

Surgical treatment of catheter related superior vena cava syndrome without cardiopulmonary bypass in a patient with renal transplantation

Böbrek nakli yapılan bir hastada katetere bağlı gelişen superior vena cava sendromunun kardiyopulmoner baypas olmadan cerrahi tedavisi

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Superior vena cava (SVC) syndrome which is a condition usually secondary to intrathoracic malignant diseases is characterized by edema and congestion of the head, neck and upper limbs. Recently, SVC syndrome cases have been seen in hemodialysis patients due to the thrombosis and fibrosis induced by insertion of permanent subclavian or jugular venous catheters. A 21-year-old female patient who was dependent on dialysis for 11 years and underwent renal transplantation five months ago was admitted to our clinic with the signs of SVC syndrome. Thoracic computed tomography revealed total occlusion of SVC before its opening to the right atrium junction. The patient underwent venous drainage with Dacron graft interposition between the right atrium and SVC without establishing cardiopulmonary bypass. The patient had no complication in the early and late at 24 months postoperative period and renal allograft functions were well preserved. Surgical strategies avoiding cardiopulmonary bypass is an important factor for protection of renal allograft function in renal transplant patients.

Key words: Central venous catheter; renal transplantation; superior vena cava syndrome.

Superior vena cava syndrome (SVCS) is characterized by edema and congestion in the head, neck, and upper extremities and the development of collateral veins which drain the blood into the inferior vena cava (IVC) system. It may occur due to benign or

Superior vena cava (SVK) sendromu baş, boyun ve üst ekstremitelerde ödem ve konjesyonla karakterize, genellikle intratorasik malign hastalıklara sekonder gelişen bir tablodur. Son yıllarda hemodiyaliz hastalarında uzun süreli subklaviyen veya juguler ven kateterlerinin kullanımındaki artışa paralel olarak, SVK tromboz ve fibrozisine bağlı SVK sendromu olguları görülmektedir. On bir yıldır diyaliz hastası olan ve beş ay önce böbrek nakli yapılan 21 yaşındaki kadın hasta, SVK sendromu bulguları ile kliniğimize başvurdu. Toraks bilgisayarlı tomografisinde SVK sağ atriyum bileşkesinde total oklüzyon saptandı. Ameliyata alınan hastada sağ atriyum ile SVK arasına kardiyopulmoner baypas kurmadan, Dacron greft interpozisyonu yapılarak, venöz drenaj sağlandı. Ameliyat sonrası erken ve 24 aylık geç takip süresince hastada herhangi bir komplikasyon görülmedi ve renal allogreft fonksiyonları normal seyretti. Böbrek nakli yapılan hastalarda cerrahi stratejide kardiyopulmoner baypastan kaçınılması renal allogreft fonksiyonlarının korunmasında önemli bir faktördür.

Anahtar sözcükler: Santral venöz kateter; böbrek nakli; superior vena cava sendromu.

malignant diseases or iatrogenic causes such as the presence of a central venous catheter or a pacemaker lead. In 85% of cases of SVCS, the etiology is metastatic pulmonary or malignant mediastinal tumors.



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CASE REPORT

A 21-year-old female patient who had been on dialysis for 11 years and had received multiple temporary and permanent venous catheter placements had undergone a renal transplantation five months prior to coming to our clinic. She had been taking oral methylprednisolone, tacrolimus, and mycophenolate mofetil therapy since the transplantation. She was admitted to our clinic because of increased dyspnea, edema of the upper part of the body, and vascular engorgements on the trunk and abdomen suggestive of collateral vessel formation. The patient was suspected to have SVCS. The hematologic parameters were within normal limits according to the levels of protein C, S, antithrombin III, and factors II, V, VII, IX, XI, and XII. Furthermore, the blood urea, nitrogen, and creatinine levels were also normal. The patient also tested negative for anticardiolipin antibodies. A thoracic computed tomography (CT) scan revealed total occlusion of a 2 cm segment of the SVC before the opening into the right atrium (RA) with severely dilated hemiazygos and azygos veins and high numbers of collaterals that had formed in the diaphragmatic area and anterior aspect of the trunk (Figure 1).

The case was diagnosed as SVCS presumably caused by repetitive thrombosis, but in the end, occlusion of the SVC due to multiple central venous catheter placements was found to be the culprit. Surgical correction was planned for the patient to drain the upper extremity and jugular veins. She was taken to the operating room where a median sternotomy was performed, and the pericardium was incised. The CT findings were confirmed, and it was seen that the azygos vein that drains into the SVC was severely dilated and that the occlusion occurred at the junction of the SVC and the RA. The right internal jugular, innominate, and azygos veins were then turned with silicone tape. Since

the obstructed area involved the sinus node region and since it was a long- segment total occlusion, we decided to perform a graft interposition. After systemic heparinization, a clamp was placed on the joint of the right and left innominate veins. A 14 mm Dacron graft was sewn in place in a manner so that it would drain from internal jugular vein and the innominate vein with its bifurcation. A side clamp was placed on the RA, and the proximal end of the graft was anastomosed to it (Figure 2). Polypropylene was used as the suture material. After completion of the anastomosis, all clamps were removed, and the flow in the graft was observed to be good. The patient was extubated at the postoperative fourth hour in the intensive care unit (ICU), and beginning the next day, the edema of the upper extremities along with the dyspnea were dramatically resolved. In the first two postoperative days, she received intravenous heparin, and then warfarin was started. The warfarin was continued indefinitely with proper international normalized ratio (INR) monitoring.

