
CASE REPORT

Two Retrievable Inferior Vena Cava Filters Inserted to Treat a Rare Inferior Vena Cava Congenital Anomaly

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ABSTRACT

We describe a case of lower limb deep vein thrombus in a patient with an inferior vena caval congenital anomaly, treated by insertion of two inferior vena caval filters.

Key Words: Lower extremity; Pulmonary embolism; Vena cava filters; Venous thrombosis

中文摘要

替一名患有罕見的先天性下腔靜脈變異的病人 植入兩個可回收型下腔靜脈過濾器

鄒起華、陳文光、郭昶熹

本文報告一名患有先天性下腔靜脈變異的病人，其下肢出現深層靜脈栓塞。替病人植入兩個下腔靜脈過濾器進行醫治。

INTRODUCTION

In the era of cross-sectional imaging, congenital inferior vena cava (IVC) anomalies are being encountered more frequently, even in asymptomatic patients.¹ Although such patients may be asymptomatic, when the need to insert IVC filters in those with lower limb deep vein thrombosis in whom anticoagulants are contraindicated, the congenital anomalies can pose technical problems. The main anomalies are a left-sided IVC, a double IVC, and azygos continuation of the IVC. We present herein a patient with a rare IVC congenital anomaly for whom two IVC filters were inserted.

CASE REPORT

A 66-year-old woman presented to us for investigation of an ovarian mass, for which computed tomography of the abdomen and pelvis was performed. The scan

revealed bilateral thrombosis of the common iliac veins and a tumour of the ovary. Apart from deep vein thrombosis, this patient had a very rare IVC congenital anomaly (Figures 1 and 2), namely a left-sided IVC. The latter coursed upward to join the left renal vein. Instead of crossing anteriorly to join the right renal vein as is usual, below the level of the left renal vein it divided into two branches. One of these crossed posteriorly to join the right renal vein, the other coursed cranially and joined the hemiazygos vein (Figure 2). The right renal vein drained into a normal right-sided IVC cranially.

In this patient, both common femoral veins, external iliac veins and common iliac veins were thrombosed. The thrombus extended cranially a level just below the left renal vein. As the patient needed an operation for the ovarian mass, anticoagulation was contraindicated.

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To avoid pulmonary embolism during the procedure, an IVC filter was inserted. Because thrombus was present in both common iliac veins, the femoral approach was not feasible, so the jugular approach was chosen. In the usual jugular approach, the IVC filter was placed in the right-sided IVC through the jugular vein. This was not suitable for this patient however, as she had a left-sided IVC with one of its branches continuing as the hemiazygos vein. If only one IVC filter was introduced into the right side, the patient would still be at risk of pulmonary embolism. Another difficulty in this patient was the acute angulation between the right renal and left hemiazygos veins, which rendered the normal jugular approach through the right IVC not feasible for placing a filter in the left hemiazygos vein. Finally we opted to use two IVC filters for this patient, both being inserted through the right internal jugular vein. Right internal jugular vein puncture was performed and guided by ultrasonography. The 7Fr sheath of a Cook Celest filter (Cook Medical, Denmark, Europe) was inserted. After the right internal jugular vein puncture, selective cannulation of the hemiazygos vein was achieved



Figure 1. Thrombus noted bilaterally in the common iliac veins and extending into the left inferior vena cava.

with 5Fr head-hunter catheter (Cordis, Miami, USA), then the 7Fr sheath was manoeuvred down to the level where the hemiazygos vein joined the left-sided IVC (Figure 3). A Cook Celest IVC filter (Cook Medical, Denmark, Europe) was deployed at the lower hemiazygos vein just below the left renal vein (Figure 4). The 7Fr sheath was then withdrawn up to the superior vena cava and cannulation into the right IVC was achieved. Another Cook Celest IVC filter (Cook Medical, Denmark, Europe) was deployed at the right IVC below the level of right renal vein (Figure 5). This patient successfully underwent the operation, without any evidence of pulmonary embolism. The IVC filters were not retrieved because this patient's malignancy was terminal.

DISCUSSION

With the invention of retrievable IVC filters, more and more of them are deployed.^{2,4} Indications for using them range from contraindication to anticoagulation to prophylaxis.^{2,5} To achieve optimal pulmonary embolism prevention, we have to know the IVC anatomy well¹; insertion of just one IVC filter into a patient with a double IVC leaves the patient vulnerable.

