosis (arterial T-Graft) was performed (n=143/13%). All data were prospectively collected and a propensity-score (PS) balanced the preoperative characteristics. Univariate-, multivariate- and logistic-regression analysis was applied to assess outcome-data. A 'Completeness of Revascularization Index' (CRI) was defined to analyze complete revascularization by dividing the number of distal anastomoses by the number of diseased-vessels. Complete-revascularization was assumed when CRI was >1.

Results: Operative was mortality-rate for OPCAB compared to on-pump CABG was 1.4 vs. 2.5% respectively (PS-adjusted Odds-Ratio (PS-OR)=0.37; 95%CI:0.09-1.43;p=0.15). OPCAB patients presented with significantly lower complications-rates including stroke (0.5% vs. 2.9%; PS-OR=0.03; 95%CI:0.02-0.40; p<0.01), renal-failure (3.4% vs. 7.4%; PS-OR=0.40; 95%CI:0.19-0.84; p=0.02) and respiratory-failure (0.6% vs. 4.9%;%; PS-OR=0.11; 95%CI:0.15-0.82;p=0.03). The number of arterial-grafts was significantly higher among OPCAB patients (1.70±0.90 vs. 1.30±1.0; PS-OR=1.60; 95%CI:1.40-1.80;p<0.0001). Complete revascularization was achieved in similar levels (94.2% vs. 93.7%; PS-OR=1.33; 95%CI:0.67-2.67;p=0.42).

Conclusions: OPCAB offers superior postoperative outcomes. Arterial-grafts are used more frequently which may contribute to better long-term outcomes. OPCAB does not come at price of less-complete revascularization and the combination with the Heartstring-System reduces stroke significantly.

PP14-STERNAL CLOSURE TECHNIQUE TO REDUCE INFECTION RATES IN PATIENTS WITH CORONARY ARTERY BYPASS GRAFTING USING BILATERAL INTERNAL THORACIC ARTERIES

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Introduction: Arterial grafts, especially internal thoracic arteries (ITA), are showing superior long-term patency rates in coronary artery bypass grafting (CABG). We demonstrate our success in preventing perioperative sternal wound infections in CABG patients using bilateral internal thoracic arteries (LITA, RITA).

Methods: From January 2007 to February 2010, 106 patients (4 female, 101 male, mean age 48.6 years (range 35 to 68 years)) were operated on using both mammary arteries in CABG procedures performed by two surgeons. Patient selection for bilateral IMA grafting was based solely on coronary anatomy. 54 patients (50.9%) were diabetics, of these 39 (72.2%) received postoperative insulin therapy. Three patients underwent OPCAB surgery (one emergency case). Two mitral and one tricuspid valve repair as well as one Dor procedure were performed concomitantly. LITA and RITA were harvested as pedicles, and additionally 1 to 3 saphenous vein grafts (mean 3.8 grafts) per patient were performed. All patients received a modified Robiçsek sternal closure (video slides). Antibiotic coverage consisted of Rifampicin (local application) and Cefuroxime (i.v.).

Results: We had no rethoracotomy, no deep sternal infection or mediastinitis, no superficial sternal wound infection and no sternum instability. One patient (0.9%) died due to perioperative infarction and heart failure 3 weeks postoperatively. The postoperative course was uneventful in all other patients (some minor complications (atrial fibrillation, pleural effusion)).

Conclusions: Bilateral ITA bypass grafting can be performed with excellent postoperative wound healing, even in diabetic patients, based on a minimal adjustment of surgical procedure. This allows expanding the patient group suitable to undergo bilateral ITA grafting.

PP15-LONG-TERM CLINICAL OUTCOME IN PATIENTS WITH SAPHENOUS VEIN GRAFT LESIONS TREATED WITH DRUG-ELUTING AND BARE METAL STENTS

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Introduction: Recent data have shown a reduction in restenosis in patients (pts) with saphenous vein graft (SVG) lesions treated with percutaneous coronary intervention (PCI) using drug-eluting stent (DES). We assessed the long-term clinical outcome in pts with SVG lesions treated with either DES or bare metal stent (BS).

Methods: Sixty-two pts that had been treated with DES were compared with 42 pts treated with BS. The clinical and angiographic data, in-hospital results and clinical outcome at 36 months follow-up (FU) were obtained. Major adverse coronary events (MACE) were considered death, non-fatal myocardial infarction (MI), and repeat revascularization.

Results: PCI was performed to dilate 66 SVG using DES and 44 SVG using BS. In total 105 lesions (1.69/pt) were treated with DES and 65 (1.55/pt) with BS. In-hospital results and clinical follow-up was obtained in all pts. There were no differences in total mortality (17.7% vs. 9.5%, p=ns), cardiac mortality (14.5% vs. 9.5%, p=ns), MI (4.8% vs. 2.4%, p=ns), any revascularization (21% vs. 26.2%, p=ns) or any MACE (38.7% vs. 33.3%, p=ns) in both groups. Independent predictors for death were ejection fraction <40% (HR 3.26, 95% CI 1.09-9.79, p=0.03) and acute coronary syndrome at presentation (HR 3.73, 95% CI 1.14-12.16, p=0.03); for MACE were diabetes mellitus (HR 1.98, 95% CI 1.0-3.90, p=0.047), acute coronary syndrome at presentation (HR 1.96, 95% CI 1.01-3.79, p=0.045), and age (HR 0.96, 95% CI 0.92-0.99, p=0.04).

Conclusion: The implantation of DES and BS in pts with SVG lesions is associated with similar in-hospital and long-term results.

PP16-ANTIBACTERIAL SUTURE REDUCES SURGICAL SITE INFECTIONS IN CORONARY ARTERY BYPASS GRAFTING

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Background: Surgical site infections still remain a major complication following cardiac surgery. Multiple approaches aimed at reducing wound complications after cardiac surgery. This study seeks to determine whether Triclosan-coated polyglycatin 910 sutures reduce chest and leg wound infection as compared to Triclosan-uncoated sutures.

Methods: A total of one hundred patients scheduled for coronary artery bypass grafting (CABG) were prospectively randomized to receive either Triclosan-coated polyglycatin 910 suture (Group A, n=50) or traditional Triclosan-uncoated suture (Group B, n=50) for wound closure. Wound infection was defined that patient has at least one of those of purulent discharge, organisms isolated from fluid or tissue sample, or infection signs. The evaluated period was the first 30 postoperative days.

Results: Total number of SSI was developed in 6 of 50 patients (12%) in Group A, and in 16 of 50 patients (32%) in Group B (p=0.03 vs. Group A). Though the groups showed no significant difference in chest wound infection, there was significant difference in leg wound infection (Group A 10% and Group B 28%, p=0.04).

Conclusions: The use of Triclosan-coated polyglycatin 910 sutures is associated with less SSI following CABG.

PP17-THE PREDICTION VALUE OF TOTAL CORONARY ARTERIES DIAMETER (TCD) ON THE INCIDENCE OF POST-OPERATIVE ATRIAL FIBRILLATION

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Objective: The incidence of atrial fibrillation rhythm after coronary artery bypass surgery is one of the most common complications and its consequence leads to morbidity and mortality. The aim of this study is to evaluate the correlation between coronary arteries diameter and the incidence of this rhythm.

Methods: The coronary angiography and the operation reports of 101 patients who underwent coronary artey bypass graft surgery were studied. The sum of proximal coronary arteries was announced as total coronary artery diameter (TCD). The ratio of distal diameter of coronary arteries just after target lesion was measured to total coronary artery diameter. The correlation between total coronary artery diameter and these ratios with the incidence of postoperative atrial fibrillation rhythm was evaluated. In order to comprehend the results more precisely the patients were divided in two groups. Group 1 had left ventricular ejection fraction over 40% and group 2had left ventricular ejection fraction equal or less than 40%.

Results: In group 2, the more total coronary artery diameter and the less ratio of left anterior descending artery distal diameter to total coronary artery diameter, the incidence of postoperative atrial fibrillation rhythm would be more likely. But in group 1, this ratio does not have this effect.

Conclusion: In patients who have moderate left ventricular dysfunction, the more the total coronary artery diameter and the less ratio of left anterior descending artery distal diameter, the incidence of postoperative atrial fibrillation rhythm would be more probable.

PP18-A SHORT-ACTING BETA-BLOCKER, LANDIOLOL, FOR REDUCTION OF POSTOPERATIVE ATRIAL FIBRILLATION IN PATIENTS UNDERGOING OFF-PUMP CORONARY ARTERY BYPASS GRAFTING

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Introduction: Atrial fibrillation (AF) after cardiac surgery is associated with increased risk of complications, length of stay, and cost of care. It has been found that beta-blockers are not only effective in controlling myocardial ischemia and arrhythmia but also in suppressing inflammatory cytokines. We used short acting beta-adrenoceptor antagonist, landiolol, and examined correlation between administration of landiolol and postoperative AF.

Methods: From January 2008, Eighty-eight consequtive off-pump coronary artery bypass grafting patients were enrolled. Patients were randomized to landiolol (n=44) or non-landiolol (n=44) groups. In the landiolol group, we administered landiolol from the beginning of the operation to post operative day two at a dose of 3~5μg/kg/min. The primary end point was incidence of AF; secondary end points were postoperative cardiac marker (troponin I, creatine kinase (CK)-MB isoenzyme) and C-reactive protein (CRP) variations.

Results: Landiolol significantly reduced the incidence of AF versus non-landiolol group (14% versus 34%, P=0.04) and also reduced postoperative peak CRP level (12.5±3.8 versus 15.3±4.1mg/dl, P=0.02). Cardiac marker release on post operative day two were reduced in landiolol group (troponin I; 1.8±3.5 versus 5.7±12.7ng/ml, P=0.05, CK-MB; 4.2±5.2 versus 7.5±9.8ng/ml, P=0.06).

Conclusion: Low dose landiol was found to be effective for postoperative AF and reduced peak CRP level and cardiac marker release.

PP19-ISCHEMIA MODIFIED ALBUMIN IN ASSOCIATION WITH RISK FACTORS IN PATIENTS WITHOUT CORONARY ARTERY DISEASE

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Introduction: Ischemia modified albumin (IMA) is a marker of myocardial ischemia. There is evidence that IMA may be increased, at rest, in diabetic subjects without established vascular disease compared to normal individuals without diabetes mellitus.

Methods: We evaluated IMA in healthy individuals with and without risk factors for CAD. All patients were referred to our institution for investigation for CAD. CAD was excluded either with thallium scintigraphy and/or dobutamine echocardiography or with coronary angiography. Patients were divided in two groups: group I (n=45) with one or more traditional risk factors and group (II=24) without any risk factor. There were 21 women and 24 men in group I and 22 women and 22 men in group II. Patients in group I were 61±14 years old whereas mean age in group II was 39±18 years. Twenty-three patients were hypertensives, 21 smokers, 20 hypercholesterolemic, 9 with a positive family history with CAD and six had diabetes. Twenty-three patients had more than one risk factors. Serum IMA was measured with the albumin cobalt binding test on an Integra 800 analyzer (Roche, Switzerland) and expressed in U/ml. The within-day coefficient of IMA measurements' variation is 6.1% while for the between-day variation is 9.22% in our lab.

Results: IMA levels in group I were 94.9±9.55 U/ml and in group II 96.4±11.6U/ml (p=0.59).

Conclusion: We conclude that traditional risk factors for CAD do not change IMA levels at rest, in individuals with no evidence for CAD.

PP20-PREDICTORS OF INOTROPE USE IN PATIENTS UNDERGOING ELECTIVE CORONARY ARTERY SURGERY

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Introduction: Predicting the risk of postoperative adverse events is still a challenging task in management of patients undergoing cardiac surgery. We aimed to determine prognostic factors for the need of inotrope use after CABG.

Methods: The study included 346 patients undergoing elective CABG. We analyzed 21 potential risk factors of postoperative hemodynamic instability: age, sex, EUROscore, presence of hypertension, diabetes, unstable angina, chronic obstructive pulmonary disease, history of myocardial infarction, left ventricle ejection fraction, preoperative heart rate and QRS interval duration, estimated glomerular filtration rate, on- vs off-pump procedure, time of extracorporeal circulation and aorta cross-clamp, number of vessels grafted, the highest serum CKMB concentration, cardiac arrhythmias, need of transfusion, postoperative chest tube drainage volume, need of reoperation.

Results: 58 patients (16.8%) required inotropic support in the postoperative course. Multiple logistic regression analysis revealed the following predictors of postoperative heart failure: history of myocardial infarction (OR 2.53, 95% CI 1.14-5.57, p=0.02), impaired left ventricle ejection fraction (OR 0.95/1%, 95% CI 0.93-0.98, p=0.002), poor glomerular filtration rate (OR 0.83/10ml/min, 95% CI 0.72-0.97, p= 0.02), elevated serum CKMB concentration (OR 1.58/10ng/ml, 95% CI 1.03-1.15, p=0.0023), transfusion (OR 1.58/every red blood cell unit, 95% CI 1.21-2.05, p=0.0007), postoperative cardiac arrhythmias (OR 2.13, 95% CI 1.07-4.25, p=0.03).

Conclusions: Preoperatively impaired heart and renal function predisposed to hemodynamic instability after operation. The other factors which can worsen hemodynamic status are complications related to the surgical procedure - bleeding and ischemic complications. Moreover, effective prophylaxis of arrhythmias may potentially reduce the prevalence of postoperative heart failure.

PP21-LEVOSIMENDAN-NOREPINEPHRINE COMBINATION DURING OPCAB SURGERY IN A HEMODIALYSIS PATIENT WITH SEVERE MYOCARDIAL DYSFUNCTION

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Introduction: We would like to present the intravenous levosimendan-norepinephrine combination during off-pump coronary artery bypass grafting in a hemodialysis patient with severe myocardial dysfunction.

Methods: A 63 year-old man with end-stage renal disease, unstable angina and significantly impaired myocardial contractility with low left ventricular ejection fraction he underwent off-pump one vessel coronary bypass surgery. Combined continuous levosimendan and norepinephrine infusion (at 0.07 μg/kg/min and 0.05 μg/kg/min respectively) started immediately after anesthesia induction and continued for 24 hours. The levosimendan / norepinephrine combination helped maintain an appropriate hemodynamic profile, thereby contributing to uneventful completion of surgery and postoperative hemodynamic stability.

Results: Although levosimendan is considered contraindicated in end stage renal failure patients, this report suggests that combined perioperative levosimendan / norepinephrine administration can be useful in carefully selected hemodialysis patients with impaired myocardial contractility and ongoing myocardial ischemia, who undergo off-pump myocardial revascularization surgery. Follow-up echocardiography 4 months after the operation showed that somewhat improved myocardial contractility, with LVEF estimated at 40%, mild mitral regurgitation and estimated peak pulmonary artery pressure at 35 mmHg. Now, three years later, he is still alive and doing remarkably well.

Conclusion: Levosimendan, is a pharmacologic agent indicated for treatment of non-compensated heart failure. In our opinion levosimendan may be used in selected and well monitored patints with renal failure without major complications.

PP22-COMORBIDITIES AT PATIENTS UNDERGONE CABG & THEIR ROLE IN APPEARING DIFFERENT COMPLICATIONS

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Study of the frequency of the comorbidities and their role in appearing different complications after surgical revascularization of coronary arteries at patient with ischemic heart diseases.

