

An Uncommon Cause of Myocardial Ischemia after Coronary Artery Bypass Grafting: “The Dangerous Drainage”

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ABSTRACT

The most common causes of myocardial ischemia and myocardial infarction early after coronary artery bypass grafting surgery are early graft occlusion/thrombosis or occlusion/thrombosis of coronary arteries due to advanced coronary heart disease. We describe a case of postoperative myocardial ischemia due to an uncommon and quickly reversible cause: mechanical compression of a vein graft by a 19F flexible silicone mediastinal drainage tube.

INTRODUCTION

Cardiac surgery generally requires the insertion of mediastinal drainage tubes for prevention of hemothorax and cardiac tamponade in the postoperative period. Problems reportedly associated with drains, especially with large-bore drainage tubes, include cardiac, pulmonary, and vascular complications, as well as pain. Smaller and more flexible silicone tubes have been introduced widely in cardiac surgical practice in recent years. The efficacy and safety of these drains have proved to be at least equal to conventional drains [Obney 2000; Lancey 2001; Frankel 2003; Sakopoulos 2005; Ishikura 2006; Roberts 2006; Bjessmo 2007].

CASE REPORT

A 79-year-old male patient was referred to our department with chest pain. His medical history included prior coronary artery bypass grafting (CABG) 18 years previously that included revascularization of the left anterior descending coronary artery (LAD) with the left internal thoracic artery and revascularization of the circumflex artery (CX) and right marginal artery with saphenous vein grafts. Upon the patient's admission to

the hospital, we observed T-wave inversion in leads I, II, III, and avF in the 12-lead electrocardiogram, and results of laboratory tests showed a maximum creatine kinase value of 831 U/L. The patient underwent cardiac catheterization. The coronary angiogram showed patent grafts for the LAD and CX, but significant stenoses were apparent in the bypass to the right marginal artery and the native right coronary artery (RCA). The patient was subsequently scheduled for coronary surgery, and a venous bypass to the RCA was performed uneventfully with the patient under cardiopulmonary bypass. The initial postoperative course was uncomplicated. The postoperative laboratory analysis, however, showed increased values for creatine kinase (maximum, 576 U/L, postoperative day 1) and troponin I (maximum of 34.6 ng/mL at 12 hours after the procedure). Serial electrocardiograms showed signs of myocardial ischemia in the posterior heart wall. Although the patient was hemodynamically stable and the echocardiography evaluations revealed no signs of regional wall-motion problems, a postoperative cardiac catheterization examination was scheduled. A subtotal stenosis of the saphenous vein bypass above the anastomosis was observed in a 15° right anterior oblique projection, which demonstrated that the silicone drain (Figure, A, asterisks) was preventing blood flow in the bypass (Figure, A, arrow). We suspected that the silicone drain (19F, BLAKE; Ethicon, Norderstedt, Germany) was putting pressure on the bypass, thereby impeding blood flow through the venous graft. The drain was immediately removed, and the bypass recovered its functionality, as is shown in the 30° right anterior oblique projection, which demonstrates a good filling pattern (Figure, B). The patient's subsequent postoperative course was uneventful. The electrocardiographic signs of ischemia resolved completely, and both creatine kinase and troponin I values showed a steady decline to values within the reference intervals. The patient was discharged from the hospital on the 10th day after his operation.

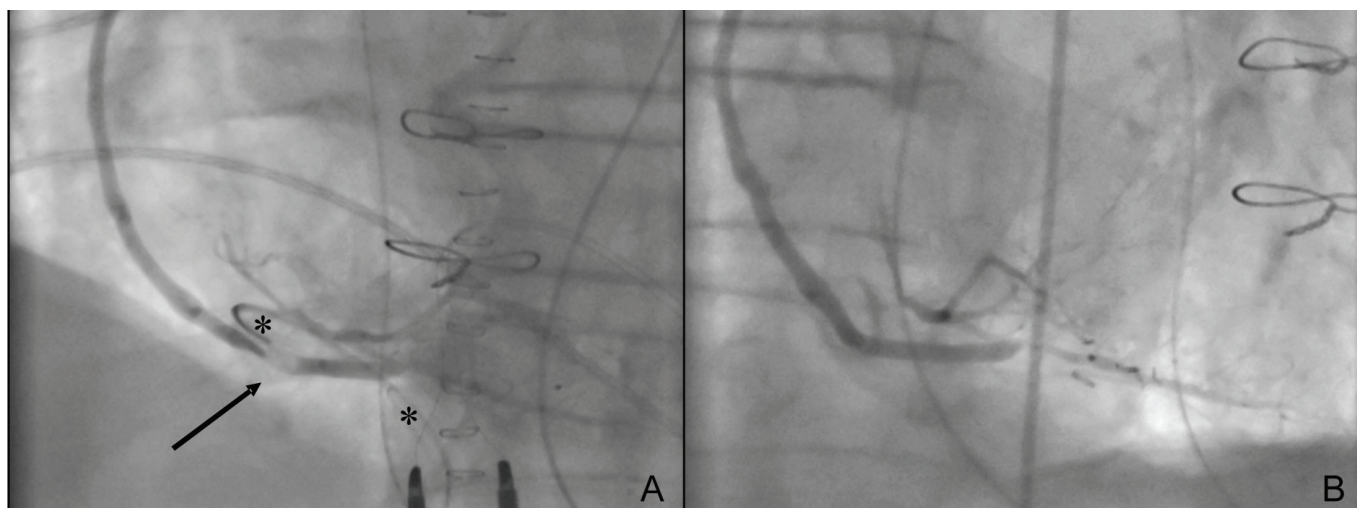
DISCUSSION

We suspected early postoperative myocardial ischemia in this asymptomatic patient with no clinical events, because of the increased values for laboratory markers of myocardial ischemia and the electrocardiographic signs of ischemia. This suspicion led to cardiac catheterization, which detected the mechanically caused graft stenosis and allowed its immediate resolution. Compression of bypass grafts or cardiac structures by drainage tubes has occasionally been reported in literature.

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Mechanically caused stenosis in a saphenous vein graft following coronary artery bypass grafting. A, Cardiac catheterization imaging (15° right anterior oblique projection) showing pressure (asterisks) from the silicone tubing preventing blood flow in the bypass (arrow). B, Imaging indicating a good filling pattern after removal of the drain (30° right anterior oblique projection).

Svedjeholm et al described a similar case of reversible venous graft compression caused by a mediastinal drain, a case that can be assumed to be related to a stiffer, large-bore tube [Svedjeholm 1997]. The patient recovered fully. In a recently reported similar case occurring after CABG surgery, immediate removal of the pericardial drain after cardiac catheterization also led promptly to complete resolution of the postoperative electrocardiographic signs of infarction [Heestermans 2009]. Interestingly, similar cases have described compression of a coronary artery [Sulimovic 2006] and compression of arterial grafts [Knipp 2002; Sbarouni 2003]. Perforation of the right ventricle [Uppal 1999] and reversible cardiogenic shock [Kollef 1991] caused by the same mechanism have also been reported. Two cases in pediatric cardiac surgery that involved acute and reversible myocardial ischemia caused by mediastinal drain suction have been described [Chapin 1980]. Consistent with the literature, the signs of myocardial ischemia in our case were fully reversible after early diagnosis and removal of the drain. In our case, the compression of the venous graft was attributable to a smaller and softer silicone tube that has increasingly been used in recent years.

CONCLUSION

Myocardial ischemia and/or infarction occurring after CABG should prompt consideration of the possibility of mechanical compromise of a bypass graft by a drainage tube, even when soft silicone drains are used.

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