

## Pericardial tube graft in superior vena cava syndrome: a case report

*Superior vena cava sendromunda perikardiyal tüp grefti: Olgu sunumu*

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Surgical treatment of superior vena cava syndrome is one of the venous surgeries with acceptable outcomes. In this case report, we present a 46-year-old male superior vena cava syndrome case with signs and symptoms of venous hypertension and stasis of the upper extremity and face with a pericardial tube graft.

**Key words:** Pericardium; polytetrafluoroethylene; superior vena cava syndrome.

Surgical treatment of superior vena cava (SVC) syndrome provides satisfactory results for both the patient and surgeon. Metastatic pulmonary or mediastinal malignancy is the most frequent cause of the disease.<sup>[1]</sup> Surgical treatment of SVC syndrome with a pericardial tube graft is presented in this case report.

### CASE REPORT

A 46-year-old male patient was admitted to our clinic with signs and symptoms of venous hypertension and stasis of the upper extremity and face. He had a headache and dyspnea as well as edema on his face, eyes, neck and upper limbs. The venous collaterals on his neck and chest were over-dilated. Doppler evaluation revealed no flow in the SVC. Computed tomography (CT) venography revealed total occlusion of the SVC with thrombus which extended to the right and left brachiocephalic veins (Figure 1). There was no compression of any of the mediastinal structures. The patient had been unsuccessfully treated with the anticoagulant warfarin; therefore, invasive radiological intervention was planned. However, the guide was unable to pass through the lesion, and surgical treatment was recommended for the patient.

The operation was done under general anesthesia. After median sternotomy, the pericardium was peeled off from the thymic and adipose tissues and resected

Superior vena cava sendromunun cerrahi tedavisi venöz cerrahiler arasında sonuçları kabul edilebilir olanlardan birisidir. Bu olgu sunumunda perikardiyal tüp greft ile üst ekstremitede ve yüzde venöz hipertansiyon ve staz belirti ve bulguları olan superior vena cava sendromlu 46 yaşında erkek bir olgu sunulmaktadır.

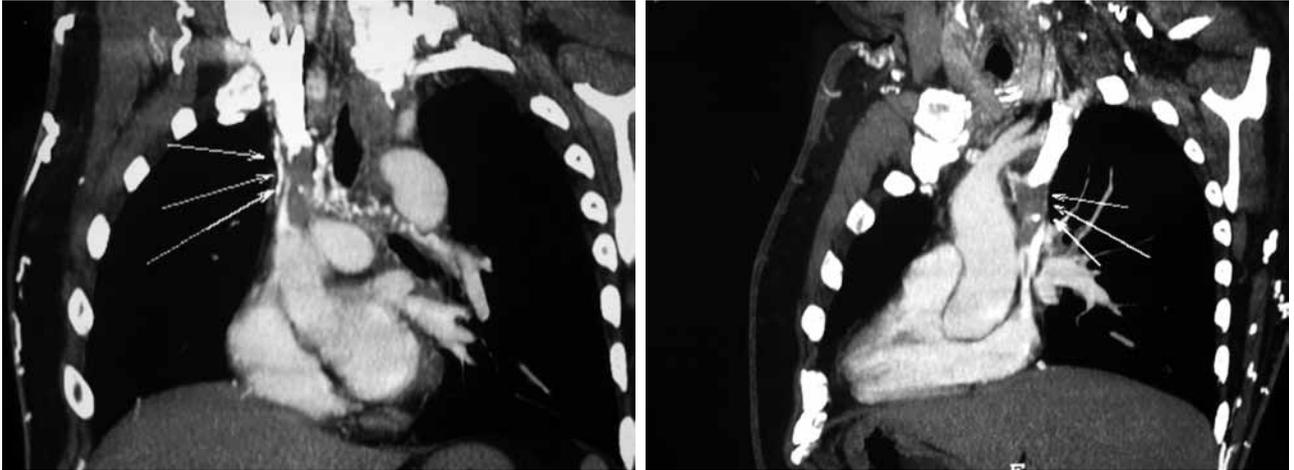
**Anahtar sözcükler:** Perikard; politetrafloroetilen; superior vena cava sendromu.

just in front of the phrenic nerves so that it would have the largest diameter. A pericardial tube graft was constructed by using a 32 F thoracic drainage tube as if the cardiac epithelial surface of the pericardium formed the inner lining of the graft (Figure 2a). Thrombus in the SVC was very stiff and severely adhered to the endothelium of the vein. The skin incision was extended to the right brachiocephalic vein, and the right brachiocephalic vein was exposed. After giving 10.000 units of heparin intravenously, a proximal venous anastomosis was performed on the proximal side of the brachiocephalic vein with a 6.0 polypropylene running suture in an end-to-side fashion. Distal anastomosis was made to the right atrial appendage with a 5.0 polypropylene running suture. Owing to the fact that the distal part of the left brachiocephalic vein was also thrombosed, a venous bypass was performed on this vein using another pericardial tube graft which was prepared in the same way. The distal anastomosis of this graft was performed on the previously implanted graft in an end-to-side fashion (Figure 2b). The mediastinum was closed after taking wedge resections of the SVC and thrombus for pathologic evaluation.

