Case Report

Journal of Emergency Medicine Case Reports

Superior Vena Cava Thrombosis in a Young Hemodialysis Patient After 1 year of Central Venous Catheter Removal: A Case Report

Osman Beyduz[1], Abdul Samet Sahin[2], Ragip Kadi[3], Muhammet Fatih Beser[4]

[1]Republic of Turkey Ministry of Health Bitlis State Hospital, Bitlis, Türkiye.

[2]Republic of Turkey Ministry of Health Çarşamba State Hospital, Department of Emergency Medicine, Samsun, Türkiye.

[3]Republic of Turkey Ministry of Health Çarşamba State Hospital, Department of Internal Medicine, Samsun, Türkiye.

[4]Karadeniz Technical University, Farabi Hospital, Department of Emergency Medicine, Trabzon, Türkiye.

Abstract

Superior vena cava (SVC) syndrome is a rare but serious condition resulting from obstruction of the superior vena cava or its tributaries. Although often associated with malignancy, it can also occur due to central venous catheterization. Acute SVC syndrome following catheter removal is uncommon. We present a 35-year-old hemodialysis patient with a history of central venous catheterization for hemodialysis one year prior. During a routine hemodialysis session, the patient developed symptoms of shortness of breath, neck swelling, and cyanosis of the lips. Physical examination revealed neck edema and prominent superficial vascular bifurcations. Without imaging studies, it was confused with cellulitis, but CT angiography later confirmed SVC thrombosis. The patient was started on anticoagulation and transferred to a tertiary hospital for further management. Emergency physicians should be aware of SVC syndrome, especially in hemodialysis patients with a history of central venous catheterization. Although it is often associated with malignancy, this case highlights the importance of considering SVC thrombosis even after catheter removal. Prompt diagnosis and appropriate management are essential to prevent life-threatening complications. Therefore, recognition and inclusion of SVC syndrome in the differential diagnosis is essential for timely intervention and improved patient outcomes..

Keywords: Thrombosis, central venous catheterization, SVC syndrome

Introduction

Superior Vena Cava (SVC) syndrome is a condition resulting from obstruction of the superior vena cava or brachiocephalic veins. While malignancy is the primary cause, other causes include mediastinitis, granulomatous disease, iatrogenic causes associated with radiation therapy or cardiac pacemakers. It is also a rare but serious complication of central venous catheterization. It can cause a variety of symptoms and can lead to life-threatening complications such as organ damage (1). This case report discusses a 35-year-old patient who presented with a history of jugular hemodialysis catheterization one year prior and was currently undergoing hemodialysis with a left arm arteriovenous fistula.

Case Report

A 35-year-old male patient with a known history of chronic kidney disease secondary to vesicoureteral reflux was referred to the emergency department by an internal medicine specialist. The patient was referred to our department after reporting symptoms of shortness of breath, throat swelling, and lip cyanosis that had persisted for two days during a routine hemodialysis session. The patient was undergoing hemodialysis three days per week through an arteriovenous fistula in his left arm. In addition, there was a history of jugular vein catheter placement one year ago for temporary vascular access during hemodialysis.

On physical examination, the patient was alert, oriented, and coherent. Vital signs were stable but, the respiratory and circulatory examinations were anormal. Neck examination revealed no palpable crepitation, tenderness, lymphadenopathy, erythema, or elevated temperature. However, skin examination revealed edema of the eyelids, bruising and swelling of the lips, and diffuse subcutaneous edema of the neck. Prominent superficial vascular branching was also observed on the upper and lower half of the trunk and neck. On previous physical examination, prominent superficial veins measuring approximately 1 cm were noted between the umbilicus and the chest (Figure 1).