Analyzed data of 118 patients operated at period of 2009 year (97 men and 21 women) with use bypass at 104 and of-pump technique at 14 patients. All patients had atherosclerotic changes at two or more vessels. All patients carefully examined with using complex laboratory-instrumental methods. Complications notes at 10 sick. They include postoperation bleeding at 2 (1,6%), graft thrombosis at 2 (1,6%), tachyarrhythmia 1 (0,8%) and infectious complications at 1 (0,8%), acute kidney insufficiency at 1 (0,8%), pleurisy at 3 (2,5%) patients. General postoperative mortality was 3,4% (4 patients).

Analysis of the comorbidities in the general population of patients, undergone operative management has shown following distribution most often revealed diseases: arterial hypertension at 101 (85,9%), diabetes mellitus at 28 (23,7%), different stages of the gastritis at 30 (25,4%), chronic cholecistitis 16 (13,6%), obesity 68 (57,6%), disease 8 (6,8%), spine osteochondrosis7 (5,9%), rheumatoid arthritis 4 (3,4%), deforming osteoarthritis of knee and gout 8 (6,8%), adenoma of prostate gland 3 (2,5%), state after acute impairment of cerebral circulation 6 (5,1%), oncology diseases at 3 (2,5%), atherosclerotic damage branches of the arc of the aorta 9 (7,6%) and other. Direct correlation relationship between comorbidities and complications we haven't revealed. However such diseases as diabetes mellitus, obesity and arterial hypertension are predispose factors to development complications.

The most frequently comorbidities with which happens to face cardiosurgeon concerning with CABG are diabetes mellitus, obesity and arterial hypertension.

PP23-COMPARATIVE ECHOCARDIOGRAPHY ESTIMATION OF THE EARLY POSTOPERATIVE PERIOD AT PATIENTS WITH OCCLUSIVE DISEASES OF CORONARY ARTERIES

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Compare echocardiographic data at early postoperative period after surgical revascularization of stenosis and occlusion coronary arteries.

Analyzed data of 112 patients operated in 2009 year with good and satisfactory result (93 men and 19 women), average age 54.8 (± 8.3 years) with use bypass at 98 and off-pump at 14 patients. There were two groups 85 and 27 patients. At group A entered patients with hemodynamically stenosis. Group B consisted of patients who had occlusion of one - 25 patients (92.6%), and 2 (7.4%) main vessels. Occlusion of LAD observed at 10 (37%), RCA at 12 (44.4%), CA at 7 (25.9%) patients. Echocardiographic data were valued after coming in hospital and before discharging. Postinfarcted cardiosclerosis revealed at 24 (28.2%) and at 25 (92.6%) B patients.

At arrival moment The average EF at group A was 44.1%, hypokinesia of different segments at 39 (45.9%), akinetik areas at 3 (3.5%) and LV aneurysms at 5 (5.9%) (revascularization complemented with aneurysmectomia) patients. Before discharging EF increased till 45.2%, hypokinetic areas noted at 38 (43.7%). There were no cases with akinetik areas appeared contractile function. At group B average EF during first examination was 38.7%, before discharging 43.7%. First, hypokinetic segments noted at 26 (96.3%), akinetik at 7 (25.9%). Postoperatively transformation hypo- to normokinesia at 2 (7.7%), akinetic to hypokinetic at 3 (42.8%). Aneurysms at B observed in 16 (59.2%) cases.

Surgical revascularization at patients with occlusion of main coronary arteries brings to bettering of the hypoxic myocardiocytes metabolism hereunder contribute increasing of general function of the myocardium.

PP24-ACUTE CORONARY SYNDROME AFTER ADRENALINE INFUSION

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Introduction: The acute coronary syndrome (ACS) is the leading cause of death worldwide, associated with atherosclerosis in 75% of all cases. The purpose of the study was early diagnosis and treatment of acute coronary syndromes (ACS) in patients with no previous cardiac history.

Methods: A 45-years-old male, smoker, with a history of allergic reactions to antibiotics preparation, presented at the hospital with uvula swelling, angioedema and bronchospasm. He was treated directly with inhaled bronchodilators, intravenous corticosteroids and dilute solution of adrenaline. Symptoms of allergic reaction were improved. However, chest pain and mild sweating was experienced, which were declined after intravenously nitrates infusion.

Results: Results of ECG showed ischemia in the lower lateral wall (Figure 1 and 2), which was came to normal 1 hour later (Figure 3 and 4) due to nitrates treatment. Blood tests showed that CK MB max = 15.7, CK max = 247, SGOT = 65, LDH = 276, while the echocardiographic values were within normal limits (aortic root = 3.1cm, left atrium = 2.9 cm, LVEF = 65%). Coronary angiography revealed no blocked coronary arteries. His clinical picture was interpreted in spasm of coronary vessels, due to prompt use of intravenous adrenaline. **Conclusion:** The ACS in patients with no previous cardiac history, who take sympathomimetic drugs, should be diagnosed early and treated effectively by the clinicians. Modern and non-invasive diagnostic tools, using mainly the medical history and the clinical picture of the patient, contribute to the early diagnosis and effective treatment.

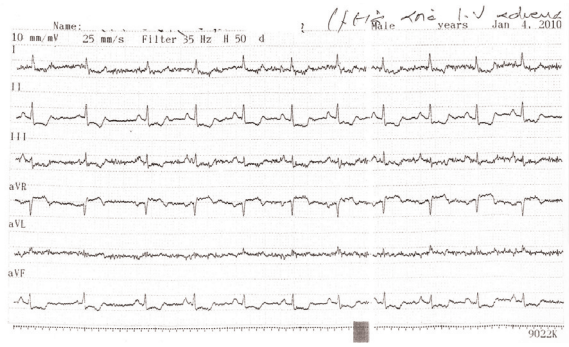

Figure 1

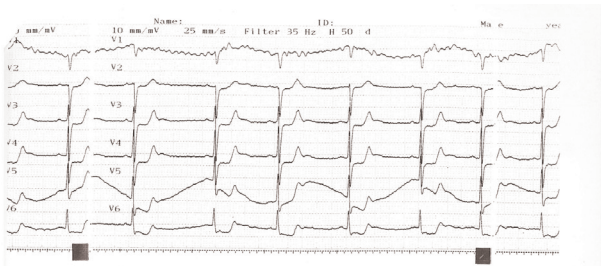

Figure 2

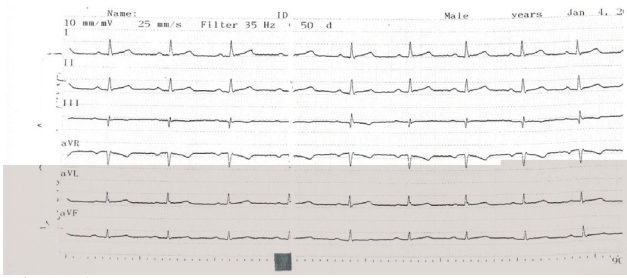

Figure 3

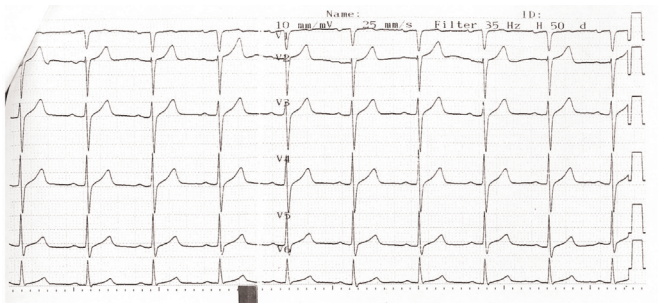

Figure 4

PP25-EFFECTS OF MUSIC LISTENING ON HEMODYNAMIC INDICES DURING EARLY POST-OPERATIVE PERIOD FOLLOWING CORONARY ARTERY BYPASS SURGERY

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Introduction: The purpose of our study was to assess the effects of music listening on hemodynamic indices at an early stage immediately following coronary artery by-pass grafting (CABG) and prior to extubation.

Methods: We have studied 15 CABG patients (pts) who consisted the music listening group (MG) (age 62±11 yrs) and 12 CABG pts consisted the control group (CG) (age 61±10). Pts in the MG listened to music via high quality headphones and relaxing type of music was played for the whole study period on a hourly basis followed by 15-20 min pause intervals. Invasive hemodynamic continuous intensive care unit (ICU) monitoring included systolic arterial pressure (SAP), heart rate (HR), capillary wedge pressure (CWP). Blood sugar (BS) measurements were recorded on a 2-hourly basis and also the total amount of IV drugs used for pain control like pethidine and morphine.

Results: Mean time up to extubation was not different between MG and CG (8±2 vs 8±3 hours, p=ns). No overall significant difference was demonstrated between MG and CG in the average hourly recorded SAP, HR, CWP, BS. However, there was a significant reduction in the amount of pethidine used in MG compared with CG (2±1 vs 7±3 mg, $p<0.05$).

Conclusion: Music listening during the immediate ICU post-operative period prior to extubation does not appear to exhibit a significant favourable hemodynamic effect in CABG pts. However, relaxing music listening may be used as a complementary non-invasive intervention to reduce the amount of opioid drugs used for pain control in ICU.

PP26-ACUTE CORONARY SYNDROME IN YOUNG FEMALE OF REPRODUCTIVE AGE- CASE STUDY

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Introduction: The purpose of this study is to sensitize health professionals to recognize, treat and prevent the emergence of ACS in patients with multiply risk factors, regardless of gender and age.

Methods: A 23-year-old female with a 7-year history of smoking and dyslipidaemia (total cholesterol: 374 mg/dl, LDL: 310 mg/dl, HDL: 38 mg/dl, Triglycerides: 129 mg/dl, Risk score 9.8), under intensive medical treatment, presented to a community hospital with acute onset of left-sided chest pain. She has family history of coronary artery disease (brother: sudden death at the age of 29; parents: ACS at young age), but she had no previous history of chest pain.

Results: The electrocardiogram showed ischemic lesions in the lateral and inferior cardiac wall and introduced into the coronary care unit. Her serum troponin (cTnT) concentration peaked at 15.4 μg/L, the Creatine kinase MB (CK-MB) at 60.5 μg/l, Serum glutamic oxaloacetic transaminase (SGOT) at 120 IU/L, and Lactate dehydrogenase (LDH) at 250 IU/L. Echocardiography revealed septal and anterior wall hypokinesis and ejection fraction of 45%. The patient was treated with aspirin, analgesics, vasodilators, antiplatelet drugs; her clinical status was improved. Coronary angiography revealed blocked arteries and stent was placed successfully. She was managed medically and subsequently discharged in stable condition.

Conclusion: The ACS in young women is a rare phenomenon in clinical practice. However, the clinician must be particularly sensitive and aware to deal with the diagnosis of these cases. Attention should be focused on prevention and information of young people with multiple cardiovascular risk factors.

PP27-CLINICAL AND ANGIOGRAPHIC PARTICULARITIES OF CORONARY HEARTHDISEASE IN PERIMENOPAUSAL AND POSTMENOPAUSAL WOMEN

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The purpose was to asses coronary pathology, in perimenopausal and postmenopausal women up to the age of 65.

Material and Method: We included into the study women with chest pain and abnormal ECG, admitted to the Medical Clinic between 2007-2009, separated into two groups: perimenopause 50, postmenopause 96 women . We assessed mainly the clinical forms of the coronary hearth disease and coronary angiography.

Results: In perimenopause the most frequent was stable angina 40%, while in postmenopause acute coronary syndromes were more frequent 50%. Syndrome X was found in 16% of women in perimenopause and 12% postmenopause. Coronary angiography has revealed normal coronary arteries in 16% vs. 12%, muscle bridge 12% vs. 10%, and the predominance of bi-trivascular lesions in postmenopause. The LAD artery was the most afected vessel, as univascular and bivascular stenosis, where it was associated mostly with right coronary lesions. The interventional therapy, was performed in 20% of patients in perimenopause vs. 25% in postmenopause and coronary by-pass in 4% of the cases. There were significant differences regarding obesity 61% vs. 79% p=0.04, diabetes mellitus 12% vs. 27% p=0.03. Cholesterol was higher in postmenopause 92% vs. 86% and a significant difference in the triglyceride levels 77% vs. 52% p=0.001, and there were also higher levels of HDLcholesterol in postmenopausal women 97% vs. 82% p=0.04.

Conclusion: In women perimenopause the most frequent clinical form was stable angina, after menopause there was an increase in unstable angina and acute myocardial infarction and the predominance of bi-trivascular lesions. Women postmenopause have a significantly increased incidence of : obesity, diabetes and dislipidemia. CHD incidence is rising early after the onset of menopause.

Aortic Root Surgery - Cardiac Anasthesia – Platelets – Hypertension

PP28-THE USE OF CRYOPRESERVED AORTIC HOMOGRAFTS AT A SINGLE UNIVERSITY CENTER (EARLY AND MID TERM RESULTS)

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Background: Aortic root replacement can be performed with cryopreserved aortic homografts with acceptable morbidity and mortality in selected cases.

Methods: From June 2002 through April 2009, 33 patients (24 male-9 female) aged 26 to 73 years old (mean 46 ±13) underwent aortic root replacement with aortic homografts.

14 patients (42.4%) / 7 patients (21.2%) underwent urgent/ emergency operation.

7 procedures (21.2%) were combined (CABG, MVR, MAZE (RF), hemiarch replacement), 12 patients (36.3%) had redo-operations [re-redo 4 (12.1 %)].

The causes were: IE in 19 patients (57.5%), degenerative disease in 6 patients (18.1%), congenital disease in 4 patients (12.1%), rheumatic disease in 4 patients (12.1%). EuroSCORE ranged from 1 to 20% (median 6%) and Logistic EuroSCORE: 1.51 - 89.51% (median 4.4%). Follow up was complete with an average between 10 to 92 months (mean 43.8±23.1).

Results: 2 patients (6.6%) had re-exploration for bleeding and 1 patient required emergency laparotomy due to splenic rupture. Perfusion time = 109 - 454 minutes (mean 201+/-75.6) aortic cross clamp=96-308 minutes (mean 162.5 +/-48.9). Total

circulatory arrest required in 11 patients (33%) and ranged from 2 to 21 min (mean 7.2+/-6.3). The hospital stay was between 4 and 59 days (mean 17+/-12.9). The operative mortality was 4/33 (12.1%). 5 patients (15.1%) required PPM. No structural aortic valve failure observed during the follow-up period. 1 patient died in 52 post-op month due to recurrence of IE.

Conclusion: Aortic root replacement with cryopreserved homografts can be performed safely with good early and mid term results.

PP29-EPIDURAL ANESTHESIA IN CARDIAC SURGERY

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Special Hospital for Surgery "Filip Vtori"

Introduction: Our 5 years experience with use of combined high epidural thoracic anesthesia (HTEA) with superficial general anesthesia (GA) in open-heart surgery.

Material and Methods: January 2005 to December 2009, 2500 patients were subjected to surgery using HTEA and GA. Epidural catheter was placed in all patients one day before surgery. The goal was to reach somatosensory and motor block between C5 and T7. General anesthesia was achieved with 12.5 µg sufentanil, followed by pancuronium of 8mg. Following endotracheal intubation, HTEA was achieved with the use of 0.5% Bupivacain and Sufenta F 25µg/ in 20ml, delivered at 30ml/h, 30min before the surgical incision and sternotomy. With adequate intraoperative analgesia, dose was reduced to 5-8ml/h.

After wound closure, HTEA is changed to combination of 0.25%Bupivacain and 25 µg/ sufentanil in 20ml, 3-5-10ml/h titrated to provide adequate postoperative analgesia. Visual Analog Scale (VAS) of pain and hemodynamic parameters were used to assess adequacy of the analgesia. Extubation time, first mobilization was documented. HTEA catheter was removed on second postoperative day.