The patient was anticoagulated with low-molecular-weight heparin in the early postoperative period and with warfarin afterwards. During the postoperative period, the symptoms remained, and Doppler

Received: November 18, 2008 Accepted: November 19, 2008

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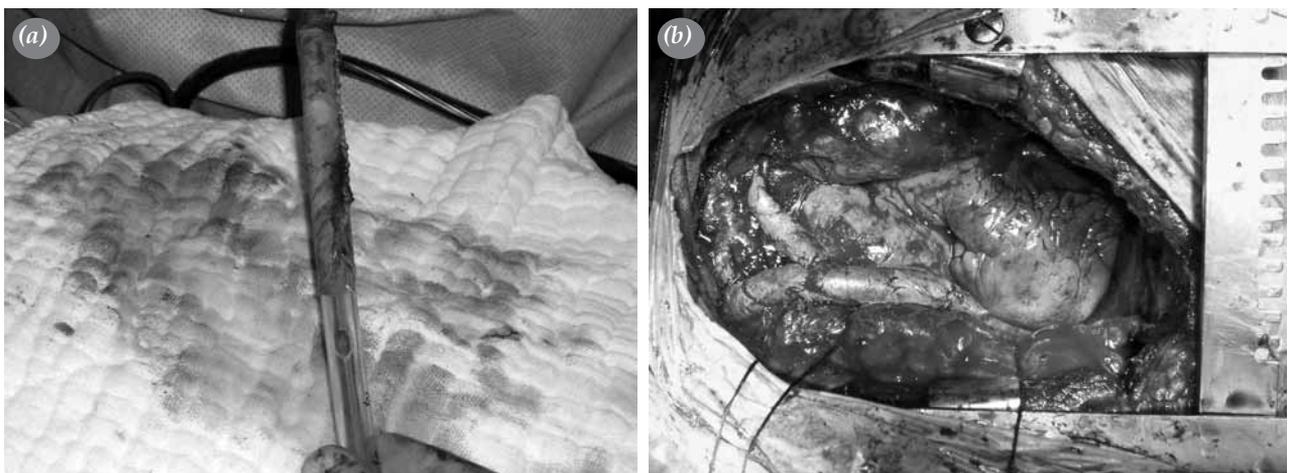
**Figure 1.** Computed tomography venography of the patient showing superior vena cava obstruction and brachiocephalic vein constriction.

ultrasonography (USG) evaluation demonstrated graft occlusion. The patient was taken for a second-look operation, and the pericardial tube graft was found to be occluded. A left internal jugular vein to right atrial appendage bypass was performed with a polytetrafluoroethylene (PTFE) graft. Thrombectomy was performed on the previously implanted pericardial tube graft. The pericardial tube graft was anastomosed to the PTFE graft in an end-to-side fashion. Postoperative Doppler evaluation revealed patent grafts. There was conspicuous clinical and symptomatic improvement during hospitalization, and the patient was discharged on the 10<sup>th</sup> postoperative day. The pathologic evaluation demonstrated no etiologic cause for SVC syndrome. Outpatient clinic control on the 15<sup>th</sup> postoperative day showed obvious regression of edema. The patient was asymptomatic in his third postoperative month outpatient clinic follow-up.

## DISCUSSION

Venous bypass via median sternotomy seems to be an appropriate choice for the treatment of SVC syndrome in symptomatic patients who have a life expectancy of more than one year.<sup>[1]</sup> Endovascular treatment is an effective treatment of choice over the short term with frequent need for repeat interventions. However, this does not adversely affect future open surgical reconstruction and may prove to be a reasonable primary intervention in select patients. Patients who are not suitable for or who fail endovascular intervention merit open surgical reconstruction.<sup>[2]</sup>

Grafts that may be used as conduits are the spiral saphenous vein graft,<sup>[2,3]</sup> superficial femoral vein graft,<sup>[2,4]</sup> Dacron graft,<sup>[5]</sup> expanded PTFE graft,<sup>[6,7]</sup> autologous pericardial tube graft,<sup>[8-10]</sup> and aortic homograft.<sup>[11]</sup> The most preferred graft is the spiral saphenous vein graft.



**Figure 2.** (a) Pericardial tube graft preparation, (b) Implanted tube grafts.

However, this graft has some disadvantages as do most other autologous grafts. We think that the most important disadvantage is the formation of a new surgical site in order to harvest the saphenous vein. Spiral vein graft preparation consumes a lot of time. Expanding the saphenous vein is another disadvantage of the spiral vein graft. The pericardial tube graft eliminates these problems unless the pericardium is unable to be used due to adhesions. As presented in our case, the pericardium is big enough to prepare two or more grafts if it is properly peeled off and completely resected. The pericardium has an epithelialized surface which minimizes the potential for clot formation. A pericardial tube graft can be easily fashioned. In addition, the pericardium is preferable to PTFE because the latter has an increased risk for prosthetic graft infection.<sup>[12]</sup> There is little data concerning the long-term patency of the pericardial tube grafts. Seeling et al.<sup>[8]</sup> has reported a 13-month patency. In another study eight-month and 24-month patencies were reported.<sup>[10]</sup> The possible mechanism of graft occlusion in the presented case was probably a distal anastomotic problem. Pectinate muscles might have occluded the outflow of the graft. Another possible mechanism may be the compression of the sternum after sternal closure. Nevertheless, the second operation revealed that the problem was probably technical since it was patent after the second operation. Therefore, we think that autologous pericardium may be preferred for such operations as it is easily available and inexpensive. It also saves time and has an epithelialized surface. However, distal anastomosis should be technically non-obstructive.

#### **Declaration of conflicting interests**

The authors declared no conflicts of interest with respect to the authorship and/or publication of this article.

#### **Funding**

The authors received no financial support for the research and/or authorship of this article.

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