

Complex Semi-Permanent Inferior Vena Cava Filter Removal Requiring Surgical Intervention for Aortic Injury

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INTRODUCTION

- Complex retrieval of permanent or semi-permanent inferior vena cava (IVC) filters are often successful with complication rates around 5% [1].
- Retrieval techniques include balloon displacement, endobronchial forceps, or the excimer laser sheath technique.
- Although rare, complications that do occur may be life-threatening, and can include hemorrhage due to arterial injury, fracture and embolization of sections of the filter, and embedding of filter fragments into the vessel wall.

CASE REPORT

- A 49-year-old male with recurrent deep venous thrombosis (DVT) and pulmonary embolism secondary to protein C deficiency had an OptEase IVC filter placed in 2006.
- He presented with acute on chronic bilateral nonocclusive lower extremity DVT and a fractured, tilted infrarenal filter (Figure 1).
- Venography and thrombolysis of the lower extremities was performed with IVC filter removal the following day, but two filter fragments embedded in the caval wall were unable to be safely removed.
- He developed a tear in the IVC requiring temporary balloon occlusion and IVC stent placement with no residual extravasation (Figure 2).
- Overnight arteriogram demonstrated active bleeding from the right gonadal, L2 and L3 lumbar arteries, which were embolized with coils.
- Worsening symptoms prompted a repeat angiogram concerning for a small aortic perforation at the right L3 level (Figure 3).
- Vascular and trauma surgery took the patient for endovascular aortic endograft placement and exploratory laparotomy for retroperitoneal hematoma evacuation.
- Hemoglobin normalized during the remainder of the hospital stay, and he was discharged without further significant event.