Results: All patients remained hemodinamically stable Twenty % of the patients were extubated in the operating theater, 40% extubated within 5 hours, 23% within 10 hours and 17% after 10 hours. None required reintubation and all remained hemodinamically stable. Average postoperative VAS 3.5 ± 0.9. All patients were mobilized first postoperative day.

Conclusion: HTEA with superficial GA has shown to be safe during surgery and postoperative period, allowing fast extubation with minimal pain, early mobilization, leading to shorter ICU and hospital stay.

PP30-MONITORING OF HAEMOSTATIC MANAGEMENT IN HIGH RISK CARDIAC SURGERY PATIENT BY THROMBOELASTOMETRY

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Introduction: Cardiac operations using extracorporeal circulation machine (cardiopulmonary bypass - CPB) can have negative outcome on the organism, especially due to influence on haemostasis. Activation of coagulation mechanisms as result of blood contact with non physiologic surfaces (CPB) can provoke activation of extrinsic coagulation pathway. Surgical trauma, hemodilution priming solutions and high doses of heparine lead to impaired coagulation and risk of bleeding. We used a bleeding management system thromboelastometry (TEM) which measures viscoelasticity of the patients' blood and monitores blood coagulation during and after the cardiac surgery.

Methods: We performed a retrospective study to evaluate the ability of TEM system to predict postoperative bleeding after cardiac surgery and to determine a transfusion guide in utilization of blood products. Participants: 64 adult male and female patients undergoing cardiac surgery (CABG, valve replacement, combined operation, aortic surgery, Htx, reoperation). Blood samples had been taken preoperatively (before introduction of anaesthesia), and 10 mins after application of protamin.

Results: Fourteen patients had normal TEM results (group 1). Significantly greater volume of fresh frozen plasma (FFP) (med. 0/810 ml, p=0,001) had been applied to 50 patients with abnormal TEM results (group 2), in operating room. There was no difference between groups in (thoracic drainage or bleeding) in early postoperative period. When comparing the TEM parameters (CT intem, CT extem, MCF fibtem), there were no significant changes, except for increase in clot strenght (maximum clot firmness MCF).

Conclusion: Introduction of this method significantly reduced necessity of blood transfusions perioperatively, it lowered reexploration rate and decreased necessity for transfusion leading to lower expenses and improvement of entire treatment results.

PP31-THE CONTRIBUTION OF RENAL DOPPLER ULTRASONOGRAPHY IN THE DIAGNOSIS OF RENOVASCULAR HYPERTENSION

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Introduction and Aims: Detecting the renal artery stenosis is important, because its consequences, especially renovascular hypertension and kidney failure, can be curable by revascularization. Using a cost efficient examination, duplex mode Doppler ultrasonography, we tried to diagnose the hemodynamically significant renal artery stenosis and evaluate its relationship with other cardiovascular diseases and renal function.

Methods: We included in our study 122 patient with hypertension admitted to hospital and with a follow-up between 2000-2009. Using duplex mode Doppler ultrasonography we measured a series of parameters:maximum systolic speed, pulsatility, resistivity indexes. Angiographic examination was used to confirm the presence of the stenosis and its severity.

Results: We found 86 patients without stenosis representing 70.49%, and with stenosis 36 patients 29.51%. The average blood pressure was higher in the group with stenosis 194 mmHg vs. the group without stenosis 160mmHg, p<0.001. A larger proportion of patients required 3 antihypertensive drugs 86.11% versus 56.98%, p=0.002. Coronary disease was found in 58.33% of the patients with stenosis versus 19.77% in those without stenosis

p=0.001. The average level of cretinine was 1.76 mg/dl in the groupe with stenosis compared to 1.11 mg/dl in the other group p=0.001.In the group with stenosis 55.56% had peripheral arteriopathy versus 24.42%, p=0.001.

Conclusions: Coronary disease, peripheral arteriopathy and renal failure have a much higher frequency in the group with stenosis. In the group with stenosis, blood pressure values were significantly higher and required more often over 3 antihypertensives. The angiographic examination confirms that Doppler vascular ultasonography is an efficient relatively cheap and reproducible examination in the diagnosis of renal artery stenosis.

Intensive Care

PP32-VENO-VENOUS ECMO IN MANAGEMENT OF ACUTE RESPIRATORY FAILURE DUE TO H1N1/2009 INFLUENZA INFECTION

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Introduction: Veno-venous ECMO was used to support eight patients admitted with severe Acute Respiratory Distress Syndrome (ARDS) secondary to influenza H1N1/2009. This report arrays the ECMO methodology employed emphasising core advantages of the circuit. Survival rates are reported.

Methods: Between August 2009 and January 2010, eight patients, diagnosed with H1N1/2009 ARDS, were transferred to our tertiary specialist cardiothoracic Center for ECMO following inability to manage type II respiratory failure despite advanced ventilatory support. The suitability for ECMO was assessed based on reversibility of pathology and criteria published in the CESAR trial (Peek G et al. 2009) ECMO circuit included two Centrimag-Levitronix consoles per patient for safety . The selection of ECMO disposables was based on national standards regarding their durability and reliability against extended hospitalisation. Anti-coagulation was maintained with continuous unfractionated heparin infusion and was monitored using Activated Prothrombin Ratio (APR) and ACT.Less invasive cannulation was achieved with single site percutaneous insertion of the AvalonEliteTM, Bi-Caval dual lumen catheter in 5 patients.

Results: The total duration of ECMO support was 133 days. The patients had the following characteristics; 5 Caucasian, 3 Asian, 3:5 male to female ratio, average age 40.4. One patient had two periods on ECMO (30 and 3 days). There was no circuitry or pump failure, but one patient required 2 oxygenators in parallel. All three patient deaths were due to intracranial haemorrhage, despite tightly controlled anticoagulation.

Conclusion: ARDS secondary to H1N1/2009 was adequately managed with veno-venous ECMO though mortality secondary to intracranial haemhorrage was high. Veno-venous ECMO has a role in the management of pneumonitis seen in influenza pandemics.

PP33-ANESTHESIA IN ADULT CARDIAC SURGERY WITHOUT MAINTENANCE OF MUSCLE RELAXANT: A RANDOMIZED CLINICAL TRIAL

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Introduction: Some recent studies concluded that there may be no need for muscle paralysis during cardiac surgery when adequate anesthesia is provided. We studied this theory in randomized clinical trial.

Methods: Eighty adult patients were randomly allocated into two groups for elective coronary artery bypass graft surgery. In study group (n = 40) only an intubation dose of cisatracurium was administrated, as opposed to control group (n = 40), who had additionally a continuous infusion. The anesthesia level was maintained at same limit using propofol infusion. Remifentanil infusion was titrated to control patient hemodynamic response. During surgery, any minor (fine body or respiratory muscle movements) or major (coarse body movements or bucking/caught) movements were recorded. Postoperatively, analgesia was provided by remifentanil. Surgical condition was classified into three states: good (no movement), acceptable (minor movements), or poor (major movements). Intra and postoperative characteristics were compared between two groups.

Results: Statistical analysis was performed in only 78 patients (study = 38, control = 40). The demographic and preoperative characteristics of two groups were comparable. Intraoperative propofol consumption was same, but significantly more remifentanil was used in study group (p = 0.001). Postoperative characteristics and complication rates was same. There were no movements in control group patients, while in study group one patient had major movement and three had minor movements.

Conclusions: We concluded that omitting maintenance muscle relaxants in adult cardiac surgery or in fact eliminating residual muscle paralysis at the end of the surgery without improving early outcome can increase patient intra-operative movement risk.

PP34-IS FINDER NEEDLE NECESSARY FOR INTERNAL JUGULAR VEIN CATHETERIZATION?

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Introduction: It may be no need for routine firstly used small finder needle during Internal Jugular Vein (IJV) catheterization when the procedure is performed by an anesthesiologist. We studied effect of finder needle use on IJV catheterization success and complications rate in adult cardiac surgery.

Methods: A prospective observational study was carried out for 3 month period and all patients older than 18 years who underwent elective cardiac surgery were studied. Data were collected about operator, using finder needle, patient position, success rate, intra and postoperative complications of IJV catheterization.

Results: Out of 399 patients, 42 patients were excluded from study. Of remaining 357 patients, in 93% right internal jugular vein was the preferred vein. Small finder needle was used in 148 (45.8%) of IJV catheterization (group one) versus 175 (54.2%) patients that IJV catheterization were done without using finder needle (group two). Anesthesiology residents significantly used finder needle more than expert attending anesthesiologist (p=0.001). Using finder needle significantly increased catheterization time from 5.8±2.2 to 8.6±3.4 minutes (p=0.002). There were not any significant differences in complications and success rate between two groups.

Conclusions: We concluded that in internal jugular vein catheterization, anesthesiologists may not have any need for small finder needle use in purpose to reduce complications or increase success rate.

PP35-EFFECTIVE COMBINED OFF-PUMP SURGICAL TREATMENT AND AUTOLOGOUS BONE-MARROW TRANSPLANTATION FOR END- STAGE ISCHEMIC CARDIOMYOPATHY

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Objective: To propose an alternative method combined off-pump treatment of end-stage ischemic cardiomyopathy consisting of revascualization of ischemic areas, external reshaping of the LV in order to restore near normal geometry and autologous bone marrow-derived mononuclear cell (BM-MNC) implantation.

Methods: Forty seven patients (mean age 58±8.9 years) underwent the above procedure. All patients were NYHA III-IV and 4 were transplantation candidates. They underwent standard laboratory evaluation, transthoracic echocardiography, dipyridamole thallium scintigraphy (DTS) and cardiac MRI preoperatively and at 3, 6 and 12 months postoperatively. After revascularization and external LV reshaping, BM-MNCs were injected into predetermined peri-infarct areas.

Results: Forty five patients survived during a follow up period of 3-37 months. Ejection fraction improved from 21.7±7.4% to 30.6±6.9%, 36.5±4.3% and 37.7±4.2% at 3, 6 and 12 months respectively. Left ventricular end-diastolic diameter was reduced from 66.1+4.9mm to 62.6±3.9mm, 60.5±2.9mm and 59.3±4.2mm respectively. Previously non-viable areas on DTS were found to contain viable tissue and MRI showed hypokinesia in previously akinetic areas. NYHA class improved to I-II. No significant arrhythmias were noted during the follow-up period.One patient died due to low cardiac output and one patient died due to septic shock.

Conclusions: Combined off-pump surgical treatment and autologous bone-marrow mononuclear cell transplantation for end-stage ischemic cardiomyopathy is safe and feasible and appears to improve the patients' functional status.

Heart Failure

PP36-EXERCISE CAPACITY IN PATIENTS WITH LEFT VENTRICULAR ASSIST DEVICE VERSUS PATIENTS WITH BI-VENTRICULAR ASSIST DEVICE LONG-TERM AFTER DEVICE IMPLANTATION

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Introduction: Due to lack of donor hearts, patients with ventricular assist devices (VAD) are increasing. We aimed to investigate whether patients with left VAD (LVAD) present with a better functional capacity compared to patients with biventricular support (Bi-VAD), late after device implantation.

Methods: Out of 23 patients with VAD (Berlin Heart GmbH, Germany) bridged to HTx, 11 patients with LVAD (9 males/2 females) and body mass index (BMI) 25.8±3.9, kg/m^2, of mean age 38.4±15.1 years, classified according to Interagency Registry for Mechanically Circulatory Support (INTERMACS) scale as 1 (n=1), 2 (n=10) and 12 patients with Bi-VAD (12 males) and BMI 23.9±3.9 kg/m^2 of mean age 37.3±14 years, INTERMACS 1 (=3), 2 (n=4), 3 (n=5) underwent cardiopulmonary exercise testing for measuring peak oxygen consumption (peakVO_2), and the 6-minute walk test (6MWT), 6±3.7 months post-implantation.

Results: Exercise capacity in patients with LVAD vs. patients with BiVAD of similar age, BMI and gender, assessed by peakVO_2 (14.9±3 vs. 16.3±3.8 ml/kg/min, p=ns), as well as exercise time (8.3±2.9 vs. 9.2±2.1 min), VE/VCO2 slope (37.8±7.4 vs. 40±5.3, p=ns), VE (45.8±12.9 vs. 55.8±15.9 L/min, p=ns), and VO_2 at anaerobic threshold (11.6±4 vs. 12.5±4.6 ml/kg/min, p=ns) respectively, did not differ significantly. The 6MWT distance was comparable between LVAD patients and Bi-VAD patients (439±87 vs. 493±59 meters, p=ns).

Conclusion: Long-term after device implantation, both maximal and submaximal exercise capacity did not differ significantly between patients with LVAD and Bi-VAD. Our findings indicate that exercise capacity in patients with VAD is independent of univentricular or biventricular support.

PP37-BENEFITS OF PHYSICAL TRAINING ON FUNCTIONAL STATUS IN PATIENTS WITH VENTRICULAR ASSIST DEVICES LONG-TERM POSTIMPLANTATION

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Introduction: Exercise capacity may not be fully restored in patients with heart failure even long-term after ventricular assist device (VAD) implantation. The benefits of exercise training in patients with VAD are unknown.

Methods: Fifteen patients, age 38.3±15.9 yrs, bridged to heart transplantation with LVAD or BiVAD (Berlin Heart) were randomized at a ratio 2/1, to a training (TG, n=10) or control group (CG, n=5), 6.3±4 months post-implantation. Both groups were advised to walk 30-45 min/day. TG also underwent moderate-intensity aerobic exercise using a bike or treadmill for 45 min, 3-5/week, combined with high-intensity inspiratory muscle training using a computer-designed software to respiratory exhaustion, 2-3/week for 10 weeks. Patients were tested using cardiopulmonary exercise testing, 6-min walk-test (6MWT), spirometry and electronic pressure manometer for inspiratory muscle strength (Pimax) and endurance (SPimax) measurement. Quality of life (QOL) was assessed with the Minnessota Living with Heart Failure questionnaire.

Results: TG improved peakVO_2 (19.3±4.5 vs. 16.8±3.7 ml/kg/min, p=0.008) and VO_2 at ventilatory threshold (15.1±4.2 vs. 12±5.6 ml/kg/min, p=0.01), while VE/VCO_2 slope decreased (35.9±5.6 vs. 40±65, p=0.009). The 6MWT distance (527±76 vs. 462±88 m, p=0.005) and QOL were improved (38.2±11.6 vs. 48.9±12.8, p=0.005) as well as Pimax (131.8±33 vs. 95.5±28 cmH_2O, p=0.005), SPimax (484±195 vs. 340±193 $cmH_2O/s/10^3$ p=0.005) and inspiratoty lung capacity (2.4±0.9 vs. 1.7±0.7 L, p=0.005). No significant changes were noted in the CG.

Conclusions: Our findings indicate that exercise training may improve the functional status of VAD recipients late post-implantation and thus, may have additional importance in cases of destination therapy.

PP38-EXERCISE CAPACITY AND QUALITY OF LIFE IN LEFT VENTRICULAR ASSIST DEVICE RECIPIENTS OF CONTINUOUS-FLOW INTRACORPOREAL SUPPORT VERSUS PULSATILE-FLOW EXTRACORPOREAL SUPPORT

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Introduction: We investigated potential differences in exercise capacity and quality of life in patients with implantable intracorporeal (INCOR) continuous- flow Left Ventricular Assist Device (LVAD) versus patients with extracorporeal (EXCOR) pulsatile-flow LVAD, bridged to heart transplantation (HTx).

