

➤ **Case Report** ◀

# Successful Percutaneous Retrieval of IVC Filter with Wide Retroperitoneal Penetration Presenting with Gastrointestinal Bleeding

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Symptomatic penetration of the retroperitoneal structures by inferior vena cava (IVC) filter is a rare clinical entity. Vast majority of these patients require laparotomy and open retrieval of the filter. We report a case of a filter penetrating into the duodenum within two months of implantation resulting in gastrointestinal bleeding. The patient was successfully managed with percutaneous retrieval of the filter, blood transfusion and serial abdominal examination thus avoiding laparotomy.

**Keywords:** inferior vena cava (IVC), IVC filter, penetration

## Introduction

Inferior vena cava (IVC) filters have been used since 1970s for treatment of patients at high risk for developing pulmonary embolus due to deep vein thrombosis who are not appropriate candidates for pharmacologic anticoagulation.<sup>1)</sup> Despite the benefits of inferior vena cava filters in these patients, there are significant risks of filter placement. An exceedingly rare complication of filter placement is penetration of the filter through the wall of the vena cava and into adjacent retroperitoneal structures.<sup>2–4)</sup> The incidence of filter penetration increases with the duration of time since the filter implantation. Most of the filter penetration is reported months to years after implantation. Though most of the filter penetration is asymptomatic, symptomatic filter penetration usually requires open retrieval of the filter.<sup>3)</sup> We report an unusual case of a filter placement with erosion of the filter into the adjacent duodenum presenting with gastrointestinal (GI) bleeding within 2 months of implantation. The patient was man-

aged successfully by percutaneous retrieval of the filter.

## Case Report

A 43-year-old gentleman presented with traumatic brain injury secondary to an assault. During his hospitalization, he developed bilateral sub segmental pulmonary emboli. Patient developed new emboli despite therapeutic anticoagulation. Patient underwent Celect IVC filter (Cook Medical, Bloomington, IN, USA) placement, which occurred without complication. After he was discharged from this hospitalization, he returned two months later with melena and acute kidney injury. Laboratory tests demonstrated hemoglobin of 5.1 g/dL, a significant drop from his hemoglobin of 11 g/dL prior to his previous discharge. Gastroenterology was consulted to perform esophagogastroduodenoscopy, which demonstrated struts of the filter within the lumen of the second portion of the duodenum. Vascular surgery was subsequently consulted for IVC filter removal in the setting of GI hemorrhage secondary to penetration of the duodenum by the filter. Computed tomography (CT) scan demonstrated all the filter legs penetrating outside of IVC (Fig. 1). At least two legs penetrated the duodenum, third leg was embedded into the right psoas muscle and the fourth one lodged behind the aorta. Plain abdominal film demonstrated grossly deformed filter struts (Fig. 2). A decision was made to perform percutaneous retrieval of the filter with an option of open retrieval if the percutaneous approach was unsuccessful. The procedure was performed two days later after he was transfused five units of packed red blood cells increasing hemoglobin count to 11.7 g/dL.

The procedure was performed under general anesthesia in supine position. Neck, chest, abdomen, and upper thighs were prepped and draped. Right internal jugular vein was accessed percutaneously under ultrasound guidance. Gunther Tulip Vena Cava filter retrieval sheath (Cook Medical, Bloomington, IN, USA) was advanced over a guidewire down the vena cava to the level of the filter. Cavogram demonstrated no extravasation or adherent

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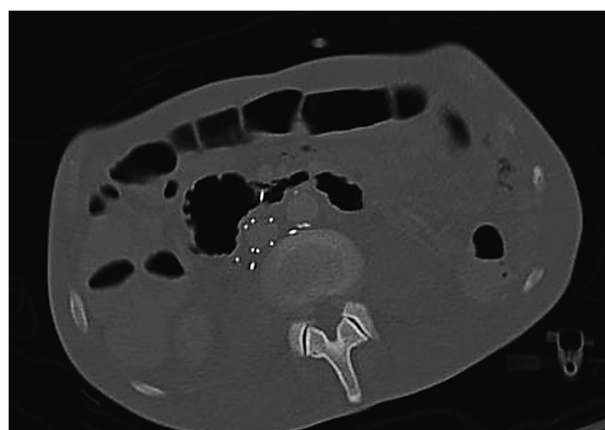


thrombus. Retrieval snare was engaged at the hook of the filter, collapsing the filter into the sheath. Finally, filter was retrieved into the inner sheath. Post-retrieval cavogram once again demonstrated no extravasation. Hemostasis was achieved at the puncture site with manual pressure.

