

Inferior vena cava reconstruction to alleviate back pain

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ABSTRACT

We present the case of a 38-year-old man with end-stage renal disease receiving hemodialysis via a left femoral loop graft who developed debilitating back pain. During a maintenance fistulogram, we found a completely occluded inferior vena cava and engorged lumbar veins. The patient underwent inferior vena cava reconstruction with stenting, which resulted in complete resolution of the engorged lumbar veins on venography and a significant reduction in his back pain. Engorgement of the lumbar veins can cause significant pain, and treatment of the underlying pathology can alleviate these symptoms. (*J Vasc Surg Cases Innov Tech* 2024;10:101439.)

Keywords: Dialysis access; Inferior vena cava reconstruction; Venous stenting

Chronic back pain is a common problem with numerous etiologies. Although vascular causes are uncommon, several cases of low back pain as a result of inferior vena cava (IVC) disease have been reported. This case report does not require institutional review board approval. All patient identifiers were removed before submission of our report. The patient provided written informed consent for the report of his case details and imaging studies.

CASE REPORT

A 38-year-old man with end-stage renal disease secondary to human immunodeficiency virus–associated nephropathy presented with a 2-month history of debilitating lower back pain. He denied any recent injuries or inciting events preceding the onset of pain and had been seen by neurosurgery and evaluated with magnetic resonance imaging (MRI) of the spine (Fig 1).

He is currently receiving hemodialysis via a left femoral loop graft and has had multiple catheters and arteriovenous (AV) accesses of the upper extremity, which have been exhausted. He also had right femoral loop graft that was no longer functional and a failed renal transplantation. Although not 100% certain, it is thought that the transplant had failed from chronic rejection. Venous outflow was not explored after the failed transplant. The patient had undergone fistulograms in the past but no significant venous outflow obstruction or IVC occlusion was noted.

Due to the chronic back pain and awareness of the limited AV access options in the future, the patient was considering comfort care.

The patient was taken for a routine fistulogram of his left femoral loop graft to preserve and maintain his limited AV access. The patient did not have leg swelling at that time, and there were no issues with the graft. During the fistulogram, the patient was noted to have a large left iliac vein on the side of his access, a completely occluded IVC, and engorged lumbar veins.

The patient was subsequently taken for IVC reconstruction within the next several days by the vascular surgery team to help maintain the AV graft and potentially reduce his back pain from the enlarged lumbar veins. The occluded IVC was crossed distally using an angled glide wire and Kumpe access catheter (Cook Medical). Both an MRI and a venogram demonstrated the extent of disease (Fig 1). Intravascular ultrasound was not used, because it is not readily available at our institution, although it is the standard of care for guidance of intraluminal placement of caval wires and iliocaval stent sizing. Multiple orthogonal views were used to ensure that the wire was in the IVC, using the vertebral column as a landmark. The patient underwent serial IVC angioplasty and stenting with the 18-mm Abre stents (Medtronic), from the level of the right atria to the left iliac vein (Fig 2). The 18-mm size was chosen to maintain the same stent size throughout the iliac vein. Our institution only allows for Abre stents for venous reconstruction. There was concern about covering the hepatic vein; however, the stents used were open cell and, thus, collaterals are still able to enter. On completion of the stenting, complete resolution of the engorged lumbar veins was observed on the venogram (Fig 3). Although concern existed for leg swelling; however, even with the occluded IVC and failed right femoral loop graft, the patient had minimal leg swelling. The patient received standard intraoperative heparin dosing and antiplatelet therapy postoperatively.

On the following morning, the patient reported an immediate 50% reduction in his back pain. At his 1-month follow-up, the patient experienced continued improvement of his back pain and quality of life. The left femoral AV graft has continued to function without problems.

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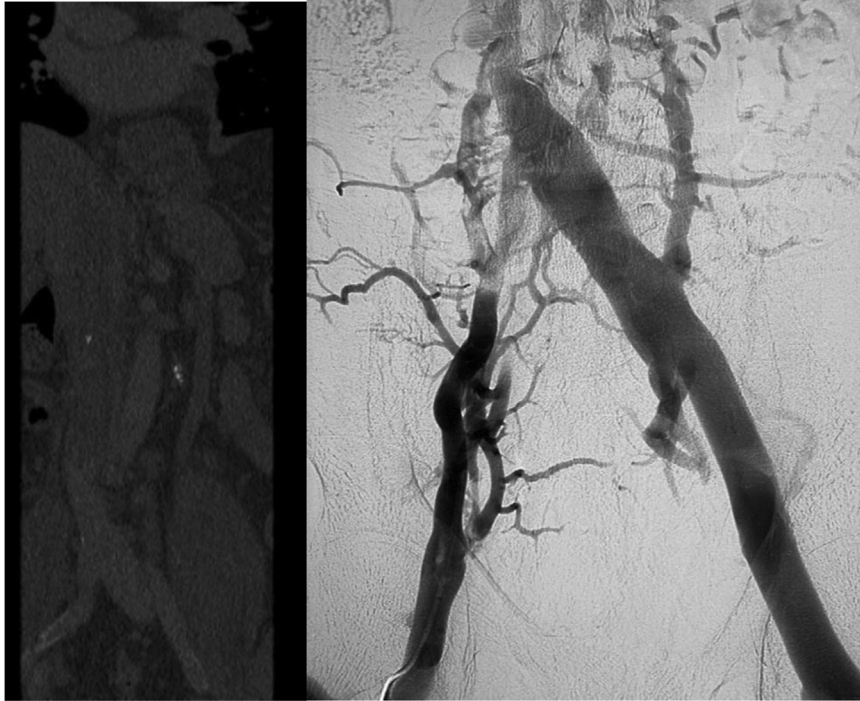


