CASE REPORT – OPEN ACCESS

International Journal of Surgery Case Reports 39 (2017) 60–63

Contents lists available at ScienceDirect

International Journal of Surgery Case Reports

journal homepage: www.casereports.com

Case report on the non-operative management of a retrievable inferior vena cava filter perforating the duodenum

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ARTICLE INFO

Article history:
Received 11 April 2017
Received in revised form 23 June 2017
Accepted 25 June 2017
Available online 10 July 2017

Keywords:
Filter
Perforation
Duodenum
Melena
Inferior vena cava

ABSTRACT

INTRODUCTION: Deep vein thrombosis (DVT) continues to be a significant source of morbidity for surgical patients. Placement of a retrievable inferior vena cava (IVC) filter is used when patients have contraindications to anticoagulation or recurrent pulmonary embolism despite therapeutic anticoagulation. Although retrievable IVC filters are often used, they carry a unique set of risks.
PRESENTATION OF CASE: A 67-year-old man presents to the Emergency Room (ER) following large volume melena and complaining of syncope. One year prior, the patient had been diagnosed with Glioblastoma multiforme, for which he underwent a craniotomy with near-total resection of the mass. He subsequently developed a deep vein thrombosis and underwent placement of a retrievable inferior vena cava (IVC) filter. Computerized tomography (CT) and esophagogastroduodenoscopy showed duodenal perforation by the retrievable IVC filter. The filter was successfully retrieved through an endovascular approach.
DISCUSSION: Retrievable IVC filter placement is the preferred method of pulmonary embolism prevention in patients with significant risk for bleeding. Duodenal perforation by a retrievable IVC filter is a rare and serious complication. It is usually managed surgically, but can also be managed non-operatively.
CONCLUSION: For patients with significant comorbidities or patients who are poor surgical candidates, non-operative management with close monitoring can serve as an initial approach to the patient with a caval enteric perforation secondary to a retrievable IVC filter.

1. Introduction

Deep vein thrombosis (DVT) continues to be a significant source of morbidity for surgical patients [1]. The physiologic conditions that predispose a patient to the development of DVT are stasis, endothelial injury, and inflammation; these are known as Virchow's Triad [2]. Other risk factors for DVT are cancer, pregnancy and trauma [3–5]. Once a DVT is diagnosed, treatment is required and consists of therapeutic anticoagulation or inferior vena cava interruption via filter placement.

The only other treatment option for DVT in patients with significant risk for bleeding is placement of inferior vena cava (IVC) filters [6]. The primary indications for IVC filters include contraindications to anticoagulation and recurrent pulmonary embolism despite therapeutic anticoagulation; IVC filters can also be used as an adjunctive therapy in people with poor cardiopulmonary capacity or respiratory and hemodynamic compromise [7,8]. However, this modality of treatment carries its own risks, such as IVC penetration (0–41%), IVC occlusion (2–40%), access site thrombosis (0–25%), insertion complication (5–23%), filter migration (0–18%), filter fracture (2–10%), IVC filter deployment outside of the target region (1–9%), recurrent pulmonary embolism (PE) (0.5–6%), filter embolization (<1%), and death (0.12%) [3,9]. Inferior vena cava perforation can cause significant hemorrhage and can result in a surgical emergency. In this case study, we report on the management of duodenal perforation by an indwelling retrievable IVC filter resulting in gastrointestinal bleed. This work has been reported in line with the SCARE criteria [19].

2. Case report

A 67-year-old Chinese man presented to the emergency room (ER) following large volume of melena and complaining of syncope. Approximately one year earlier, the patient was diagnosed with Glioblastoma multiforme (GBM), for which he underwent a craniotomy with near-total resection of the mass. He subsequently developed a deep vein thrombosis during the course of his

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http://dx.doi.org/10.1016/j.ijscr.2017.06.062

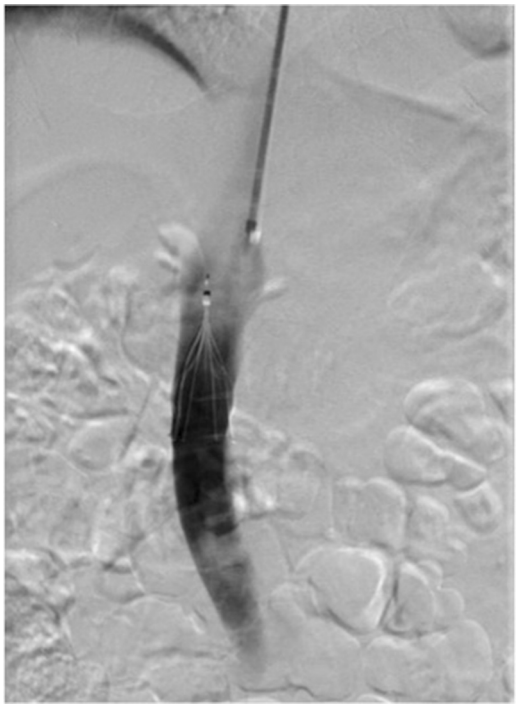

Fig. 1. Angiogram of retrievable IVC filter placement in inferior vena cava.

initial hospitalization and underwent placement of a Cook Celect Platinum filter, a retrievable IVC filter, because of his significant bleeding risk (Fig. 1). The patient was in his usual state of health when he presented to the ER with melena and syncope.

