

Filter placement in duplicated inferior vena cava: case report and review of the literature

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ABSTRACT

Double inferior vena cava is a rare anatomic variation with prevalence ranging between 0.2-3.0%. In cases of duplication, inferior vena cava filter placement options include placing it in both vena cava, coil-embolization of the intervenous segment plus placing a filter in the right inferior vena cava, or suprarenal filter placement. We report a case of deep venous thrombosis after unilateral primary total hip replacement, presenting with contraindications for anticoagulant therapy, in which cavography showed inferior vena cava duplication. Inferior vena cava filter placement was performed in the supra-renal portion and was proved to be an adequate and safe procedure.

Keywords: Vena cava inferior, vena cava filters, abnormalities

RESUMO

Veia cava inferior dupla é uma variação anatômica rara cuja prevalência é de 0,2-3%. O implante de filtro de veia cava, quando indicado em casos com duplicidade da veia cava inferior, pode ser realizado de diferentes formas: em ambas as veias cavas; em uma delas, embolizando a anastomose entre ambas; em somente uma delas; ou por implante supra-renal. Relatamos um caso de trombose venosa profunda no pós-operatório de implante de prótese de quadril com contra-indicação para tratamento anticoagulante e cuja cavografia evidenciou duplicidade de veia cava inferior. O implante de filtro de veia cava inferior realizado em posição supra-renal mostrou-se opção adequada e segura.

Introduction

Duplicated inferior vena cava (IVC) is a rare malformation, with prevalence between 0.2-3%.¹⁻³ Knowing this anatomical variation is important in cases of surgical repairs in the IVC and its tributaries.^{4,5}

Diagnosis of duplicated IVC in most cases is performed by findings of complementary examinations, since the signs or symptoms are rare during the patient's life. Filter placement in duplicated IVC can be performed using radioscopic control, which is the method of choice. Some authors have also described filter placement using ultrasound control when there is a duplicated vena cava.⁶⁻⁸

There are few reports of filter placement in the vena cava in this situation. We report a case of vena cava filter placement in suprarenal position in a patient with duplicated IVC.

Case description

A 74-year-old female patient, hypertensive, obese (body mass index = 34.92) was submitted to right total hip arthroplasty. Drug prophylaxis (5,000 UI unfractionated heparin every 8 hours subcutaneously) for venous thromboembolism was prescribed, starting 12 hours after the surgery. On the 30th postoperative day, due to a coagulation disorder that occurred during home administration of heparin, the patient was again admitted to the orthopedic ward, where she had her treatment suspended. After surgical site bleeding, there was an infectious process caused by *Acinetobacter* sp, and initially treated by imipenem/cilastatin. Five days after suspension of prophylaxis for venous thromboembolism, the patient, who was bedridden and under treatment due to surgical wound infection, progressed with pain and asymmetrical edema in the entire right lower limb; there was no dyspnea or signs suggesting pulmonary thromboembolism.

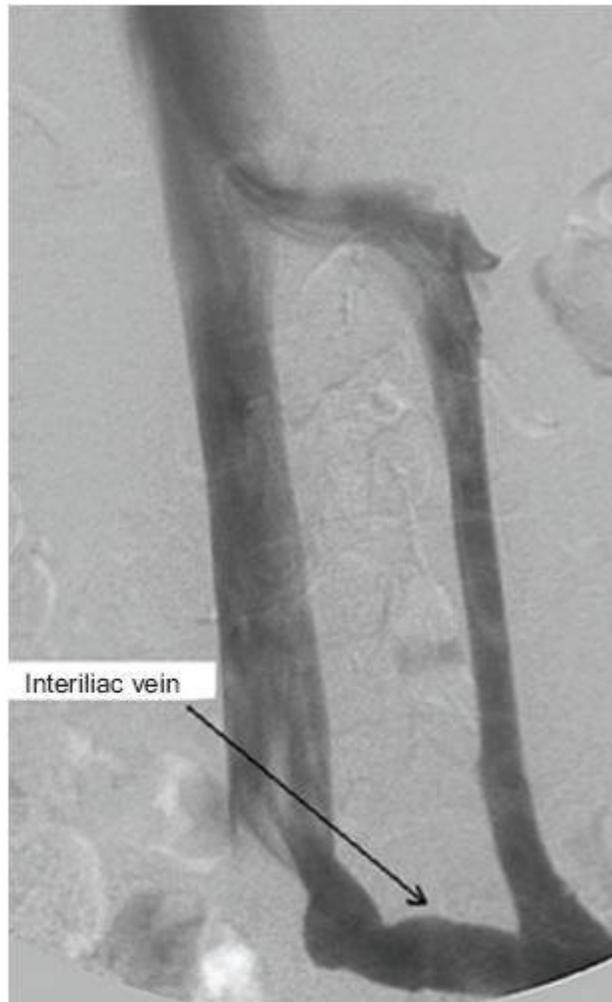


Figure 1 - Cavography by left femoral catheterization showing duplicated vena cava (arrow indicates interiliac vein)