There are several groups of congenital IVC anomalies, including: left-sided IVC, double IVC, azygos continuation of the IVC, circumaortic left renal vein, and absent infrarenal IVC.^{1,6} The left-sided IVC and double IVC have implications for the placement of filters.¹

A left-sided IVC is encountered in 0.5% of the population.⁶ Usually, it joins the left renal vein and crosses anterior to the aorta uniting with the right renal vein and courses cranially as the normal pre-renal right-sided IVC. In which case, transjugular access to the infrarenal IVC to introduce a filter may be difficult.

A double IVC is found in 3% of the population.⁶ The left IVC typically ends at the left renal vein, which crosses anterior to the aorta in a normal fashion to join the right IVC. Recurrent pulmonary embolism may ensue even after placement of an IVC filter.

IVC venography before placement of a filter can usually alert us to an anomaly, but is not foolproof. For example, if there is deep vein thrombosis in one side of a double IVC, the venogram may not reveal the anomaly and only one IVC filter might be introduced, in which case the risk of pulmonary embolism would

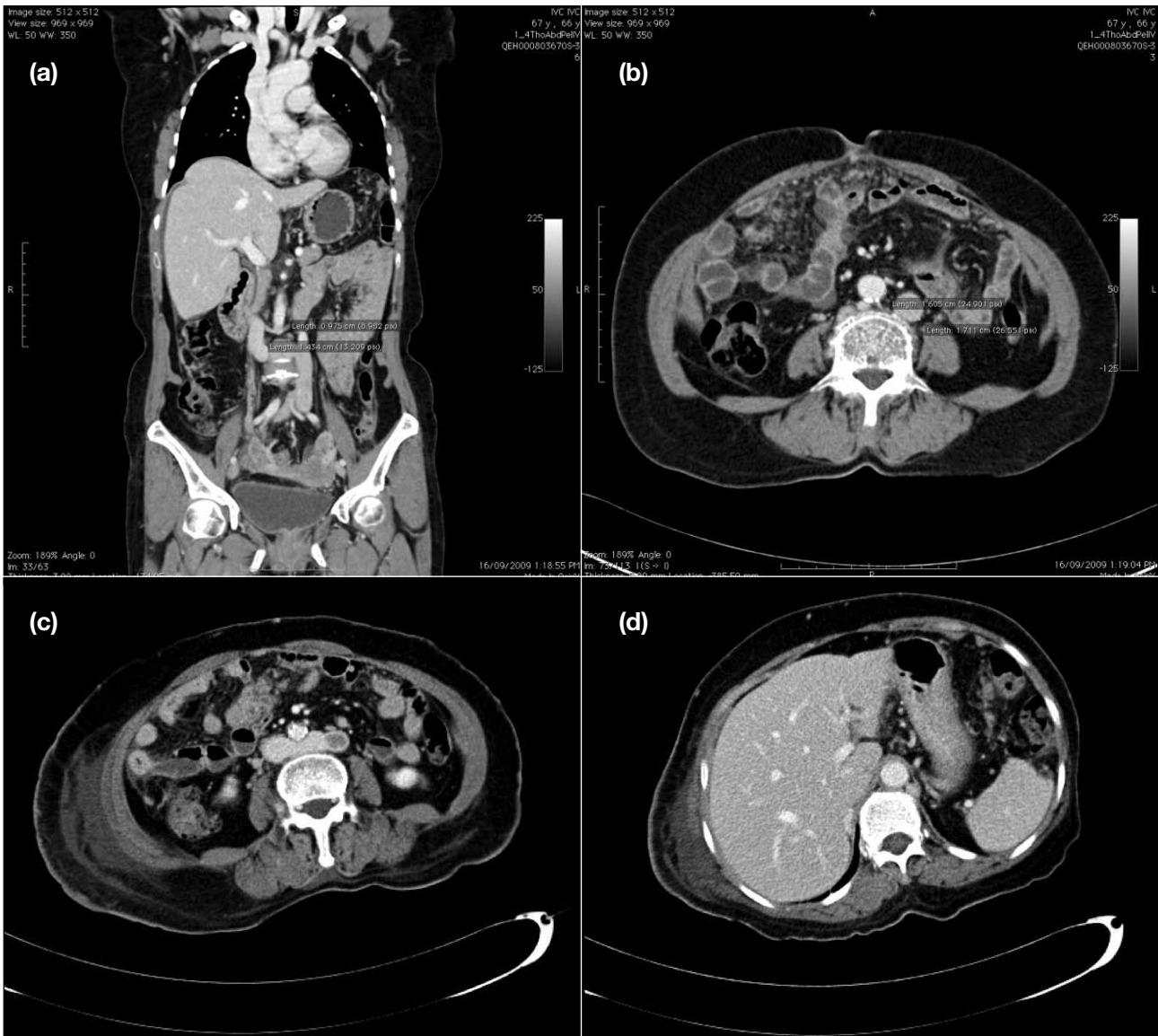


Figure 2. Left-sided inferior vena cava (IVC) dividing into two branches below the left renal vein, one crosses posteriorly to join the right renal vein, the other crosses cranially and joins the hemiazygos vein. (a) The right-sided IVC measures 1.4 cm below the level of renal vein. (b) The left-sided IVC measures 1.7 cm below the level of renal vein. (c) One branch of the left-sided IVC crosses posteriorly to join the right renal vein. (d) The other branch coursed cranially and joined the hemiazygos vein.