Methods: Eleven patients with LVAD (Berlin Heart) participated in the study. Five male patients with INCOR continuous-flow support LVAD, with body mass index (BMI) 25.8±3.9, kg/m^2, of mean age 44±18 years, classified according to Interagency Registry for Mechanically Circulatory Support (INTERMACS) scale as 2 (n=5) and 6 patients with EXCOR pulsatile-flow LVAD with BMI=23.9±3.9 kg/m^2 of mean age 34±11 years, INTERMACS: 1 (n=1), 2 (n=5), underwent cardiopulmonary exercise testing (CPET) for measuring peak oxygen consumption (peakVO_2) and quality of life evaluation using the Minnesota Living with Heart Failure (MLwHF) Questionnaire, 5.1±3 months after device implantation.

Results: Exercise capacity in patients with INCOR continuous-flow support LVAD vs. patients with EXCOR pulsatile-flow LVAD, assessed by peakVO2 (14.8±2.8 vs. 14.9±3.5 ml/kg/min, p=ns), as well as exercise time (8.9±2.2 vs. 7.7±3.5 min), VE/VCO_2 slope (41±7 vs. 35±7.1, p=ns) and VO_2 at anaerobic threshold (9.5±5.8 vs. 12.9±1.7 ml/kg/min, p=ns) did not differ significantly. QOL assessed by the MLwHF questionnaire was also comparable in patients with INCOR continuous LVAD vs. EXCOR pulsatile LVAD (39.6±12.6 vs. 44.4±5.2, p=ns)) respectively.

Conclusion: Exercise capacity and quality of life did not differ significantly between patients with INCOR continuous-flow LVAD and EXCOR pulsatile-flow LVAD. Thus, potential inconvenience due to the operating console in patients with EXCOR LVAD does not limit their functional status.

PP39-COMPARISON OF FUNCTIONAL STATUS BETWEEN PATIENTS WITH MECHANICAL CIRCULATORY SUPPORT AND PATIENTS AFTER HEART TRANSPLANTATION

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Introduction: Since patients with ventricular assist devices (VAD) are increasing, we compared the functional status of VAD recipients to that of patients after heart transplantation (HTx).

Methods: Fifteen patients with VAD (LVAD [n=7]/ BiVAD [n=8], Berlin Heart), (14 males, 1 female), age 38.3±15.9 yrs, bridged to HTx with body mass index (BMI) 23.6±4.2 kg/m^2 and 14 patients (12 males, 2 females) after orthotopic HTx, age=43±11 years and BMI=24±4.9 kg/m^2 were studied. Exercise capacity was tested using cardiopulmonary exercise testing on a treadmill using the Dargie protocol and the 6-min walk-test (6MWT) at least 3 months post-surgery. Dyspnea was measured using the Borg scale at the end of the 6MWT.

Results: Patients with VAD were matched for age, gender and BMI to HTx patients. HTx patients achieved a higher mean peakVO_2 compared to VAD patients (20.4±3 vs. 16.2±3.8 ml/kg/min, p=0.005), longer treadmill exercise time (11.5±1.2 vs 9.1±2.4 min, p=0.004) and higher VO_2 at anaerobic threshold (16.2±3 vs. 12±5 ml/kg/min, p=0.01), respectively. However, the 6MWT distance in patients with HTx was comparable to that covered by VAD patients (478±71 vs. 452±75 m, p=ns) although dyspnea tended to be more for patients with VAD (9.2±1.5 vs. 10.5±1.3, p=0.03).

Conclusions: Our findings show that although maximal exercise capacity is higher in patients after HTx in comparison to VAD patients, submaximal exercise capacity which may be more important in determining daily activities does not differ significantly between HTx and VAD patients. Rehabilitation programs could contribute to a further improvement of exercise capacity in VAD recipients.

PP40-BENEFICIAL EFFECTS OF A COMBINED WHOLE BODY ENDURANCE / INSPIRATORY MUSCLE TRAINING ON AEROBIC ENDURANCE IN PATIENTS WITH HEART FAILURE

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Introduction: Whole body endurance training (WTR) improves functional status in patients with heart failure (HF). Inspiratory muscle training (IMT) also resulted in significant improvement in exercise capacity in this population. We investigated the potential additive benefits of IMT on WTR in HF.

Methods: Seventeen patients (n=17), age 56±17 years, with dilated cardiomyopathy (n=10) or ischemic cardiomyopathy (n=7) were randomly assigned to either WTR (n=9) group or combined WTR/IMT (n=8) group. WTR involved bike exercise at 60-80% of max heart rate, 3-5/week for 12 weeks for both groups. IMT, for WTR/IMT group, involved training at 60% of sustained maximal inspiratory pressure (SPimax) for 30 min, 3/week for 12 weeks using a designed-purpose software with an electronic pressure manometer. Pre- and post-training exercise capacity was evaluated using cardiopulmonary exercise testing and end-systolic LV volume (LVESV) was assessed by 2-D echocardiography while inspiratory muscle strength (Pimax) and endurance (SPimax) by electronic pressure manometer.

Results: WTR/IMT group, improved Pimax (114±16 vs. 89±23 cmH2O, p=0.01) and SPimax (499.8±142 vs. 378±115 cmH20/s/1000, p=0.01). LVESV decreased significantly in WTR group (96.2±21 vs. 105.1±30 ml, p=0.04) and tended to decrease in the WTR/IMT group (119.6±41 vs. 139±51 ml, p=0.07). WTR and WTR/IMT groups tended to increase peakVO2, (20.5±5 vs. 18.8±3.9, ml/kg/min, p=ns) and (20.5±3.6 vs. 18.7±3, ml/kg/min, p=ns) respectively, but not significantly.

Conclusion: Training resulted in a decrease in LVESV in both WTR and combined WTR/IMT groups. Exercise capacity tended to increase in both groups. Inspiratory muscle function improved only in the combined WTR/IMT group.

PP41-A NEW MATHEMATICAL APPROACH INVESTIGATING PATIENT SPECIFIC FACTORS FOR THE DETERMINATION OF CLINICALLY USEFUL MARKERS OF CARDIOVASCULAR STATUS

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Introduction: Cardiopulmonary exercise-testing (CPX) is a tool to determine the functional capacity of patients with heart failure. We developed a model predicting the main CPX parameters from patient specific factors and clinical information.

Methods: We developed mathematical formulas linking the metabolic equivalent (METs), ratio of maximum expiratory volume to CO_2 production (VE/VCO_2) and maximum respiratory Oxygen uptaken ($VO_{2,peak}$) of a symptom–limited CPX with the age, gender, height, weight, smoking habits, fitness, systolic pressures, diastolic pressures, heart rate, recording values at rest and after maximum exercise from 188 subjects, aged 18–80 years (mean age 48.2±13.7 years) who referred for a CPX. We used the Spearman correlation coefficient to assess the association strength of each patient specific factor with the quantities of interest and computed p-values and the robust iteratively reweighed least squares method to compute the linear regression coefficients relating the input variables with the quantities of interest. We report the out-of-sample mean absolute error (MAE).

Results: p-values indicate whether an input variable is significant in predicting the outcome measurement, and the Spearman correlation coefficients offer a preliminary indication of the association strength of each input variable with the quantities of interest (METs, VE/VCO_2, $VO_{2,peak}$). For each quantity of interest we only include the significant predictors (p-value<0.05).The out-of-sample MAE were (mean±standard deviation): 1.20±0.42 for METs, 5.09±0.95 for VE/VCO_2, 3.09±0.65 for $VO_{2,peak}$.

Conclusions: We present a method linking cardiovascular disease markers with measurable quantities which offers a reasonable estimate of METs, VE/VCO_2 and $VO_{2,max}$, without requiring the patient to undertake the CPX.

PP42-THE EFFECT OF BOSENTAN ON CLINICAL AND HAEMODYNAMIC STATUS OF PATIENTS WITH B-THALASSAEMIA AND PRIMARY PULMONARY HYPERTENSION

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B-thalassaemia has been recognized as a cause of primary pulmonary hypertension (PPH).

The aim of our study was to prospectively evaluate the safety and haemodynamic and clinical efficacy of bosentan therapy in a group of b-thal patients with PPH.

Methods: Eleven b-thal patients, with increased (>50 mmHg) right ventricular systolic pressure (RVSP), with normal LV systolic and diastolic function were included. Patients had a clinical, echocardiographic evaluation and 6 minutes walk test (6MWT) at baseline and every 3 months for at least 18 months. In 6 patients who consented, a right catheterization was also performed at baseline and at the end of follow up. Apart from regular medication, all patients received bosentan in maximal dose of 250mg/day.

Results: Patient's follow up lasted 24±8 months (8-32). Bosentan was discontinued in one patient due to liver dysfunction and in another patient due to extensive skin rash which both recovered. The patients showed a significant functional improvement (6MWT: 415±61m at baseline, 561±62 m at the end, p<0.001). RVSP declined (from 74±12 to 63±11 mmHg, p<0.01) and RV diameter decreased (from 38±4 to 35±5 mm, p<0.05). Cardiac output increased (from 6.0±0.9 to 6.3±0.8 L/min, p<0.01). Mean systolic pulmonary pressure (in the 6 patients) showed a decline (from 44±4 to 38±8 mmHg, p:0.08) with a significant drop of estimated pulmonary resistance (from 5.5±1.4 to 4.9±1.5 Wood units, p<0.01).

Conclusion: Therapy with bosentan seems to be efficient in clinical and haemodynamic improvement of patients with b-thal and PPH, without significant or permanent adverse reactions.

PP43-LONG-TERM SUPPORT WITH A BI-VENTRICULAR ASSIST DEVICE – A SINGLE CENTER EXPERIENCE

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Introduction: Low organ donation combined with delayed referral of advanced-stage cardiomyopathy patients necessitates biventricular assist device (BiVAD) support for extended periods of time. Reliable devices and close patient follow-up increase the survival likelihood. We report our experience with the Berlin Heart Excor BiVAD.

Methods: Thirty-six biventricular Berlin Heart Excor devices have been implanted since 2004. Patients' ages ranged from 11 to 60 years (median age 35 years). Diagnoses included dilated (74.5%), ischemic (17%) and restrictive (8.5%) cardiomyopathies. All patients presented in severe biventricular failure (intravenous inotropes, 31; ventilated, 5; IABP, 25; mean: CI 1.9 L/min/m^2; CVP 19 mmHg; total bilirubin 3.75 mg/dl; NT-proBNP, 25,500 pg/ml). Two patients needed a BiVAD after left ventricular assist device support of 439 and 295 days, respectively. Anticoagulation consisted of heparin, Vitamin K antagonist,aspirin, dipyridamole and clopidogrel.

Results: Thirty day, 180 day, and 1 year survival after implantation (excluding transplanted patients) was 95%, 87% and 82% respectively.

Nineteen patients (53%) were transplanted, and 9 are ongoing. Mean time on support was 319 days and 31 out of 36 patients with adult-sized pumps were discharged home with a mobile driver. Three patients exceeded 2 years of uncomplicated support before they were transplanted. Twelve patients were on support for more than 1 year.

One patient with renal failure and dialysis dependence lives at home 3 years after implantation. Complications included infection (n =6), bleeding requiring reexploration (n=3), and thromboembolic events (n =4).Seven patients died, 1 of an accidentally ruptured cannula (after 365 days),2 of sepsis ,4 of multiorgan system failure.

Conclusions: Reliability of components and strict utilization of patient-care protocols leads to excellent survival in this extremely sick population. Meticulous multi-disciplinary management by experienced personnel is essential.

PP44-EVALUATION OF THE 6-MIN WALK TEST FOR THE ASSESSEMENT OF EXERCISE CAPACITY IN PATIENTS WITH VENTRICULAR ASSIST DEVICES

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Introduction: We aimed to investigate whether the widely used 6-min walking test (6MWT) in patients with heart failure, can be used for the assessment of exercise capacity in patients with ventricular assist devices (VAD).

Methods: Fifteen patients with VAD (Berlin Heart GmbH, n=14, Heart Mate XVE n=1) with either left ventricular assist device (LVAD, n=7) or biventricular assist device (BiVAD, n=8), of mean age 38.3±15 years, classified according to Interagency Registry for Mechanically Circulatory Support scale as 1 (n=3), 2 (n=9) and 3 (n=3) participated in the study. After a mean time of 6.3±4 months post-VAD implantation, patients underwent cardiopulmonary exercise testing (CPET) for measuring peak oxygen consumption (peakVO2) on a treadmill using the Dargie protocol. The 6MWT distance was also measured in an unobstructed 100-meter corridor according to the American Thoracic Society guidelines.

Results: Patients achieved a mean peakVO_2=16.1±3.8 ml/kg/min at an exercise time=9.1±2.4 min while VO_2 at anaerobic threshold was 12±5 ml/kg/min, VE/VCO_2 slope=39.8±6.4 and VE=52.2±16.9 L/min. The mean 6MWT distance was 452±76 m. A significant correlation was detected between 6MWT distance and peakVO2 (r=0.705 p=0.003) and 6MWT distance with exercise time (r=0.680 p=0.005)

Conclusion: Exercise capacity assessed by the 6MWT positively correlated with peakVO_2 and treadmill exercise time measured with cardiopulmonary exercise testing. If our findings are confirmed in a larger number of patients, then, the simple cost-effective 6MWT could be used to evaluate exercise capacity in patients with ventricular assist devices.

Interventional Cardiology – Minimally Invasive Techniques

PP45-DIAGNOSTIC CORONARY ANGIOGRAPHY IS RELATED TO DECREASED TNF-α PRODUCTION AFTER EX-VIVO WHOLE BLOOD STIMULATION WITH LPS

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Introduction: Several studies showed serum markers elevation as a result to coronary angiography. We investigated the effect of diagnostic coronary angiography (DCA) on the development of systemic inflammatory response syndrome (SIRS) and on whole blood cytokine production capacity after *ex-vivo* LPS stimulation.

Methods: Clinical characteristics and serum cytokines of the patients were recorded at baseline and at 2, 6, 12, and 24 hours after DCA. Peripheral blood was collected at baseline and at 2, and 24 hours for complete blood count, and *ex-vivo* stimulation with

LPS for subsequent cytokine measurement. Values are expressed as median ± IQR and were compared by use of the Wilcoxon's signed rank test for nonparametric data.

Results: We included 23 male patients (mean age 52.0 ± 18.0 years) undergoing DCA. None of the patients developed clinical or laboratory signs of SIRS. Serum IL-6 significantly increased at 12 and 24 hours. There was a significant decrease in TNF-α production after ex-vivo LPS stimulation of whole blood at 2 and 24 hours compared to baseline (716.0 ± 319.0; 576.0 ± 715.0 vs. 1154 ± 844.0 pg/ml; respectively) suggesting that DCA may cause transient immunosuppression.

Conclusions: DCA is related to increased serum IL-6 levels but not clinical SIRS. Development of SIRS after DCA is indicative of infectious or other in origin complication. DCA is associated with immune cells hyporesponsiveness expressed as decreased TNF-α production after whole blood stimulation with LPS *ex-vivo*.

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PP46-MINIMAL INVASIVE CARDIAC SURGERY

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Introduction: We describe the results in patients underwent cardiac operations with minimally invasive techniques.