Fig 1. *Left*, Extent of inferior vena cava (IVC) disease seen on magnetic resonance imaging (MRI). *Right*, Venogram showing engorged lumbar veins.

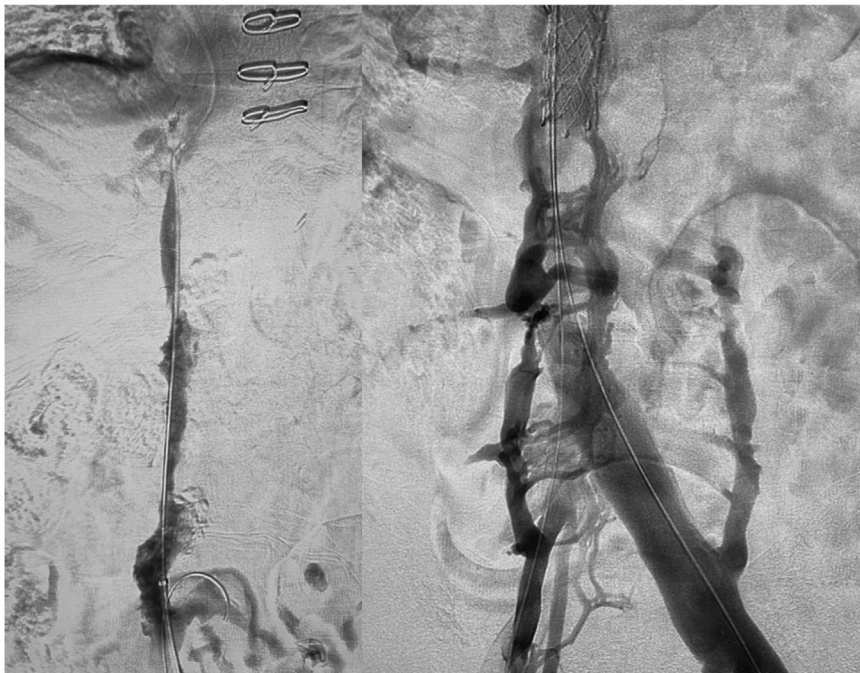


Fig 2. Balloon angioplasty (*Left*) and stenting (*Right*) of the inferior vena cava (IVC).

DISCUSSION

IVC occlusion is an uncommon disease that stems from various etiologies. The constellation of symptoms can be wide, depending on the degree of drainage from

collateral systems.¹ The symptoms are similar to those due to extremity venous stasis and include pain, swelling, skin changes, ulcers, and weakness.¹ A 2013 retrospective study (n = 1470) showed that 48% of patients with IVC

