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Cadaveric Graft Repair of Inferior Cava Vein in a Patient with Previous Resection without Flow Reconstruction

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Abstract

We present a 39-year-old male diagnosed one month after birth with thrombosis of the infrarenal IVC and left renal vein. He underwent surgery, performing a left nephrectomy and resection of the infrarenal IVC without flow reconstruction. The patient remained asymptomatic until adulthood, when he presented several episodes of deep vein thrombosis. Due to frank clinical worsening despite medical treatment, surgical treatment was proposed to the patient. A cadaveric vena cava and iliac vein graft was used for flow reconstruction. We reviewed diagnostic methods for these complex cases and technical tips and tricks.

Keywords: thrombosis, inferior vena cava, graft, surgery, outcomes.

Introduction

Thrombosis of the inferior vena cava (IVC) is an underdiagnosed entity of unknown incidence and high morbidity. It can occur due to structural alterations (congenital malformations) and prothrombotic factors (coagulation disorders, oral contraceptives, obesity, and prolonged immobilization). Congenital malformations of the IVC have a prevalence in the general population of 1-4%, associated with a prevalence of thrombosis of 60-80% (1,2). In patients with IVC thrombosis and deep vein thrombosis (DVT) between 20-40 years old, we must always rule out the existence of structural alteration of the IVC (3). We present an extraordinary case of the absence of IVC due to resection in childhood that required surgical intervention.

Case Presentation

Male, 39 years old, diagnosed one month after birth with thrombosis of the infrarenal IVC and left renal vein. He underwent surgery, performing left nephrectomy and resection of the infrarenal IVC up to the bifurcation of

the common iliac veins without flow reconstruction. The patient remained asymptomatic until adulthood when he was diagnosed with several episodes of bilateral thrombophlebitis and deep vein thrombosis (DVT), which resolved with anticoagulation (vitamin K antagonists and low molecular weight heparin) and compression stockings. On physical examination, he presented several subcutaneous collateral veins, especially on the left flank, with varicose cords and venous ulcers in both lower limbs. Like other clinical manifestations, he presented lumbar and abdominal pain that worsened with physical activity.

Method

A Doppler ultrasound was performed, and no infrarenal IVC was identified, but the IVC was patent in its intrahepatic tract. In the lower limbs, the permeability of the deep venous system was confirmed with insufficiency of both arches of the internal saphenous veins. The CT showed the absence of IVC until the bifurcation of both common iliac veins and several deep collateral veins with dilation of the azygos, hemiazygos system, and intervertebral and superficial veins through epigastric veins (Fig 1AB). An extensive bilateral subcutaneous collateral veins system stood out on the left flank. (Fig 1AB). The thrombophilia study did not show significant alterations. Due to frank clinical worsening despite medical treatment, surgical treatment was proposed to the patient.

The intervention was performed by supra-infra umbilical midline laparotomy, performing the Cattell-Braasch and Kocher maneuver, meticulous dissection of the iliac vessels until both stumps of the common iliac veins, the right renal vein, and the stump of the IVC were located. Heparinization was done with 5000IU/ml of intravenous sodium heparin. We used cadaveric vena cava and iliac vein graft for reconstruction. After clamping both stumps, end-to-end anastomosis of the left and right iliac stump was performed with a continuous 6/0 polypropylene suture. Proximally, end-to-side anastomosis was performed with a continuous 5/0 polypropylene suture of the cava upper stump and right renal vein. After reperfusion, an initial flow of 600 ml/min was measured, which improved to 896 ml/min with compression of abdominal varicose bundles. Figure 2 shows the postoperative result after one week.

