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. 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. 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 managed 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. 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. 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
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 abdomi-
nal 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 toler-
ating regular diet and had hemoglobin of 12 g/dL at the
time of discharge. Gastroenterology team did not feel that
follow up esophagastroduodenoscopy 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.5) 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 pa-
tient usually requires open filter retrieval.6) 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 associ-
ated with prolonged surgical time, high risk of intraop-
erative complications and prolonged recovery time. There
are few reports of cases of widely penetrating undergoing
percutaneous retrieval without significant procedural
complication.7) 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 can-
didate 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.8,9) 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
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 pro-
cceed 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 Celect
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.\(^{10}\)

**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

**References**