Methods: 11 patients (1 male, 10 female; mean age 24.25 years) underwent cardiac operation for correction of congenital heart defects, between September 2005 and December 2009. Surgical procedures included sinus venosus defect closure (n=4), atrial septal defect closure (n=7). In all cases, the surgical approach was by right mini thoracotomy via submammary incision (5-7cm length).

Results: Total intraoperative time increased by 30 min in the right mini thoracotomy compared to conventional sternotomy. There were no perioperative complications or death. 7 patients extubated in operating room and 4 within 3 hours after completion of surgery. Mean hospital stay was 4.3 days. Postoperative cosmetic result was excellent in all of them.

Conclusion: Right mini thoracotomy offers an excellent cosmetic result, although technically more demanding. In selected cases may become the surgical approach of choice, when the surgeon is familiar with this method.

PP47-MINIMALLY INVASIVE AORTIC VALVE SURGERY YIELDS EXCELLENT RESULTS ESPECIALLY IN THE ELDERLY

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Introduction: We investigated if minimally invasive aortic valve replacement (MIC-AVR) has the potential a) to become the standard approach for AVR and b) to be an alternative for percutaneous aortic valve replacement (PAVR) in high risk patients.

Methods: From 04/2009 to 01/2010 15 patients older than 75 years (mean age 80±3 years, range 76 to 87 years) who underwent AVR via upper partial J-sternotomy, were enrolled in the present study. Canulation sites were ascending aorta and right atrium. Myocardial protection was obtained by antegrade cold crystalloid cardioplegia and mild hypothermia (mean: 33±1°C). Postoperative course including ICU-stay, neurological and other secondary complications, mortality, etc. were recorded and evaluated.

Results: Mean aortic cross clamp time was 70±14 minutes and mean cardiopulmonary bypass time was 90±15 minutes. Duration of ventilation was 14±10 hours and median ICU-Stay was 2 days. None of our patients had a major or permanent cerebrovascular event. Only 1 patient had prolonged (>24 hours) ventilation and 3 had atelectasis. All patients were mobilized at the regular ward and median total hospital length of stay was 8 days. Operative as well as 30-day mortality were zero.

Conclusions: Our data show that MIC-AVR can be safely established as standard approach for aortic valve surgery yielding excellent results even in the elderly. As perioperative morbidity and mortality is very low even in high risk patients, MIC-AVR should be considered in these patients, specifically, as long as PAVR is not yet established as routine procedure.

Robotics – Stem Cells – Thoracic Surgery

PP48-THORACOSCOPIC AND ROBOTIC TRICUSPID VALVE ANNULOPLASTY WITH A BIODEGRADABLE RING

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Introduction: Ring annuloplasty remains technically demanding and time-consuming thoracoscopic and robotic surgery. We review our initial experience with the intra-annular Bioring tricuspid ring using minimally invasive access and propose some modifications to adapt it to the particularities of these approaches.

Methods: Patients undergoing minimally invasive tricuspid annuloplasty were prospectively included between March and September 2009. The feasibility and ease of implantation were evaluated. 10 patients were included, 8 for functional regurgitation and 2 for endocarditis. Six were operated through a small anterolateral thoracotomy and 4 with the da Vinci S robotic system.

Evaluation: Mean CPB and aortic cross clamping were 123±30min and 86±28 min respectively. Ring implantation was

successful in all of the patients. There was 1 late death from MOF. No patient required reoperation. On discharge, 7 patients had no or discrete TR and 2 patients had moderate TR with no tricuspid stenosis, and remained stable during follow-up.

Conclusion: This biodegradable ring offers a simple and quick implantation which is feasible and simplified in minimally invasive approaches.

PP49-CARDIAC RESIDENT STEM CELLS: HYPE OR HOPE FOR MYOCARDIAL REGENERATION?

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Introduction: Stem-cell based therapies have raised new hope for the treatment of heart-diseases. As marker proteins for resident cardiac stem-cells, c-kit (CD117) and BCRP (breast-cancer resistance protein/conferring the side-population phenotype) have been described. However, the distribution-pattern before and after pathological events in the adult human heart has not been determined in detail.

Methods: We investigated the expression-pattern of c-kit and BCRP in normal and diseased adult human heart-tissue. We obtained 55 atrial and ventricular biopsies from 50 patients undergoing heart-surgery and performed immunohistochemical staining for BCRP and C-kit. A Titin staining was performed to identify cells with a cardiac-phenotype. Fluorescence microscopy was used for analysis and BCRP+ cells were excluded if they co-stained for CD-31 (endothelial-marker) as well as C-kit+ cells if they co-stained positive for mast-cell tryptase.

Results: The highest frequency of BCRP+/CD31- cells was detected in the right atria (5.78%±2.37% vs. 4.85% ±1.83%; p=0,225). Significant higher amounts were identified in ischemic compared to non-ischmeic ventricles (5.68%±2.14% vs. 1.39%±1.79; p=0,002). Few numbers of BCRP+ cells co-expressed Titin. In ischemic patients, female right-atrial tissue showed an increased cell-ratio of BCRP+/CD31- cells when compared to males. Ckit+ cells were detected in higher frequencies in injured (ratio: 1:25,000±2,500 of cell-counts) vs. healthy myocardium (1:105,000±43,000). C-kit+ cells did not stain for sarcomeric-marker Titin. BCRP+/c-kit+ cells were not identified.

Conclusion: The atria seem to contain higher numbers of BCRP+/CD31- cells than the ventricles and may be considered as a reservoir for these cells. Furthermore, their population appears to be also higher within- and around infarcted ventricle.

PP50-VIDEO-ASSISTED PLEUROPERICARDIAL WINDOW FORMATION VS SUBXIPHOID PERICARDIOCENTESIS FOR THE MANAGEMENT OF SYMPTOMATIC MALIGNANT PERICARDIAL EFFUSION

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Introduction: Purpose of this study was to compare the effectiveness and safety of pericardiocentesis versus thoracoscopic window formation for the treatment of malignant pericardial effusions.

Methods: Two groups were studied. Group A consisted of 90 patients who underwent subxiphoid pericardiocentesis. When the malignant nature of the effusion was cytologically confirmed, intrapericardial instillation of antineoplastic agent was performed according to chemosensitivity of primary tumor (cisplatin for lung cancer, thiotepa for breast cancer and bleomycin for the other cases). Group B consisted of 11 patients underwent video-assisted pleuropericardial window formation. Clinical and echocardiographic evaluation was performed every month thereafter.

Results: Prompt clinical and echocardiographic improvement was observed in all patients. There were no serious complications in both groups except for transient electrical instability. In group A paroxysmal atrial fibrillation was detected in three patients (3,3%) and non-sustained ventricular tachycardia in two (2,2%). Four out of 90 patients (4,4%) in group A relapsed and 2 (2,2%) developed constrictive pericarditis. These patients needed surgical intervention. In group B one case of atrial fibrillation was detected. None of the patients of group B relapsed. The mean survival period (for both groups) was 7,5 months (range 3-112 weeks) and mortality was attributed to widespread disease.

Conclusions: Video-assisted pleuropericardial window formation (despite the small number of cases performed) and pericardiocentesis are both safe and effective in confronting symptomatic malignant pericardial effusion. Thoracoscopic intervention seems to have the advantage of more permanent results and is highly accurate for diagnosis and staging.

PP51-EARLY AND LATE PLEURAL EFFUSIONS FOLLOWING CABG. IS THERE A DIFFERENT PATHOGENETIC WAY?

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Introduction: Purpose of this study is to highlight the pathologic characteristics of early and late effusions following CABG procedure.

Methods: This retrospective study included 36 patients who had a persistent pleural effusion following CABG without other identifiable cause. Video-assisted thoracoscopic surgery was considered when therapeutic thoracenteses and anti-inflammatory agents proved unsuccessful. All patients underwent VATS for investigation and management of persistent pleural effusions, including multiple pleural biopsies and talc pleurodesis.

Results: Early effusions (within 30 days of surgery) were bloody exudates with high red blood cells and eosinophil count and contained higher lactic acid dehydrogenase levels, whereas late effusions were yellow exudates with lymphocyte predominance. Histologic examination of pleural biopsies in early effusions showed a predominance of inflammation with dense infiltrates and little

fibrosis. On the contrary, pleural samples of late effusions showed less inflammation and increased fibrosis. VATS talc pleurodesis led to symptomatic and radiologic improvement in all patients. No recurrence has been observed during follow up.

Conclusions: Pathologic characteristics of early and late pleural effusions are different suggesting a different way of pathogenesis. VATS talc pleurodesis should be always considered as a permanent solution.

PP52-POST-STERNOTOMY INDUCED MEDIASTINITIS; IS THE SURGICAL APPROACH WITH THE MODIFIED BIPECTORAL MUSCLE FLAPS PROCEDURE FEASIBLE? OUR EXPERIENCE WITH 28 PATIENTS.

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Introduction: After cardiovascular procedures, about 0.97-6.9% of patients suffer from a potentially lethal contamination of surgical trauma, especially of the sternum. Risk factors include obesity and diabetes. Post-sternotomy mediastinitis remains a life-threatening situation, requiring quick diagnosis and immediate surgical treatment. The development of multi-resistant microbes is a potential risk, needing attention.

Aim of this abstract is to present our method of treatment.

Methods: During 2004 to 2010, 28 patients with post-sternotomy mediastinitis were treated in Laiko General Hospital of Athens using the technique of alternative bi-pectoral muscle flaps.

Results: Patients aged 54 – 80 years were treated successfully with 1 death (mortality 3.67%) due to sepsis. Surgical time ranged from 40 -150 minutes, the average days of hospitalization were 8 and the need of ICU post-operatively was minimal.

Conclusion: The aggressive surgical treatment, the removal of all foreign bodies (e.g. wires) and the surgical approach with the above technique seems to constitute an important treatment protocol of post-sternotomy mediastinitis. In male patients this technique is treatment of choice, while female patients with big breasts may have recurrence in the bottom quartile of the incision due to tension; treated conservatively.

Valves

PP53-BIOMECHANICAL AND HISTOLOGICAL CHARACTERISATION OF A DECELLULARISED PORCINE PULMONARY VALVULAR SCAFFOLD

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Introduction: The aims of this study were to assess the effectiveness of a decellularisation treatment incorporating low-concentration sodium-dodecyl-sulphate (SDS) in the production of acellular pulmonary valve conduits, and to investigate the effect of the treatment in the biomechanics of the acellular valves.

Methods: Porcine pulmonary roots (n=6) were washed in: hypotonic Tris buffer (HTB; 10mM Tris pH 8.0, 0.1% EDTA, 10KIU aprotinin); 0.1% SDS in HTB; treated with DNase and RNase and washed in PBS. Decellularisation was assessed histologically using H&E, Hoechst and Miller's elastin. Uniaxial tensile tests to failure were used to compare the tensile properties of fresh and decellularised leaflets and pulmonary artery wall, along the circumferential (n=6) and radial (n=6) direction for the leaflets, and the circumferential (n=6) and axial (n=6) direction for the pulmonary artery wall.

Results: Histology confirmed complete decellularisation and retention of the valvular histoarchitecture. With the exception of leaflet failure stress in the radial direction and wall failure stress in the circumferential direction, there were no significant differences in the rest of the biomechanical parameters between the fresh and decellularised pulmonary leaflet and artery wall test groups.

Conclusion: Porcine pulmonary roots were successfully decellularised using low-concentration SDS. The treatment did not impair the histoarchitecture or mechanical properties of the pulmonary valve. The acellular valves have the potential to be used, either seeded or non-seeded with cells, as valve replacements in the pulmonary position.

PP54-MID-TERM RESULTS AND RISK FACTORS FOR AORTIC VALVE REPLACEMENT IN OCTOGENARIANS

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Introduction: Octogenarians who require aortic valve replacement (AVR) have increased in the past decades. The aim of this study is to evaluate the surgical outcome in 46 octogenarians after AVR.

Methods: We retrospectively identified 46 patients (17 men, 29 women) aged 82.2 +/- 2.4 years (mean, 80 to 89 years) who underwent AVR with (23.9%) and without concomitant coronary artery bypass grafting between May 1999 and January 2010. Predictors of mortality and major adverse cardiac events in the short and mid-term postoperative period were determined.

Results: Mean preoperative NYHA classification was 2.8 +/- 0.8 and 60.9% of patients were classified as NYHA3 or 4. The

in-hospital mortality rate was 8.7%. Actual survival at 1 and 5 years was 85.7% and 62.9%, respectively. Freedom from major cardiac events at 1 and 5 years was 83.2% and 63.2%, respectively. Risk factors of in-hospital mortality were coronary artery disease (risk ratio, 0.2; p=0.02). Euro score did not affect in-hospital mortality. Risk factors of major adverse cardiac events were postoperative intraaortic balloon pump placement (RR, 41.5; p=0.008), coronary artery disease (RR, 5.9; p=0.006), euro score (RR, 1.4; p=0.03), and postoperative renal failure (RR, 3.9; p=0.03). Preoperative left ventricular function, aortic valve area did not affect cardiac events.

Conclusions: AVR can be performed in octogenarians with an acceptable short and mid-term survival. AVR should not be withheld on the basis of age alone. But in high risk octogenarian who has coronary artery disease, combination therapy which is transcatheter valve therapy and PCI should be considered.

PP55-IN-SITU MORPHOLOGY OF THE AORTIC VALVE IN STENOSIS

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Introduction: Description of the aortic valve morphology is mostly done preoperatively on echocardiographic picture and may differ from the findings during valve surgery. The aim of the study was the analysis of the gross morphology of the aortic valve in stenosis made *in-situ* during surgery.

Methods: Retrospective data analysis of the morphology of aortic valve in 100 consecutive patients who underwent surgery for aortic stenosis was performed. The morphology was described and drawn (in all cases) by the same surgeon. Incompetent aortic valves or valves with bacterial infection were excluded from this analysis.

Results: Bicuspid valves were found in 10 cases; in 9 cases a raphé representing congenital fusion of two cusps was present: in 6 cases between the right-coronary and the non-coronary cusp, in 3 cases between the left-coronary and the right-coronary cusp. In 15 cases tricuspid aortic valves had had severe acquired commissural fusion resulting in bicuspidalization of the valve. Tricuspid aortic valve was found in 73 cases with more or less involvement of the aortic annulus; the base of the cusps was in 25 cases calcified, the free edges in 27, and the complete cusps in 19. The two remaining cases were: quadricuspid valve and bicuspid valve with rudimentary third cusp.

Conclusions: Calcification of the tricuspid aortic valve is the most common cause of clinically aortic stenosis is the surgical population. Calcified congenitally bicuspid, quadricuspid, or malformed tricuspid aortic valves resulting in severe stenosis were found in 12%.

PP56-TEN-YEAR RESULTS AFTER MITRAL VALVE REPAIR FOR MIXOMATOUS MITRAL VALVE DISEASE AND RISK FACTORS ANALYSIS FOR LATE OUTCOMES

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Objective: Aim of the study is to evaluate long-term results after standardized techniques of mitral valve repair (MVR) for treatment of degenerative mixomatous mitral insufficiency (MI) and to analyse risk factors for late outcomes.

Methods: Two hundred and sixty-one patients (mean age 63±12 years) underwent MVR from January 1999 to January 2010 for treatment of degenerative MI. From 2005 we have standardized repair techniques by means of intraoperative transesophageal echocardiography, routinely use of annuloplasty prosthetic ring, quadrangular /triangular resection of posterior leaflet and/or edge-to-edge technique. Mean follow-up (99% complete) was 54±38 (range 6-137) months.

