Off-Pump Coronary Bypass via Left Thoracotomy Resulting from Sternoclavicular Arthritis

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We report a case of coronary artery bypass grafting through the left thoracotomy in a patient who suffered from sternoclavicular joint infection with methicillin-resistant Staphylococcus aureus. We performed off-pump coronary bypass surgery, using the left internal thoracic artery to the left anterior descending coronary artery and a saphenous vein graft from the aorta to the circumflex artery, with a successful outcome. This approach seems to be safe and effective for coronary bypass grafting in situations where median sternotomy is not favorable, as in the described patient. (Ann Thorac Cardiovasc Surg 2010; 16: 125–127)

Key words: coronary artery bypass grafting, surgery, thoracotomy, infection

Introduction

Coronary artery bypass grafting (CABG) through the left thoracotomy has become a useful approach to revascularization in patients who need median sternotomy. The coronary bypass surgery via the left thoracotomy is indicated in patients with a hostile sternum, such as reoperative CABG or a history of radiation therapy, and cases that require other concomitant operations in the left thoracic cavity. In this report we describe a case of off-pump CABG (OPCAB) via left thoracotomy in a patient who had sternoclavicular (SC) arthritis with methicillin-resistant Staphylococcus aureus (MRSA).

Case Report

A 57-year-old man with a medical history of coronary artery disease, hypertension, insulin-dependent diabetes, and chronic renal failure on hemodialysis for 5 months presented with right SC joint pain and angina. He also had suffered from osteomyelitis, which had led to amputation of the left lower leg. On examination, he was observed to have redness covering the right SC joint, with moderately raised inflammatory markers (C-reactive protein 20.7 mg/dl, white blood cell [WBC] 13.5 × 10^9/liter). Chest computed tomography revealed a soft tissue mass with ill-defined margins around the right SC joint and an osteolytic lesion in the clavicle (Figs. 1A and 1B). Scintigraphy performed 24 hours after the injection of Ga-67 demonstrated a markedly increased uptake in the right SC joint and the sternum (Fig. 1C). Cultures of the SC joint aspirate and blood grew MRSA.

After the patient had received treatment with initial high-dose loading of teicoplanin targeting a trough serum level of 20 mg/l, inflammatory markers were reduced, though angina was worsening. Cardiac catheterization revealed 90% stenosis of the left anterior descending coronary artery (LAD), 99% stenosis of the left circumflex artery (LCX), and 90% stenosis of the proximal right coronary artery (RCA). Percutaneous coronary angioplasty was performed with success in the RCA, but not in the LAD or LCX because the coronary arteries were severely calcified and rigid.

A decision was made to perform OPCAB through the left thoracotomy. After general anesthesia, tracheal intubation was performed, using a Carlen double-lumen and flexible
endobronchial tube. Left posterolateral thoracotomy through the 5th intercostal space was performed with the patient in lateral recumbent position. The thorax was opened, and the left internal thoracic artery was harvested in a skeletonized fashion by an ultrasonic coagulator (Harmonic Scalpel; Ethicon Endo-Surgery, Inc., Cincinnati, OH). The saphenous vein was simultaneously obtained from the right lower leg. Ventilation to the left lung was suspended, and the pericardium was incised longitudinally anterior to the phrenic nerve. Heparin was administered at a dose of 1.5 mg/kg body weight. After a decision on the anastomotic site by periaortic ultrasonography, proximal anastomosis of the saphenous vein was made to the descending aorta using the HEARTSTRING proximal seal system (Guidant Corporation, Santa Clara, CA). Coronary anastomoses of the LAD and LCX were completed with a stabilizer (Octopus II; Medtronic, Inc., Minneapolis, MI) and tourniquet sutures. Once the coronary revascularization was completed, heparin was partially reverted with protamine sulfate, the left lung was reexpanded, and the thorax was drained and closed by layers.

No complications, including recurrence of infection, perioperative cardiac events, and distal embolism, were observed. The patient started continuous hemodialfiltration on postoperative day 2 and resumed hemodialysis on postoperative day 4. Coronary angiography demonstrated good flow in both grafts (Fig. 2) at postoperative day 12. The postoperative course was uneventful with intravenous teicoplanin (Targocid; Sanofi-aventis, France) for 14 days under monitoring of serum concentrations. No subsequent treatment has been required.

**Discussion**

Our patient had an infection of SC arthritis, which mainly occurs in patients with immunocompromising diseases, such as diabetes or chronic renal failure, as in this case. We decided to choose the following strategies: the first was not to perform median sternotomy including partial sawing; the second was to avoid cardiopulmonary bypass (CPB); and the third to control infection with anti-MRSA antibiotics.

There have been several alternative approaches for

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**Fig. 1.** Preoperative chest computed tomography. White arrows indicate soft tissue mass with ill-defined margins around the right sternoclavicular joint (A) and osteolytic lesion in the clavicle (B). These findings are compatible with sternoclavicular arthritis. Anterior view of Ga-67 scintigraphy performed 24 hours after the injection of tracer: the black arrow demonstrates a markedly increased uptake in the right sternoclavicular joint and the sternum (C).
patients who need cardiac surgery, but none is suitable for full median sternotomy. These procedures include partial sternotomy,\textsuperscript{4} manubrium-spearing sternotomy, and bilateral thoracotomy\textsuperscript{5} that allows the use of CPB. However, we avoided even partial sawing of the sternum, since the “no touch” of the sternum is considered preferable for patients who have possibilities of osteomyelitis. Ross and Shamsuddin\textsuperscript{6} reported that 56 percent of the 180 SC septic arthritis patients had clavicular and/or sternal osteomyelitis.

The CPB may cause immunosuppressive and inflammatory effects as well as perioperative hemorrhage, which may have deleterious effects on the SC arthritis. Many studies addressed the reduced systemic inflammatory response in OPCAB as compared with CABG with CPB. Off-pump surgery is reported to reduce the risk of postoperative bleeding and the number of transfusions required. We believe that OPCAB would minimize the risk of a postoperative immunosuppressive state. According to several reports, the number of coronary arteries grafted were not limited to the OPCAB via left thoracotomy.\textsuperscript{7}

Teicoplanin is a glycopeptide antibiotic used against Gram-positive bacteria, including MRSA. Its mechanism of action is to inhibit bacterial cell wall synthesis. Previously published data suggest that a trough serum teicoplanin level of more than 20 mg/l is quite likely to bring about improved outcomes in serious staphylococcal infection.\textsuperscript{8} We measured the serum concentrations of teicoplanin to keep the trough serum level at 20 mg/l or more.

The patient recovered favorably after surgery, and his postoperative course was uneventful without wound infection, including mediastinitis and other complications. The OPCAB through the left thoracotomy seemed to be safe and effective in situations in which the median sternotomy is not favorable because of the infection around the sternum.

References