

of filter-related anticoagulation and can be used to prevent and alleviate filter-related morbidity.

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Abstract No. 224

Mid-term imaging follow-up of the VenaTech convertible filter: results from the prospective multicenter trial

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Purpose: To evaluate the incidence of adverse imaging findings at 6 months of the VenaTech Convertible IVC Filter.

Materials: 149 patients at 11 sites were enrolled in the prospective multicenter trial of the VenaTech convertible filter. 80 converted and 38 non converted filters have been followed for a minimum of 6 months. Subjects were evaluated for incomplete opening of filter struts, migration, fracture, penetration, thrombus, and intimal hyperplasia. IVC penetration was reported based on the criteria listed in the table below.

Results: 76 patients with converted filters and 24 “permanent” filter patients obtained a 6 month follow-up CT. Five (6%) converted filters had incomplete opening of the filtering legs. There was 1 major early filter migration and no other significant migration was observed. Two converted filters displayed grade 2 penetration (3%) and the remainder were either grade 0 or grade 1. There were no reports of significant IVC penetration in the permanent filtration subjects. Thrombus within the converted filter was noted in 1 of the 76 converted filter patients and in 4 of the permanent filter patients. No instances of intimal hyperplasia or filter fracture were identified.

Conclusions: At 6 month CT follow up, the convertible filter shows a low incidence of adverse findings including IVC penetration, thrombus, migration, and no evidence of fracture in both converted and unconverted filters.

Reference

- Oh J, Trerotol S, Dagli M, et al. Removal of Retrievable Inferior Vena Cava Filters with Computed Tomography Findings Indicating Tenting or Penetration of Inferior Vena Cava Wall. *J Vasc Interv Radiol* 2011;22:70-74.

Table 1. Grading System for IVC Filter Interaction with IVC Wall

Grade 0	Normal; filter strut confined entirely within IVC
Grade 1	Filter strut is immediately adjacent to external aspect of IVC wall likely reflecting tenting of IVC wall
Grade 2	Filter strut is entirely outside IVC lumen within retroperitoneum as evidenced by a “halo” of retroperitoneal fat around axially viewed strut
Grade 3	Filter strut interacts with adjacent organ outside of IVC*

*An “interaction” was defined as a strut touching, impressing, or perforating any other organ

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Abstract No. 225

Long-term complications of IVC filters: initial report from the Kaiser Permanente National IVC Filter Registry (KIFR)

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Purpose: We aimed to better understand the prevalence of long-term (>46 month) complications of both permanent and retrievable IVC filters (IVCFs).

Materials: From January 1, 2007, to December 31, 2009, 3,303 IVCFs were placed across a large US healthcare region, and only patients with contrast enhanced CTs of the abdomen at a minimum of 46 months post IVCF implantation were selected in this study. A retrospective observational study was performed in 96 patients. Primary outcomes were prevalence and predictive factors for IVCF fracture, IVC thrombosis, and IVC perforation.

Results: Of 96 patients, 39 had permanent IVCFs and 57 had retrievable IVCFs. Mean dwell time at most recent CT scan was 61.1 months (range: 46.1-84 months). Overall rate of filter fracture was 13.5% with the majority (92.3%) in Cordis OptEase (37.5% fracture incidence) and TrapEase filters (23.1% fracture incidence). No distant embolization of fractured fragments was noted. Overall rate of partial/complete IVC occlusion was 12.5% (7.3% total and 5.2% partial). Overall rate of IVC perforation was 47.9%, though incidence was higher among retrievable devices (70.2%) compared to permanent devices (15.4%). Perforation involving retroperitoneal structures was 68.3% among conical retrievable devices and 5.1% among permanent devices.

Conclusions: Long-term complications related to chronic (>4 yr) dwelling IVCFs are relatively common, and the incidence of fracture and IVC penetration varies with device type. Higher rates of fracture were seen with the Cordis OptEase and TrapEase filters, while higher rates of IVC perforation were seen with retrievable conical type devices.

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Abstract No. 226

Strut perforation of the Greenfield IVC filter

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Purpose: Given the increasing awareness of the consequences associated with long-term indwelling retrievable inferior vena cava filters (IVCFs), there has been renewed interest in permanent filters in select patients. In our study population, we evaluated the adverse events for the Greenfield IVCF over time in patients with computed tomography (CT) studies after placement.