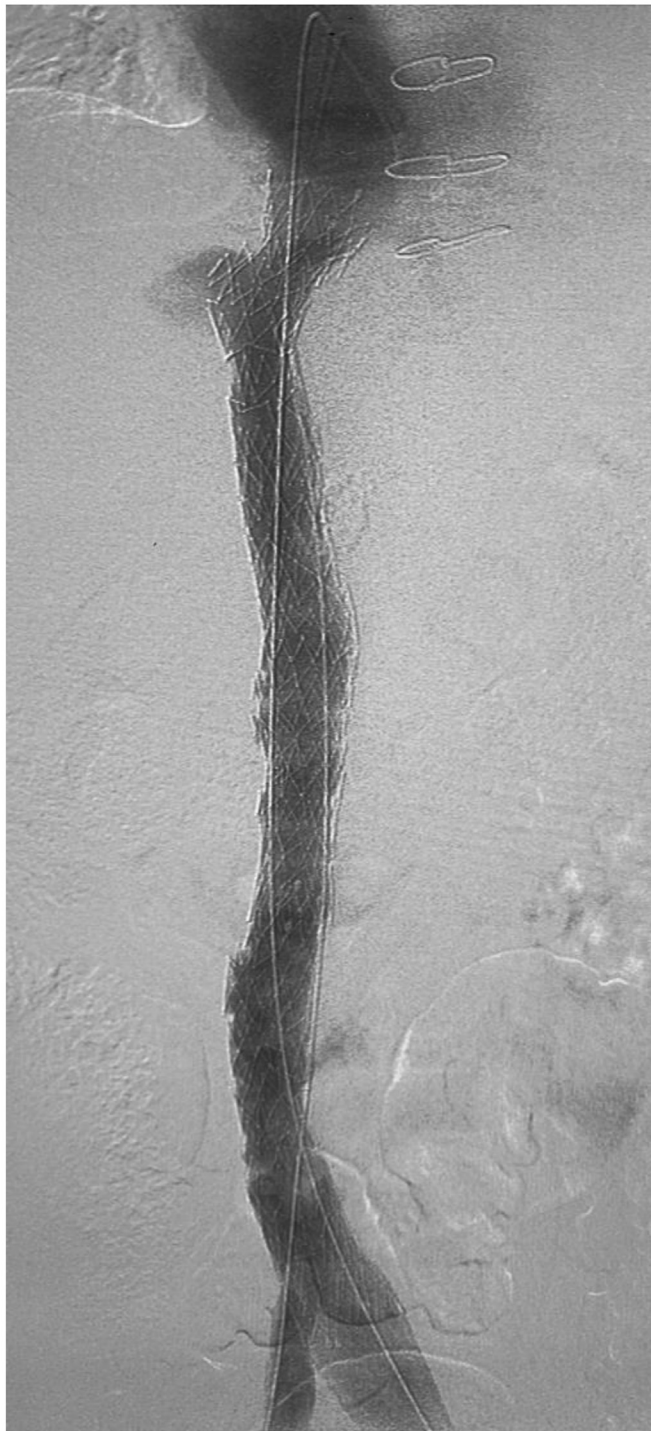


Fig 3. Completion venogram showing resolution of inferior vena cava (IVC) occlusion.

thrombosis had back pain and abdominal pain as their initial symptoms.²

When adding an AV access to the lower extremity, we typically see symptoms of lower extremity swelling when central venous obstruction is present. Several studies have reported IVC obstruction or epidural venous

plexus enlargement mimicking disc herniation or radiculopathy.^{3,4} Paksoy and Gormus³ identified 13 of 9640 patients who had undergone MRI for back pain in a 2-year span who had symptoms of disk herniation or radiculopathy. Most of the patients with IVC thrombosis and back pain had clot extension into the lower extremity veins.³ All 13 patients had an IVC occlusion or obstruction that resulted in enlarged lumbar veins compressing the lumbar nerve roots.³ One patient could not be treated because of an intra-abdominal malignancy; however, the remaining 12 patients with IVC obstruction or occlusion experienced complete resolution of their pain after treatment.³ Yigit et al⁵ presents a case of a 13-year-old girl with chronic back pain and found that she had extensive epidural and paravertebral collateral vessels compressing the thecal sac because of IVC agenesis.

More commonly, however, we identify and treat patients with superior vena cava (SVC) occlusion or stenosis secondary to dialysis access. Patients can develop symptoms of SVC syndrome with upper extremity and facial swelling, as well as pain secondary to swelling with an SVC occlusion. Similar to SVC occlusions, once the IVC is recanalized, the collateral vessels will be seen to have collapsed on imaging. These occlusions can be treated via endovascular interventions and show promising regression of symptoms.⁶ Symptoms of SVC syndrome also typically resolve once recanalization occurs. The parallel pathophysiology between SVC syndrome and a symptomatic IVC demonstrate how engorged venous collaterals can cause a wide array of symptoms that are often not appreciated.

Current treatment of IVC thrombosis includes both medical and surgical options. Anticoagulation is the most common treatment and, depending on the severity and chronicity of the symptoms, other adjuncts can be added.⁷ Patients who present with acute (<14 days) or subacute (14-28 days) thrombosis might benefit from catheter-directed thrombolysis with or without percutaneous transluminal angioplasty or stenting.⁷ For patients with chronic thrombosis (>28 days), angioplasty or stenting with intravenous ultrasound guidance can be used.⁷ IVC stent patency varies; however, one report noted 67% primary patency at 24 months after the treatment of chronic thrombosis.⁸

CONCLUSIONS

Engorged lumbar veins with central stenosis can be a contributory factor to back pain. If symptomatic treatment for the common causes of back pain (musculoskeletal causes) fail and workup findings for other degenerative and neurologic causes are negative, it is not unreasonable to examine the IVC and collateral vessels as a potential cause, especially if patient is at higher risk of forming clots.

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