IVC FILTERS: A CASE REPORT REVIEWING THE INDICATIONS FOR PLACEMENT, RETRIEVAL AND ANTICOAGULATION

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47 year old previously healthy male presented to ED with new onset right pleuritic chest pain and leg pain for the past few weeks.

Additional complaints included shortness of breath and cough.
RELEVANT HISTORY

- Past Medical History
  - Hypertension, third degree burns in both feet, motor vehicle accident

- Past Surgical History
  - Traumatic amputation of a finger with reattachment

- Family & Social History
  - HTN, no prior family history of coagulopathy
  - Positive history of pulmonary embolism (PE) in father
  - Divorced, works as a welder, drinks a 6-pack of beer daily, tobacco abuse (2-3 packs per day)

- Medications
  - None

- Allergies
  - No known allergies
DIAGNOSTIC WORKUP

- Physical Exam
  - Vitals - BP: 170/80 mmHg, Pulse: 100 bpm, O2 Sat: 95% on RA oxygen
  - Respiratory – unable to take deep breaths, no rales/rhonchi/ or wheezing
  - Cardiovascular – S1/S2, no murmur/rub/gallop, diminished pedal pulses bilaterally
  - Gastrointestinal – within normal limits
  - Neurologic – sensation and motor strength within normal limits

- Laboratory Data
  - Screen 8 within normal limits, WBC = 12.7

- Non-Invasive Imaging
  - Chest CTA was performed to rule out a PE and possible lung cancer
CTA
1) What is the Diagnosis?

A: No acute abnormality.
B: Pneumonia.
C: Right main pulmonary artery embolism.
D: Bilateral pulmonary emboli.
1) What is the diagnosis?

A: No acute abnormality.

B: Pneumonia.

C: Right main pulmonary artery embolism.

D: Bilateral pulmonary emboli – filling defects are seen in both main pulmonary arteries. Submassive PE given clinical presentation.
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D: Bilateral pulmonary emboli – filling defects are seen in both main pulmonary arteries. Submassive PE given clinical presentation.
ACUTE PULMONARY EMBOLISM

- Upon further review, there was no identified history of thrombophilia, although family history was positive for PE in the father.
- No inciting cause for venous thromboembolism (VTE) was identified.
- Patient was treated with IV heparin and Coumadin.
- Vascular duplex ultrasound (US) showed an acute deep vein thrombosis (DVT) of the right posterior tibial, peroneal, and popliteal veins.
- IVC filter was placed the next day.
2) Should this patient receive an IVC filter?

A: Yes, he needs an IV filter.
B: No, he does not need an IV filter.
C: Indeterminate for now.
D: Yes but not emergently.
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Antithrombotic Therapy and Prevention of Thrombosis, 9th ed: American College of Chest Physicians Evidence-Based Clinical Practice Guidelines (Feb 2012)

Vena Cava Filters for the Initial Treatment of Patients With PE

- In patients with acute PE who are treated with anticoagulants, the ACCP recommends against the use of an IVC filter (Grade 1B)
- In patients with acute PE and contraindication to anticoagulation, the ACCP recommends the use of an IVC filter (Grade 1B)
- In patients with acute PE and an IVC filter inserted as an alternative to anticoagulation, the ACCP suggests a conventional course of anticoagulant therapy if their risk of bleeding resolves (Grade 2B)
• In patients with an acute DVT of the leg, the ACCP recommends against the use of an IVC filter in addition to anticoagulants (Grade 1B)

• In patients with an acute proximal DVT of the leg and contraindication to anticoagulation, the ACCP recommends the use of an IVC filter (Grade 1B)

• In patients with an acute proximal DVT of the leg and an IVC filter inserted as an alternative to anticoagulation, the ACCP suggests a conventional course of anticoagulant therapy if their risk of bleeding resolves (Grade 2B)

• The ACCP does not consider that a permanent IVC filter, of itself, is an indication for extended anticoagulation
QUESTION

3) Do IVC filters decrease long-term mortality in patients with a PE?

A: Yes, there is decreased intermediate and long-term mortality in patients with IVC filters vs. without.

B: No, there is no difference in intermediate or long-term mortality in patients with or without IVC filter placement.

C: No, IVC filters only decrease intermediate-term mortality in patients with a PE.

