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Superior vena cava reconstruction during redo cardiac surgery: a case report

Redo kardiyak cerrahi sırasında süperior vena kava tamiri: Olgu sunumu

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ABSTRACT

Redo cardiac surgeries holds a higher risk of damage to the cardiac and/or mediastinal structures compared to primary cardiac operations. Complicated iatrogenic damages necessitating reconstruction are rarely reported in the published literature. In this article, we present a case of superior vena cava reconstruction with autologous pericardium which was impossible to repair without grafting.

Keywords: Cardiac surgery; parietal pericardium; superior vena cava.

ÖZ

Redo kardiyak cerrahilerde kalp veya mediastinal yapıların hasar riski, primer kardiyak ameliyatlara oranla daha yüksektir. Yayımlanmış literatürde tamir gerektiren komplike iyatrojenik yaralanmalar nadiren bildirilmiştir. Bu yazıda, greftsiz tamiri imkansız olan otolog perikardiyum ile superior vena kava tamiri sunuldu.

Anahtar sözcükler: Kardiyak cerrahi; parietal perikard; süperior vena kava.

It is more common to experience inferior/superior vena cava (IVC/SVC) injuries in redo cases than in primary cardiac surgery. The added risks attributed to a reoperation are predominantly due to scarring and fibrosis of the heart, pericardium, and mediastinum. Dissections made to access venous cannulation sites jeopardize the right atrium and intrapericardial portions of the vena cava. Usually simple suturing is sufficient to repair the injury,[1] but it may be necessary to reconstruct complicated sites that cause massive hemorrhage. Herein, we report on a patient with a successful reconstruction of the SVC with an autologous pericardium, which was incidentally injured during redo mitral valve surgery.

CASE REPORT

A 51-year-old female patient who had undergone mitral valve replacement with a tilting disc prosthesis 28 years earlier was admitted to the hospital because of severe paravalvular leakage. Following a resternotomy, each vena cava was cannulated separately due to the fragility of the right atrium, and an injury occurred while peeling off the pericardium. After performing cardiopulmonary bypass (CPB) and a left atriotomy, the tilting disc mitral valve was resected, and a bileaflet mechanical mitral valve was implanted in the mitral annulus. While preparing to wean the patient off of CPB after closing the left atrium, we noticed multifocal bleeding from the posterior of the SVC-atrial junction, which was probably the result of the excessive traction needed to expose the mitral valve. At first we used 4/0 pledgeted prolene sutures and a pericardial patch to close the defect, but various attempts to repair via this simple technique ended with more rupturing due to the thin walls of the SVC and narrowing the luminal diameter. Therefore, we occluded the SVC with a bulldog clamp closely distal to the SVC cannula and resected about 3 cm of the SVC up to the cavoatrial junction. A pericardial island with a clean surface facing the right atrium (about

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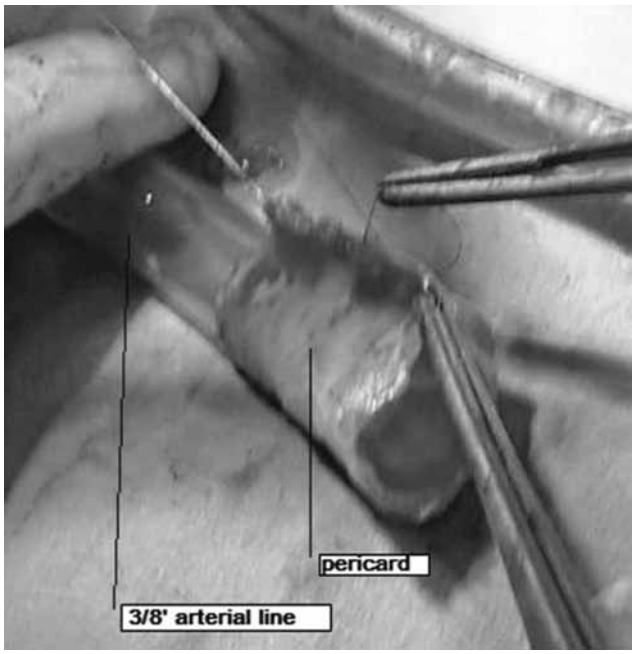

Figure 1. A pericardial patch is wrapped around a 3/8 inch cardiopulmonary circuit line to form a tube graft.

3.5x5 cm in size) was then resected in a quadrangular fashion, and it was wrapped around a sterile 3/8-inch arterial line of the CPB circuit to form a tube. Next, compensating free edges were sewn using 4/0 propylene sutures (Figure 1), and the pericardial tube graft was consecutively anastomosed to the SVC and the SVC-atrial junction with the same sutures in an end-to-end fashion (Figure 2). The CPB was then terminated after checking the surgical field for bleeding. The patient was discharged on the postoperative fifth day with an adjustment in warfarin dosage, and at the six-month control visit, transthoracic echocardiography (TTE) demonstrated the luminal patency of the reconstructed SVC (Figure 3).

