Simultaneous surgical repair of post-infarct ventricular septal defect, left ventricular aneurysm and coronary artery disease

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Abstract

A 52-year-old patient was admitted in our hospital for postinfarction ventricular septal defect (VSD), left ventricular aneurysm and coronary artery disease. He was investigated by echocardiography and coronary angiography and proposed for operation. In the light of the patient’s stable hemodynamic condition, surgical intervention was delayed. 3 weeks following the acute myocardial infarction open heart surgery was performed and had been managed just pre-operatively with an intra-aortic balloon pumping. The patient underwent successful VSD closure with a patch. The repair involves VSD closure and infarct exclusion technique. The patient discharged 10 days postoperatively. We consider that this modification is a simple and effective way to decrease the surgical risk of postinfarction VSD.

Introduction

Postinfarction ventricular septal defect (VSD) and left ventricular aneurysm (LVA) are highly lethal complications of acute myocardial infarction (MI) with an incidence of 1-2% and 8-10%, respectively [1-3]. The surgical repair of postinfarction VSD is mandatory. After confirming diagnosis and evaluation of coronary arteries prompt attempts should be done to stabilize the patient since postinfarction VSD closure should be performed 4-5 weeks after MI. Surgical repair of VSD is accompanied by technical difficulties due to the weakness and unclear border of infarcted myocardial tissue. Although numerous techniques and materials have been used to close postinfarction VSDs, the best technique has not yet been settled upon [4,5].

We present the case of a patient who underwent successful correction of postinfarction VSD and LVA using the one patch technique and coronary artery by-pass (CABG).

Case Presentation

A 52-year-old man was referred for a postinfarction VSD occurring after an acute MI. Echocardiography demonstrated significant shunt flow through the ruptured anterior ventricular septum (Figure 1). Emergency cardiac catheterization was performed. Cineangiography revealed a shunt flow through the anterior VSD with 2.1 Qp/Qs ratio and triple-vessel disease. In the light of the patient’s stable hemodynamic condition, surgical intervention was delayed. 3 weeks following the acute MI open heart surgery was performed and had been managed just pre-operatively with an intra-aortic balloon pumping (IABP).

A midline sternotomy was performed under general anesthesia. Total cardiopulmonary bypass (CPB) with bicaval drainage was established and cooled to 28°C. A cross-clamp was applied. Crystalloid cardioplegia was administered into the aortic root with topical cooling using ice slush. The infarcted area was seen along the left anterior descending artery (LAD). A longitudinal transinfarction incision was made in the left ventricular myocardium parallel to and 15 mm away from the LAD. There was a twenty mm diameter VSD with fibrotic margins in the anterior part of the septum (Figure 2).

A Dacron patch was inserted into the left ventricular cavity and placed on the anterior septum and a series of pledged interrupted mattress sutures were placed around the perimeter of the VSD and then into the patch (Figure 3). The second group of sutures passed through the anterior septum about 3 cm away from the VSD into the right ventricular cavity.
and came out through the right ventricle free wall. The rest of the Dacron patch was placed on the epicardial site covering the infarcted area was used as a support for the suture on the other and hence the running suture is easy, fast and, as it is achieved very far away from the necrosed area, has little tendency to tear. The infarcted myocardium with VSD and ventriculotomy was sandwiched between one Dacron patch in a double manner without infarctectomy. The curve of the patch reinforce the fragile wall of the intraventricular septum (Figure 4). The ventriculotomy closed over the patch with 3-0 polypropylene suture, buttressed with 2 strips of Teflon (Figure 5).

The left internal thoracic artery was grafted to LAD, and saphenous veins were grafted to right and diagonal coronary arteries. The heart was rewarmed after a cross-clamp time of 83 min. The patient was weaned from CPB after a total pump

**Figure 1:** Pre-operative echocardiography of the patient shows the postinfarction ventricular septal defect.

**Figure 2:** Intra-operative photograph of postpostinfarction ventricular septal defect.

**Figure 3:** Operative photograph shows repair of postinfarction ventricular septal defect using the single patch technique.

**Figure 4:** The curve of the patch reinforce the fragile wall of the intraventricular septum.

**Figure 5:** The ventriculotomy was closed in two layers of sutures buttressed on strips of pericardium or Teflon felt.
time of 125 min on dopamin 7, 5 mcg/kg/min as continuous infusion.

The patient tolerated the procedure well and returned to the intensive care unit in a stable condition. He was weaned off the IABP on the 5th post-operative day. The patient discharged 10 days postoperatively and there were no signs of residual VSD on echocardiography. At the last follow-up visit 3 months after operation, he was in New York Heart Association class I with no signs of residual VSD.

Discussion

Cooley et al. reported the 1st surgical repair of postinfarction VSD in 1957 [6]. From that time, surgical correction has been accepted as the preferred therapy in this difficult group of patients. Subsequently, the improvements in myocardial protection and the design and refinement of surgical techniques, improved prosthetic grafts, and widespread use of echocardiography to permit the earlier diagnosis of postinfarction VSD have all contributed to making earlier successful repair of this entity a possibility. However, technical difficulty in managing the fragile myocardium is often encountered while repairing postinjury VSD. This problem becomes greater if the patient is old, if myocardial necrosis is fresh, or if the MI is extensive in the endocardium [7]. The decision, to operate a patient who is in cardiogenic shock should be tailored for each patient individually. Repair of postinjury VSD 2-3 weeks or more after septal rupture is relatively safe. By then the edges of the VSD have become tougher and repair is more securely and safely accomplished. Therefore when the patient presents with a stable hemodynamic state, repair can be delayed like our patient. Percutaneous closure of VSD has become a widely accepted alternative to surgical repair [8]. The placement of the device greatly improved the patient’s clinical condition allowing the delay of the surgical procedure. However, until date our knowledge postinjury VSD closure with percutaneous technique still remains limited. Furthermore, there are no data about long-term efficacy, which could compare the results of surgical closure.

Some studies showed no benefit of CABG while others found evidence for concomitant CABG to be advantageous. It has been shown that concomitant myocardial revascularization decreases operative mortality and improves long-term survival [9]. We could not prove any influence of concomitant CABG on late survival of our patient, but we believe that patients who have multivessel disease should be routinely revascularized.

Balkanay and co-authors [10] described a technique with two autologous pericardial patches to repair postinjury VSD. We modified the classical Balkanay’s technique using a single patch in a double manner. The observations made by David et al. [11] demonstrate the technique of endocardial patch with infarct exclusion should enhance operative survival because it leaves the right ventricle undisturbed and restores the geometry the left ventricle in these patients with acute MI and ruptured septum. Infarct expansion is common after transmural MI and patients in whom a VSD develops often have an acute ventricular aneurysm. Restoration of left ventricular geometry has been shown to be important for left ventricular function [12,13].

Due to of necrotic myocardium and friable endocardial tissue, the suture of the Dacron patch is difficult with a high risk of recurrence of the VSD and subsequent mortality [14]. The single Dacron patch placed on the left side of the intraventricular septum, which covers the anterior VSD and ventriculotomy from the inside in a double layer, sticks to the endocardium tightly due to the high blood pressure of the left ventricle. Furthermore, the curve of the patch reinforce the fragile wall of the intraventricular septum. We consider that this modification is a simple and effective way to decrease the surgical risk of postinjury VSD. In patients without cardiogenic shock urgent operation becomes unnecessary and the choice of surgical technique and surgical timing as well as pre-operative management should be tailored for each patient individually.

References