Venous duplex scan of the lower limbs showed images of deep venous thrombosis in the femoral, popliteal, posterior tibial and fibular veins in the right lower limb, with absence of deep venous thrombosis in the left lower limb. Laboratory tests were normal, as well as chest x-ray, electrocardiogram and chest computed tomography.

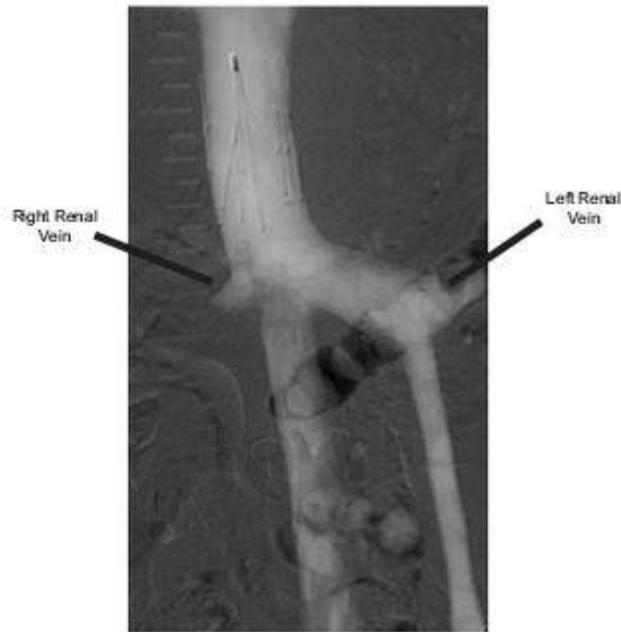


Figure 2 - Suprarenal filter placement in duplicated inferior vena cava

After interrupting prophylaxis with heparin due to bleeding and having a scheduled surgery for surgical wound debridement, the patient was considered as high risk for embolism and, therefore, received an indication of IVC filter placement.

After left common femoral vein puncture and insertion of a 6-Fr sheath, venography showed duplicated IVC since the beginning of the iliac vein confluence, also with presence of interiliac vein, until the right renal vein entrance level ([Figure 1](#)).

Considering the proper space in the suprarenal vena cava, choice was for vena cava filter placement (VenaTech LP -B, Brown, Nashville, USA) in this position, passing the filter from the previously approached left femoral vein and through the left vena cava ([Figure 2](#)).

The patient progressed uneventfully in the immediate postoperative period and showed no signs of pulmonary thromboembolism after the debridement surgery in the right hip joint. Because of hip prosthesis infection, the patient remained 60 days hospitalized and was discharged with no events concerning the procedure of IVC filter placement during hospital stay.

Discussion

Duplicated vena cava can be manifested in several forms: retroureteral IVC, left IVC, retrocaval IVC, IVC with drainage through the azygos vein and IVC interruption with continuation through the azygos vein.⁹ Duplication occurs when there is failure in cardinal vein fusion during embryogenesis or fail of regression of the left supracardinal vein.¹⁰

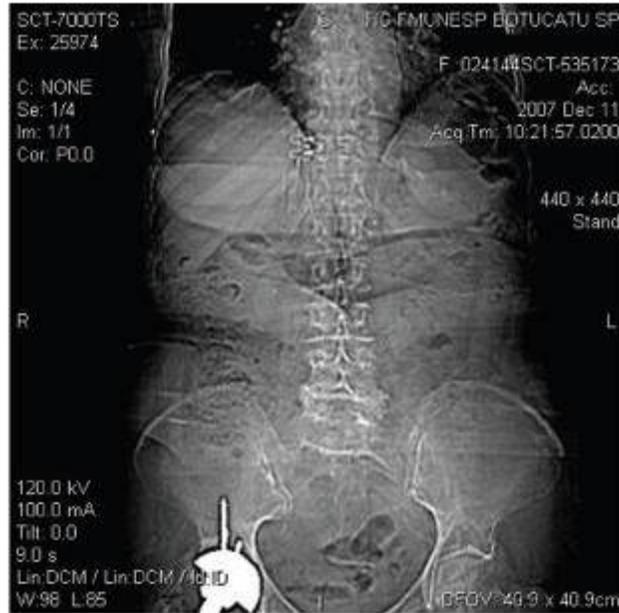


Figure 3 - Abdominal x-ray showing vena cava filter 6 months after the procedure.

