

# Infected Aortic Pseudoaneurysm at the Site of a Proximal Mechanical Anastomotic Connector following Off-Pump Coronary Artery Bypass Grafting: Case Report

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## ABSTRACT

We describe a patient who underwent off-pump coronary artery bypass graft surgery performed with an aortic connector. The patient developed a malignant deep sternal wound infection that subsequently led to an aortic pseudoaneurysm at the site of proximal anastomosis.

## BACKGROUND

Although most patients with sternal wound infections are successfully treated with aggressive debridement and flap closure, occasionally virulent or inadequately treated infections can erode and spread into bypass grafts, the aorta, or other cardiac structures [Katsumata 2000]. The desire to further minimize aortic manipulation during off-pump coronary artery bypass grafting (CABG) has led to the development of proximal anastomotic devices [Eckstein 2002, Mack 2003]. The first and most widely used such device, the St. Jude Medical Symmetry aortic connector, consists of a nitinol frame that is attached to the saphenous vein and then rapidly deployed into the ascending aorta without the need for clamping the aorta.

## CLINICAL SUMMARY

A 56-year-old woman with brittle insulin-dependent diabetes and severe peripheral vascular disease presented with an acute myocardial infarction and was found to have a 60% stenosis of her left main coronary artery, diffuse distal coronary artery disease, and an ejection fraction of 25%. She underwent urgent off-pump CABG. The left internal mammary artery was grafted to the left anterior descending artery. A segment of saphenous vein was loaded onto an aortic connector and successfully deployed into the distal ascending aorta. The distal anastomosis was performed to the first obtuse marginal branch of the left circumflex artery. The patient initially required modest inotropic support but had an

otherwise smooth early postoperative course. On postoperative day (POD) 7 she developed purulent wound drainage, which was initially treated with local drainage, dressing changes, and oral antibiotics.

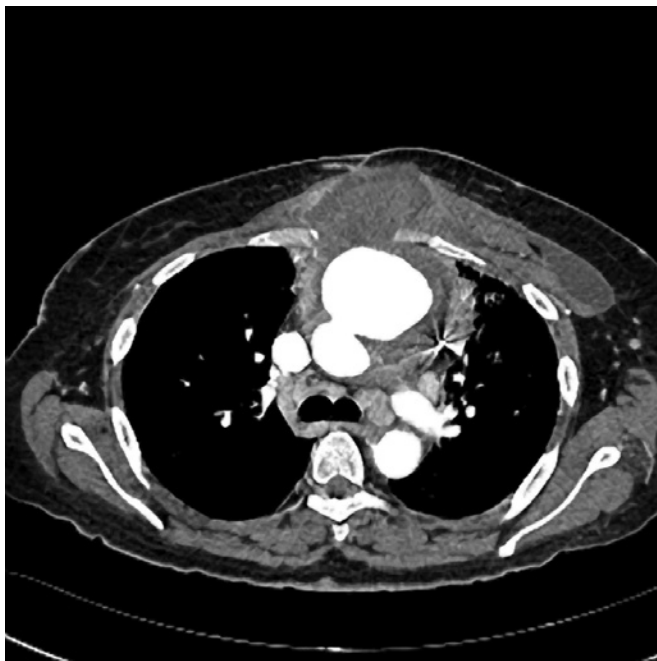
Six weeks after discharge the patient was readmitted with sternal drainage and instability. Sternal debridement was performed several days later by wound closure using bilateral pectoralis major muscle flaps. Intraoperative wound cultures confirmed that the infectious organism was methicillin resistant *Staphylococcus aureus* (MRSA).