Two days prior to his presentation in the ER, the patient reported having a large-volume maroon-colored bloody bowel movement followed by a moderate volume of bright red blood, which eventually stopped after 2 h. The patient did not seek medical attention during or immediately after this episode. The following morning, the patient had another bowel movement of bright red blood that soaked his bed sheets. The patient reported some dizziness and presyncope after trying to get up following the bloody bowel movement. The patient was then taken to an outside emergency room by his family where he was found to be in hemorrhagic shock with hemoglobin of 4.6 g/dL and a systolic blood pressure of 60 mmHg.

After resuscitation with crystalloid intravenous fluids and four units of packed red blood cells, the patient was transferred to our institution for higher level of care. On arrival, the patient continued to require blood transfusions. Once the patient stabilized, his physician ordered computed tomography (CT) scans of the abdomen and pelvis; these revealed an infrarenal IVC filter with tines extending beyond the wall of the inferior vena cava and into the lumen of the distal second and proximal third portion of the duodenum (Fig. 2). One of the tines also extended close to, but did not clearly transgress, the proximal right ureter. There was no retroperitoneal hematoma or pneumoperitoneum.

The surgical team was consulted by the admitting physician. Following initial evaluation, an esophagogastroduodenoscopy (EGD) was ordered to evaluate the extent of duodenal perforation and whether any active bleeding communication was present. Endoscopic evaluation of the patient showed the retrievable IVC filter tines perforating the second part of the duodenum, although there was no evidence of gross blood (Fig. 3). The patient was hemodynamically stable without any evidence of melena or hematochezia and had stable hemoglobin of 9.8 g/dL.

Based on the patient's hemodynamic stability, the absence of active bleeding, and the extreme risk of an open procedure to remove the filter, the team elected to pursue endovascular removal of the retrievable IVC filter rather than surgery. The retrievable IVC filter was successfully retrieved through an endovascular approach and the patient was monitored for bleeding (Fig. 4). The patient did well without any complications following the endovascular retrieval of the retrievable IVC filter. A bleeding scan was ordered to confirm the absence of bleeding, and the study was negative. The patient resumed an oral diet and was subsequently discharged home.

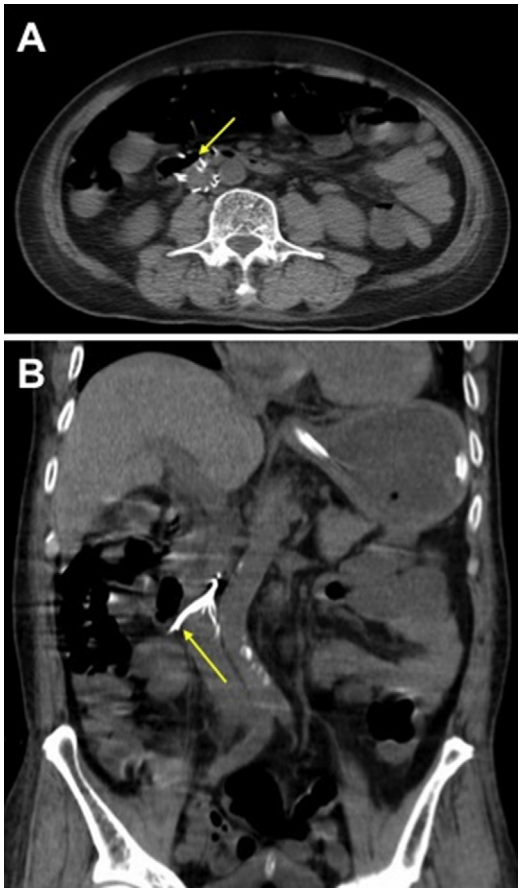

Fig. 2. (A and B) Axial and coronal CT views of abdomen and pelvis demonstrating the perforation of retrievable IVC filter tines through IVC into duodenum (yellow arrows). (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

3. Discussion

Deep vein thrombosis is commonly encountered in clinical practice with significant amount of morbidity and mortality. In cases where bleeding poses a significant risk, IVC filter placement is the preferred method of pulmonary embolism prevention. The only validated and precise indications for IVC filter placement in patients with thromboembolism are an inability to administer anticoagulation because of concurrent pathologies such as 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), and development of DVT while on therapeutic anticoagulation.

Up until 1967, surgical interruption of the inferior vena cava (IVC) to prevent pulmonary embolization was performed with general anesthesia via a retroperitoneal incision. It was not until after 1967 that transvenous interruption of the IVC (via direct venous