Radical surgical repair with stepwise Cabrol shunt for severe prosthetic valve endocarditis

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Abstract

Prosthetic valve endocarditis involving other valves and cardiac structures requires complex surgical reconstruction, which is sometimes accompanied by uncontrollable bleeding. We report the case of a 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 torrential bleeding from the proximal aortic root anastomosis, which was successfully controlled by a stepwise Cabrol shunt.

Keywords: Infective endocarditis • Cardiac valve prosthesis • Operative procedures • Bleeding

INTRODUCTION

Surgical treatment for prosthetic valve endocarditis with paravalvular abscess is associated with high mortality and morbidity [1]. When the aortic and mitral valves together with the intervalvular fibrous body are involved in infection, more complex surgery is required [2] and the risk of complication, including uncontrollable bleeding, becomes higher. Perigraft space-right atrial shunt for uncontrollable bleeding during aortic surgery was first described by Cabrol et al. [3] and several modifications have been reported thereafter [4]. We report a case with extensive prosthetic aortic valve endocarditis with paravalvular abscess affecting the intervalvular fibrous body and the mitral valve, requiring radical surgical repair followed by a stepwise Cabrol shunt to manage torrential bleeding.

CASE REPORT

A 41-year old man was referred to our unit with an extensive prosthetic aortic valve endocarditis due to methicillin-sensitive \textit{Staphylococcus aureus}. Echocardiography showed large vegetations on the mitral valve, the atrial septum and the tricuspid valve. Computed tomography (CT) demonstrated a paravalvular abscess around the aortic prosthesis (Fig. 1A). Although he was neurologically asymptomatic, magnetic resonance imaging showed multiple cerebral infarctions. There were also multiple splenic and bilateral renal infarctions on the CT. At operation, the tricuspid valve and the atrial septum was thoroughly debrided through right atriotomy. After draining the paravalvular abscess, the infected prosthesis was removed and the

Figure 1: (A) Preoperative CT showing an extensive paravalvular abscess around the aorta. (B) Postoperative CT showing a large patent perigraft space. Ao: ascending aorta; PA: pulmonary artery; Ab: paravalvular abscess; AG: aortic graft; PS: perigraft space.
The aortic root and the intervalvular fibrous body were aggressively debrided together with the right and left atrial wall, the mitral leaflets and the endomyocardium of the left ventricle. The defect of the right atrial wall was repaired with an autologous pericardial patch, and the left atrium with a polyester prosthetic graft as per Manouguian’s technique [5]. The mitral valve was replaced with a mechanical prosthesis and a valved conduit was used for aortic root replacement. The aortic cross-clamp time was 442 min. As the heart regained ejection, significant bleeding occurred at the aortic root adjacent to the atrioventricular septum. The aortic cross-clamp was placed again and was repaired with pledgetted stitches. The aorta was declamped again and, on this occasion, torrential bleeding was found underneath the left coronary anastomosis. The aortic cross-clamp was applied for the third time, the aortic graft was transected and the proximal aortic anastomosis was reinforced, suturing the fragile left ventricular outlet tissue to the graft. Despite these attempts to control bleeding with additional 40- and 50-min cross-clamps, massive pulsatile bleeding from the posterior aortic root did not subside (Fig. 2A). To create a Cabrol shunt, the distal aortic anastomosis was tightly wrapped with a Teflon felt strip, and then this strip was sutured with surrounding tissue to make a perigraft space. This space was closed up with an aortic graft sheet and was drained into the right atrium using an 8-mm tube graft (Fig. 2B). Cardiopulmonary bypass (CPB) was discontinued, but there was still active bleeding underneath the aorta. After removing the perfusion cannula, this periaortic space was isolated using another aortic graft sheet to create a second shunt, and finally bleeding was controlled (Fig. 2C). The total CPB time was 882 min and the operation time was >21 h. The patient was extubated 3 days after the operation. The periaortic fluid and tissue microscopically contained gram-positive cocci, but they were culture negative. Postoperative CT demonstrated a large patent perigraft space (Fig. 1B), and echocardiography showed blood flow from the left ventricle to the perigraft space, and from the perigraft space into the left atrium as well. The patient underwent permanent pacemaker implantation for complete heart block and received intravenous antibiotics, including rifampicin and cefazolin, for 8 weeks, and was discharged home on oral rifampicin and cefaclor. At 14 months postoperatively, the patient was back at work with New York Heart Association functional class I and the size of the perigraft space has not changed on CT.

DISCUSSION

An aortic annular abscess often damages the fibrous body connecting the aortic and mitral valves and it necessitates thorough debridement of this part. When the mitral valve is also affected, a high-risk operation including aortic and mitral valve replacement with reconstruction of the intervalvular fibrous body is required [2]. In the present case, aggressive debridement necessitated anastomosis between the aortic graft and very fragile left ventricular outlet tissue. The CPB and aortic cross-clamp times were extremely long, ~15 and 9 h, respectively, and naturally the patient developed coagulopathy. Together with fragility of the subaortic tissue, this coagulopathy caused such torrential bleeding that it could not be controlled with simple Cabrol shunt. However, a stepwise Cabrol shunt eventually brought it under control.

When prosthetic materials are used for treatment of infection, it is recommended to wrap the grafts with vascularized tissue flaps which enable adequate postoperative delivery of antibiotics for prevention of reinfection [6, 7]. In our case, despite active infection and repair without vascularized tissue flap, there has been no reinfection yet postoperatively. Continuous blood irrigation in the perigraft space might be contributing to it.

In summary, severe prosthetic aortic valve endocarditis with paravalvular abscess affecting the mitral valve and other cardiac structures was successfully treated by aortic root and mitral valve replacement with reconstruction of the intervalvular fibrous body. The stepwise Cabrol shunt was effective in controlling serious bleeding, letting surgeons leave the operating theatre without sorrow.

Conflict of interest: none declared.

REFERENCES


