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CASE REPORTS

Chest pain from excluded inferior vena cava filter after stent placement

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A 52-year-old patient presented with chronic substernal chest pain 18 months following exclusion of an inferior vena cava (IVC) filter with a self-expanding IVC stent. After a thorough work-up revealed no other possible cause of chest pain, the filter and stent were removed with subsequent resolution of chest pain. Intraoperatively, filter struts were found to have penetrated the posteromedial wall of the IVC and were abutting the periaortic neural plexus. Referred chest pain due to strut penetration of the caval wall is a novel complication of both IVC filters and IVC stents, demonstrating a need for continued surveillance. (J Vasc Surg: Venous and Lym Dis 2014;2:70-3.)

Retrievable inferior vena cava (IVC) filters are an increasingly popular method for short-term prevention of pulmonary emboli from proximal lower extremity deep venous thrombosis (DVT).[1,2] However, 10% to 15% of filters are unable to be endovascularly retrieved, most commonly due to fibrous attachments between filter struts and the IVC wall or significant thrombus in the filter.[3,4] Unretrievable filters increase risks of delayed complications from prolonged dwell time, including device fracture or migration, recurrent DVT, filter thrombosis, guidewire entrapment, and IVC penetration.[5,6] Although IVC penetration is common, clinically significant caval penetration is rare and usually presents with symptoms of back or abdominal pain.[7] The present case highlights a novel complication of IVC filter penetration resulting in unrelenting chest pain.

CASE REPORT

This report was exempted by the University of Virginia Institutional Review Board. A 52-year-old patient with a history of hypertension, hyperlipidemia, and multiple pulmonary emboli presented to an outside hospital with recurrent pulmonary emboli and a left iliofemoral DVT following prolonged immobility. An infrarenal OptEase (Cordis Corp, Bridgewater, NJ) IVC filter was placed to prevent further pulmonary embolization, and the patient was therapeutically anticoagulated. A complete hypercoagulability workup was performed and did not reveal any abnormalities. One month following filter placement, a repeat duplex ultrasound demonstrated resolution of the iliofemoral DVT. Filter removal was attempted but was unsuccessful, and the patient was referred to our institution. The patient was evaluated 6 weeks following IVC filter placement for removal. Initial fluoroscopic imaging demonstrated that the filter was significantly tilted (Fig 1, *A*). Given the risks of long-term IVC filter placement, multiple attempts at IVC filter removal were performed from both the right common femoral vein as well as the right internal jugular vein. The IVC filter was freed from the vessel wall, but the filter folded on itself (Fig 1, *B*) and could not collapse for retrieval into the sheath. Since the filter was essentially free-floating in the IVC, the filter was excluded from the IVC lumen using a 24-mm × 45-mm uncovered Wallstent (Boston Scientific, Natick, Mass) with serial balloon dilation to 25 mm (Fig 1, *C* and *D*). The patient tolerated the procedure with no apparent complications and was monitored overnight without complaints of pain.

The patient did well following filter exclusion with IVC stent placement until substernal chest pain developed 18 months afterward. The chest pain was severe and radiated to the abdomen, groin, and thighs. Given a history of recurrent thromboses, hypertension, and hyperlipidemia, the patient underwent extensive cardiac and pulmonary evaluations that included multiple echocardiograms, a cardiac stress test, cardiac catheterization, computed tomography (CT) pulmonary angiograms, and pulmonary function tests. The workup revealed no cardiac or pulmonary pathology. With no other potential source of persistent chest pain, the excluded IVC filter was considered a potential cause, and the patient was evaluated for filter and stent removal. Preoperative CT angiography demonstrated a patent stent with filter struts displaced posteromedially toward the aorta and vertebral column (Fig 2, *A* and *B*).

Operative details. In the operating room, the IVC was exposed from the right renal vein to the iliac veins via a midline laparotomy with mobilization of the duodenum (Fig 2, *C*).