not be eliminated. Pre-placement computed tomography (as used in our patient) is a more definitive solution for detecting IVC anomalies. This facilitates better planning, saves time, and reduces stress for the interventional radiologist.

Congenital IVC anomalies occur in less than 5% of the population, so it is not cost-effective to perform pre-placement computed tomography routinely. Besides, it also increases the radiation to the patient. However, if the patient has recurrent pulmonary embolism

shortly after the placement of an IVC filter, computed tomography could be helpful in revealing congenital IVC anomalies as the cause.

CONCLUSION

Congenital IVC anomalies are present in less than 5% of the population. Such patients may nevertheless be prone to recurrent pulmonary embolism after placement of IVC filters, if the anomalies appreciated before placement. Pre-placement computed tomography may not be cost-effective for all patients, but should be

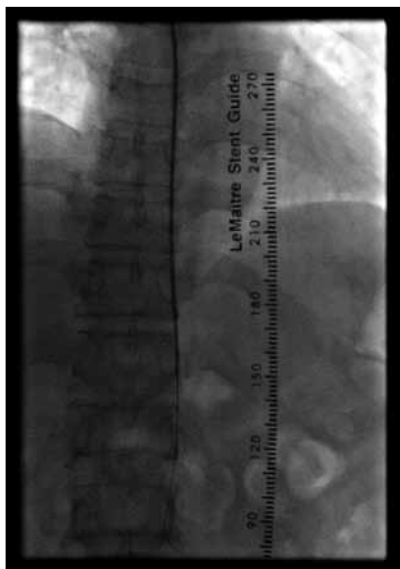


Figure 3. Selective cannulation of the hemiazygos vein.

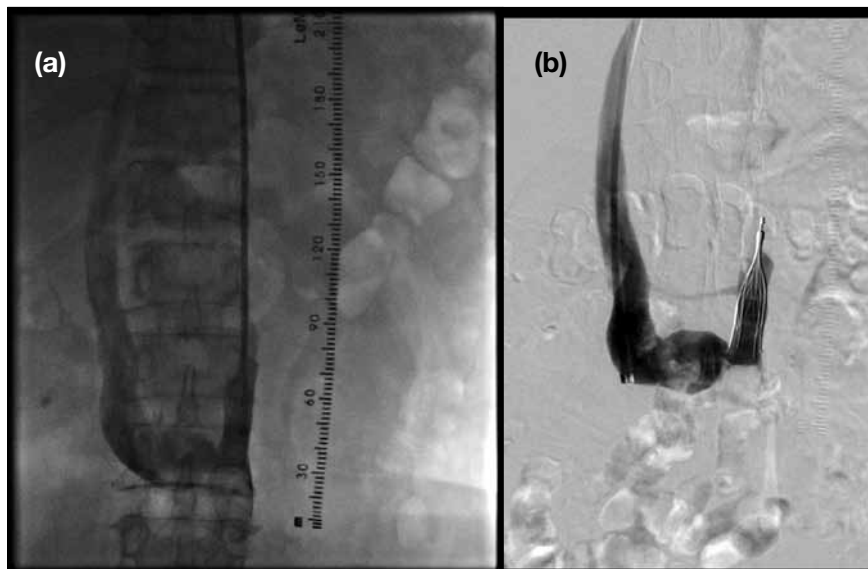


Figure 4. (a) A Cook Select inferior vena cava (IVC) filter (Cook Medical, Denmark, Europe) was deployed at the lower hemiazygos vein just below the left renal vein. (b) The venous long sheath is now at the right-sided IVC below the level of renal vein.



Figure 5. Another Cook Select inferior vena cava (IVC) filter (Cook Medical, Denmark, Europe) was deployed at the right IVC below the level of right renal vein.

considered for any patient enduring recurrent pulmonary embolism shortly after the placement of an IVC filter as a means of looking for congenital anomalies of the IVC.

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