How-to-do-it

Aortic root replacement and coronary interposition using a cryopreserved allograft and its branch

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Abstract

This communication describes a modified aortic root replacement technique using a cryopreserved allograft consisting of the aortic conduit and its branch. This method was applied in a patient suffering from infective pseudoaneurysm which had developed after aortic root replacement using an artificial graft with a mechanical aortic valve. A piece of the innominate artery obtained from the aortic allograft was used for interposition between the fragile left coronary artery root and the main conduit of the allograft. © 2001 Elsevier Science B.V. All rights reserved.

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1. Introduction

In cardiovascular surgery, cryopreserved allografts have been used in particular circumstances as a beneficial alternative to artificial prostheses [1,2]. This communication describes a modified implantation technique using a cryopreserved allogenic conduit of the aorta and its branch applicable for aortic-root replacement with coronary reconstruction. This method was employed in a patient suffering from an infective pseudoaneurysm which had grown after aortic-root replacement using an artificial graft with a mechanical aortic valve.

2. Patient

A 47-year-old man presented with annulo-aortic ectasia and severe aortic regurgitation. Aortic root remodeling for preservation of the native aortic valve was planned, but intraoperative transesophageal echocardiography demonstrated significant residual valvular leakage after remodeling, and therefore the aortic root was instead replaced with a Dacron graft containing a mechanical valve. Both coronary arteries with aortic tissue buttons were directly anastomosed to the graft.

Four weeks after surgery, the patient developed high fever with an increased white blood cell count of 18,000 per mm³. Staphylococcus capitis was demonstrated by blood culture, and vegetation on the prosthetic valve was found on echocardiography. Vancomycin and penicillin G were administered intravenously, and the body temperature and white blood cell count gradually normalized. Six weeks after surgery, however, echocardiography demonstrated pseudoaneurysm formation at the back of the aortic root. Although hemodynamics were stable and no aortic valvular regurgitation was observed, the emergence and growth of this entity prompted us to carry out surgical treatment.

3. Operation and follow-up

Under cardiopulmonary bypass, the aortic root was carefully dissected and exposed. The pseudoaneurysm was located just beneath the left main trunk of the coronary artery and extended between the aortic root and the left atrium. This entity had a communication with the aortic root through a dehisced portion of the proximal anastomosis between the Dacron graft and the aortic annulus, and it consisted of coagula and some aggregates of microorganisms. After removal of the graft and extensive debridement, a cryopreserved allogenic conduit, consisting of the aorta and its branch, was employed for reconstruction of the aortic root. Proximal anastomosis to the aortic annulus was performed without pledgets using interrupted sutures of 4-0 Prolene. The left main trunk of the coronary artery with the aortic tissue button had become friable due to the adja-
cent contamination and it was carefully dissected and detached from the Dacron graft. However, as direct anastomosis to the allograft seemed to create significant tension, a 2-cm-long piece of the innominate artery was cut from the allograft and interposed. The right coronary root with the aortic tissue button was reconstructed directly, and distal anastomosis was carried out using running sutures with no pledgets. Hemorrhage from the proximal and distal anastomoses of the allograft was found during reperfusion, but this was easily controlled using a small amount of biological glue.

The postoperative course was uneventful. Aortography performed 2 months after surgery showed that the interposed graft between the main trunk of the allograft and the left main trunk of the coronary artery retained a good configuration with no stenosis or kinking (Fig. 1). The patient has been doing well with no evidence of recurrent endocarditis for 21 months after surgery.

4. Comments

Cryopreserved allografts have been employed worldwide in particular circumstances as a viable alternative to artificially produced grafts. Allograft implantation is considered the ideal choice in cases of acute bacterial endocarditis, because this offers resistance to reinfection. Prager and colleagues [3] reported high hospital mortality (17%) after aortic root replacement with allografts due to infection-related pathologies, but they and Vogt et al. [4] emphasized the satisfactory results obtained with regard to the late incidence of recurrent endocarditis.

In the present patient with a serious complication of infective pseudoaneurysm, allograft implantation was considerably effective for reconstruction of the aortic root, and the postoperative course was satisfactory. A branch of the allograft, the innominate artery tissue, was beneficially utilized for interposition between the fragile left main trunk of the coronary artery and the main trunk of the allograft. Nevertheless, long-term follow-up will be important for our patient, because the durability of this type of allograft branch employed in the present situation has not been reported.

Considering the particular circumstances of the present case, it is recommendable that when harvesting aortic arch grafts from donors, care should be taken to ensure that their branches are of a sufficient, usable length.

We conclude that implantation of an allogenic aortic conduit and interposition using its branch can be used beneficially for reconstruction of the aortic root and the coronary artery under certain circumstances.

References