Surgery for Perforating IVC Filters

Timothy K. Liem, MD, MBA, FACS
Professor of Surgery
Division of Vascular and Endovascular Surgery
Knight Cardiovascular Institute
Oregon Health & Science University

November 13-17, 2018, Veith Symposium, New York, NY

Disclosures

Timothy K. Liem, MD discloses the following:
• None

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

• IVC filter insertion and retrieval rates/100,000 Medicare fee-for-service beneficiaries (1994-2015)

• Geographic variation in IVC filter use/VTE: an interstate comparison. Greater rates of IVC filter/DVT represented by darker color.

• Higher IVC filter insertion along East Coast
  • PE/100,000 population no different
  • States with highest IVC filter insertion rates had higher paid malpractice claims/100,000 population
  • Higher general surgeon liability premiums (79K vs 44K)

• IVC filter placement is not free of consequences, ~0.3%
  – Peri-procedural
  – Delayed

• Delayed complications include filter tilt, perforation of the IVC and/or adjacent organs, migration into proximal or distal venous segments, IVC thrombosis, fracture, strut embolization

• Many complications may be treated percutaneously, but some require open surgery

November 13-17, 2018, Veith Symposium, New York, NY
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: 43 (range 17-81)
- Prior VTE: 7 (87.5%)
  - One prophylactic filter (poly-trauma)

Results: Demographics

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

Results: Demographics - Filter Types

- Cordis Optease (2)
- Cook Celect (1)
- Bard Simon-Nitinol (1)
- Cook Günther Tulip (2)
- Cook Bird’s Nest (1)
- Bard Eclipse (1)
Results: Surgical Outcomes

Open Filter Retrieval: 8

- Incomplete: 3 (37.5%)
- Complete: 5 (62.5%)

Venotomy: 1
Perforating struts excised: 2

Laparotomy, Cattell-Braasch: 3
Right retroperitoneal exposure: 1

Laparotomy, Cattell-Braasch: 6
Right retroperitoneal exposure: 3

Open Snare/Sheath Technique

Cavotomy and Reconstruction

17 yo with left iliofemoral thrombosis, lysis, stenting, and multiple attempts at IVC filter retrieval

Results: Demographics

- History of attempted percutaneous retrieval: 5 (62.5%)
  - Median number of percutaneous retrieval attempts: 3 (range: 1-4)
  - No percutaneous attempts: 3 (27.5%)
    - 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 an under-recognized complication (19%-34%). 19% of penetrations show organ/structure impairment.
- IVC filters with symptomatic perforation/ asymptomatic severe perforation should be removed, unless filter still indicated or removal not possible.
- Open IVC filter retrieval for patients with filter-associated perforation or migration has a reasonable perioperative morbidity and, in our series, no mortality
- Open retrieval is a viable option for patients with IVC filter- associated complications who are not candidates for, or who have failed, percutaneous retrieval