Results: In-hospital mortality was 0.8% (2/261). At ten years actuarial survival was 89±3%, actuarial freedom from cardiac death 94±2.6%, from reoperation 95±2.4%, from trhomboembolism 96±2.1%, from endocarditis 100%. Independent predictor of late all-causes mortality was advanced age at operation (71±10 vs 62±12, p=0.001, OR 3.2). Progression of moderate-to-severe MI after MVR was observed in 15 patients (5.7%) and reoperation was required in 6 patients (2.3%). Predictor of late progression of moderate-to-severe MI after MVR was the annuloplasty without the use of prosthetic ring (p=0.03, OR 9.1). Follow-up echocardiography showed improvement of MI grade (0.8±0.9 /4 vs 3.5±0.5 /4 preoperatively, p<0.00001), left ventricular end-diastolic (52±6.0 vs 57±11 mm, p<0.0001) and end-systolic (34±5.0 vs 42±9.7 mm, p<0.00001) diameters, pulmonary artery systolic pressure (32.7±8.8 vs 40±11 mmHg, p<0.00001), left atrial diameter (44.6±8.3 vs 51.4±8.1 mm, p<0.00001).

Conclusions: Mitral valve repair is a low-risk, durable surgical procedure. Standardized techniques with the routinely use of prosthetic ring guarantee excellent late results.

PP57-ACUTE MITRAL REGURGITATION DUE TO LEAFLET DETACHMENT FIFTEEN YEARS AFTER MITRAL VALVE REPLACEMENT

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Introduction: A 43 year old male patient transferred to our department intubated and hemodynamically unstable with the diagnosis of thrombosed mitral valve prosthesis and signs of acute pulmonary edema. From his medical record was referred that he had been operated fifteen years ago for mitral valve streptococcal endocarditis. At that time mechanical bileaflet prosthesis (Duromedics 27mm, Edwards CVS Division Baxter Health Care Corporation) was used. The patient had an uneventful postoperative period and remained in excellent condition the following years.

His reported symptomatology was severe dyspnea and orthopnea, which started while jogging, several hours prior. He immediately intubated, supported adequately and transferred to our facility for emergency surgical treatment.

Methods: We performed an emergent transesophageal echocardiography, which revealed a severe (4+/4+) mitral regurgitation and one of the two leaflets was not recognized.

The patient was hypoxemic, hypercapnic, his temperature was 39°C and hemodynamically unstable despite the inotropic and IABP support. He emergently transferred to the operating room and a redo resternotomy performed. Extracorporeal circulation was established as usual (double cannulation). A transeptal approach was performed and the old mechanical valve was recognized. The prosthesis was in anatomical orientation, the entire mechanism was intact, but the posterior leaflet was missing. A thorough inquiry of the left atrium, left ventricle and the ascending aorta did not reveal the missing leaflet. There were neither signs of thrombosis nor vegetation of the valve. A mitral valve re-replacement was performed, using a new mechanical prosthesis (ATS 27mm). The patient was transferred to the ICU hemodynamically stable with minimum inotropic and IABP support. The next day the patient underwent a whole body CT scan, which revealed two fragments of the mitral valve leaflet, wedged to the right common femoral artery and to the left common iliac artery respectively. Peripheral tibial pulses were presented equally in both sides. These fragments were removed later surgically. Eighteen months postoperatively the patient remains asymptomatic and in excellent condition.

Conclusions: Valve fracture is a very rare complication. Similar complications have been reported for the same valve in the literature. The valve has been retired from the market since 1996 due to functional problems. We must be highly suspicious in cases with valve thrombosis and consider always valvular functional problems.

PP58-THE ROLE OF ANATOMICAL CHARACTERISTICS AND PROCEDURAL VARIABLES IN PACEMAKER IMPLANTATION FOLLOWING CORE-VALVE MEDTRONIC AORTIC VALVE IMPLANTATION

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Introduction: Percutaneous aortic valve implantation (PAVI) is currently being performed in selected patients (pts) with high surgical risk aortic stenosis (AS). The incidence of atrioventricular block requiring pacemaker implantation (PM) after PAVI is varied between 6% and 32%. In this study, we assessed anatomical characteristics and procedural variables that may play a role for PM following PAVI.

Methods: We studied 25 pts, mean age 79±6 years, with severe AS (aortic valve area 0.70±0.13 cm2), who were high risk surgical candidates (Euroscore Logistic 30.6±13.8) and had successful PAVI using the Core-Valve-Medtronic prosthesis. We assessed left ventricular outflow truck (LVOT) diameter, aortic annulus (AA) diameter, the depth of implantation (DI) and the diameter of the distal part of the aortic prosthesis in LVOT (DVD), the size of predilatation balloon (BA) and the size of the implanted valve (VS).

Results: Two pts had PM pre-procedure and were excluded from the analysis; a PM is required post-PAVI in 8 (35%) pts. The difference in anatomic and procedural variables in pts with and without PM is shown in the table.

	BA (mm)	VS (mm)	LVOT (mm)	AA (mm)	DVD (mm)	DI (mm)
PM (–) (n=15)	22.6±1.3	27.4±1.5	19.8±3.3	22.6±1.6	22.2±4.1	7.6±3.2
PM (+) (n=8)	23.5±1.6	27.9±1.6	20.8±2.6	23.3±2.4	21.5±5.5	9.6±2.7
P	ns	ns	ns	ns	ns	ns

The ratio of DVD/DI was higher in pts with PM after PAVI (3.64±2.2 vs. 2.32±0.4 (p=0.08).

Conclusion: Anatomical characteristic or procedural variables do not predict the need for PM in pts with severe aortic stenosis undergoing PAVI.

PP59-LATE ONSET CHYLOTHORAX AFTER DOUBLE VALVE OPERATION

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Introduction: A 63 year old female patient was referred to our department with the diagnosis of severe aortic valve stenosis and moderate mitral regurgitation. The patient was complaining of dyspnea on moderate exercise (NYHA functional class III). Her past medical history included arterial hypertension, smoking, non-insulin-dependent diabetes mellitus, peripheral vascular and coronary artery disease. In 1998 she underwent PCI to the middle portion of the left anterior descending coronary artery. Two months later due to stent restenosis, she underwent a coronary artery bypass procedure (LIMA to LAD, saphenous vein graft to intermediate coronary artery). She underwent also in left and right carotid endarterectomy (2001 and 2003, respectively). Radioiodine therapy for toxic multinodular goiter four years prior to the present admission (2003) and new PTCA and stenting in the right coronary artery (2006).

Methods: The patient underwent an uncomplicated redo resternotomy and a mechanical aortic valve replacement (ATS 18mm) and mitral valve annuloplasty (Cosgrove-Edwards 26mm) were performed. She had an uneventful recovery and was discharged home the 7th postoperative day. Four days later, she started complaining of mild dyspnea which progressively worsened. She presented to our emergency department the 28th postoperative day with severe dyspnea, orthopnea with oxygen saturation (SpO2) 90% in room air, arterial blood pressure 120/88mmHg, pulse rate 109 bpm and absent respiratory sounds in the right hemithorax.

The chest x-ray revealed complete opacification of the right hemithorax. A chest tube inserted drained 700 ml of milky fluid. A suspected diagnosis of chylothorax was thought, which the laboratory analysis confirmed it.

The patient was kept in no fat diet for 15 days. Parenteral nutrition was not started. A progressive decrease of the amount of daily chyle drainage was observed. Regular diet was resumed the 13th day of hospitalization, while the chest drainage recorded only few ml of fluid drainage. Two days later, the patient had a normal chest x –ray and was discharged home asymptomatic. Thirty days later she had a normal chest x-ray.

Conclusions: Chylothorax after cardiac valve surgery is extremely rare. Possible cause of this complication could be injury of the minor thoracic duct, during placement of the central venous line, in an area with possible local anatomic derangement, due to the previous carotid endarterectomy and/or radioiodine therapy.

PP60-CASE REPORT: ACUTE THROMBOSIS OF A MECHANICAL VALVE PROSTHESIS IN A WOMAN WITH MISSED ABORTION AFTER 4 WEEKS OF PREGNANCY

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Introduction: Mechanical valve prostheses, requiring life-long anticoagulation with cumarine, are the devices of choice in young patients. However, female patients in the 5th decade of life still being fertile are facing severe problems if becoming pregnant after previous valve surgery receiving a mechanical prosthesis.

Background: A 45 year old woman was admitted to the emergency room of our hospital, showing severe dyspnea, hypotension (70/40 mmHg) and tachycardia (heart rate 130 pm).

Medical History: the patient was operated on in 2005 for severe mitral valve stenosis (rheumatic disease), and MVR with a mechanical prosthesis (Carbomedics 27 mm) was performed. On admission, echocardiography and angiography showed a prosthesis visually blocked by thrombus. Actually, she had a missed abortion after 4 weeks of pregnancy and warfarin anticoagulation therapy was switched to i.v. heparin infusion only one week previously. The patient became hemodynamically unstable requiring high dosages of catecholamines, intubation and resuscitation therapy. She underwent emergency operation (redo mitral valve replacement with a mechanical prosthesis, Carbomedics 29 mm). The postoperative course was complicated due to respiratory failure requiring tracheotomy, infectious disease problems and perioperative stroke. The patient was discharged home after 67 days, fully recovered.

Discussion: We will discuss pregnancy and anticoagulation in patients with mechanical heart valve prosthesis, the modus operandi (redo operation, thrombolysis) in acute device thrombosis as well as the postoperative anticoagulation management, infection control (missed abortion) and complications (stroke).

PP61-PREDICTIVE VALUE OF ELECTROCARDIOGRAPHY AND ELECTOPHYSIOLOGICAL STUDIES IN CONDUCTION ABNORMALITIES AFTER CORE VALVE-MEDTRONIC AORTIC VALVE IMPLANTATION- PRELIMINARY RESULTS

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Introduction: The aim of this study was to assess the value of the electrocardiogram (ECG) and the electrophysiology study (EPS) as predictors of transient or permanent conduction abnormalities after Core valve-Medtronic percutaneous aortic valve implantation (PAVI).

Methods: Twelve consecutive patients (pts) mean aged 80±6 years with severe aortic stenosis who underwent Core Valve-Medtronic implantation were included in the study. The baseline 12 lead ECG was analyzed and the EPS study was performed a day before PAVI.

Results: At baseline ten pts were in sinus rhythm, 2 had preexistinsting bundle branch block and 1 had a left anterior hemiblock. Two pts were in chronic atrial fibrillation with no intrafascicular or intraventricular conduction delay. Mean PR was 182±37msec and the mean QRS was 106±23msec. The basic EPS measurements were: AH 93±11msec, HV 52±7msec, effective refractory period of the AV node 290±25msec, and Wenckebach cycle length 375±56msec. After PAVI 5 pts required a permanent pacer implantation due to complete AV block. Five pts showed LBBB during days 3 and 4 (transient in 3 and permanent in 2). None of the 2 pts with preexisting block required pacemaker implantation. In 2 pts who required pacemaker implantation, normal AV conduction was restored at first month follow-up. Statistical analysis showed that the baseline ECG and EPS measurements were not correlated to new conduction abnormalities and complete AV block after PAVI.

Conclusions: Preliminary data show that baseline ECG characteristics and EPS basic measurements are not predictive for major conduction abnormalities after PAVI.

PP62-MONOPOLAR RADIOFREQUENCY ABLATION FOR CHRONIC ATRIAL FIBRILASYON IN OPEN HEART OPERATION

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Introduction: To review our early experience with the use of monopolar radiofrequency ablation of atrial fibrilation.

Methods: During the 2003-2007 period in 22 of 1100 patients who had gone open heart surgery with chronic atrial fibrilation (AF) ablation with "monopolar radiofrequency" (Cardiablate TM,Medtronic) is applied.

In all of the (22) patients "modified Maze" procedure with endocardial monopolar radiofrequencies is performed in monopolare biatrial 16 and monopolare-left atrial in 6.

From 16 patients who bilateral ablation had been performed is (%93.7).

Results: 3 from 6 patients (%50) who left atrial ablation had been performed was sinus rhytm during discharge.

Conclusion: Atrial fibrilation is a postoperative risk factor for the patients undergone open heart surgery. Monopolar radiofrequency ablation is a safe and successful method for providing more living quality for these patients.

Miscellaneous

PP63-CASE REPORTS OF TWO PATIENTS WITH ACUTE PULMONARY EMBOLISM UNDERGOING TRENDELENBURG OPERATION PROCEDURES

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Introduction: Pulmonary embolism is a life- threatening common disease, which carries still a high mortality rate. Right heart failure due to pulmonary hypertension caused by acute obstruction or occlusion of the pulmonary arteries is defined as major risk for death in these patients. Thrombolysis, catheter guided thrombectomy and surgical embolectomy (Trendelenburg procedure) is well-established therapies in the management of acute pulmonary embolism (APE). We present two patients with massive APE, operated on recently in our department.

Material and Methods: Two patients (both male, 60 and 50 years old) were operated on APE. Medical history was free from thrombotic events in both patients. The CT scan showed massive APE (fig.), with thrombi also in the right atrium and right ventricle in both patients (video slides). Both patients had impaired right ventricular function (video slides) and high pulmonary artery pressure. Coronary angiogram was done in both patients, and no coronary artery disease was found.

Results: Both patients underwent pulmonary embolectomy (Trendelenburg procedure) using the heart- lung machine. The embolectomy was performed on beating heart. After embolectomy, the right ventricular function improved significantly (video slide). A cava filter device was implanted in the vena cava inferior in both patients. The postoperative course was uneventful, with both patients receiving Warfarin therapy from day one postoperatively.

Conclusion: Trendelenburg procedures can be performed successfully in patients with massive APE. It will be matter of discussion, if thrombolysis, which is commonly used in patients with APE, was successful in our two patients with big and part of them organized thrombi.

PP64-BRIEFING AND DEBRIEFING IN THE CARDIAC OPERATING ROOM. ANALYSIS OF IMPACT ON THEATRE TEAM ATTITUDE AND PATIENT SAFETY

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Introduction: Error in the delivery of health services has long been recognised as significant cause of inpatient morbidity and mortality. The majority of root-cause analyses have cited communication failure as at least one of the contributing factors in an adverse event or close-call report. The formalised and detailed fighter pilot mission brief and debrief has formed the basis of the National Aeronautics and Space Administration (NASA) crew resource management (CRM) concept produced in 1979. This paper is a qualitative analysis of our experience with the briefing-debriefing process applied to the cardiac operating room.

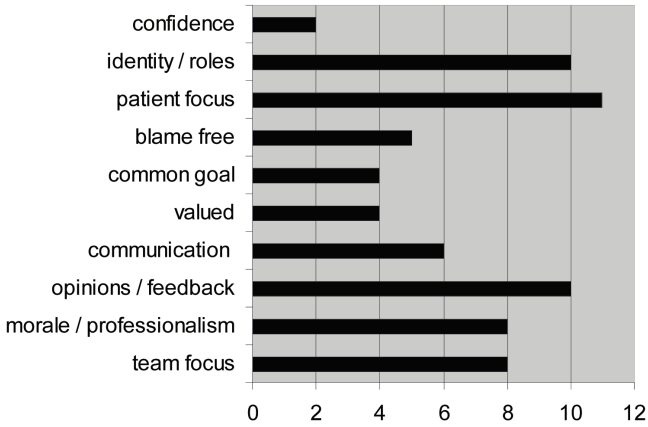
Methods: We instituted a policy of formal operating room briefing and debriefing in all cardiac theatre sessions. Briefing establishes a platform for common understanding and gives people permission to be frank and honest. It gets all members of the team on the same page and provides a structure for collaborative planning.

