IVC Filter: Friend

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Background

Inferior Vena Cava (IVC) filters are utilized in the setting of pulmonary embolism that is resistant to anticoagulation, patients with contraindications to anticoagulation that have DVT involving the iliac or femoral veins, and in high-risk patients where complications necessitate the cessation of anticoagulation therapy. There are three major kinds of IVC filters: permanent filters that are not removed, retrievable filters that may be removed if desired, and temporary filters that are expected to be removed. Typically, these filters are placed infrarenal to reduce the risk of renal thrombosis, with the tip of the filter seen on angiography or by radiography at the level of the renal veins.

Deep vein thrombosis is common in the hospital setting secondary to chronic inflammatory states, immobile patients, cancer patients and long lengths of stay. On a normal basis, DVT prophylaxis is achieved with NOACS, heparin, or low molecular weight heparin for anticoagulation.

Indications for IVC Filter

In those patients where bleeding poses a significant risk, IVC filter placement is preferred for pulmonary embolism prevention. The only validated indications for IVC filter placement are an inability to administer anticoagulation because of:

- Concurrent intracranial bleeding
- Bleeding diathesis
- Platelet count of less than 50,000/μL
- Recent planned or emergent surgical operation
- Major trauma
- History of heparin induced thrombocytopenia (HIT) Development of DVT while on therapeutic anticoagulation.

Case Presentation

- A 52-year-old male with relevant past medical history of recurrent lower extremities deep vein thrombosis and inferior vena cava filter placement in 2017 presented to the Emergency Department (ED) with right lower quadrant abdominal and right sided back pain that began several days prior after consuming a meal. He denied nausea or vomiting and states that it was a constant 10/10 pain that was not relieved by Percocet. His wife noted that he was having trouble with speaking and there was a question of facial droop that day. This was similar to a transient ischemic attack (TIA) he had several years prior, and insisted he go to the hospital.
- His speech symptoms had improved upon examination in the ED, with mild persistent numbness of the left side of his face and upper extremity, however CT of the abdomen and pelvis performed on his presentation demonstrated infiltration of his inferior vena cava filter into the anterior surface of his L3 vertebral body, with another fragment extending into his aorta. Vascular Surgery was consulted, and recommended nonsteroidal antiinflammatory medication and follow-up as an outpatient. The patient was subsequently admitted for pain control.

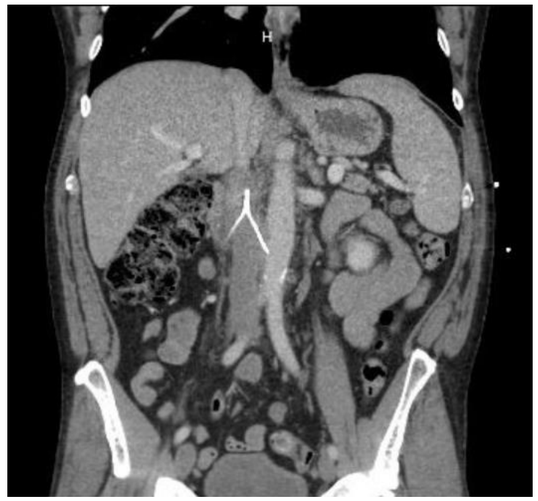

Figure 1. Coronal View IVC Filter infiltration into ascending aorta

Figure 3. Transverse View IVC Filter infiltration into ascending aorta and surrounding mesentery and L3 Vertebral Body with Encasement

Figure 2. Transverse View IVC Filter infiltration into ascending aorta and mesentery

Figure 4. Coronal View IVC Filter Penetrating L3 Vertebral Body with Encasement

Discussion

Complications of IVC filter placement vary with the type of filter used, its location, duration of filter placement, and comorbidities. Retrievable filters have consistently shown an increased rate of post-procedure and filter retrieval complications compared to permanent filters. These complications include filter fracture, thrombosis and perforation, particularly when they are left longer than intended. In our case, he had a retrievable filter that had been in place for approximately three years, putting him at increased risk for filter perforation. Our case clearly shows penetration into the abdominal contents causing his very rare presentation of pain.

Filters can be inserted from either a transfemoral or transjugular approach, and complications include:

- Inability to cannulate the vein
- Incorrect anatomic position of the filter, including placement into the hepatic veins and suprarenal IVC
- Hematoma
- Air Embolism
- Pneumothorax
- Hemothorax
- Wound infection
- Thrombosis at the insertion site

Late complications that arise from filter insertion include:

- Filter migration and tilting
- Fracture of filter struts
- Perforation of the IVC wall by filter struts
- IVC thrombosis and lower extremity swelling

Conclusion

As shown by our patient, IVC filter complications are not limited to insertion of the device. Distal filter migration, strut erosion, and perforation of the IVC wall and surrounding structures, and the small ongoing risk of pulmonary embolism, all represent real complications.

References

1. Fernandez-Moure JS, Kim K, Zubair MH, Rosenberg WR. Case report on the non-operative management of a retrievable inferior vena cava filter perforating the duodenum. Int J Surg Case Rep. 2017;39:60-63. doi:10.1016/j.ijscr.2017.06.062
2. Lowe G.D. Common risk factors for both arterial and venous thrombosis. Br. J. Haematol. 2008;140(5):488–495.
3. Knudson M.M., Lewis F.R., Clinton A., Aitkinson K., Megerman J. Prevention of venous thromboembolism in trauma patients. J. Trauma Acute Care Surg. 1994;37(3):480–487.
4. Sørensen H.T., Mellemkjær L., Steffensen F.H., Olsen J.H., Nielsen G.L. The risk of a diagnosis of cancer after primary deep venous thrombosis or pulmonary embolism. N. Engl. J. Med. 1998;338(17):1169–1173.
5. Che Yaakob C.A., Dzarr A.A., Ismail A.A., Zuky Nik Lah N.A., Ho J.J. Anticoagulant therapy for deep vein thrombosis (DVT) in pregnancy. Cochrane Database Syst. Rev. 2010;6:CD007801.

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