Brachiocephalic Vein Stenosis and Superior Vena Cava Syndrome Presenting as Acute Airway Obstruction

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Introduction

Central Vein Stenosis (CVS) is a common complication associated with the placement of intravascular devices such as pacemakers and intravenous central catheters. CVS has also been observed in the setting of fibrosing mediastinitis, post-radiation therapy, and malignancy. It is characterized by a slow, insidious onset of upper extremity pain and swelling. In the setting of central venous catheterization, CVS is associated with placement of indwelling intravascular devices in the subclavian vein, innominate vein, and the superior vena cava. The risk of stenosis is directly related to repeated and longer duration of catheterization, location in the subclavian vein, and catheter-associated infection.

Endothelial injury with alteration in the organization of the vessel wall results in the development of microthrombi and smooth muscle proliferation leading to the stenosis of the vein. The majority of patients do not present clinically because of collateral shunting that evolves over time. However, hemodialysis patients can develop Superior Vena Cava (SVC) syndrome when challenged with the increased flow from an arteriovenous fistula or graft. These patients present with classic features of SVC syndrome, including head and neck and upper extremity edema, cough, pain, and headache.

Initial treatment includes supportive management of symptoms including airway protection and placement of a nasogastric tube. However, endovascular intervention is the mainstay of management.

Case Report

We report the case of a 66 year-old man with a complicated medical history including diabetes mellitus, hypertension, and end-stage renal disease on home dialysis through an AV fistula. The patient had a recurrent history of thrombosis at the fistula site and had recently undergone a thrombectomy of the AV fistula. He presented to our emergency department with a two-day history of progressive shortness of breath, odynophagia and mental status changes.

At presentation, the patient was unable to tolerate liquids or solids. There was audible bibasilar stridor. On physical exam, the patient had massive edema of the head and neck and upper extremities. Flexible fiberoptic laryngoscopy revealed significant retropharyngeal and supraglottic edema with near-complete obstruction of the airway, requiring controlled fiberoptic intubation in the operating room.

The patient was initially managed with antibiotics and high dose steroids, but when the edema failed to resolve, a tracheostomy was performed, and a CT scan of the neck with contrast was obtained.

CT scan revealed high-grade stenosis of the right innominate vein extending to the proximal right jugular vein. A large amount of collateral venous circulation in the left neck was also visualized. The superior vena cava was patent, and there were no masses at the base of the neck or thoracic inlet.

Venous Angiography demonstrated a thrombosed right-sided AV fistula and a high-grade right brachiocephalic vein stenosis (Figure 1). Thrombectomy was performed of the AV fistula, and the nearly occluded right brachiocephalic vein required balloon venoplasty and placement of two stents across the stenosis.

Follow-up venogram demonstrated resolution of the stenosis and disappearance of collateral vessels in the upper chest (Figure 2). Following brachiocephalic vein stent placement, the patient’s edema decreased significantly and rapidly. He was decannulated, was able to tolerate oral diet, and was discharged home soon thereafter.

Discussion

This case demonstrates a potential complication of central venous catheterization in patients with Arteriovenous Graft (AVG) or Fistula (AVF) placement for hemodialysis. Superior vena cava syndrome with acute airway obstruction is a rarely reported sequela of brachiocephalic vein stenosis.

A thorough literature search found very few cases of acute airway obstruction following central venous access placement and required only removal of the indwelling vascular access. Another patient with a history of previous neck dissection became acutely symptomatic following thrombosis of the contralateral internal jugular vein with a central line. This patient was managed with systemic anticoagulation.

Our patient had undergone recent thrombectomy of his AVF in conjunction with a high grade stenosis that was created by placement of subclavian access line. Following thrombectomy of the AVF, sudden challenge of a high flow vessel in the face of a high grade stenosis resulted in the dramatic onset of SVC syndrome. The increased flow could not be accommodated by collateral circulation.

Complete resolution of the patients symptoms occurred after endovascular stenting across the patients stenosis.

It is important to understand that patients with AVF/AVG’s for hemodialysis are at uniquely increased risk for SVC syndrome with placement of central venous lines. Furthermore, the otolaryngologic manifestations of this condition, such as airway obstruction and facial edema, may be the initial presentations of this potentially lethal syndrome.

References


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