Proposal for bail-out procedures - Cardiac general
Right atrial and septal reconstruction after tumor excision: the single-patch technique

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Received 30 December 2008; received in revised form 31 January 2009; accepted 3 February 2009

Abstract

Surgical excision is the only therapy for benign atrial tumors, if serious complications are to be avoided. We propose a simplified technique whereupon a single autologous pericardial patch is used to not only close the septal defect, but to also reconstruct the right atrium. This new technique allows for wide excision of tumors without reduction of the right atrium, distortion of the tricuspid valve or traction on the atrioventricular node. We propose that this new approach will probably reduce the incidence of postoperative arrhythmias.

Keywords: Myxoma; Cardiac tumors; Surgery/complications; Pericardium; Arrhythmia

1. Introduction

Complete resection is the optimal treatment for patients with atrial tumors. Surgical techniques include right atrial or biatrial exposure, en block tumor excision with the interatrial septum and closure of the created defect with or without a pericardial or Dacron patch. We describe a modified operative technique, which provides for reconstruction of the atrial septum, as well as of the atrial wall, using a single autologous pericardial patch. We believe that by applying this strategy to patients with broad-based tumors, complications such as tricuspid valve insufficiency and arrhythmias are reduced, as the right atrial size remains perfectly adequate.

2. Technique

Since 2006 three patients were operated on for atrial myxomas. All patients were asymptomatic. Diagnosis was incidentally made in the course of a routine transthoracic echocardiogram and confirmed with transesophageal echocardiography. Patient 1, a 60-year-old male, had a 5.8 x 4.7 cm left atrial tumor attached to the fossa ovalis. Patient 2, a 50-year-old female, had a 5.3 x 4.5 cm left atrial tumor with a wide base (1.5 cm) attached to the interatrial septum. Patient 3, a 77-year-old female, had a 4.4 x 3.5 cm left atrial tumor attached to the interatrial septum.

The heart was exposed through a median sternotomy and a large piece of pericardium was harvested. Ascending aorta and superior/inferior vena cava were separately cannulated and moderate hypothermia was induced. After aortic cross-clamping, myocardial protection was effected with antegrade and retrograde cold HTK cardioplegia. Dissection of the interatrial groove (Waterston) was followed by a longitudinal incision in the left atrium starting just anteriorly to the right superior pulmonary vein. A transverse incision in the right atrium, starting between the cannulae and crossing the first one at right angles, was extended medially into the interatrial septum, between the fossa ovalis and the coronary sinus (Fig. 1a). The free edges of the right atrial wall were retracted and the tumor was resected en bloc with the interatrial septum under direct vision from both sides (Fig. 1b). The created triangular septal defect was then closed with a pericardial patch using a running 4/0 Prolene suture. At the level of the left atriotomy the patch was turned upwards and sutured to both free edges of the right atrial wall without tension (Fig. 1c). The left atriotomy was subsequently closed with a vertical double layer of a running 4/0 Prolene suture (Fig. 1d).

The mean aortic cross-clamp time was 93 min (80–118 min) with a mean cardiopulmonary bypass time of 122 min (110–148 min). All patients resumed sinus rhythm after the cross-clamp was removed. All patients were discharged on the 5th postoperative day. At one-year follow-up there was no recurrence and all patients remained in sinus rhythm. On echocardiography there was no tricuspid regurgitation.

3. Discussion

Primary cardiac tumors are a rare entity with an estimated incidence of 0.001–0.3% in the general population and in the majority (75%) are benign [1, 2]. Surgery is always
indicated as the optimal treatment in order to avoid such complications as blood flow obstruction, dysrhythmias, thromboembolism, valve damage, pericardial involvement, constitutional symptoms (fever, weight loss) and death (up to 8% preoperatively) [1–3]. The majority of these tumors are myxomas located in the left atrium and attached to the interatrial septum in the fossa ovalis region. Surgical excision on cardiopulmonary bypass with an arrested heart is the treatment of choice [1–4]. Biatrial exposure has been generally accepted as the preferred approach having the advantage of precisely identifying the site of attachment and of avoiding tumor manipulation. Surgical excision carries a low morbidity and mortality rate [3, 4]. Autotransplantation is reserved for multiple tumors or for recurrent complicated cases, as it affords better exposure and ease of manipulation [2]. To avoid a recurrence the specimen margins must include a wide base of the atrial septum and the atrial wall, in case the tumor is attached to the latter. The created septal defect may be closed with or without a pericardial or Dacron patch and care must be taken to avoid injury to the atrioventricular node [1, 3, 4]. The use of a rotational flap of free right atrial wall is another alternative [4]. We prefer the use of autologous pericardium because of its advantages: ease of availability and handling, avoidance of using a foreign body and no cost. Arrhythmias and conduction disturbances are not uncommon postoperatively. A high percentage of patients develop atrial fibrillation, atrial flutter, junctional rhythm, sinus arrest or complete heart block requiring a permanent pacemaker [1, 3, 5]. The pathophysiologic basis for these complications, in our opinion, is related to the operative technique, which may cause sinus or atrioventricular node injury and interatrial conduction delays. We propose that by using a large piece of autologous pericardium for the reconstruction of the interatrial septum and of the right atrium, the risk of a tension injury to the sinus node or to the atrioventricular node is reduced. Theoretically, distortion of the tricuspid valve causing regurgitation is avoided, while the size of the right atrium remains unchanged. This modified excision is easily reproducible. It combines the advantages of the biatrial exposure with a conceivably lower incidence of postoperative arrhythmias and of tricuspid valve insufficiency.

Acknowledgments

The authors thank Jo Brewer, RN, for her kind assistance with the illustrations.

References