

The use of autologous pericardium to reinforce the aorta suture in the surgical treatment of the aortic valve

Uso do pericárdio autólogo para reforço da aortorrafia no tratamento cirúrgico da valva aórtica

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Abstract

The repair of the aortotomy in the surgical treatment of aortic valves can be achieved using different techniques. Nevertheless, in some cases, the ascending aorta is atherosclerotic, thin and friable, making the risk of aorta rupture and late aneurysm development higher. This article describes the technique and the results obtained from the reinforcement of the aortic suture with autologous pericardium with the retrospective analysis of 23 cases operated between 1999 and 2003 in the Heart Institute of São Paulo.

Descriptors: Pericardium. Suture techniques. Surgical flaps. Cardiac surgical procedures.

Resumo

O reparo da aortotomia no tratamento cirúrgico da valva aórtica pode ser realizado por meio de diferentes técnicas. Em alguns casos, porém, a aorta ascendente encontra-se aterosclerótica, fina e friável, aumentando o risco de rotura no pós-operatório imediato e formação tardia de aneurismas. Este trabalho descreve uma técnica de reforço da aortorrafia com a utilização de pericárdio autólogo e seus resultados, através da análise retrospectiva de 23 casos realizados no Instituto do Coração de São Paulo, entre 1999 e 2003.

Descritores: Pericárdio. Técnicas de sutura. Retalhos cirúrgicos. Procedimentos cirúrgicos cardíacos.

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INTRODUCTION

Aortotomy repair in the surgical treatment of the aortic valve can be achieved using different techniques. In some cases, nevertheless, the ascending aorta is arteriosclerotic, fine and friable, increasing the risk of rupture in the immediate postoperative period and the late formation of aneurysms [1]. In these situations, the repair of the aortotomy becomes a challenge for the surgeon.

The use of materials to reinforce the suture line on the aorta is an important ploy in these cases. Currently, a great diversity of materials can be utilized for this purpose, including Dacron, Teflon, Gor-Tex and bovine pericardium. Each material, due to its characteristics, presents advantages and disadvantages [1].

Autologous pericardium is an easily available biomaterial which is free, complacent and resistant, non-filamented, free of pathogens in respect to the donor and incapable of causing an immune response [2,3]. Several authors have described their experiences using this material for the repair of left ventricle aneurysms and hemostasis at the injection site of the cardioplegia [4,5]. In this study, the technique of reinforcing the aortotomy during the surgical treatment of the aortic valve using autologous pericardium is described and as well as the obtained results.

METHOD

Between January 1999 and October 2003, 23 patients submitted to surgical treatment of the aortic valve in the Heart Institute of São Paulo (Incor) who presented with fine, friable arteriosclerotic aortas were selected for the utilization of autologous pericardium to reinforce the suture line of the aortotomy. The average age of the patients was 69.7 ± 10.2 years (ranging from 46 to 84 years old), with 16 (69.6%) female patients. The demographic data, risk factors and preoperative echocardiographic data are shown in Table 1.

Table 1. Demographic data, risk factors and preoperative echocardiograms

Variables	n	%
Age	69.7+10,2	
Female patients	16	69.6
Hypertension	17	73.9
Diabetes	2	8.7
Dyslipidemia	10	43.5
Reoperation	6	26.1
Rheumatic fever	4	17.4
Left ventricle dysfunction		
Ejection fraction > 55%	13	56.5
Ejection fraction 45 – 55%	2	8.7
Ejection fraction 35 – 44%	3	13.0
Ejection fraction < 35%	5	21.7

Patients who presented with aortas with diameters of 4.2 cm or greater in their preoperative echocardiograms were excluded from the study. The data collected using a special protocol form and the patient records of Incor were retrospectively analyzed.

The follow-up of these patients was by postoperative clinical and echocardiographic evaluations in the outpatients' clinic.

Descriptive statistics with an analysis of the frequencies was used with continuous variables represented as means \pm standard deviations. The student t-test was employed to compare the means.

Operative technique

At the moment of suturing the aortotomy, two 0.5-cm strips of autologous pericardium 25% longer than the length of the suture line were dissected at the pericardium-pleural boundary. Hemostasis of the bleeding area of the pericardium was performed. The rrhaphy of the aorta was performed in the usual way, utilizing the autologous pericardium strips to reinforce both sides of the aortotomy as is illustrated in Figure 1. The surgery was completed in the normal manner.