Prevalence of duplicated vena cava is low, and its association with venous thrombosis and filter indication is even more unusual.¹¹ Only six cases of duplicated vena cava filter placement have been described so far. Indications of filter placement in IVC in these cases were: 1) contraindication of anticoagulation, three cases (bleeding and recent neurosurgery);¹¹ 2) prevention of massive pulmonary thromboembolism in cases of extensive proximal deep venous thrombosis, two cases;¹¹ 3) pulmonary thromboembolism in case of anticoagulation, one case.¹¹

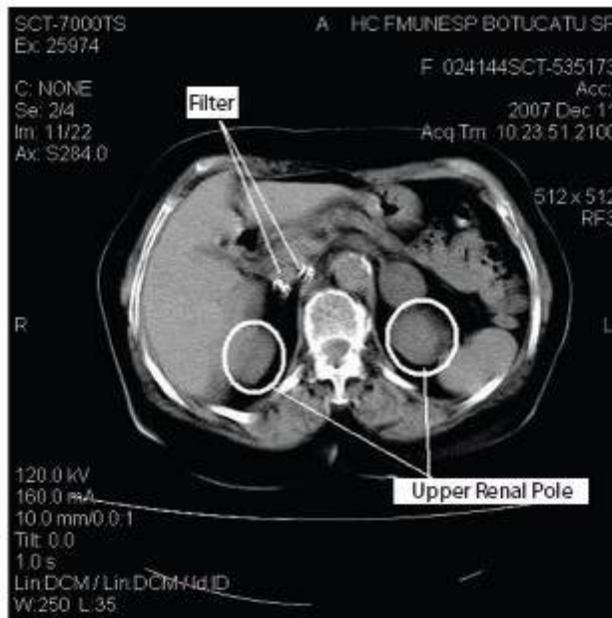


Figure 4 - Computed tomography showing final portion of the filter in a suprarenal position (patent inferior vena cava, 6-month follow-up)

Filters used for placement were Kimray Greenfield (Medi-Tech/Boston Scientific, Watertown, USA), Simon Nitinol (C.R. Bard, Murray Hill, USA), Vena Tech LP (B/Brown, Bethlehem, USA). In three cases, the filters were implanted in both cava branches; in one case, parallel to left branch embolization; and in two cases, in suprarenal position.

Among the options of placement site,¹²⁻¹⁴ perhaps the chosen position in this case is the most interesting as it avoids additional procedures, such as embolization of one of the vena cavae or its interconnection. In addition, only one filter is used, representing an expressive reduction in costs, since endovascular materials are imported and, therefore, very expensive in Brazil.

Filter release in suprarenal vena cava is safe and has already been established in special situations. Greenfield et al. have suggested filter placement in the IVC using suprarenal position when there are thrombi extending above the level of renal veins or inside them, in pregnant patients or in women of fertile age.¹⁴ Suprarenal placement has also been described in cases of small-caliber vena cava.¹⁵

The need of anticoagulation after filter placement is not consensual. Decousus et al.,¹⁶ in a randomized study, showed that patients who underwent filter placement and were anticoagulated had higher recurrence rates of pulmonary thromboembolism in the long term compared with those who were only anticoagulated. Therefore, it is possible that patients who underwent filter placement and were not anticoagulated may have even higher recurrence rates. On the other hand, a recent consensus report does not recommend use of anticoagulants in the long term for these patients. Our patient was not anticoagulated after filter placement.¹⁷

When choosing the filter, profile and easy application were taken into consideration. Since the sheath easily crossed the left vena cava (smaller), filter placement with low profile facilitated the procedure. However, other models or even temporary filters could be equally effective, including the option of a jugular vein access.

The patient remains asymptomatic after 6 months, and has no problems inherent to the procedure (Figures 3 and 4). Such evolution suggests that suprarenal vena cava filter placement can be a safe and effective option when there is duplicated vena cava.

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