Debriefing constitutes real time reporting and captures 'near-misses' which are usually not detected by record review at some time remote from the procedure. It identifies and addresses recurring issues with communication, equipment deficiencies, systems issues and most of all safety.

Results: We reviewed the first one hundred and eighteen cases that went through the briefing-debriefing process. A trouble free operation was noted in only twenty eight (23.7%) cases. On the other hand we experienced multiple problems in thirty eight (32.2%) of cases. A gap was identified in the second order problem solving system in relation to instrument repair and maintenance.

Theatre team members were interviewed and their comments were subjected to qualitative analysis. The collaborative feeling is that the briefing-debriefing process has improved communication and team work.

Conclusion: Characteristics of a strong safety culture include a commitment to discuss and learn from errors. The health industry may benefit from embracing the briefing-debriefing technique as an adjunct to continuous improvement through reflective learning, deliberate practice and immediate feedback. This may be the initial step toward a substantive and sustainable organizational transformation.



YORKSHIRE HEART Center - OPERATING ROOM BRIEFING/ DEBRIEFING TOOL

Name:	Unit No:	Dob
Operation:	Date:	Time:

	General Step Process	Check
1.	Does everyone know each other? Anything to celebrate? Anything troubling anybody?	Delete as appropriate Yes / No
2.	Is everyone familiar with theatres/equipment?	Yes / No
3.	Do we anticipate problems?	Yes / No

4.	Does everyone understand the procedure/critical steps?	Yes / No
	Reinforce to stop process "I am not happy' is the trigger	Yes / No

	Briefing - before every procedure	
1.	First names and roles to be written on board	Yes / No
2.	Do the following match:- Patient ID band, Informed Consent (read out loud), Site marking, OR posting, patient's verbalization of procedure (if patient awake), other clinically relevant documentation (H&P, clinic note)	Yes / No
3.	Have antibiotics been given, What are the anticipated times of antibiotic redosing?	Yes / No
4.	Is glycaemic control/beta blockers indicated?	Yes / No
5.	Is the patient positioned to minimise injury?	Yes / No
6.	Has the Prep been applied properly, without pooling and allowed to dry?	Yes / No
7.	Is the appropriate amount of blood available?	Yes / No
8.	Is DVT prophylaxis indicated?	Yes / No
9.	Any Special Precautions? If yes, describe	Yes / No
11.	Are warmers on the patient?	Yes / No
12.	Is the time allotted for this procedure an accurate estimate?	Yes / No

	Debriefing - After every procedure	
1.	Are there any concerns - communication/ safety	Yes / No
2.	Could anything have been done to make this case safer or more efficient?	Yes / No
3.	Where can we improve?	
4.	Are the patient's name, history, number and the surgical specimen name and laterality on the paperwork? (Specimen paperwork/labeling to be independently verified by Surgeon)	Yes / No
5.	Did we have problems with instruments?	Yes / No
6	Plan for transition of care to post op unit discussed? To include: Fluid management/ blood (all slips in chart), Antibiotics - continue post-op (dose interval), PACU tests/ Xrays, Pain/PCA plan, New meds needed (immediate periop), Beta blockers (as required), Glycaemic control (as required, DVT prophylaxis	Yes / No

Documentation Stop Events: Reasons/Concerns:		Time:
Consultant Anaesthetist	Consultant Surgeon	Circulating ODP Perfusionist

PP65-CARDIAC MYXOMA 18-YEARS EXPERIENCE

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Introduction: Cardiac myxoma are the most common benign tumour of the heart. It presents with a variety of clinical signs and symptomatology making diagnosis frequently quite a challenge.

Methods: Between 1993 - 2010 were operated 40 patients presenting with the pre-opeative diagnosis of myxoma. All patients clinical and demographic characteristics were recorded including peri-operative details.

Results: Mean age 53,8(19-79) and m/f ratio was 0,3. Clinical presentation include dyspnoea 17/40(42,5%), asymptomatic 14/40(35%), syncoptic episodes 4/40(10 %), tachycardia 4/40(10%) and CVA 1/40(2,5%). There were 30 left sided tumours, 8 right sided and 2 involving both atria. They were all operated with standard sternotomy and CPB with intermittent cold blood cardioplegia. In 5 patients concomitant procedures were carried out. The masses were approached through the right atrium in 31 cases, 1 case right atrium and aorta, through the left atrium in 7 cases and 1 case through the aorta. Mean CPB time was 86,17(54-162)min and mean CxC time was 55,75(0-113)min. Mean maximal diameter of the tumours removed was 5,2(1-12)cm. A PPM was required in 3 cases, CVA in one case and reccurens in two cases. Mean hospital stay of 7,17(4-13)days. The 30 day mortality was 0%.

Conclusion: Cardiac myxomas form a very small percentage of the cardiac cases. Biatrial approach allows for the inspection of the four cardiac chambers, limits manipulation of the mass, and facilitates the complete excision of the tumor. Surgical excision of cardiac myxoma carries a low operative risk and gives excellent short-term and long-term results.

PP66-VOCAL CORD PARALYSIS AS A COMPLICATION OF ADULT CARDIAC SURGERY. CONCERNS A PROPOS OF TWO CASES

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Introduction: Vocal cord injury is a significant, although undereported complication following adult cardiac surgery with an incidence between 0.67-1.9%.

Methods: Two cases of vocal cord paralysis, following cardiac surgery (CABG and CABG-AVR respectively) are reported. Both patients underwent the procedure with routine anesthetic and surgical techniques and were extubated the first postoperative day after initial satisfactory weaning criteria. Several hours later they developed an increasing breathing work with inefficient cough, accumulation of secretions and persistent hoarseness. The diagnosis of vocal cord dysfunction was confirmed by fiberoptic laryngeal examination performed by otolaryngologist.

Results: Both patients required reintubation. One patient recovered gradually with no significant residual effect at the 3 month follow up examination. For the other one, the pattern of respiratory insufficiency was repeated after the second extubation. Mini tracheostomy was performed and the patient had gradual normal recovery but with permanent hoarseness.

Conclusions: The aetiology of vocal cord dysfunction following open heart surgery remains unclear. It may be due to direct trauma of the vocal cords during tracheal intubation or from the

cuff of the tube. A less likely possibility, is manipulations during central venous cannulation. Thermal injury during internal thoracic artery harvesting, as well as local cooling may be also risk factors.

Whatever the cause, it is very important to highlight that in a cardiac surgery patient who develops respiratory insufficiency after extubation, with inefficient cough and voice hoarseness and in abscence of cardiac, respiratory or other general cause, vocal cord paralysis should be seriously suspected and early tracheostomy should be considered.

PP67-A RARE CASE OF PROSTHETIC VALVE ENDOCARDITIS AND MYCOTIC ANEYRUSM

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Introduction: A 58 year old male refers to the emergency department of our hospital, because of intense respiratory distress and thoracic pain. The patient describes the beginning of symptoms several months ago, which gradually became worse. He presented with normal temperature and his whole biochemical and hematological profile was at the normal range. The patient underwent a mechanical aortic valve replacement, due to infective endocarditis (staphylococcus aureus) ten years prior. He is currently under methadone program because of drug addiction.

Methods: The patient was admitted for further evaluation. He was subjected to X-ray examination, CT-scan, D.S.A, CT coronary angiography and cardiac echocardiographic studies. This thorough examination revealed an aneurysm of the aortic root and the ascending aorta. The mechanical valve was insufficient with moderate to severe paravalvular leak. The patient was operated on and underwent a redo replacement of the mechanical valve, the aortic root and the ascending aorta with a new mechanical valve conduit graft and modified cabrol technique. The surgical course was uneventful.

Results: The cultures of the aneurysmal sac and the mechanical valve, revealed an infective endocarditis from staphylococcus xylosus.

Conclusion: Infective endocarditis from staphylococcus xylosus is a very rare entity, especially as a second late presentation. Although there are no available publications, could be the etiologic factor for prosthetic valve endocarditis and mycotic aneurysm formation with a latent course and without systemic inflammation signs.

PP68-SURGICAL TRAINING IN THE 48 HOURS WEEK. A NOVEL SIMULATION AND EDUCATIONAL TOOL. FROM AMATEUR GOLFER TO PROFESSIONAL PILOT

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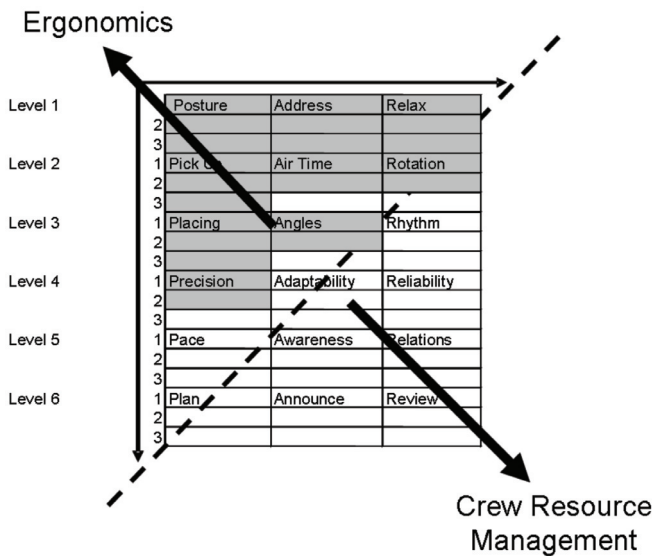
Introduction: Compliance to the European Working Time Directive has made obvious the need for a surgical skills training system which will aim to produce surgeons fast and reliably. We have previously proposed a model for objective assessment of surgical dexterity. In this paper we aim to place an updated version of that model into the context of a holistic approach on assessment of a trainee's progress towards becoming an independently operating surgeon.

Methods: The PAR Matrix breaks down an operation, into clearly defined skills which need to be successively acquired.

It consists of a 3 x 6 table depicting 18 skill-goals. The y-axis is divided into 6 levels and the x-axis into 3 columns. The initials of the 3 skills on each level form the acronym PAR. Each skill is further graded from 1 - 3 (unsatisfactory, competent, good). The levels are: Level 0 - Posture, Address, Relaxation; Level 1 - Pick-up, Airtime, Rotation; Level 2 - Placing, Angles, Rhythm; Level 3 - Precision, Adaptability, Reproducibility; Level 4 - Pace, Awareness, Relations; Level 5 - Planning, Announce, Review/ Reflexion.

Results: The format of the PAR model is such that allows trainer and trainee to objectively assess progress, identify deficiencies and strengths, and formulate appropriate plan of action.

Conclusion: Ergonomics and crew resource management skills are essential for a safe operating environment. The PAR matrix may prove helpful in selection of trainees and revalidation of trainee surgeons as a competence and performance testing method, placed in the appropriate training curriculum.



PP69-FUNCTIONAL CHANGES AFTER MITRAL VALVE REPAIR: AN IMAGING STUDY

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Introduction: The circumference of the aortic annulus adjusts proportionally with changes in left ventricular volume. These dimensional changes in the aortic annulus improve the left ventricular outflow tract (LVOT) hemodynamics and

enhance the anterior mitral valve leaflet (AML) movement. In this study, we investigated the impact of circumferential and partial circumference prosthetic mitral rings on aortomitral apparatus function.

Methods: Forty patients who underwent coronary artery bypass graft surgery and restrictive annuloplasty of the mitral valve annulus through either a partial circumference flexible ring (group A = 20 patients) or a circumferential rigid ring (group B = 20 patients) were evaluated using cardiac magnetic resonance imaging. Imaging was performed at the end of a 2-year follow-up period. Variations in LVOT diameter, transmitral valve gradient, and effective mitral valve area were measured and compared.

Results: Mean variation in LVOT diameter was significantly higher in group A compared with group B (12.7% versus 3.6% , p = 0.0005). Transmitral valve gradient was higher in group B than in group A (6.2 versus 4.6 mm Hg, p = 0.007), whereas effective mitral valve area was larger in group A than group B (3.9 versus 3.1 cm(2), p = 0.009). The long-axis cardiac magnetic resonance imaging of patients in group B demonstrated that movement at the base of the AML was hindered with the AML pivotal point appearing to shift posteriorly.

Conclusions: This study demonstrated that the use of circumferential annular rings significantly impairs overall aortomitral apparatus function by reducing outflow diameter and AML movement.

PP70-LONG-TERM RESULTS AFTER SURGICAL LEFT ATRIAL RADIOFREQUENCY ABLATION ACCORDING TO MAZE PROCEDURE IN ASSOCIATION TO MITRAL AND MITRO-AORTIC VALVE SURGERY

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Objective: Left atrial ablation is a surgical standard technique for the treatment of chronic atrial fibrillation (CAF) or persistent/paroxysmal atrial fibrillation (PAF). Aim of the study was to evaluate long-term results of left atrial ablation according to Maze procedure in patients affected by CAF or PAF and concomitant mitral and mitro-aortic valve disease.

Methods: One hundred and twenty-eight patients (mean age 66±8.5 years) underwent left atrial ablation by means of monopolar (n=62) or bipolar (n=66) radiofrequency for CAF (n=100) or PAF (n=28) in association to mitral valve repair (n=42) or replacement (n=51), mitral and aortic valve surgery (n=35). Mean follow-up (96% complete) was 39±32 (range 2-129) months.

Results: In-hospital mortality was 0.8%. Patients with CAF as compared to those with PAF, were older (66.9± 8 vs 62.5± 8.5 years, p=0.01), with preoperative greater value of preoperative left atrial diameter (56.7±7.4 vs 52±9 mm, p=0.05), advanced mitral and aortic valve disease (84.5 vs 68%, p<0.05), prevalent use of monopolar ablation system (55 vs 27%, p<0.01). At 9 years in patients in sinus rhythm after effective Maze procedure as compared to those with residual atrial fibrillation, actuarial survival was 100% vs 86±6.4% (p<0.05), freedom from stroke 98±4 vs 95±3% (p=0.1), left atrial diameter 49±4.4 vs 55±8.3 mm (p<0.01), NYHA class 1.3±0.5 vs 1.7±0.6 (p<0.0001), mean heart rate 75±10 vs 83±14 beats/min. (p=0.01), need of life-long anticoagulation therapy 43% vs 91% (p<0.0001).

Conclusions: Early left atrial Maze procedure offers better chances to conversion in sinus rhythm. Survival, functional status and quality of life are superior in patients who benefit from sinus rhythm.

PP71-CEREBRAL OXIMETRY BASELINE VALUES IN CARDIO-VASCULAR SURGERY PATIENTS. A PROSPECTIVE OBSERVATIONAL STUDY

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Introduction: The aim of our study is to evaluate baseline INVOS values and identify factors influencing baseline INVOS values in carotid endarterectomy and cardiac surgery patients. This is a prospective observational study on 157 patients (100 cardiac surgery, 57 carotid endarterectomy patients).

Methods: Data were collected on factors possibly related to baseline INVOS values. Data were analyzed with student's t-test, Chi-square, Pearson's correlation and Linear Regression as appropriate.