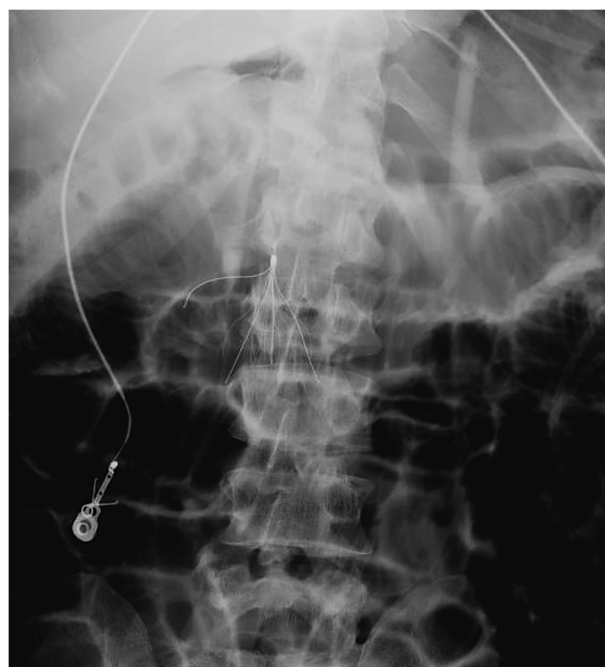
Post-procedurally, the patient was monitored in the intensive care unit (ICU) setting with serial lab works, continuous hemodynamic monitoring and serial abdominal exam. Forty-eight hours after the procedure, patient remained stable and was transferred to the floor. Patient did not require any further transfusion. Patient was tolerating regular diet and had hemoglobin of 12 g/dL at the time of discharge. Gastroenterology team did not feel that follow up esophagogastroduodenoscopy was warranted, given that the patient did not have peritoneal signs and there was no pneumoperitoneum on follow up abdominal films. Patient was maintained on proton pump inhibitor to prevent from postoperative duodenal perforation at the site of penetration.

## Discussion

In recent times, there has been increasing concern about the long term complications of IVC filters.<sup>5)</sup> The current paradigm has been that in the event a patient with an IVC filter has a complication due to penetration of the filter, into GI tract or otherwise outside of the vena cava, the patient usually requires open filter retrieval.<sup>6)</sup> Open retrieval of the filter is favored mostly due to the fact that wide penetration with kinked struts would pose significant technical difficulty and low success rate of percutaneous retrieval. Also, open approach allows the opportunity to address GI tract pathology like perforation, bleeding simultaneously. However open surgical retrieval is associated with prolonged surgical time, high risk of intraoperative complications and prolonged recovery time. There are few reports of cases of widely penetrating undergoing percutaneous retrieval without significant procedural complication.<sup>7)</sup> The hypothesis for the success of these interventions is that, with time, fibroblastic reactions to this foreign body have allowed for removal of the filter with vessels or GI tract sealing off the site of perforation. In this instance, we felt this patient was a suitable candidate for a percutaneous retrieval, even with significant migration and penetration of his filter in the short interval since filter placement. A great deal of data regarding filter retrieval secondary to complications discusses patients who had IVC filter placement many years before.<sup>8,9)</sup> With less than three months to symptomatic wide penetration, it is less defined whether a percutaneous or open retrieval would be the ideal approach, as this is a rare occurrence. Based on our limited experience, we believe that degree and duration of penetration does not necessarily preclude



**Fig. 1** CT abdomen 2 months post implantation. Note all 4 primary filter struts outside of IVC with one of the legs penetrating into the duodenal lumen.



**Fig. 2** Plain abdominal film showing grossly deformed filter struts.

percutaneous retrieval in symptomatic patients. As long as the team can perform open retrieval in case of failed percutaneous attempt and can monitor patient closely for GI complications postoperatively, it is advisable to proceed with percutaneous retrieval. In our case, the patient consented for conversion to an open surgery. He was also informed about the possibility of laparotomy if he had continued to have symptoms pertaining to hemorrhage from the vena cava or due to duodenal perforation despite successful percutaneous retrieval of the filter. With regards to why there was so wide and so early penetration by the filter, we believe the design of the filter itself probably played a major role. Bos et al. have reported that Celec

IVC filter had 28.5% incidence of strut penetration more than 3 mm outside caval wall as seen on a follow up abdominal CT scan.<sup>10)</sup>

## Conclusion

Wide symptomatic perforation of the IVC filter does not necessarily mandate open retrieval. All patients with symptoms that require filter retrieval can be managed with percutaneous first approach with open surgical backup in case of failure to retrieve by percutaneous approach. By this approach, the morbidity and technical difficulty of an open surgery can be avoided with an added benefit of short postoperative recovery time.

## Disclosure Statement

All authors have no conflict of interest.

## Author Contributions

Study conception: AS, EW, AJD

Data collection: JMB, AS

Investigation: AS, JMB

Writing: AS, JMB

Critical review and revision: all authors

Final approval of the article: all authors

Accountability for all aspects of the work: all authors

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