EMBEDDED INFERIOR VENA CAVA FILTER REMOVAL

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Program/Dept(s): St. John Providence Hospital, Southfield, Michigan
CHIEF COMPLAINT & HPI

- 27 year-old female with h/o 5 years of dysfunctional uterine bleeding presented to the radiology department with complaints of acute shortness of breath, status post myomectomy (POD #1).
# RELEVANT HISTORY

<table>
<thead>
<tr>
<th>Past Medical History</th>
<th>Review of Systems</th>
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<tbody>
<tr>
<td>Uterine Fibroids</td>
<td>Pleuritic chest pain</td>
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<tr>
<td>Diabetes Mellitus</td>
<td>Palpitations</td>
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<td>Nausea without vomiting</td>
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<tr>
<td>Past Surgical History</td>
<td>Medications</td>
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<tr>
<td>Myomectomy (POD #1)</td>
<td>Metformin</td>
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<td></td>
<td>Iron Supplements</td>
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<tr>
<td>Family &amp; Social History</td>
<td>Allergies</td>
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<td>Social smoker and EtOH, denies elicit drug use.</td>
<td>NKDA</td>
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<tr>
<td>Family history includes DM and heart disease</td>
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</tbody>
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DIAGNOSTIC WORKUP

- Physical Exam
  - Mildly anxious and diaphoretic
  - Tachycardia (115 bpm)
    - No murmurs
  - Tachypnea (27 br/min)
    - Clear lungs

- Laboratory Data
  - + d-dimer 857
  - Hgb 9.2
The OB/GYN was concerned about a potential pulmonary embolism.

Subsequent CT confirmed a large filling defect in the lower lobe segment of the left pulmonary artery consistent with **Pulmonary Embolism**:
- Contraindication to anticoagulation as patient is s/p myomectomy POD #1
- Due to the contraindication the patient was referred to our department for temporary placement of a retrievable IVC filter
2. Maximum safe caval diameter for traditional filter placement? What should you use if larger?

a) 27mm 

b) 28mm 

c) 29mm 

d) 30mm
2. Maximum safe caval diameter for traditional filter placement? What should you use if larger?

a) 27mm  
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If larger use a Bird’s Nest Filter

Return to Case
2. Maximum safe caval diameter for traditional filter placement? What should you use if larger?

a) 27mm  
b) 28mm  
c) 29mm  
d) 30mm  

If larger use a Bird’s Nest Filter
INTERVENTION

- Preliminary placement of a retrievable IVC filter was uneventful and patient was instructed to follow up in our clinic in 30 days for reassessment and potential retrieval.

- Patient presented approximately 60 days later for removal. Inferior vena cavogram was performed.
INTERVENTION

-Multiple attempts were made to snare the hook utilizing a gooseneck snare device, however it was embedded into the caval wall.

-The snare was then exchanged for a Mikaelsson catheter. The body of the IVC catheter was then snared using the Mikaelsson catheter in an attempt to dislodge the hook from the caval wall.

-This also proved unsuccessful and lengthy discussions were had with the patient and her family, who were adamant that the IVC filter must come out.
QUESTION

1) Recommended time interval for filter to be removed?
   • Günther Tulip?
   • Celect?
   • Option?
1) Recommended time interval for filter to be removed?

- Günther Tulip? **94% probability of successful retrieval at up to 12 weeks**

- Celect? **100% at 50 weeks**

- Option? **85.7% at 25 weeks**
INTERVENTION

There were extensive faculty meetings and literature searches to determine how to proceed. A small trial from University of Pennsylvania described the use of endobronchial forceps in the removal of embedded IVC filters.

The patient returned to the department 30 days later for a second potential attempt at filter retrieval using this approach.

Embedded Inferior Vena Cava Filter Removal: Use of Endobronchial Forceps

S. William Stavropoulos, MD, Robert G. Dixon, MD, Charles T. Burke, MD, Joseph M. Stavas, MD, Anand Shah, MD, Richard D. Shlansky-Goldberg, MD, and Scott O. Trerotola, MD

PURPOSE: Removing a retrievable inferior vena cava (IVC) filter can be extremely difficult with the use of standard techniques if the filter is tilted and embedded in the wall of the IVC. The use of rigid endobronchial forceps has been described in case reports to remove embedded IVC filters, and the present report describes the use of this technique to remove a series of tip-embedded IVC filters in two separate institutions.

MATERIALS AND METHODS: The medical records were reviewed of 21 consecutive patients at two institutions who underwent attempted IVC filter removal with rigid endobronchial forceps over a 34-month period. The mean age of patients was 32.4 years (range, 14.1–54.1 y). The patients had the following filters: Recovery (n = 6), G2 (n = 10), Günther Tulip (n = 4), and OptEase (n = 1).

RESULTS: Rotational or biplane venography was used to confirm that the filters were tilted and embedded in the wall of the IVC in all 21 patients. Rigid endobronchial forceps were used successfully to remove 20 embedded IVC filters in 21 patients. There was one case of failure to remove an embedded suprarenal G2 filter. There were no major complications.

CONCLUSIONS: Rigid endobronchial forceps may be used as a reliable option for removal of embedded IVC filters.
- Initial cavogram demonstrated the filter to be in stable position. Multiple unsuccessful attempts were made using the Gooseneck snare and guidewire.

- Tract was serially dilated and a 18-French hemostatic sheath placed

- Semi-rigid enobronchial forceps were then advanced and utilized to sheer the hook of the filter off the IVC wall and sheath was advanced over the filter.
INTERVENTION

- Filter was partially unsheathed to allow hook to be snared

- Snare was then used to remove the filter. Post-procedure cavogram demonstrated no luminal clot or extravasation of contrast.
CLINICAL FOLLOW UP

- Sheath was removed and hemostasis achieved

- Patient was restarted on anti-coagulation and remained asymptomatic
  - Following the end of the six month course of anti-coagulation patient had no further clinical events

- No further imaging was indicated
SUMMARY & TEACHING POINTS

- IVC filter placement has become one of the most common procedures in many interventional radiology practices.

- However, given recent FDA recommendations for filter retrieval and greater awareness by patients and referring clinicians, sometimes novel techniques must be utilized for removal when the retrieval hook becomes embedded in the caval wall.
3. What do you see? How should you proceed?
ANSWERS!

3. Duplicated IVC. Filter Placement options include:
   a) Suprarenal filter placement
   b) Bilateral infrarenal filter placement
REFERENCES & FURTHER READING