Corresponding Author: Abdul Samet Şahin
e-mail: abdulsahin61@gmail.com
Received: 14.11.2023 • **Accepted:** 08.12.2023
DOI: 10.33706/jemcr.1389895

Cite this article as: Beydüz O, Sahin AS, Kadı R, Beser MF. Superior Vena Cava Thrombosis in a Young Hemodialysis Patient After 1 year of Central Venous Catheter Removal: A Case Report. Journal of Emergency Medicine Case Reports. 2024;15(1): 4-6

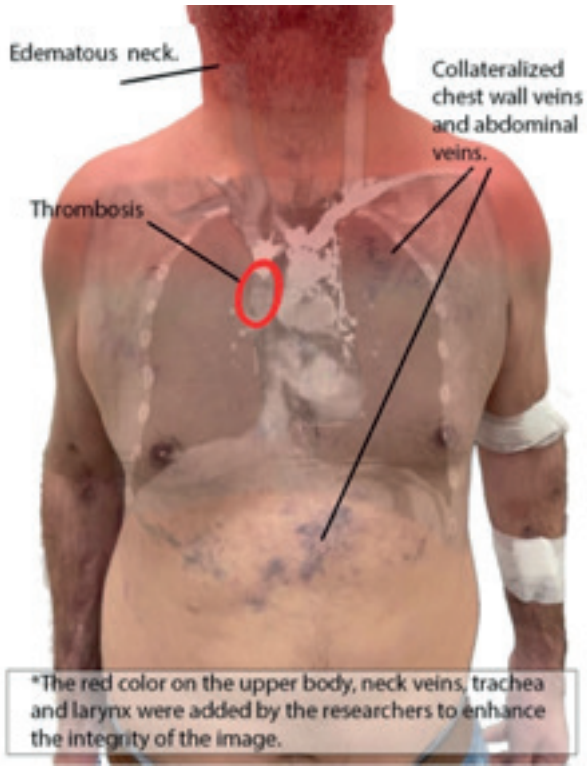

Figure 1. Prominent superficial veins measuring approximately 1 cm between the umbilicus and the chest

Laboratory results showed a significantly elevated C-reactive protein (CRP) level of 29 mg/L. The patient's complete blood count (CBC), biochemistry, and blood gas results were all within normal limits, with a white blood cell (WBC) count of 5 x 10^9/L, procalcitonin (PROC) of 0.8 ng/mL, creatinine (Cr) of 10mg/dL, sodium (Na) of 135 mmol/L, venous pH of 7.31, pCO2 of 53 mmHg, HCO3 of 27 mmol/L, and INR of 1.08.

Doppler ultrasound of the carotid and vertebral arteries was performed to evaluate the patient's symptoms, and a preliminary diagnosis of superior vena cava syndrome wasn't made. However, no pathology was found. He was referred to a tertiary hospital for further investigation. The patient was diagnosed with cellulitis, started on treatment and then discharged. However, the patient's symptoms persisted, and a CT angiography was performed at our hospital on the second visit to the emergency department. Subsequent carotid CT angiography revealed a thrombus in the middle and distal part of the superior vena cava, obstructing blood flow in the lumen along a 5 cm segment (Figure 2). The patient was diagnosed with superior vena cava thrombosis and started on a therapeutic dose of enoxaparin. The patient was transferred to a tertiary hospital for further management.

Discussion

SVC syndrome is a rare but potentially life-threatening condition caused by obstruction of the superior vena cava or its tributaries. The most common cause of SVC syndrome