Two weeks later the patient was readmitted complaining of chest discomfort. Although she did not have objective evidence of myocardial ischemia, a cardiac catheterization was performed and showed that both grafts were patent. The patient was released home with some pain relief medications, but 1 week later she returned to the emergency room with a pulsatile mass in the upper portion of her sternal wound and clinical evidence of a recurrent infection. A chest computed tomographic scan with intravenous contrast showed a superior mediastinal fluid collection adjacent to a 5-to-6-cm sacular aortic aneurysm arising from the vicinity of the proximal anastomosis (Figure). The patient was taken emergently to the operating room with the diagnosis of an infected pseudoaneurysm. Peripheral cardiopulmonary bypass was initiated and the patient's body temperature was cooled to 15°C. A collection of bloody purulent matter consistent with an infected hematoma was encountered under the pectoralis flap. The pseudoaneurysm itself was entered after the circulation was arrested. The aneurysm was >6 cm in diameter and communicated with the left side of the distal ascending aorta through a 15-mm defect. The nitinol aortic connector had detached from the aortic wall and was found lying freely within the pseudoaneurysm cavity. The saphenous vein graft appeared to enter the pseudoaneurysm but was occluded. After the aneurysm sac was completely excised, the rim of the aortic defect was debrided to normal-appearing aortic tissue and the resulting 25-mm defect was closed with an aortic homograft patch. The wound was covered with a vacuum assisted closure (VAC) sponge (KCI, San Antonio, TX, USA) until it was clean, and the pectoralis major flaps were readvanced for secondary closure.

During the course of this hospital stay the patient developed massive hemoptysis. Flexible and rigid bronchoscopy was performed to clear the airways but was otherwise nondi-

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Chest computed tomographic scan with intravenous contrast showing a superior mediastinal fluid collection adjacent to a 5- to 6-cm saccular aortic aneurysm arising from the vicinity of the proximal anastomosis.

agnostic. As the patient began to awaken from her bronchoscopy she developed a brief episode of hypertension after which bright red blood began seeping through the upper part of her wound. She was emergently returned to the operating room and placed on peripheral cardiopulmonary bypass with hypothermic circulatory arrest. The wound was reexplored and some purulent fluid was found around the homograft patch, which had partially dehisced from the aorta. This time the ascending aorta was resected and replaced with a dacron (Hemashield) tube graft. The wound was left open and treated with wet-to-dry dressing changes until the entire graft was covered with granulation tissue. The wound was finally closed with a rectus abdominus muscle flap followed by a split-thickness skin graft on postoperative day 173. The wound completely healed and the patient made a complete recovery.

## DISCUSSION

This is to our knowledge the first report of an infection involving a proximal anastomotic device. Given the appearance of the wound at the time of initial debridement, we do not believe that the connector was the primary source of infection, rather that it became secondarily infected after being bathed in a purulent hematoma which had developed under one of the pectoralis muscle flaps. There is no way to know for certain that the presence of foreign material at the

anastomosis contributed to the development of the infected pseudoaneurysm. This high-risk patient presented with a particularly virulent MRSA infection. Instances of erosion of infection into conventional sutured saphenous vein graft proximal anastomoses have been previously described [Katsumata 2000]. Furthermore, nitinol is an inert material, and the amount of foreign material on the outside of a completed connector anastomosis is not significantly different from the amount of polypropylene outside a sutured anastomosis. In animal studies, the nitinol arms of the connector become covered with tissue within a few weeks [Ko 2002]. It is also interesting to note that the graft was patent and the pseudoaneurysm had not developed at the time of the catheterization, although the infected hematoma was probably already present. We can speculate that the aorta around the anastomosis was in the early stages of infection but had not yet ruptured. Instrumenting the device during the catheterization may have caused a small disruption of the anastomosis, which subsequently evolved into a pseudoaneurysm.

In retrospect, a different management strategy might have prevented these life-threatening complications. Given the patient's risk factors and the virulence of the organism, the original wound infection might have been treated more conservatively with dressing changes before proceeding with muscle flap closure. If the moderate hematoma that had developed under the flap had been diagnosed and drained earlier, it may not have become infected. We were surprised that the homograft patch did not prove itself to be more resistant to infection. Perhaps some of the remaining aortic wall was still infected and more aggressive treatment of the pseudoaneurysm with a tube graft at its original presentation might have been definitive.

We suggest that patients with anastomotic devices who develop sternal wound infections should probably be treated with extra caution. Muscle flap closure should be delayed until the wound is completely clean with excellent granulation tissue, and the flaps should be monitored with extra vigilance for hematoma formation. Because this case represents the only late adverse event we have seen in several hundred Symmetry aortic connector deployments, we continue to find this device to be a useful enabling technology for off-pump CABG.

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