Difficult Caval Filter Retrieval: Tips and Tricks

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Increase in Utilization of IVC Filters

Number of IVC Filters Implanted in the U.S.:

- 1979: 2,000
- 1999: 49,000
- 2012: 250,000

Retrieval rate of Retrievable IVC filters: ~20%

Risks of Indwelling IVC Filters

- Strut Perforation
- Fractures +/- Migration
- Abdominal Pain
- Tissue Adherence
- Filter Tilt and Retrieval Hook Inaccessibility
- Increased risk of recurrent DVT

Disclosure Statement of Financial Interest

Within the past 12 months, I or my spouse/partner have had a financial interest/arrangement or affiliation with the organization(s) listed below.

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Increase in Utilization of IVC Filters

Circulation

Eight-Year Follow-Up of Patients With Permanent Venous Cava Filters to Prevent Pulmonary Embolism: The FILTER (Filtre de Protection Fœtale par Embolisation Cutanée du Tronc Veineux) Trial

Abnormal prolongation in the early postpartum period of maternal venous occlusive disease was observed in pregnancy complicated by pre-eclampsia and this was attributed to partial or complete caval occlusion by a removable filter. In the present study, we evaluated the long-term efficacy of this strategy and its effects on maternal and fetal outcomes. The study included 143 high-risk patients who received the filter, plus 143 matched controls. After an average follow-up period of 8 years, we observed no significant differences between the two groups in terms of postpartum complications or maternal and fetal mortality. Our findings suggest that the use of caval filters during pregnancy with normal uterine venous circulation is effective and safe, and should be considered a reasonable option for the management of high-risk pregnancies with significant maternal venous occlusive disease.
Barriers to IVC Filter Retrieval

Two Main Issues:
- Centering Issues
  - Leads to inability to snare retrieval hook
- Adherence Issues
  - Densely adherent filters struts
  - Strut perforation

Filter Centering Techniques

Guidewire Centering Technique
- IJ and Femoral Access
- Stiff guidewire ("body floss")
  - Femoral vein opposite the side of the filter tilt
  - Angled catheter to direct wire around the tilted filter hook

Filter Centering Techniques

Snare over Guidewire
- Snare catheter looped over wire and wire used to guide snare down to retrieval hook

Filter Centering Techniques

Balloon Centering Technique
- Angioplasty balloon used to center retrieval hook
- Useful to free hook from intimal hyperplastic tissue

Dealing with Densely Adherent Filters

Snare Over Looped Guidewire Technique
- SOS Omni catheter
- Terumo 0.035 Glidewire
- Loop snare
- Advantages:
  - Centering
  - Traction

Deformation of Retrieval Hook due to Excessive Traction
Dissection Techniques

Co-Axial Telescoping Sheath Dissection
- 10/12Fr 55cm Cook Sheath or 14/16Fr 45cm Cook Performer Sheath
- Standard snare technique or Snare over lopped guidewire
- “To-and-fro” motion with gentle twisting of inner sheath
- Intermittent relaxation and full anticoagulation

Dissection Techniques

Laser-Assisted Co-Axial Sheath Dissection Technique
- Spectranetics 14Fr SLS II Laser Sheath Lead Extraction System
- 14F 45cm Cook Performer Sheath
- Calibrated at 60mJ/mm²
- 2-5sec activation time
- Advantages:
  - Additional sheath rigidity
  - Photoablative rx of intimal hyperplastic tissue
- Disadvantages:
  - Unknown safety profile

Dissection Techniques

Laser-Assisted Co-Axial Sheath Dissection Technique
- 25 patients underwent complex retrieval
- Technical success in 24 (95%)
- One (4%) major complication
  - Acute thrombosis requiring lysis
- Three (12%) minor perforations
  - All self limited, no transfusions

Dissection Techniques

Complication Management in High-Risk Retrieval
- BP 54/30
- Patient losing consciousness
- IR Suite without anesthesiologist
- Single peripheral IV

Complication Management in High-Risk Retrieval
- Appropriate setting & IV access
- Large diameter occlusion balloons and large sheaths
- Thoracic aortic endografts and infra-renal aortic cuffs
Complication Management in High-Risk Retrieval

High-Risk Retrieval of Densely Adherent Filters

- With these advance filter retrieval techniques:
  - Retrieval of almost any filter is possible...
  - ...but so are major complications.

  - Hemorrhage
  - Filter Fracture
  - Chronic Pain
  - Caval Perforation
  - Caval Thrombosis

High-Risk Retrieval of Densely Adherent Filters

- Decision regarding whether to proceed with high-risk filter retrieval depends on the risk:benefit ratio and clinical scenario.
- May be most appropriate for patients with chronic filter-associated pain, filter fractures, or high risk of recurrent iliofemoral or caval thrombosis.

  Instead, our focus should probably be on the leading cause of filter retention...

  Lack of Appropriate Follow-up!!

Conclusions

- IVC filter usage has increased dramatically in recent years, yet retrieval rates remain quite low
- Technical barriers to filter retrieval include poor filter centering and dense adherence to the caval wall
- Most technical barriers to retrieval can be overcome with advanced techniques
- While minor perforations can be of little consequence, the potential for catastrophic complications remains and requires appropriate tools for successful management

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