Results & Discussion

No postoperative complications occurred. On outpatient

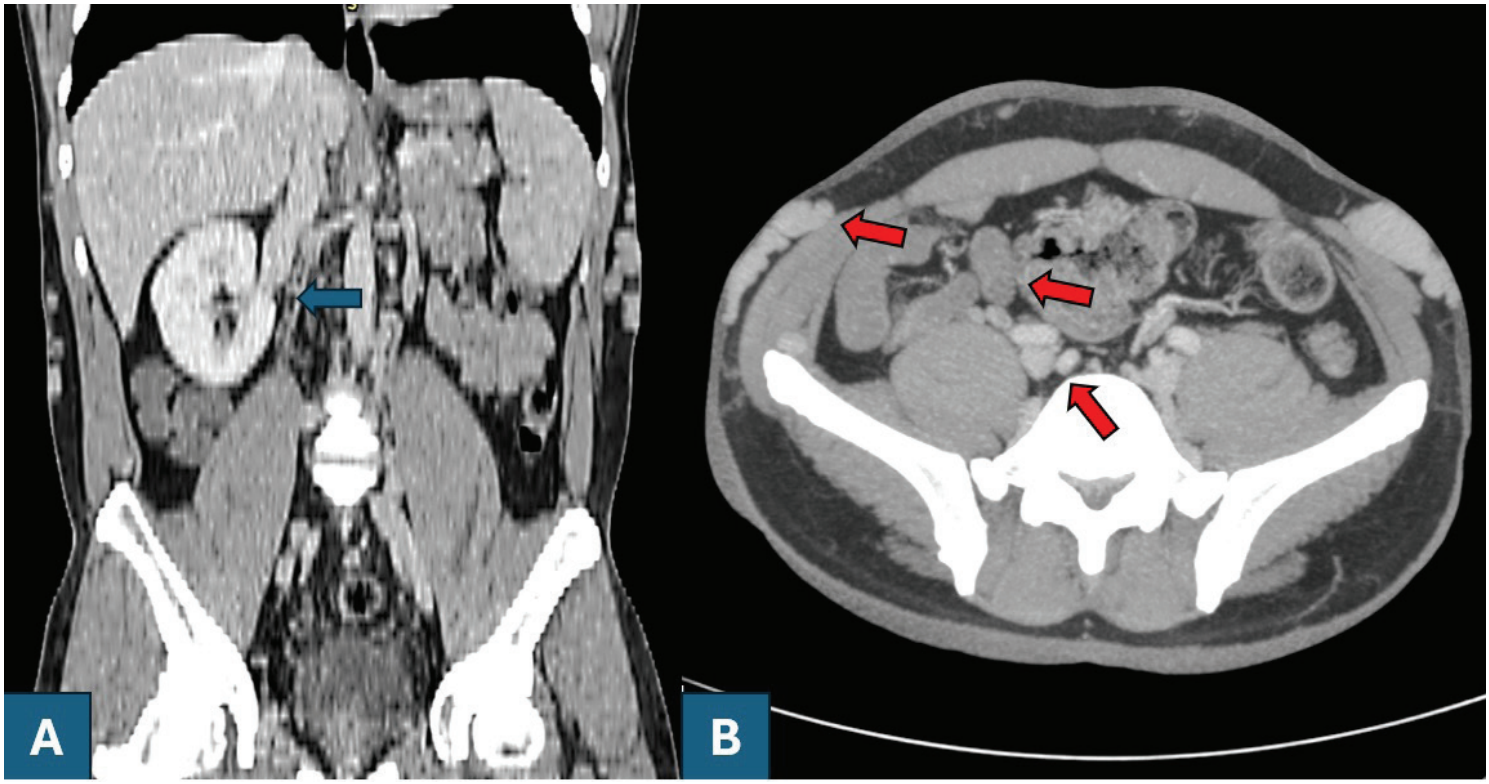


Figure 1. A. CT image showing the absence of IVC until the bifurcation of both common iliac veins. The blue arrow represents the place where IVC disappears. **B.** The red arrows show the several deep collateral veins with dilation of the azygos, hemiazygos system, and intervertebral and superficial veins through epigastric veins.