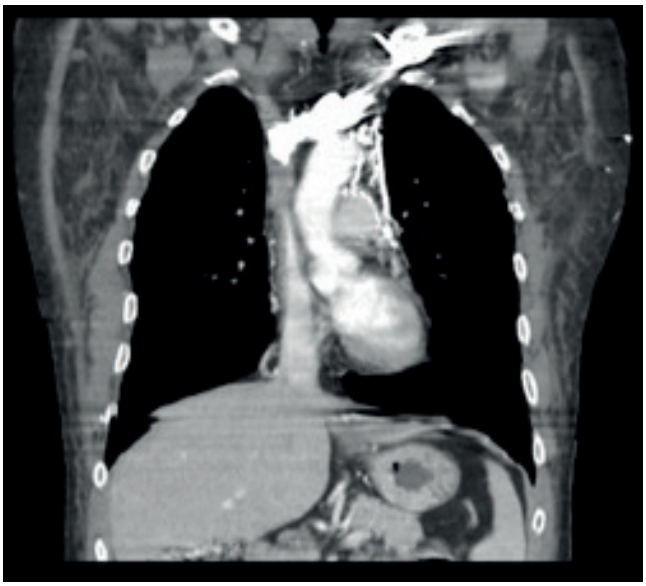

Figure 2. Carotid CT angiography a thrombus in the middle and distal part of the superior vena cava, obstructing blood flow in the lumen along a 5 cm segment

is the presence of malignancy, accounting for up to 70% of cases (2). Other causes include benign mediastinal tumors, thrombosis, and infection. In the present case, the patient had a history of jugular hemodialysis catheterization, which is a known risk factor for the development of SVC syndrome.

A history of central venous catheter use in hemodialysis patients is also a cause of SVC syndrome; however, most cases occur in patients who develop acutely after catheter insertion or chronically after long-term use. In this case, acute SVC syndrome occurred in a patient undergoing hemodialysis through an arteriovenous fistula after removal of his hemodialysis catheter one year ago.

Previous studies have shown a high incidence of superior vena cava stenosis in dialysis patients with hemodialysis catheters, but a lower incidence of SVC syndrome (3,4). However, the occurrence of SVC syndromeafter removal of a hemodialysis catheter, as observed in our case, is rarely reported in the literature (5).

Several risk factors contribute to catheter-associated thrombosis in hemodialysis patients. These factors include catheter size-to-vein ratio, procedural trauma, catheter positioning (especially distal to the superior vena cava), vein diameter, and medical history including malignancy, previous thromboembolic events, and coagulopathy. The mechanism underlying hemodialysis catheter-associated thrombosis has not been elucidated, but factors such as repeated vascular interventions, platelet dysfunction, endothelial factors, inflammation, and coagulation abnormalities have been suggested (6).

Superior vena cava syndrome can present with a wide range of clinical manifestations. It can range from asymptomatic cases to severe conditions such as life-threatening upper airway obstruction and increased

10.33706/jemcr.1389895
Journal of emergency medicine case reports. 2024;15(1): 4-6

intracranial pressure. Symptoms correlate with the severity and extent of venous obstruction and inversely with the development of venous collateral vessels. Manifestations can vary from localized facial edema to erythema, edema, cyanotic changes, telangiectatic veins and collaterals in the head, neck, and upper trunk. Symptoms such as shortness of breath, cough, blurred vision, orthopnea, hoarseness, nausea, headache, chest pain, dizziness, or fainting may also occur, and may worsen in the supine position. In severe cases, more serious symptoms such as stridor and confusion may develop. Symptoms such as headache, dizziness, visual disturbances, impaired consciousness, and seizures may also occur due to cerebral edema. Cases with laryngeal edema may present with symptoms such as hoarseness and stridor.

In addition to clinical findings, imaging modalities can be used to diagnose superior vena cava syndrome. Imaging techniques are particularly important for determining the location and extent of the lesion, planning treatment, and monitoring the patient. Chest radiography is a preliminary imaging modality that can be used in the initial step of diagnosing SVC syndrome. However, other imaging modalities may be required to differentiate it from conditions such as congestive heart failure or Cushing's syndrome. Computed tomography, magnetic resonance imaging, conventional venography, angiography, ultrasonography, and echocardiography are among the other imaging modalities that may be used in the diagnosis of SVC syndrome (7). Magnetic resonance angiography and computed tomography angiography have high sensitivity (96%) and specificity (92%) in monitoring collaterals and diagnosing SVC syndrome. Therefore, it is recommended that these methods be used in the diagnosis of SVC syndrome (8).