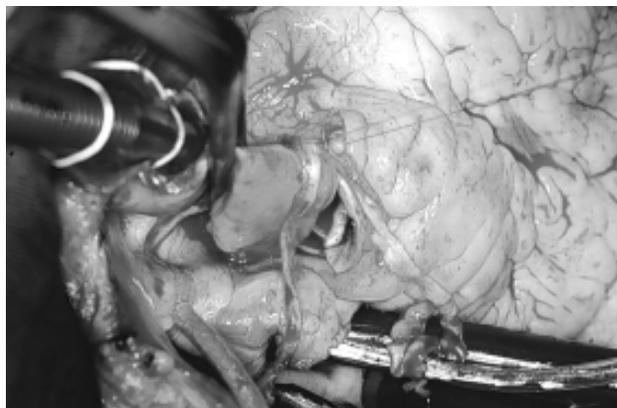


Fig. 1 - Reinforcement of the sutures of the aortotomy using two strips of autologous pericardium.

RESULTS

During the period between January 1999 and October 2003, 23 patients submitted to reinforcement of the aortotomy using autologous pericardium were evaluated. After the procedure, two (8.7%) patients died. In both these cases, replacement of both mitral and aortic valves was performed. The first patient, a 72-year-old male, was operated due to endocarditis, presenting with an aortic valve with rupture of two valves with vegetations and the mitral valve with perforation of the anterior leaflet and vegetations, without evidence of annulus abscess. The aortic and mitral valves

were replaced using N° 25 and N° 29 bioprostheses respectively. The patient developed sepsis and death occurred on the 7th postoperative day.

The second case operated electively was an 80-year-old female patient, who after replacing the aortic and mitral valves for N° 23 and N° 29 bioprosthesis respectively, presented with sepsis of the respiratory tract, evolving with multiple organ failure and death on the 29th postoperative day.

Only one patient was reoperated for a review of the hemostasis, due to bleeding identified at the site of the aortic cannulation. The patient evolved well after the repair.

After release from hospital, 21 patients were followed, with an average follow-up of 13.52 ± 11.87 months, ranging from 2 to 48 months. None of these patients required reoperations or passed away.

The diameter of the aorta described in the last postoperative consultation was compared with the preoperative aorta diameter. The mean preoperative diameter was 35 ± 3.8 mm (ranging from 30 to 42 mm) and in the postoperative period the average was 34.29 ± 4.2 mm (varying from 28 to 44 mm). There was no significant statistical difference between the means (p -value = 0.17).

COMMENTS

In the treatment of the aortic valve, the closure of the aortotomy may be associated to technical difficulties to achieve adequate hemostasis mainly with fine and friable aortas. Dehiscence of the aortic sutures, in general, is a dramatic event and in some cases fatal [1].

Several different materials have been used to reinforce an aorta with macroscopic characteristics of fragility. Nevertheless, these materials may predispose the patient to infection as they are foreign bodies [1,6]. LOOSER et al. [6] described infections on suture lines in patients in whom Teflon was employed for correction of aneurysms of the left ventricle. The successful utilization of autologous pericardium patches for hemostasis of the aorta at the site of the introduction of cardioplegic solutions in 20 patients was described by RESCIGNO et al. [5].

Autologous pericardium was employed to successfully reinforce the aortotomy in 23 high-risk patients. This inert material minimizes the risks of infection, as well as being easy to harvest during the surgery and free of charge [2,3]. The utilization of two strips of autologous pericardium is a safe technique that is easily reproduced. In our series of patients, only one patient was reoperated to review the

hemostasis, when a lesion at the site of cannulation was found and not of the reinforcement of the aortotomy. There was no bleeding related to the aortotomy in any of the patients in which this technique to reinforce the sutures of the aorta was used.

The selection of the patients to perform this technique was subjective due to the absence of objective criteria in publications. This may be a weakness of the study methodology although the identification of a lack of criteria may stimulate further studies in the area.

The patients were followed up in the postoperative period during a maximum period of 48 months. There were no statistically significant differences between the mean preoperative aortic diameter and the mean postoperative diameter. Additionally, no cases of death or the need of reoperations occurred. Reinforcement of the sutures of aortotomy utilizing autologous pericardium is a simple and safe technique.

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