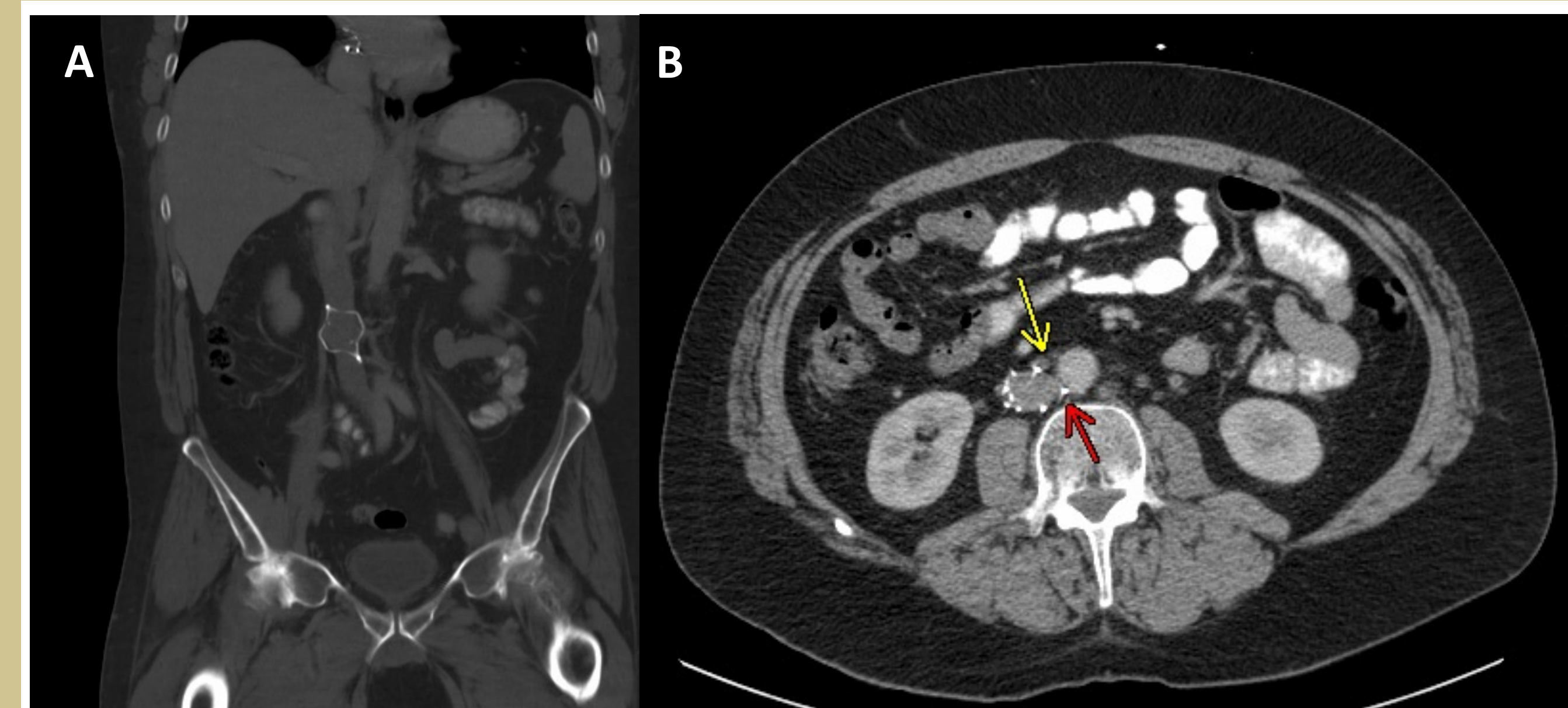


Fig. 1: Initial (A) coronal and (B) axial CT showing tilted and embedded OptEase filter. Note proximity of the right gonadal (yellow arrow) and L3 lumbar (red arrow) arteries to the penetrated filter struts.

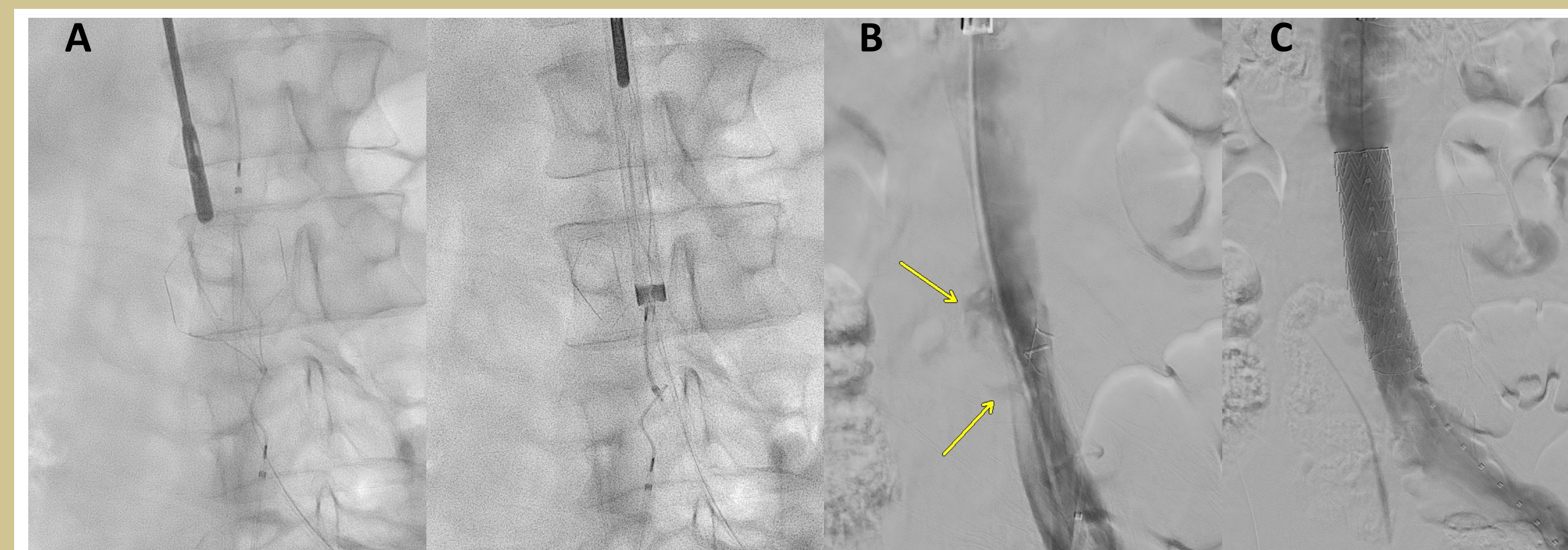


Fig. 2: (A) Spot fluoroscopic images from forceps IVC filter retrieval showing filter fracture and retained fragments. (B) Subtracted IVC venography with extravasation (yellow arrows), which persisted after prolonged balloon tamponade, (C) but resolved after stent grafting with Gore thoracic endograft.