In the management of superior vena cava syndrome, it is important to identify the underlying cause and develop a targeted treatment plan accordingly. Several treatment modalities are available to restore normal venous flow. Surgical interventions such as autologous saphenous vein bypass surgery, excisional procedures, or endovascular treatments may be used. In addition, non-invasive treatments such as radiation therapy, pharmacologic thrombolysis may be used. In catheter related SVC syndrome, the first step is to remove the catheter. Systemic anticoagulation should then be initiated to prevent further blood clotting. In refractory or recurrent cases, invasive treatment modalities such as pharmacologic thrombolysis or mechanical thrombectomy may be considered.

Conclusion

In conclusion, the management of SVC syndrome is based on the identification of the underlying cause and the development of an appropriate treatment plan. Therefore, it is crucial to evaluate patients diagnosed with SVC syndrome with a multidisciplinary team and establish a comprehensive treatment approach (9). This case report describes a patient with a history of central venous hemodialysis catheter removal one year ago who developed superior vena cava syndrome. While malignancy is a common cause of SVC syndrome, hemodialysis patients with a history of central venous catheter use are also at risk. However, most cases of SVC syndrome occur acutely after catheter placement or chronically after prolonged use. In the case presented, the patient developed acute SVC syndrome despite having had the hemodialysis catheter removed one year earlier and receiving hemodialysis through an arteriovenous fistula. Symptoms of SVC syndrome can range from asymptomatic to life-threatening upper airway obstruction and increased intracranial pressure. SVC syndrome may be confused with cellulitis in hemodialysis patients with a history of central venous catheterization and should be considered in the differential diagnosis.

References

1. Küçükarslan N, Yilmaz M, Us M, Arslan Y, Güler A, Yilmaz A (2007). Diyalizkateterininnedenolduğu vena kava süperiorsendromu: Olgusunumu. UlusalTravmaveAcilCerrahiDergisi, 13(1), 63 - 66.
2. Azizi, A. H., Shafi, I., Shah, N., Rosenfield, K., Schainfeld, R., Sista, A., & Bashir, R. (2020). Superior Vena Cava Syndrome. JACC. Cardiovascular interventions, 13(24), 2896–2910. https://doi.org/10.1016/j.jcin.2020.08.038
3. Labriola, L., Seront, B., Crott, R., Borceux, P., Hammer, F., &Jadoul, M. (2018). Superior vena cava stenosis in haemodialysis patients with a tunnelled cuffed catheter: prevalence and risk factors. Nephrology, dialysis, transplantation : official publication of the European Dialysis and Transplant Association - European Renal Association, 33(12), 2227–2233. https://doi.org/10.1093/ndt/gfy150
4. Arasu, M., Thangaswamy, C. R., Chakravarthy, D., &Elakkumanan, L. B. (2021). Catheter-related superior vena cava thrombosis-how do we face it?. Annals of cardiac anaesthesia, 24(4), 512–514. https://doi.org/10.4103/aca.ACA_119_20
5. Janssen M, Logtenberg S. (2022). Vena Cava Superior Syndrome Six Years after Central Venous Catheter Removal in a Patient on Hemodialysis. Case Rep Nephrol Dial, 12(2):132-137. doi:10.1159/000525795
6. Thapa, S., Terry, P. B., &Kamdar, B. B. (2016). Hemodialysis catheter-associated superior vena cava syndrome and pulmonary embolism: a case report and review of the literature. BMC research notes, 9, 233. https://doi.org/10.1186/s13104-016-2043-1
7. Shaikh, I., Berg, K., &Kman, N. (2013). Thrombogenic catheter-associated superior vena cava syndrome. Case reports in emergency medicine, 2013, 793054. https://doi.org/10.1155/2013/793054
8. Adışen E, Özer İ, Gürer MA. (2016). Vena Kava SüperiorSendromu. Dermatoz, 7(2):0-0. doi: 10.15624.dermatoz16072o5
9. Cui, J., Kawai, T., & Irani, Z. (2015). Catheter-directed Thrombolysis in Acute Superior Vena Cava Syndrome Caused by Central Venous Catheters. Seminars in dialysis, 28(5), 548–551. https://doi.org/10.1111/sdi.12362