INTRODUCTION

Cabrol et al. performed the first direct aortocaval anastomosis in 1978 to decompress the peri-aortic space and autotransfuse the shed blood.1 Since that time, several modifications of Cabrol's procedure have been described.

We describe another successful modification of Cabrol's technique using periortic-to-right-atrial fistula formation with the use of bovine pericardium to redirect intractable bleeding after complex aortic root reconstruction.

TECHNIQUE

A 51-year-old intravenous drug user, presented with dyspnea and blood cultures positive for *Staphylococcus aureus*. Three months earlier, she had a # 23 mechanical valve replacement for endocarditis and aortic root abscess. Her pre-operative echocardiogram demonstrated a 3.5 cm false aneurysm posterior to aortic root, along with severe aortic and mitral insufficiency. Patient was taken to operating room for aortic and mitral valve replacement.

Arterial cannulation in the left femoral artery was performed. Ascending aorta was opened through the previous aortotomy. Cardioplegia was given in an anterograde fashion. The aortic prosthesis was removed and dissection of the right lateral wall of the ascending aorta was performed to locate the false aneurysm at the artro-ventricular junction. Then anterior leaflet of mitral valve was resected. Sutures were placed in the posterior annulus of the mitral valve. A 27 mm Hancock Edwards prosthesis (Irvine, CA, USA) was marked and a tailored patch of the bovine pericardium sown to the valve. The aortic prosthesis was sized to 23 mm Hancock Edwards (Irvine, CA, USA). Sutures in the non-coronary sinus part of the valve were placed in the same plane as the left and right annular sutures. Ventricular pacing wires were placed on the right ventricular wall, since the patient was likely to have heart block due to complex reconstruction. Patient was removed from bypass. Even with the reversal of heparin blood product and topical hemostatic agents, there was still significant bleeding from aortic root area. Modification of Cabrol patch was then performed.

Patch was sutured to the main pulmonary artery, ascending aorta and continued laterally on Superior Vena Cava (SVC). Punch hole was made in the patch with tourniquet choke at the site of venous cannulation. A purse-string suture was placed around the opening in the patch, tourniquet on SVC was opened and tourniquet on the patch was closed (Figure 1). Bleeding was thus controlled. Postoperative echocardiogram demonstrated good ventricular function in the mitral and aortic prosthesis.

Postoperatively, patient was extubated on postoperative day 2. She received a pacemaker for heart block and was discharged postoperative day 14.
DISCUSSION

Rate of bleeding following aortic root replacement is reported in up to 24% of cases, and bleeding significant enough to require re-operation in up to 4% of cases. Cabrol et al. originally used direct aortocaval anastomosis in the setting of intractable bleeding after complex aortic reconstruction, connecting the right atrial appendage to the aortic wall where they wrapped the bleeding aortic root. Their study consisted of 100 patients who were operated upon for aortic insufficiency associated with an aneurysm of ascending aorta. Authors reported that operative mortality for the entire group was 4% and late mortality was 11%. Among 84 survivors, clinical improvement was readily apparent as stated by the authors. Several modifications of Cabrol patch have been described; more recent ones describe fistula formation without aortic root wrapping. Posacioglu and colleagues created a perigraft-to-right-atrial fistula by using autologous pericardium to control the inaccessible bleeding after aortic root repair in 7 patients with acute type A dissection (involving the ascending aorta). Authors reported that none of their patients required re-exploration for bleeding and they were all discharged from the hospital uneventfully. Additionally, no perigraft-to-right atrial shunt was detected on the echocardiogram which was performed prior to discharge. Goldstone and associates used modification of Cabrol to treat hemorrhage secondary to left ventricular rupture. Kao and colleagues reported two cases of perigraft-to-right atrial fistula by using autologous pericardium to control the inaccessible bleeding after aortic root replacement. Authors reported that both their patients had an uneventful postoperative course. They advocated that their technique enabled them to achieve hemostasis with preservation of the proximal vein graft. More recently, Elefteriades et al. described a modification using a valved Contegra graft, which is an integrated valved conduit derived from a bovine jugular vein. Authors advocated that the advantage of using this conduit is that it obligates unidirectional flow and eliminates venous back bleeding. Kitamura and colleagues described another interesting technique for torrential bleeding from proximal aortic root anastomosis in a case of 41-year-old man, who developed prosthetic aortic valve endocarditis with paravalvular abscess affecting the intervalvular fibrous body, the mitral valve and other cardiac structures. Aortic root and mitral valve replacement with reconstruction of the intervalvular fibrous body led to uncontrollable bleeding, which was successfully controlled by a stepwise Cabrol shunt. To create a Cabrol shunt, authors wrapped the distal aortic anastomosis with a Teflon felt strip, and then this strip was sutured with surrounding tissue to make a perigraft space. This space was closed with an aortic graft sheet and was drained into the right atrium, using an 8-mm tube graft. They still encountered active bleeding after discontinuation of cardiopulmonary bypass requiring a second shunt by isolation of periaortic space, using another aortic graft sheet to create a second shunt. Authors reported that at 1 year follow-up, patient was back at work with a New York Heart Association class A. Spontaneous closure of the fistula was reported for most of the formentioned techniques. Kao et al. reported spontaneous closure of the fistula within one week of operation for one of his two cases. Cabrol and colleagues also reported spontaneous closure for most of his perigraft-to-aortic fistulas.

Bleeding from aortic root is a devastating complication requiring immediate attention and a quick solution. Although several techniques have been described to tackle this problem, our technique is unique in a way that it is simple and quick. Additionally, it provides a very reliable method, which can easily be performed in a matter of minutes to control bleeding from aortic root with low risk of complications postoperatively.

REFERENCES


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