

Duodenal Perforation Caused by an Inferior Vena Cava Filter

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The inferior vena cava (IVC) filter is known as an effective and safe method for preventing fatal pulmonary thromboembolism in patients with deep vein thrombosis. Usually, the remaining IVC filters are asymptomatic and do not cause clinical problems. We report a case of duodenal perforation caused by a remaining IVC filter.

Key words: 1. Venous disease
2. Complication
3. Foreign bodies
4. Penetrating trauma
5. Vena cava filters

CASE REPORT

A 33-year-old female patient presented at the emergency room with epigastric pain, nausea, and vomiting that had persisted for a day. The patient had a history of child birth eight months prior, and had proximal deep vein thrombosis (DVT) on the left common femoral vein during the 36th week of pregnancy. An inferior vena cava (IVC) filter had been inserted instead of anticoagulation due to the high risk of bleeding during pregnancy. Anticoagulation therapy was administered immediately after the birth of her child. Removal of the IVC filter was recommended one month after insertion, but the patient refused for personal reasons. On arriving at the emergency room, her vital signs were stable and the laboratory examination did not show abnormalities other than mild leukocytosis. The patient's prothrombin time international normalized ratio value at the emergency room was 1.31 due to irregular intake of warfarin. A computed tomography

(CT) scan revealed that one of the IVC filter legs had penetrated the IVC wall and caused a duodenal perforation (Fig. 1). There was no evidence of thrombi in the lower IVC. An endoscopy was performed to evaluate the severity of duodenal injury. A protruding IVC filter leg was observed in the lumen of the third portion of the duodenum (Fig. 2). In addition, the duodenum mucous membrane on the opposite side showed erythema, erosion, and nodular changes, resembling chronically progressing penetration.

An emergency laparotomy was performed in order to remove the IVC filter and to repair the duodenum. Because there were concerns regarding the possible IVC rupture during surgery, a cannula was placed in the superior vena cava to provide extracorporeal circulation when needed. Also, the femoral artery and femoral vein were isolated for cannulation. The portions of the IVC and the duodenum, including the penetrations, were isolated behind the colon. When the duodenum was lifted up, we found the IVC filter leg between

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Fig. 1. Computed tomography shows one of the inferior vena cava filter legs (arrow) penetrating the inferior vena cava wall and causing penetration into the duodenum.

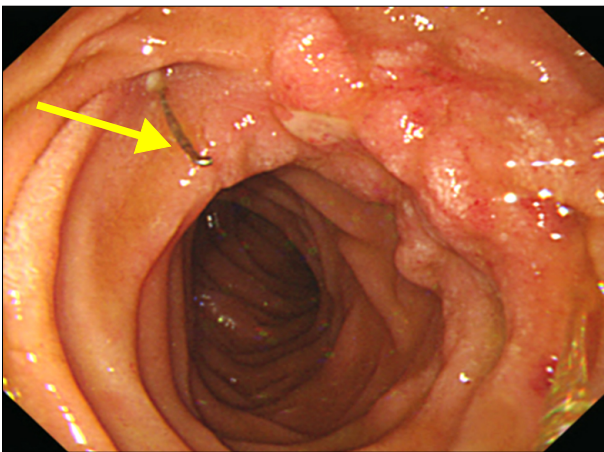


Fig. 2. Endoscopy shows protruding inferior vena cava filter leg (yellow arrow) in the lumen by penetrating the third portion of duodenum. In addition, the duodenum mucous membrane on the opposite side showed erythema, erosion, and nodular changes, resembling a chronically progressing penetration.

the IVC and the duodenum. We then cut the IVC filter leg and removed the IVC filter leg remnant from the duodenum portion. The duodenal perforation was repaired directly. The IVC was found to be densely adhered to the surrounding tissue including the aorta, and fixed to the adjacent structures. We concluded that isolation and removal of the IVC filter leg remnant in the IVC were more dangerous due to the risk of rupture. The remaining leg protruding from the IVC side to the duodenum was cutoff and removed (Fig. 3).

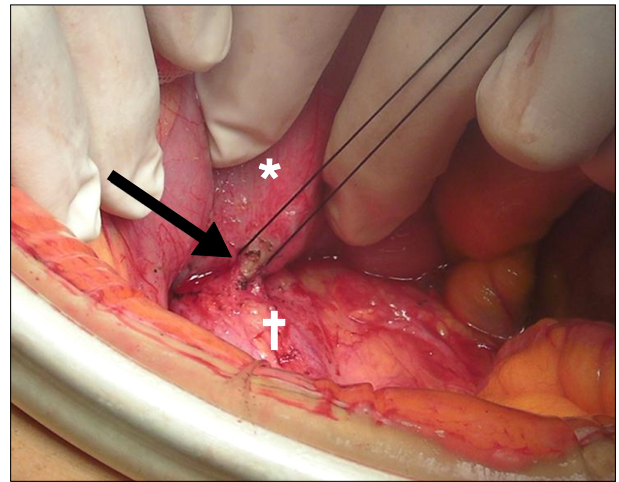


Fig. 3. The duodenum was lifted up, and the inferior vena cava (IVC) filter leg (arrow) between the IVC (†) and duodenum (*) was cut.

After the surgery, ileus occurred and the patient started to eat by mouth after 14 days. The patient was discharged on the 20th postoperative day without any complications. The patient returned to work and is currently under follow-up observation.

DISCUSSION

The IVC filter is known as an effective and safe method for preventing fatal pulmonary thromboembolism in patients with deep vein thrombosis. The IVC filter is indicated in DVT patients when any of the following symptoms are present: contraindication of anticoagulation, major bleeding, need for surgery within 2 weeks, severe and prolonged thrombocytopenia, and recurrent DVT disease despite anticoagulation. Complications related with the IVC filter can be categorized as insertion-related complications, device failure, and late complications [1]. Insertion-related complications include pneumothorax, hemorrhage, filter misplacement, excessive tilt, and vascular injury. Late complications include recurrent pulmonary embolus, caval occlusion, filter migration, and filter leg perforation. Filter leg perforation occurs very frequently. In a review of collected case series, the titanium Greenfield filter showed a 3.5% perforation rate, the stainless steel Greenfield filter showed a 4.4% rate, the Bird's Nest filter

showed a 38% rate, and the Simon nitinol filter showed a 37% rate [2]. Most patients with perforations do not show any symptoms and the perforation rarely causes clinical problems [3]. However, there are cases where the filter can damage surrounding organs and cause severe complications in the aorta, duodenum, ureter, or retroperitoneal space [4-6]. Pulsation of the aorta and respiratory motion are thought to be the main cause of caval penetration of the filter leg [7]. In our case, the cause of the IVC wall penetration seemed to be chronic progression of the IVC filter leg, nine months after the IVC filter insertion; subsequently, it finally penetrated into the duodenum. Based on the preoperative CT venography, the IVC flow was maintained and there was no DVT below the IVC level. Also, based on the observations in the operation room, dense adhesion around the IVC and firmly fixed IVC filter itself was found. Although cardiopulmonary bypass was in standby before surgery, removal of the IVC filter was thought to be more risky. Thus, a partial resection of the IVC filter leg that was penetrating the duodenum was performed, and the IVC was reinforced.

Currently, the IVC filter is widely used and only 50% of them are removed from patients [8]. Most of the remaining IVC filters are asymptomatic and do not cause clinical problems. However, in order to prevent potential sequelae caused by IVC filter leg penetration, like that reported in this

case, the removal of the IVC filter, when possible, is preferred.

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