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Routine Preoperative Insertion of IABP in High-Risk Off-Pump Coronary Artery Bypass Grafting

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ABSTRACT

The beneficial effects of intraaortic balloon pump (IABP) in coronary artery bypass graft surgery with cardiopulmonary bypass have been reported. However, whether preoperative insertion of IABP in high-risk off-pump coronary artery bypass grafting (OPCAB) has any beneficial effects remains to be established. We report our experience of preoperative insertion of IABP in OPCAB.

INTRODUCTION

Dislocation of the heart during off-pump coronary artery bypass grafting (OPCAB) in high-risk patients may result in hemodynamic instability and coronary ischemia [Grundeman 1997,1998, Mathison 2000]. High-risk coronary artery bypass grafting (CABG) has been considered a contraindication for OPCAB by some investigators [Buffolo 1996, Baumgartner 1999]. Improvements in anesthesia and the functional design of OPCAB-stabilizing devices have led to the application of OPCAB to high-risk CABG patients who previously would have undergone cardiopulmonary bypass (CPB). Despite improvements in OPCAB, these patients are more susceptible to deterioration and conversion to CPB because of severe multivessel disease, left main stem stenosis, or poor cardiac contractility. The elective use of an intraaortic balloon pump (IABP) in these patients may prevent patient deterioration and thus avoid the need for CPB with its attendant risks, which include inflammation and global ischemia [Kirklin 1991, Edmunds 1998].

RESULTS AND DISCUSSION

A total of 198 patients underwent OPCAB between 1999 and 2003. A total of 10 patients (5%) had preoperative elective insertion of IABP. These patients fulfilled at least 2 of the following criteria: left main stem stenosis ≥70%, unstable angina (Canadian Cardiovascular Society class III-IV), or poor left ventricular function (≥30%). The preoperative characteristics of the patients are shown in Table 1. The surgery was performed by one operator. After general anesthesia, the IABP was inserted by the closed method in the operating room before sternotomy. The IABP used was a 9.5 F, 40 mL connected to a pump (Datascope, Oakland, NJ, USA). There was no failure of placement of IABP and no conversion to CPB. Patients returning from the operating theater with an IABP underwent anticoagulation with heparin once the bleeding from the drains subsided. The number of distal coronary anastomoses performed were 3.1 ± 0.99. The postoperative characteristics of the patients are shown in Table 2.

We have electively used IABP in 10 patients undergoing OPCAB. As seen in Table 1, this high-risk group included patients with a mean Euroscore of >6, and 60% of the patients had significant left main stenosis, impaired left ventricle function, and unstable angina. Our results show that none of the patients required adrenaline or dobutamine postoperatively. There was minimal morbidity, with no readmissions to the intensive care unit, no IABP-related complications, no renal failure requiring hemofiltration, no stroke, and no gastrointestinal complications. These results may be due to minimization of end-organ dysfunction caused by low-flow episodes [Gutfinger 1999]. Three patients who had new-onset atrial fibrillation (AF) reverted back to sinus rhythm with medical treatment, and in 1 patient a superficial wound infection resolved with antibiotic treatment. IABP therapy was needed for less than 24 hours, and there were no IABP-related complications. These results support the findings of Gutfinger et al [1999] and Christenson et al [1999] that preoperative insertion of IABP is associated with lower complication rates than intraoperative or postoperative insertion.

In the context of CABG with CPB in high-risk patients, it has been convincingly shown that preoperative use of IABP improves outcome [Christakis 1992, Christenson 1997]. Evidence is less compelling with OPCAB surgery, although some studies [Gutfinger 1999, Christenson 1999] have suggested that mortality is reduced with the use of preoperative IABP in these patients. Our series with no mortality at 30 days after surgery certainly supports this hypothesis.

OPCAB surgery for multivessel myocardial revascularization in high-risk patients has been shown to reduce the inci-

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Table 1. Preoperative Patient Characteristics*

Age, y	68.8 ± 6.9
Canadian Cardiovascular Society class III/IV	6 (60%)
New York Heart Association class III/IV	4 (40%)
Previous myocardial infarction	6 (60%)
Diabetes	6 (60%)
Triple-vessel disease	9 (90%)
Left main stem disease and/or impaired left ventricle	6 (60%)
Peripheral vascular disease	1 (10%)
Previous stroke	1 (10%)
Euroscore, mean	6.1 ± 2.5

dence of perioperative morbidity and mortality compared to conventional CABG [Sabik 2002, Al-Ruzzeh 2003]. The addition of elective IABP in these patients, by increasing visceral perfusion, may further improve outcomes and reduce the risk of conversion to CPB with its associated adverse effects [Kirklin 1991, Edmunds 1998]. In addition, OPCAB patients with left main stem stenosis and blocked right coronary artery and those with mild-to-moderate mitral regurgitation and moderate left ventricular function may be considered as candidates for elective IABP insertion.

A better understanding of the beneficial effects of IABP has led to a recent greater tendency to use IABP electively in high-risk OPCAB patients for whom there is anticipated deterioration during cardiac dislocation and local stabilization. Although data on the use of elective IABP in high-risk OPCAB patients from randomized controlled trials and well-conducted observational studies is still awaited, on the basis of our early experience we advocate this practice routinely in this group of patients.

Table 2. Results

Postoperative need for adrenaline or dobutamine	0
Time on ventilation in intensive care unit, mean	17.1 ± 3.5 h
Length of intensive care unit stay, mean	34.2 ± 14.6 h
Hospital stay, median	12 d
Readmission to intensive care unit	0
New-onset atrial fibrillation, n	3 (30%)
IABP-related complications	0
IABP counterpulsation, mean	22.6 ± 12.6 h
Renal failure/hemofiltration	0
Infection, n	1 (Superficial sternotomy wound)
Stroke	0
Gastrointestinal complication	0
30-day mortality	0

*IABP indicates intraaortic balloon pump.

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