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The Complication of Migration: To place or not to place an inferior vena cava filter?

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INTRODUCTION

The morbidity and mortality of pulmonary emboli (PE) and deep venous thrombosis (DVT) are significant. PE is responsible for approximately 200,000 deaths in the U.S. per year.[1,2] Inferior Vena Cava (IVC) filters are percutaneous, metal devices placed for prevention of DVT from embolizing to the pulmonary vasculature. The efficacy of the filters is controversial, as noted in a recent systematic review in which no recommendations could be made regarding their effectiveness based on the available data.[3] They are placed to prevent a potentially fatal PE, but there are also possible complications.

CASE

A 17-year old male presented to the Emergency Department September 5, 2009 complaining of severe right-sided abdominal pain. The pain began suddenly on the day of presentation, was sharp in quality and radiated to the epigastrum. He had a significant history of left knee arthroscopy with ACL repair on August 13, 2009 and subsequent postoperative left lower extremity DVT. His medical history is also complicated by a left thigh hematoma and evacuation following initiation of warfarin therapy for his lower extremity DVT. After the thigh hematoma, the warfarin was discontinued and an IVC filter was placed.

On evaluation of a CT scan of the abdomen and pelvis for his abdominal pain, it was noted that the IVC filter had migrated caudally and there was possible perforation of the filter into the duodenum. He was admitted to the MICU and the filter was retrieved via Interventional Radiology. There was no extravasation of the contrast to suggest caval perforation, but the radiologist noted that there was a centering strut missing from the filter.

A CT scan of the chest without contrast demonstrated that a bent filter strut was located in the right heart, extending from the base of the tricuspid valve into the proximal right ventricle. This was further evaluated by echocardiogram, which demonstrated mobile elements with lodgment in the right atrial/IVC juncture. Interventional Radiology retrieval was unsuccessful, partly due to multiple episodes of ventricular tachycardia from manipulation.

He was monitored in the hospital until the decision was made to leave the strut in the heart with likely granulation of the strut. Open heart surgery was considered and they did not proceed due to the stability of the strut on imaging. A follow-up CT scan on January 29, 2010 demonstrated that the strut was unchanged in position from discharge.

CONCLUSION

This case demonstrates two reported complications of vena cava interruption, filter migration and filter fracture. There are multiple case reports describing cardiac tamponade secondary to filter migration and fracture.[4-7] To date, the PREPIC Study Group is the only prospective trial evaluating to benefit of IVC filter use.[8] The study compared the use of anticoagulation alone to the placement of an IVC filter and anticoagulation. The primary outcome was occurrence of symptomatic pulmonary embolism. The patients included in this study where older with proximal DVT. They found that IVC filters reduced the risk of PE, but increased the risk of DVT and had no benefit on survival at eight years. There was no statistical significance of the rate of symptomatic PE at two years. Fifty percent of PE in the no-filter group occurred between two and eight years. The study considers the use of IVC filters and anticoagulation to be beneficial in high risk patients, which they described as 1) having a PE as the initial event, 2) PE in a non-surgical situation, and 3) idiopathic or cancer-associated PE. This patient's initial DVT was located in the left posterior tibial and peroneal veins and a repeat venous duplex prior the IVC filter placement demonstrated no evidence for deep vein thrombosis and resolution of the previously noted left calf DVT. In total, he had four venous duplex studies completed after the initial diagnosis, which were all negative for DVT. This case poses the question of the necessity of the intervention. He presented with a DVT without other comorbidities and the DVT was surgery related. His complications are rare, but there are case reports describing the potentially fatal outcomes of these complications. The occurrences of these complications are listed in Table 1.

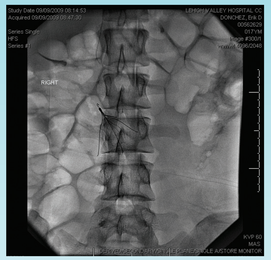

Figure 1. Fluoroscopic image of caudally migrated IVC filter prior to retrieval

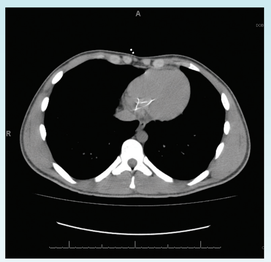

Figure 2. CT scan of the chest with centering strut visualized in right atria 9/17/09

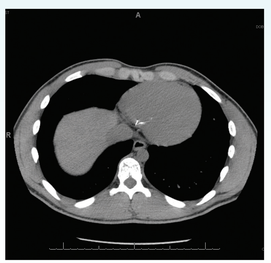

Figure 3. CT scan of the chest with centering strut visualized in right atria 1/29/10

TABLE 1

REPORTED COMPLICATION	PERCENTAGE (%)
Pulmonary Embolism	2-5%
Fatal Pulmonary Embolism	0.7%
Death Linked to Intervention	0.12%
Complications from Intervention	4-11%
Venous Insertion Site Thrombosis	2-28%
Migration	3-69%
Penetration	9-24%
Obstruction	6-30%
Venous Insufficiency	5-59%
Filter Fracture	1%
Guide Wire Entrapment	<1%

Adapted from: Update in Inferior Vena Cava Filters JVIR April 2003 [2]

There are guidelines that have been defined by the American College of Chest Physicians for the use of vena caval interruption, which are: [9]

1. Routine use of vena cava filter in addition to anticoagulants in not recommended (Grade 1A).
2. Placement of an inferior vena cava filter is recommended in patients with acute proximal DVT, if anticoagulant therapy is not possible because of the risk of bleeding (Grade 1C).
3. In patients with an IVC filter placed as an alternative to anticoagulation, it is recommended to subsequently treat with a conventional course of anticoagulant therapy if the bleeding risk resolves (Grades 1C).

Although complication rates of IVC filter placement have greatly improved, the risks are still present. This case is an excellent reminder of the importance of understanding the indications of an intervention, its effectiveness, and the potential complications.

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