Oct 13th, 12:00 AM

Removal of Permanent IVC Filter

Sarah Aleman
LSU Health Sciences Center- New Orleans

Hector Ferral
LSU Health Sciences Center- New Orleans

Removal of permanent IVC filter

Sarah Aleman, Dr. Hector Ferral.
LSUHSC School of Medicine, Department of Interventional Radiology

Patient Presentation

A 53-year-old woman with history of Chron's disease was referred for inferior vena cava (IVC) filter removal with the diagnosis of a fractured IVC filter. At the time of evaluation, in early 2022, the patient reported back pain. No imaging was available when the patient was first seen.

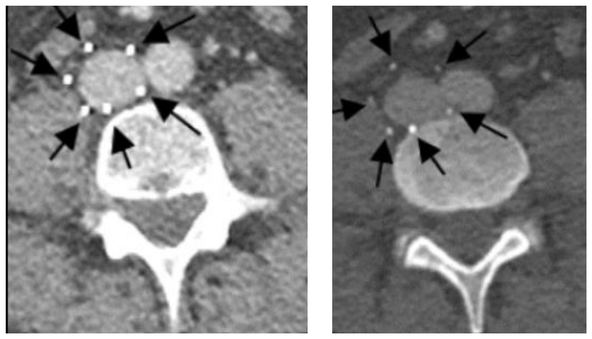
The IVC filter was originally placed in 2011. The indication for filter placement was the presence of deep vein thrombosis (DVT) shortly after small bowel resection. At the time, anticoagulation therapy was contraindicated.

Clinical Presentation

IVC filter placement is the treatment of choice for venous thromboembolism in patients with a contraindication to anticoagulation or anticoagulation therapy failure (1). Permanent IVC filters were designed to remain in the IVC after placement. Retrievable IVC filters were designed to allow the option to remove the filter when IVC filter is no longer required (2). Complications with retrievable IVC filters are higher when compared to permanent filters (2) and the FDA has recommended early removal of retrievable filters when these are no longer required. Removal of permanent IVC filters is controversial. Accepted indications for permanent IVC filter removal would include filter fracture or complications related to the presence of the filter. Filter strut penetration through the IVC wall can cause symptoms, including abdominal or back pain, and these may be quite bothersome to the patient, affecting their quality of life. Filter removal is not a complication-free procedure, prolonged filter dwell time may increase the risk of a complication during filter removal (1).

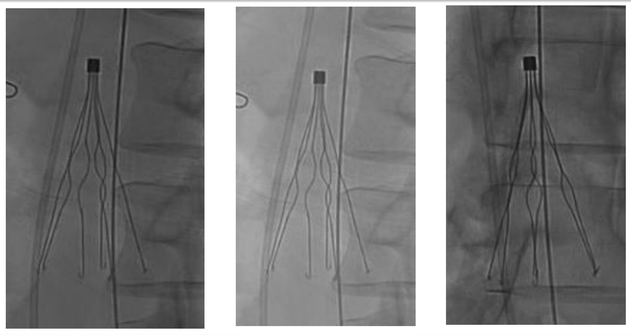
Removal of a permanent filter comes along with risk of hemorrhage, vessel perforation, or device fracture during retrieval. Because of these risks, the removal of a permanent filter is typically not recommended if the patient is entirely asymptomatic and if the filter is causing no known complications (3). However, when approaching a decision on whether or not to remove a filter, caution must be utilized. All aspects must be considered when making a decision including the patient's presentation, age, medical history, and the current filter status and position (1).

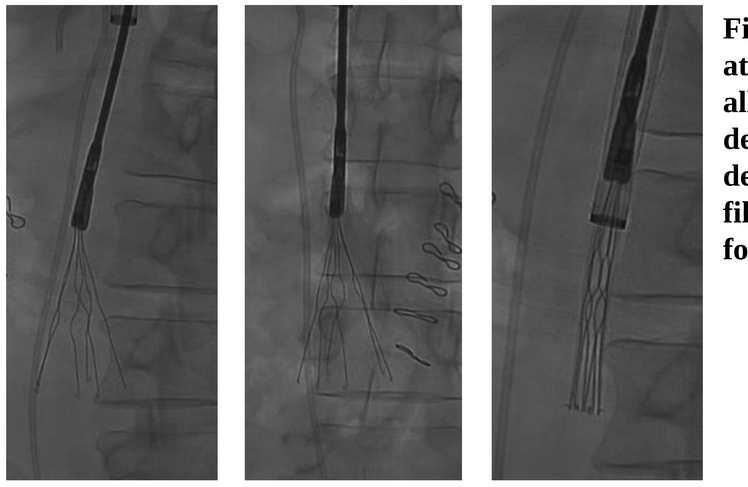
Images



Spectral CT images in the axial plane depict the legs at the lower end of the filter, with one in contact with the lumbar spine.

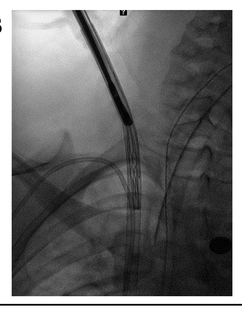
Radiographs in different projections show a permanent Stainless Steel Greenfield IVC filter with no identifiable fractures.





Filter removal was attempted using the alligator biopsy forceps device. Oblique views depict the apex of the IVC filter captured with the forceps.

Spot radiograph shows the IVC filter within the 20 Fr "Dry Seal" sheath (W.L. Gore, Flagstaff, AZ) captured with the forceps device.



Coronal view from a follow-up contrast enhanced CT scan one month after IVC filter removal shows a normal IVC.

Imaging Features

Imaging of an IVC filter allows for evaluation of the status of the filter including its exact positioning, degree of tilt, presence of penetration through the caval wall, or other complications (1). Imaging studies will provide the required information for deciding whether a filter should be removed and what removal procedures can be attempted.

Therapeutic Options

For patients with complications arising from permanent IVC filters, advanced techniques for filter removal must be utilized since these filters are designed to permanently embed into the wall of the IVC (5). These advanced methods of removal are associated with a 5.3% risk for complication comparative to standard techniques that carry only a 0.5% risk for complications. The risks of advanced filter removal procedures include hemorrhage, distortion or fracture of the filter, development of venous pseudoaneurysms or stenoses, and breach of the IVC wall integrity (1).

The endobronchial forceps technique has been described as an effective and safe method for IVC filter removal, as illustrated in the present case (1).

References

1. Daye D, Walker TG Novel and Advanced Techniques for Complex IVC Filter Retrieval. Curr Treat Options Cardiovasc Med 2017;19 (4):28
2. Andreoli JM, Lewandowski RJ, Vogelzang RL, Ryu RK Comparison of complication rates associated with permanent and retrievable inferior vena cava filters: a review of the MAUDE database. J Vasc Interv Radiol 2014;25 (8):1181-1185
3. Lee C, Stavropoulos SW, Kuo WT Routine Removal of Inferior Vena Cava Filters. N Engl J Med 2022;386 (22):2149-2151
4. Chen J, Castle JC, Makary MS, Yang X, Dowell JD Greenfield stainless steel vena cava filters on computed tomography follow-up. J Vasc Surg Venous Lymphat Disord 2020;8 (5):762-768
5. Kuo WT, Doshi AA, Ponting JM, Rosenberg JK, Liang T, Hofmann LV Laser-Assisted Removal of Embedded Vena Cava Filters: A First-In-Human Escalation Trial in 500 Patients Refractory to High-Force Retrieval. J Am Heart Assoc 2020;9 (24):e017916

This research project was supported through the LSU Health Sciences Center, School of Medicine.