Surgical Removal of Perforated IVC Filters

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Background

• Inferior vena cava (IVC) filter placement is indicated in patients with venous thromboembolism (VTE) who cannot be anticoagulated, or who fail anticoagulation therapy

• IVC filters have been available since the 1960s, but their use rose exponentially in the late 1990s and early 2000s
  – ~2000 filters in 1979 to >100,000 in 2005
  – Slight decline in the 2010s
  • No evidence of mortality benefit
  • Increasing reports of filter-related complications with low overall retrieval rates
  • FDA warning

Disclosures

Timothy K. Liem, MD discloses the following:

• None
Evidence-Based Evaluation of Inferior Vena Cava Filter Complications Based on Filter Type

Search MEDLINE, FDA MAUDE, FDA Premarket Notifications for IVC filter type and complications 1980-2014

- IVC penetration 90-100% of complications
- IVC thrombosis 30-50% of complications
- Filter fracture (40% of Bard Complications)

Jia, Circulation 2015

Medline search (1970-2014) finding 88 clinical studies and 112 case reports, 9002 pts
- IVC filter wall penetration (1699/9002) 19%
- Organ/adjacent structure involvement (322/1699) 19%
  - Duodenum 123
  - Lumbar vertebrae 63
  - Aorta 62
  - Psoas muscle 8
  - Lumbar artery 6
- Interventions
  - Surgical removal 63
  - Endovascular stent 11
  - Endovascular retrieval 4
  - Nephrostomy/ureter stent 3

Methods
- All open IVC filter retrievals (2007-2018) reviewed
  - Age
  - Filter type
  - Prior attempts at removal
  - Operative technique/EBL
  - Perioperative complications
- Eight open IVC retrievals (340 percutaneous)
  - Age: 43 yrs (range 17-81 yrs)
  - Prior VTE: 7/8 (87.5%)
    - One prophylactic filter (poly-trauma)

Results: Demographics
- Asymptomatic: 2 (25%)
- Symptomatic: 6 (75%)
  - Migration into iliac veins: 2
  - Duodenal perforation: 2
  - Aortic perforation: 2
  - Pancreatic: 1
  - IVC/renal vein perforation: 1
Results: Demographics

- History of attempted percutaneous retrieval: 5 (62.5%)
  - Median number of percutaneous retrieval attempts: 3 (range: 1-4)
  - No percutaneous attempts: 3 (37.5%)
  - Evidence of aortic perforation on imaging: 2 (25%)
  - Permanent filter: 1 (12.5%)
- Average duration of IVC filter: 1921 days (range: 5-8395 days)
- Perioperative outcomes
  - EBL: 342ml (range 50-1200ml)
  - Median LOS: 6.5 days (range 4-49*)
  - Incisional hernia: 1 pt
  - *Aortic pseudoaneurysm: 1 pt
  - No perioperative mortality

Summary

- IVC filter-associated perforation is under-recognized (19%-34%). 19% of penetrations show organ/structure impalement.
- IVC filters with symptomatic perforation/asymptomatic severe perforation should be removed, unless filter still indicated or removal not possible.
- Percutaneous retrieval is possible for most. For patients who are not candidates for, or who have failed, percutaneous retrieval, open retrieval is a viable option.
- Open IVC filter retrieval for filter-associated perforation or migration has a reasonable perioperative morbidity and, in our series, no mortality.