No problems were reported in the early postoperative recovery period, and her kidney function remained well preserved throughout the 24-month follow-up.

DISCUSSION

Edema and congestion of the upper extremities as well as development of prominent collateral veins which drain the blood into the IVC system are characteristics of SVCS. William Hunter first defined this syndrome in 1757 during an autopsy performed on a case involving a saccular aneurysm.^[1] In addition to the aforementioned metastatic pulmonary or malignant mediastinal tumors, which are known to cause the vast majority of cases suffering from SVCS, mediastinal fibrosis and granulomatous fungal disease can be considered as benign etiologic factors that may also play a role.^[2]



Figure 1. Thoracic computed tomography scan showing collateral veins and totally occlusion of the superior vena cava.

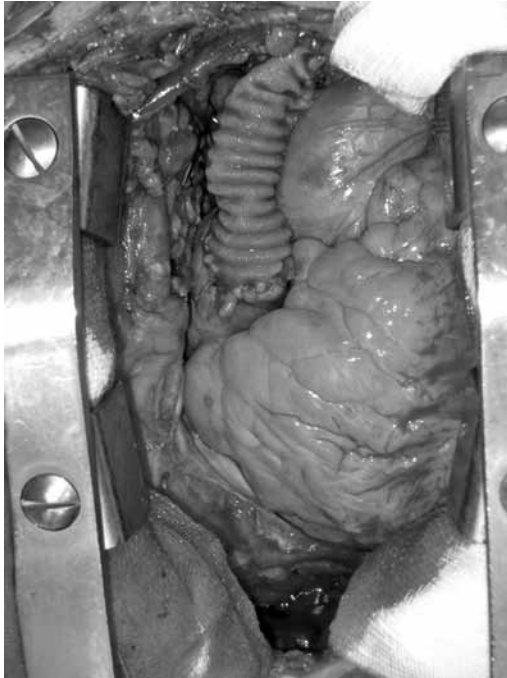


Figure 2. Operative view of the interpositioned Dacron graft.

In addition, occurrences of SVCS have been recently reported that were due to the thrombotic and fibrotic occlusion of the SVC caused by the placement of central venous catheters and endovenous pacemaker leads. This is an important risk factor for chronic hemodialysis patients who have permanent hemodialysis catheters.^[3]

The signs and symptoms of SVCS are determined by the severity, level, and duration of obstruction, which are also important determinants for the development of collaterals. Patients with this condition mostly present with edema of the face, neck, and arms as well as facial flushing. Afterwards, the dilated collateral veins appear on the thoracic anterior wall. Due to the increased venous pressures and cerebral edema, resultant headaches, vertigo, vision disturbances, and even convulsions can be seen. In cases where the underlying cause is a malignancy, weight loss, fever, night sweats, and palpable cervical masses are common.^[11]

The diagnosis may be obvious in a severely affected case, but it may be more obscure with lesser degrees of obstruction. A variety of imaging techniques can be used for not only confirming the diagnosis, but for assessing the collateral veins and determining the level and severity of the obstruction, both of which are important for planning the treatment and determining the best surgical strategy. Moreover, imaging also

supplies clues about the etiology, which also affects the treatment strategy. Superior vena cava syndrome can be a life-threatening condition; hence, prompt diagnosis and treatment are essential, especially for cases in which the underlying course is a malignancy. In our case, the etiology was related to multiple catheterizations through the right subclavian vein for the establishment of IV access during hemodialysis. In such patients, the cause may be acute thrombosis due to venous catheterization. In these instances, the catheter must be withdrawn initially, and if there are no contraindications, a thrombolytic or systemic anticoagulation treatment can be started. Resolution of the thrombosis should be monitored via clinical findings and imaging. Nevertheless, in these cases, reconstructive surgical treatment may still be necessary if the acute thrombus fails to resolve or if the thrombus is chronic or fibrotic.^[3-5] A variety of surgical treatment modalities can be used when thrombolytic treatment fails. According to the presenting pathology, the treatment can involve repair of the obstructed segment, its reconstruction, or a bypass. In cases when a venous bypass is needed, spiral vein grafts, Dacron or expanded polytetrafluoroethylene (ePTFE) grafts, autologous pericardium, or aortic homografts can be used.^[4,6,7] Endovascular treatment is another emerging option for treatment; however it was not appropriate in our case due to diffuse and total occlusion. We used a 14 mm Dacron tube graft compatible with the SVC diameter to bypass the occlusion and inserted it into the right atrium. In patients with renal transplantation or non-dialysis dependent renal dysfunction, avoidance of off-pump cardiopulmonary bypass (CPB) is highly recommended for cardiac operations.^[8,9] This can be accomplished by side-clamping the right atrium. In some patients, a larger diameter graft may not match with a small right atrium, or a hemodynamic impairment may occur after side-clamping the right atrium. If either of these occurs, CPB may be mandatory. However, in every case, the off-pump surgical approach should be considered initially.

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