Materials: Retrospective, IRB-approved review of 107 patients with at least one CT study after Greenfield IVCF placement at our institution between January 2007 and July

2015. Of those, 52 had at least 2 follow-up CT studies. Filter strut perforation (strut >3 mm outside caval wall) was evaluated on each of the follow-up CTs. Age, gender, and malignancy status were considered. IVC thrombus and breakthrough pulmonary embolism were recorded when possible. Perforation data was analyzed using the generalized linear mixed model (GLMM).

Results: Among the 107 patients, the average time from filter placement to first CT was 135 days. In 52 patients with more than one CT, the average time from filter placement to the last follow-up CT was 527 days. There is a significant increase in perforation rate of the Greenfield IVC filter with time ($p = 0.02$). Of patients who had a CT within 100 days of IVCF placement ($n = 76$, average time from filter placement was 27 days), 6 (7.9%) developed IVC strut perforation. Among the entire population ($n = 107$), 21 (19.6%) eventually developed strut perforation of the IVC (average time from filter placement was 332 days). There was no significant difference in perforation rate between patient age ($p = 0.61$), gender ($p = 1.00$), or a history of malignancy ($p = 0.40$). None of the Greenfield filters demonstrated fracture. IVC thrombus was identified in 11 patients (10.3%). Breakthrough pulmonary embolism was identified in 7 patients (6.5%).

Conclusions: In our study population, the Greenfield IVCF has a low caval wall strut perforation rate that does increase over time. The perforation rate is not dependent on patient age, gender, or malignancy status. Comparatively to other filters in the literature, the Greenfield remains a safe option for patients requiring permanent mechanical filtration.

Scientific Session 24

Arterial Embolization: Visceral and Pelvis

Tuesday, April 5, 2016

3:00 PM – 4:30 PM

Room: 116/117

3:00 PM

Abstract No. 227

Perisplenic abscess formation after splenic artery embolization with gelfoam versus coil embolization

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Purpose: Splenic artery embolization (SAE) is the first-line non-surgical treatment for splenic trauma, hemorrhage, and splenic vascular complications such as splenic artery aneurysm or pseudoaneurysm formation. The rate of perisplenic abscess formation can be as high as 6.8% after SAE. While the complication rate has been well characterized, differences in the complication rate between the two most common agents, gelfoam and embolization coils, has not been studied.

Materials: A retrospective chart review was performed. Cases were identified using billing codes. Exclusion criteria included age less than 18 years, not surviving the initial SAE procedure, or lack of follow-up for at least 1 month. The study was approved by the Institutional Review board with an informed consent waiver. Data was abstracted by a single reviewer, and included age at the time of the procedure, gender, embolization agent, trauma as an indication, development of a perisplenic abscess within one month of SAE, concurrent sites embolized, and whether a repeat procedure was necessary.

Results: Our case series included 45 patients, with 23 cases of coil embolization only, 14 of gelfoam only, and 8 of coil plus gelfoam. Four patients developed perisplenic abscesses (8.9%). No patients who underwent coil embolization alone developed a perisplenic abscess. Two gelfoam patients and two gelfoam plus coil patients developed perisplenic abscesses. There was a 18% difference in the complication rate between the coil only and any gelfoam use groups ($p=0.049$, Fisher's exact test).

Conclusions: Use of gelfoam with or without coil embolization is associated with a higher rate of post-procedural perisplenic abscess formation than coil embolization alone. One mechanism for the introduction of bacteria may be the use of room air to create the gelfoam slurry. These findings are statistically significant, and suggest the utility of a large randomized controlled trial to further characterize this relationship (1–5).

References

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Abstract No. 228

Comparison of fluoroscopy time in proximal-to-mid splenic artery embolization with coils versus amplatzer plugs

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Purpose: Splenic artery embolization is often performed in the blunt trauma setting. Multiple methods of embolization exist including Amplatzer plugs and coils. Fluoroscopy time is a direct measure of radiation exposure, and an indirect indicator of overall procedure time. As trauma patients are often young and undergo multiple diagnostic exams using ionizing radiation, limited radiation dose is ideal. Trauma patients often require other procedures or a higher level of care in another setting. To that end, short procedural time is also optimal. We therefore sought to evaluate whether a difference in fluoroscopy time exists between splenic artery embolization utilizing coils and Amplatzer plugs.

Materials: Retrospective single-institution review of patients undergoing splenic artery embolization for blunt trauma