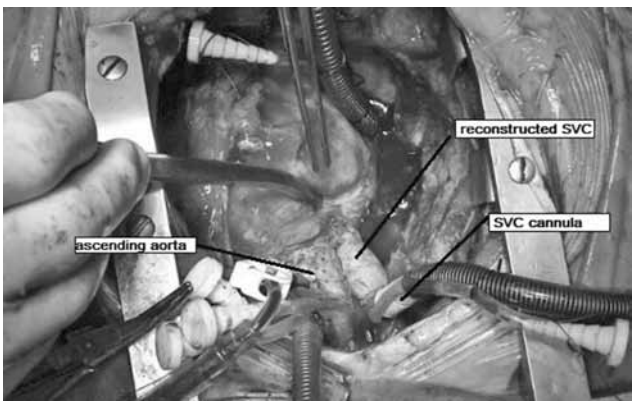

Figure 2. A view of the reconstructed superior vena cava (SVC).

DISCUSSION

Innominate vein and SVC injuries that occur during cardiac surgery may have devastating complications, but these can be managed via several surgical techniques. Simple repair is preferred when possible, and it is generally recognized that the left innominate vein can be ligated without serious long-term consequences.[1] Recently, however, the reconstructive approach has gained popularity since it guarantees the right atrial connection of the upper body venous return.

Reconstruction of the SVC is a known surgical procedure which is usually needed for surgical interventions of malignant bronchopulmonary neoplasms, mediastinal neoplasms, and benign symptomatic diseases.[2] The optimal graft choice is still a topic of debate, and spiral saphenous vein grafts, polytetrafluoroethylene (PTFE) grafts, bovine pericardia, autologous pericardia, and human aortic allografts all have been used.[3,4] The five-year primary, primary assisted, and secondary patency rates of spiral saphenous vein and PTFE grafts are 53%, 70%, and 74%, respectively.[4] Optimal luminal flow can be achieved with bovine pericardial grafts, but in many centers, their availability in an emergency is limited.[5] The parietal pericardium has many advantages, as do most of the other autologous tissue grafts, because it has a low risk of infection and thrombotic activity. In addition, it is a biocompatible material that can be used in venous structures with low luminal pressure. Furthermore, it is an easily

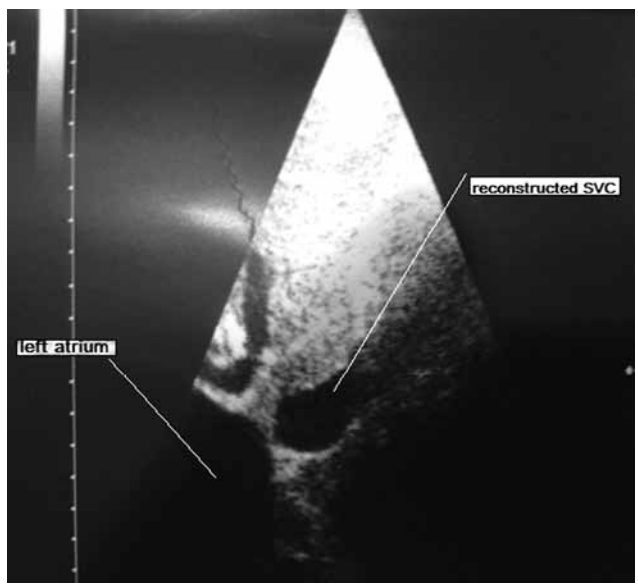

Figure 3. Echocardiographic view of the superior vena cava (SVC) at the postoperative sixth month after the operation.

available and processable structure unless it has been damaged since it lies in the surgical field. Moreover, it is practically cost-free.

Autologous pericardia are used in a variety of primary cardiac operations while pericardial patches are used to close or reconstruct defects in low pressure-bearing areas of the heart, such as atrial septal defects (ASDs) and the right ventricular outflow tract (RVOT).[6] Some groups have also reported their successful use in the repair of left ventricular aneurysms.[7] Additionally, Czerny et al.[8] repaired an infected endovascular and prosthetic graft with a self-made pericardial tube, and they achieved 100% freedom from infection in the survivors in their study. Spiral saphenous grafts can provide another option in emergency cases, but the harvesting process causes even more surgical wounds, and the preparation process takes much longer.

Redo cardiac surgery has an innate risk of complications due to adhesions which may occur in the mediastinal structures. Careful dissection, wise and flexible judgment when deciding on cannulation sites, and the avoidance of excessive traction are paramount to minimize such complications. Small injuries to the vena cava and right atrium, which are secured with simple repair, are not uncommon. However, major bleeding or lacerations may necessitate reconstruction by means of a graft. The use of pericardial grafts or patches in redo cardiac surgery probably occurs more often that is actually reported,[9] and preserving the pericardium may be just as beneficial in primary cases. It is obvious that an atraumatic dissection of the parietal pericardium, which has the disadvantage of a limited surface area, is crucial because a fibrotic and inflammatory surface may not be ideal for thrombotic activity and durability. On the other hand, if needed, the tough texture of the pericardium can resist ventricular and aortic pressure. The functionality of this kind of reconstruction with the pericardium in redo cases may be elucidated over time as similar reports are published.

Declaration of conflicting interests

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