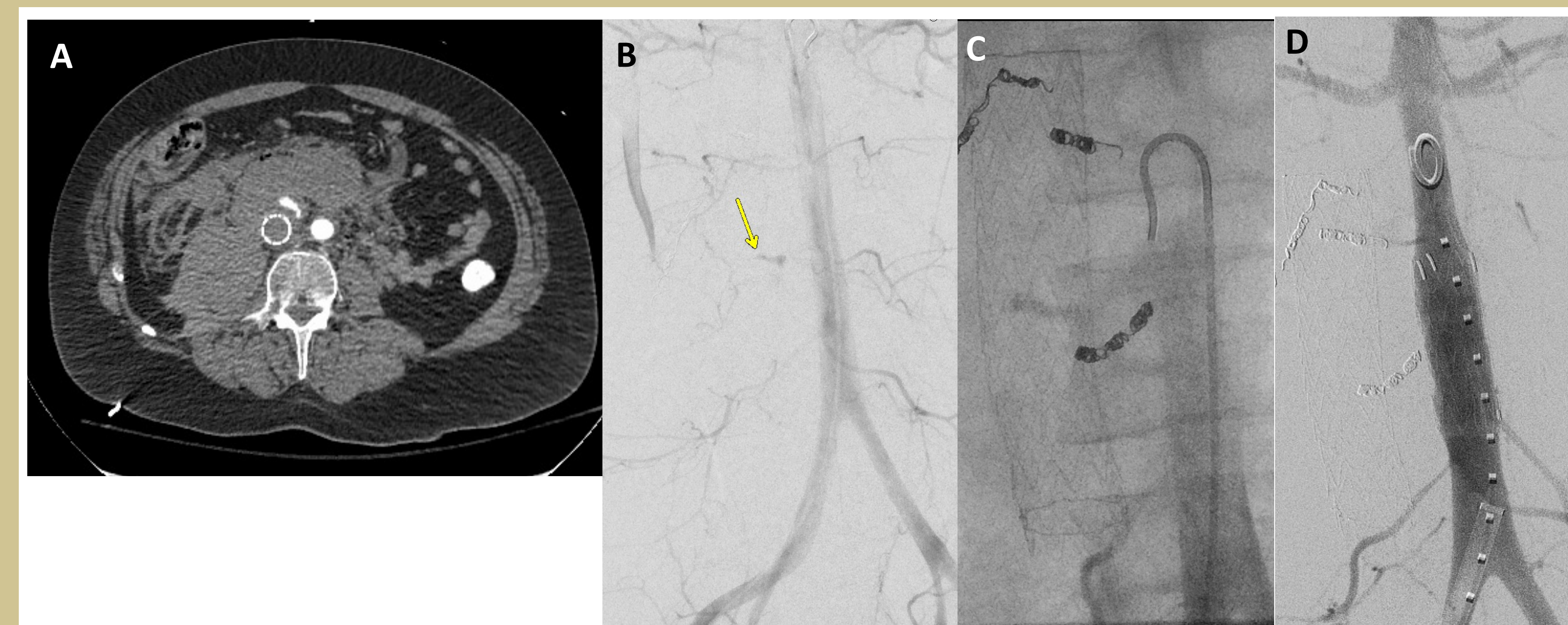


Fig. 3: (A) Axial CTA showing active arterial phase extravasation anterior to the IVC with large retroperitoneal hematoma. (B) Digital subtraction angiography (DSA) image from abdominal aortogram showing a similar focus of extravasation (yellow arrow). (C) Spot fluoroscopic image showing persistence of the same focus of extravasation despite coil embolization of the right L2/L3 lumbar and gonadal arteries. (D) Final DSA image shows resolution of the extravasation after stent grafting of the aorta.

DISCUSSION

- Although the implantation of IVC filters has continued to decline, complex retrievals of older filters occur more frequently secondary to evolving knowledge of their long-term complications.
- Safe removal strategies are necessary to minimize harm to the patient.
- Filters can become embedded due to fibrosis and hyperplastic tissue caused by chronic mechanical trauma and turbulent blood flow around a tilted filter [2].
- Removing these filters requires additional force and can increase the risk for vessel rupture and perforation. Endobronchial forceps are among the most reliable retrieval methods for embedded filters [3].
- Though reports of aortic perforations during filter retrieval are very rare, they can cause a patient to rapidly enter hemorrhagic shock and must be addressed immediately.

CONCLUSIONS

- This case emphasizes the challenges and unique risks of removing these filters, especially when multiple fracture fragments are present and the struts make long segments of wall contact, such is the case with OptEase and TrapEase filters.
- While uncommon, arterial injury is a dreaded complication of filter removal which should be anticipated and may occasionally require surgical intervention.

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