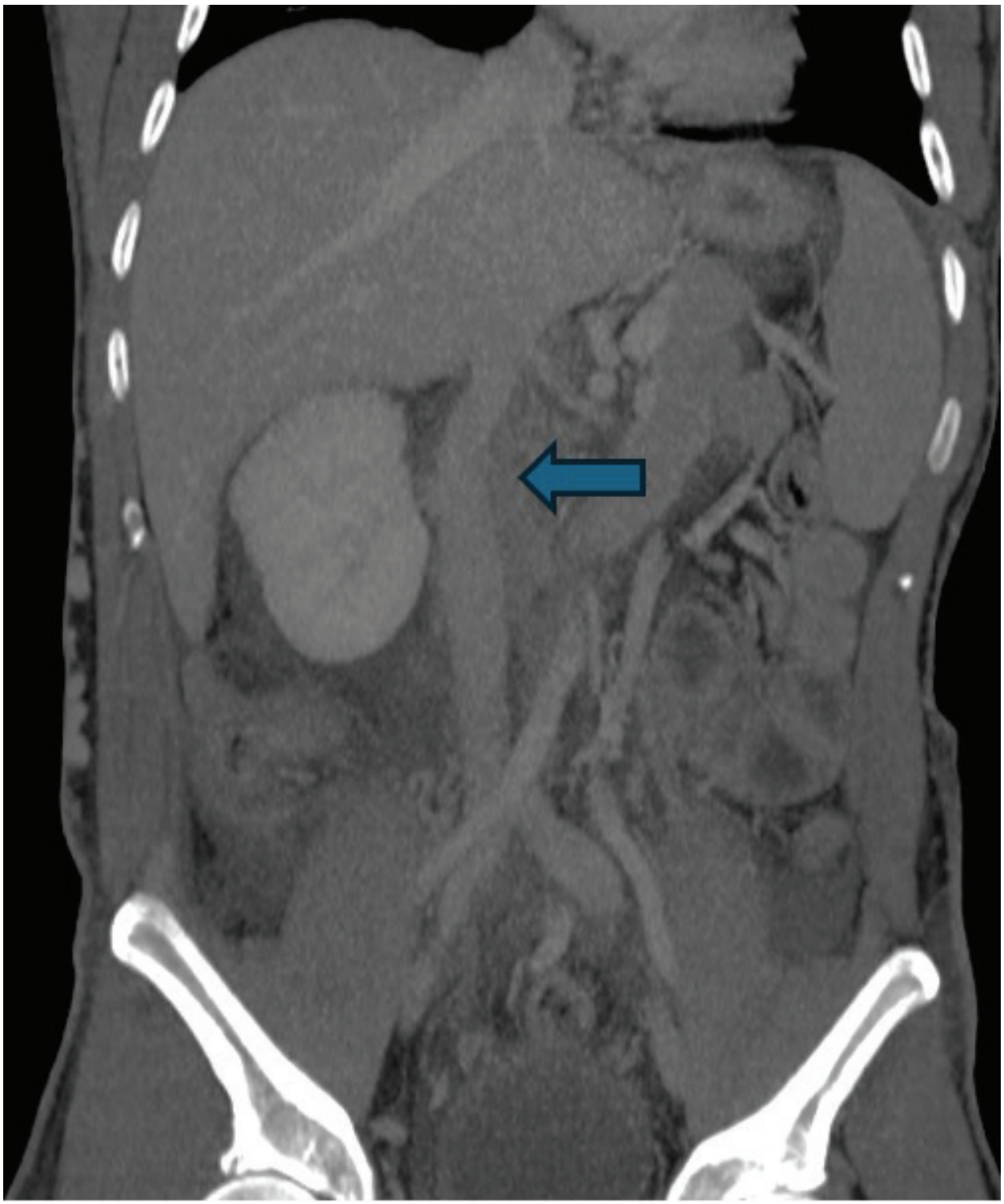


Figure 2. Postoperative CT image. The blue arrow shows the IVC anastomosis.

follow-up, there was significant regression of the collateral circulation of the abdominal wall. Anticoagulation with acenocumarol and anti-aggregation with acetylsalicylic acid were started. For two years, he was asymptomatic, but he began new episodes of thrombophlebitis in the lower limbs, superficial venous thrombosis, and reappearance of superficial collateral circulation, so MRI angiography was requested, in which partial thrombosis of the infrarenal vena cava was confirmed located in the exit of the right renal vein. Now, the patient is asymptomatic with anticoagulant treatment with a direct factor Xa inhibitor.

The rarity of the clinical case we present is that no flow reconstruction was performed after resection of the IVC in childhood. We did not find similar cases in the lit-

erature. Our patient presented symptoms like those cases of untreated IVC agenesis. He remained asymptomatic until adulthood, when the first clinical manifestations began, secondary to the chronic alteration of venous flow and the developed collateral system, especially after a triggering factor, such as sports, where the inability of the collateral system to manage increased flow facilitates the appearance of DVT. Contrast-enhanced CT and Doppler ultrasound made the definitive diagnosis. CT allows for checking the anatomical details of the IVC, the presence of thrombosis, and the existence of collateral circulation, but MRI had the advantage of no exposure to ionizing radiation (4-6). Venography is a reliable method, but it is relegated to exceptional cases as it is invasive (7). The initial treatment used was anticoagulation and compression stockings, measures aimed at reducing the associated thrombotic risk (6). Surgical treatment is performed when medical or endovascular management is insufficient to alleviate the associated symptoms or the patient's general condition is seriously compromised, as occurred in our patient (8,9).

There are several controversial topics in the literature regarding surgical techniques. Firstly, there are differences regarding the graft to be used. In reconstructions due to tumor invasion, a polytetrafluoroethylene (PTFE) graft is recommended (8-12). In reconstructions due to benign pathology, saphenous vein spiral allograft or autograft is usually chosen (13). In our service that performed liver transplantation, cadaveric vein grafting was selected based on availability. Specific options have been proposed to avoid early thrombosis of the graft: use of heparin before anastomosis, creation of an arteriovenous fistula, or grafts of a smaller caliber than that of the remnant to increase flow (10–12). In postoperative follow-up, radiological control is recommended by CT or MRI to check graft patency and endovascular treatment in cases of stenosis/thrombosis.

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