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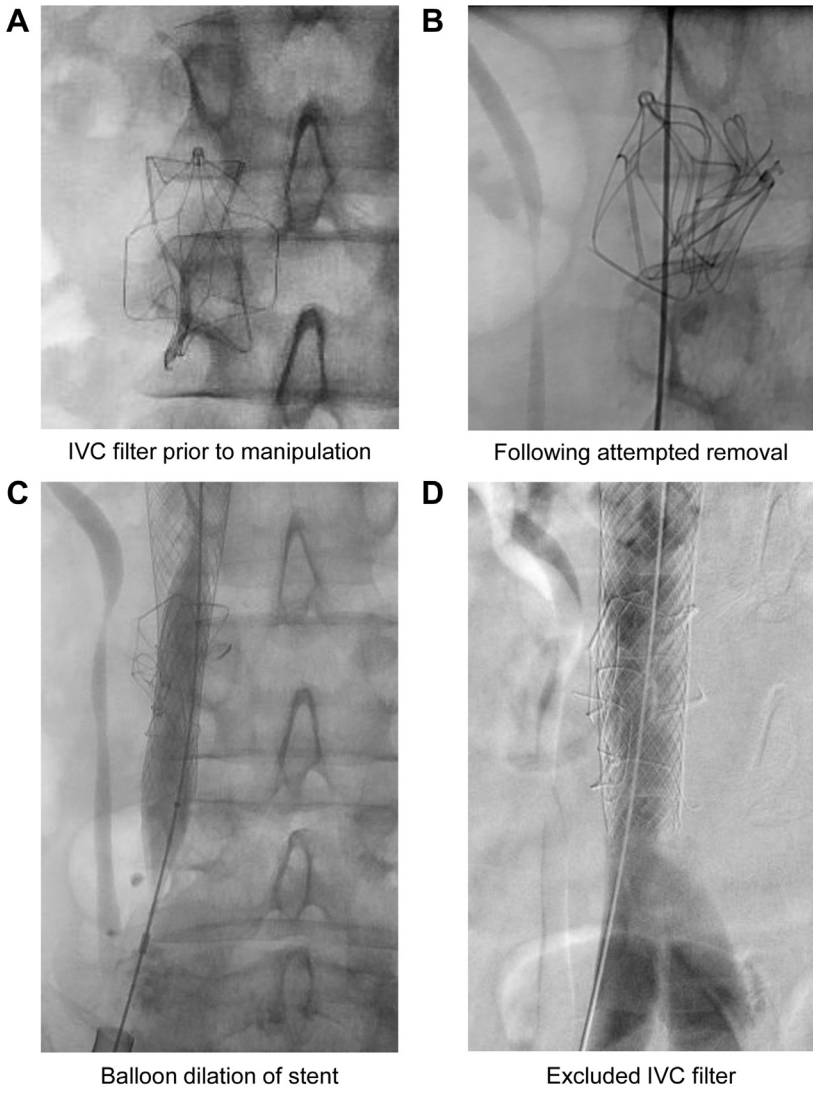

Fig 1. Venography demonstrating tilted inferior vena cava (*IVC*) filter **(A)** that significantly deformed following attempted removal **(B)** and was treated with stent exclusion **(C)**. Final venogram demonstrated patent IVC with exclusion of the IVC filter **(D)**.

Following anticoagulation, a vascular clamp was placed distally below the stent across the terminal IVC, and a proximal clamp was placed across the IVC above the right renal vein. Through an anterior venotomy, the filter was carefully dissected, and the struts were exposed. The filter struts had penetrated the posterior and medial wall of the IVC in two places and were abutting the aorta. The struts were divided with wire cutters, and the two venotomies were repaired with polypropylene sutures. The stent and filter were carefully removed (Fig 2, *D*), and the longitudinal anterior venotomy was primarily repaired (Fig 2, *E*). The clamps were removed, and the retroperitoneum and abdominal wall were closed in standard fashion.

Postoperatively, the patient did well with resolution of chest pain and was discharged on postoperative day 5. A CT scan performed 4 months following IVC stent and filter removal demonstrated complete removal of the stent and filter (Fig 2, *F*) with patency of the IVC.

DISCUSSION

The present case highlights two novel points. First, stenting the IVC to exclude an IVC filter has a risk of caval penetration and carries a risk of complication that is not mentioned in previous studies of IVC stenting for filter exclusion. Second, chest pain from IVC filter penetration has not been previously reported and represents a very unusual complication of IVC filter placement. Penetration of the IVC wall by the filter struts occurs in 4% to 38% of patients with filters, but clinically significant penetration of the duodenum, aorta, and ureter account for less than 1% of IVC filter penetrations.[7]