Results: 100 cardiac surgery and 57 carotid surgery patients enrolled. Compared to cardiac surgery, carotid endarterectomy patients were older (71.05±8.69 vs. 65.72±11.04, P<0.001), with higher baseline INVOS (P<0.007) and greater stroke frequency (P<0.002). Diabetes and high cholesterol were more common in cardiac surgery patients. Right and Left side INVOS values were strongly correlated in carotid (r=0.772, P<0.0001) and cardiac surgery patients (r=0.697, P<0.0001). Diabetes and high cholesterol were associated with significantly (P<0.001) lower and Smoking was associated with higher baseline INVOS values in carotid, but not in cardiac surgery patients. Age, sex, CVA history, Hypertension, CAD, Asthma, carotid stenosis side and surgery side were not related to INVOS. Multivariate analysis showed that diabetes is strongly associated with lower baseline INVOS values bilaterally (P<0.001) and explained 36.4% of observed baseline INVOS variability in carotid (but not cardiac) surgery.

Conclusion: Compared to cardiac surgery, carotid endarterectomy patients are older, with higher baseline INVOS values and greater stroke frequency. Diabetes and high cholesterol are associated with lower baseline INVOS values in carotid surgery. Right and left side INVOS values are strongly correlated in both patient groups.

PP72-NONINVASIVE ASSESSMENT OF LEFT INTERNAL MAMMARY ARTERY GRAFT PATENCY USING TRANSTHORACIC COLOR DOPPLER ECHOCARDIOGRAPHY BEFORE AND AFTER DIPYRIDAMOLE INFUSION

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Objectives: The aim of this study was to evaluate patency of left internal mammary artery (LIMA) graft on left anterior descending artery (LAD) using transthoracic color doppler echocardiography before and after infusion of dipyridamole.

Methods: High frequency (5 MHZ) transthoracic echocardiography was performed on 34 patients who had left internal mammary artery graft to the left anterior descendig artery and were undergoing selective coronary angiography because of typical chest pain. Doppler velocity profiles of left internal mammary artery were obtained in 29 patients. In all of them biphasic pattern of blood flow was recorded before and after infusion of dipyridamole. Patients were divided into 2 groups according to degree of left internal mammary artery stenosis on angiography: group 1 was patients had patent left internal mammary artery, in group 2, left internal mammary artery had significant (>70%) stenosis. Left anterior descending artery was patent after insertion of left internal mammart artery in both groups.

Results: In group 1, blood flow velocity was maximal during diastole, but in group 2, this flow was maximal during systole and low velocities were recorded during diastole. There was significant increment of diastolic blood flow of left internal mammary artery after dipyridamole infusion in relation to group 2.

Conclusions: Dipyridamole echocardiography is a simple and noninvasive method for evaluation of left internal mammary artery graft patency.

PP73-TREATMENT OF ANEURYSM WITH SIDE BRANCHES-A SIMPLE METHOD

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Purpose: To present performance data on the use of the Cardiatis Multilayer Stent which is a 3-dimensional (3D) braided mesh made of interconnected layers, particularly in patients with side branches within the aneurysm.

Methods: A study protocol was designed to examine the safety and efficacy of the Cardiatis Multilayer Stent in patients with aneurysms in different target vessels. Between December 2006 and November 2009, 19 patients were enrolled in the study. Four patients had a renal aneurysm (one male three females) (mean diam: 18mm), 12 iliacs (mean diam: 25mm), 1 popliteal (diam: 55mm), 1 thoracic (diam: 57mm) and 1 abdominal (diam: 103 mm), all males.

Results: The multilayer stent was successfully deployed in all the patients (100% technical success); Mean follow-up for the peripheral aneurysms was 28 months (range 12 to 36) and for the aortic aneurysms was 1 month. The occlusion rate of the aneurysm at the peripheral arteries was 100% and all the side branches remained patent. For the thoracic and the abdominal aneurysms, the 1 month CTA showed patent artery side branches and reduced blood flow inside the sac.

Conclusion: The Cardiatis Multilayer Stent seems to be efficient as it concerns the side branches which remain patent and the aneurysm is excluded. The question remains about the time needed to achieve the curing of the aneurysm in large arteries such as the thoracic and abdominal aorta and we believe that is related to the number and size of the branches within the aneurysm.

A larger multi center study is underway to confirm the suitability of Cardiatis Multilayer Stent for the large thoracic, abdominal and thoracoabdominal aneurysms.

PP74-COMPLICATED ACUTE TYPE A DISSECTION WITH LARGE PSEUDOANEURYSM TWO YEARS POSTOPERATIVELY

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Introduction: Pseudoaneurysm is a rare complication in cardiac surgery field. It is a multifactorial disease which presented with a variety of signs and symptoms.

Methods: A 69 year old female patient, presented to the emergency department due to severe dyspnea on mild exertion, orthopnea. Her past medical history was uncontrolled hypertension and surgically treated acute type A dissection, replacing the ascending aorta and aortic valve replacement, two years prior.

The chest x-ray revealed a widen mediastinum. The echocardiographic examination revealed a giant saccular formation posteriorely of the aortic graft, an aorto-right pulmonary shunt, with concomitant pulmonary hypertension (75/35mmHg). The multislide CT scan examination demonstrated a giant pseudoaneurysm formation.

Results: The patient underwent an unsuccessful attempt to close the defect using an ASD closure devise. The following day underwent a surgical correction of the pseudoaneurysm. A deep hypothermic circulatory arrest was performed before resternotomy, to avoid excessive bleeding. A circulatory arrest was obtained at an esophageal temperature of 18°C. A resternotomy was performed and a huge pseudoaneurysm seen immediately under the sternum.

The Amplatzer devise was found within the pseudoaneurysm partially undeployed. A 3 cm long shunt was present above the non coronary cusp and a second shunt of 3 cm long was present between the pseudoaneurysm and the right pulmonary artery. The old aortic graft was excised. Selective antegrade cerebral perfusion was used. A pericardial patch used to close the pseudoaneurysm-right pulmonary shunt. A new impregnated graft used to reconstruct the distal anastomosis first. After the completion of the distal anastomosis, extracorporeal circulation reestablished. The previously implanted mechanical valve was functionally normal. The proximal anastomosis completed the heart was deaired and the aortic cross-clump removed.

Conclusions: Ascending aortic pseudoaneurysm is an uncommon pathologic condition. Favorable outcomes can be attributed to thorough surgical planning, adequate cerebral and myocardial perfusion.

PP75-INDUCTION CHEMOTHERAPY AND SURGICAL TREATMENT IN STAGE IIIA-N2 NSCLC.

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Objectives: To evaluate the effects of pathologic status N0M0 on long term survival in patients undergoing induction chemotherapy and surgery for stage IIIA-N2 NSCLC.

Methods: From January 2005 to May 2010, 100 patients (66 male, 34 female main age 60) received induction chemotherapy (MVP) before surgery for histologically proven stage IIIA-N2 NSCLC.

Results: 93% (n= 92) had complete anatomic lung resection plus radical mediastinal lemphadenectomy, 7% (n=8) had unresectable lesions. Operative mortality was 0%. Pathologic review of 92 specimens (30 pneumonectomies, 70 lobectomies/ belobectomies/ sleevelobectomies) and nodes revealed that 20.5% were T0N0, 10.2% T1N0, 10.2% T2N0, 17,9% T0-1N1, 15,4% T2N1-T3N0, 1,2% T3N1 , 23.1% T1-2-3N2 and T4N2.

Univariate analysis showed a 5-year survival rate of 94% for pT0N0, 48% for T0-1N1, and 0% for T1-2-3N2. Multivariate analysis showed a significant prognostic factor for pT0N0 vs all remaining stages (p<0.000).

Conclusions: In patients undergoing induction chemotherapy and surgery p T0N0 is associated with an impressive 94% 5-year survival. The preoperative identification of such a subset of patients should be the goal future trials.

PP76-THE ABRUZZINI TECHNIQUE IN THE TREATMENT OF CHRONIC BRONCHOPLEURAL FISTULA AFTER PNEUMONECTOMY FOR NON-SMALL CELL LUNG CANCER

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Goal Of The Paper: The chronic bronchopleural fistula (PBPF) remains a severe complication after pneumonectomy.

Its treatment is a major postoperative problem for every thoracic surgeon.

Material: From 2005 to 2010, 13 (thirteen) patients with bronchopleural fistula were treated in our clinic, with the *Abruzzini* technique. They were all males aged from 57 to 67 (i.e. mean age 61 years), with right pneumonectomy for NSCLC.

In 11 (eleven) patients bronchopleural fistulae appeared 3 (three) years after pneumonectomy. In one case, it appeared one year postop and the patient was re-operated 10 years later, while in one other patient the fistula was manifested the 9th day post pneumonectomy and surgery was performed 33 months later.

Results: All patients survived and were treated with success. The average duration of their hospitalization was 34 days.

For all patients the bronchopleural fistula was closed transsternally using a No 4.0 prolene suture and the bronchial stump was covered with epiploon.

15 days later, 12 out of the 13 patients underwent open window-thoracostomy with resection of 3-4 ribs.

For one patient with chronic bronchopleural fistula and a drainage tube after surgery, who developed purulence in the sternum, we were not able to apply the method of thoracostomy.

Conclusion: The use of the Abruzzini technique, combined to the 'open window'- thoracostomy (when possible) 15 days after the re-operation, is a successful method for treating chronic bronchopleural fistula.

PP77-THE VALUE OF THE RESECTION OF MAIN CARINA, IN CASE OF INFILTRATION FROM NON SMALL LUNG CANCER

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Goal Of The Paper: The infiltration of the main carina by a tumor, and of the tissue thereby, (it is usually a tumor infiltrating the upper lobar or the truncal bronchus), is not a very rare phenomenon and constitutes 2% of lung cancers (neglected cancer).

Therefore, we present our experience in handling and treating such cases (n.m.l.c.), following the method of pneumonectomy with simultaneous 'sleeve-like' excision of the main bronchus, and, in fact, excision of the main carina combined with tracheoplasty.

Material: From 2005 to date, 2010, we have applied the method in ten cases (-20-), twelve men (-12-) and four women (-8-), aged from 52 to 70.

The histological type of the specific tumors was mainly squamous epithelium, mostly of low differentiation, and a smaller number of adenic carcinomas, also of low differentiation most of the times, though more aggressive to the tissues.

Method: We applied the method of pneumonectomy, combined with a 'sleeve-like excision' of the main bronchus, in fact carinectomy, with parallel tracheoplasty, where the site resected in the form of a spindle, was closed by a No.4.0 prolene stitch (plastic, 'meander-like and over & over' suture).

In all these operations, we used a double tracheal tube, which allowed us to achieve better ventilation or occlusion of the lung, depending on its maneuvering by the surgeon.

Results:

1. Eighteen (18) out of twenty (20) patients survived and were successfully treated post-op.
2. We had two (2) deaths, one of a 70-year old patient, the sixteenth (16) day post-op, because of aspiration and one other of a 72 –year old patient the twentieth day because of an embolism.
3. Tracheostomy was required for one (-1-) out of the twenty (-20-) patients.
4. Average hospital days were 14.

Conclusion: The combined method of pneumonectomy with simultaneous 'sleeve-like' excision of the main bronchus

(sleeve-ectomy), and actually resection of the main carina (carinectomy), and parallel tracheoplasty, when there is infiltration of the main carina by a tumor (n.s.c.l.c.), makes these severe cases operable, in fact with very successful postoperative results.

PP78-INTRALUMINAL STENT-GRAFTING REPAIR FOR ACUTE TRAUMATIC AORTIC ISTHMUS TRANSECTION

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Objective: Prospective evaluation of immediate implantation of endoluminal stend-graft in patiens with transection of the aortic isthmus.

Methods: Between January 2005 and May 2010, endovascular stend-graft repair was performed in 6 patients (5 male ,1 female) with a mean age of 65 years (range: 59 –84 years). Indication for treatment was the acute traumatic aortic isthmus transection.Individually manufactured Talent's - medronic – (6) stents were used.

(Technics of the examination : according Seldinger) .

Follow–up examination was performed 1 week after implantation and repeared every 3 months (mean follow-up 6 months).

Results: All patients survived. No paravascular leakage, no stend dislocation, no neurological deficit or perfusion impairment was observed. All patients discharged from hospital at postoperative day 2-3.

Conclusion: Stend- graft repair is a save and feasible treatment option, especially in emergency situations, if the aortic lesions can be clearly identified and localized. The use of bi- plane X-ray control combined with simultaneous intravascular and transesophageal ultrasound imaging in an interdisciplinary way enables a more precise targeting of the stent landing zone.

PP79-USE OF TOPICAL HEAMOSTATIC AGENTS TO CONTROL PERIOPERATIVE BLEEDING IN CARDIAC SURGERY

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Objective: Aim of the study is to evaluate the effect of two topical haemostatic agents, platelet-rich gel and fibrin sealant, on perioperative bleeding and need of blood transfusion after elective cardiac surgery.

Methods: Forty patients (mean age 68±10 years) (Group 1) who underwent elective cardiac surgery received autologous Vivostat haemostatic agent (platelet-rich gel, n=26, fibrin sealant, n=14) by means of spraypen applicator (8.2-8.5 mL per patient). Topical haemostatic agents were applied to either the right and left side of the sternum, to the proximal and distal anastomoses, site of internal thoracic artery harvesting, on the surgical sites. Postoperative bleeding data and need of blood transfusion after use of topical haemostatic agents were compared to those of forty patients (mean age 68.5±10 years) (Group 2) operated on the same data. Age >70 years represented a selection criterion to blood transfusion for postoperative haemoglobin value <10.5 gr/dL.

Results: There was no in-hospital mortality. Baseline characteristics, preoperative clotting variables, cardiopulmonary and aortic cross-clamp times were similar in Group 1 and Group 2. At 12 postoperative hours need of blood transfusion and mean number of blood units /patient were lower in Group 1 as compared to Group 2 (11/40 vs 20/40, p=0.05, and 0.5±0.6 vs 0.9±1.1, p=0.2); in Group 1 as compared to Group 2 chest drainage at 12 and 24 postoperative hours was 200±131 vs 267±128 mL (p=0.03) and 330±195 vs 411±187 mL (p=0.08), respectively. Postoperative mean value of haemoglobin was similar among Group 1 (11±1.1 gr/dL) and Group 2 (11.2±1.6 gr/dL) (p=NS).

Conclusions: Autologous topical haemostatic agents can be effective in reducing bleeding and need of blood transfusion after cardiac surgery.

PP80-THE FIVE YEAR SURVIVAL AND SURGICAL TREATMENT OF THE BRRONCHIOLOALVEOLAR LUNG CANCER.

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Objectives: In recent years the prevalence of adenocarcinoma among lung cancers has risen worldwide. We studied whether there is a similar tendency for the bronchioloalveolar carcinoma (BAC). Is it possible to confirm the statement that BAC is multiple cancer among non- smoking women?

Methods: Between March2005-March 2010, 14 lung resections for adenocarcinoma were carried out. Of these 37.1% were BAC. We effected 8 lobectomies, 3 pneumonectomies and 3 wedge resections.

Results: The preoperative CT suspected three multiple tumors, but only two were confirmed by postoperative pathology. The tumor was indicated to be in stage I or II in 6 cases by surgery, 8 cases by pathology. 6 tumors were in stage I/A. for the overall group of 37.1% of patients the 5-year survival rate for wedge resections (41%) was lower than that for major resections (64%) (p=0,41).

Conclusions: Bronchioloalveolar carcinoma (BAC) has favourable survival, particularly in women. Because of its slow growth, the patients are operated on at an early stage. In spite of this, resection smaller than lobectomy is recommended only as compromise. The high proportion of non-smoking women may suggest genetic or hormonal etiological factor for BAC.