D: There is no available literature to determine the correct answer.
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CONTINUE WITH CASE
Decousus et al:
- In high risk patients, **there is an initial benefit** in vena cava filter placement
- Study demonstrated an initial reduction in the occurrence of a PE with an IVC Filter
  - 2/200 in the filter group vs. 9/200 in the non-filter group had a PE at 12 days (Odds ratio 0.22, p value 0.03)

- Overall, however, there was no long-term benefit
  - **No difference in intermediate or long-term mortality** between the filter vs. non-filter groups
  - After 2 years, the initial benefit was counterbalanced by a significant **increase in recurrent DVT**
    - 37/200 in the filter group vs. 21/200 in the non-filter group had a recurrent DVT (Odds ratio 1.87, p value 0.02)

- This study concludes that systematic use of an IVC filter for the prevention of PE is **not recommended**
TEACHING POINT: IVC FILTERS AND PE PREVENTION

- Unfractionated heparin followed by oral anticoagulation (OAC) for 3 months prevents PE in 95% of patients with proximal DVT

- Current indications for filter placement include failed anticoagulation therapy or contraindication to anticoagulation
CLINICAL FOLLOW UP

- After being on Coumadin for 14 months, a follow-up CTA chest/abdomen/pelvis and lower extremity (LE) US were negative for DVT/VTE
- Coumadin was then stopped by the primary care physician and an IVC filter removal was requested
- IVC filter retrieval was scheduled two weeks after stopping Coumadin
4) When is it acceptable to consider removing an IVC filter?

A: If the risk of a PE is low, it would be acceptable to remove an IVC filter.
B: An IVC filter can be removed immediately after clinical symptoms subside.
C: It is currently not recommended to remove an IVC filter after placement.
D: If there is evidence of an acute PE but no evidence of a DVT, the IVC filter can be removed.
4) When is it acceptable to consider removing an IVC filter?

A: If the risk of a PE is low, it would be acceptable to remove an IVC filter.

B: An IVC filter can be removed immediately after clinical symptoms subside.

C: It is currently not recommended to remove an IVC filter after placement.

D: If there is evidence of an acute PE but no evidence of a DVT, the IVC filter can be removed.

CONTINUE WITH CASE
4) When is it acceptable to consider removing an IVC filter?

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B: An IVC filter can be removed immediately after clinical symptoms subside.

C: It is currently not recommended to remove an IVC filter after placement.

D: If there is evidence of an acute PE but no evidence of a DVT, the IVC filter can be removed.
• Kaufman et al:
  • Patients with IVC filters may have limited periods of risk for a PE and/or contraindication to anticoagulation – thus they may not require permanent protection from a PE with an IVC filter
  • There are no absolute indications for discontinuation of an IVC filter unless it is a source of major morbidity
  • Discontinuation of an IVC filter should only occur when the risk of a clinically significant PE is reduced to an acceptable level and is less than the risk of leaving the filter in
  • Patients with IVC filters should be managed pharmacologically according to their VTE status and risk of anticoagulation
TEACHING POINT: GUIDELINES FOR IVC FILTER REMOVAL

- The FDA currently recommends removing the filter as soon as protection from a PE is no longer needed.

- It is recommended that a patient should be referred for an IVC filter removal when the risk/benefit profile favors removal and the procedure is feasible given the patient’s general health status.
5) Is it safe to retrieve an IVC filter if a patient is therapeutically anticoagulated?

**A:** No, filter retrieval with respect to hemorrhagic complications is not safe in therapeutically anticoagulated patients.

**B:** Yes, filter retrieval with respect to hemorrhagic complications is safe in patients only if the INR is < 2.0.

**C:** Yes, filter retrieval with respect to hemorrhagic complications is safe in therapeutically anticoagulated patients.

**D:** There is no available literature to determine the correct answer.
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B: Yes, filter retrieval with respect to hemorrhagic complications is safe in patients only if the INR is $< 2.0$.

C: Yes, filter retrieval with respect to hemorrhagic complications is safe in therapeutically anticoagulated patients.

D: There is no available literature to determine the correct answer.
Hoppe et al:
- First study to assess the safety of IVC filter retrieval in anticoagulated patients
- IVC filter retrieval procedures were performed in 61 (56.5%) therapeutically anticoagulated patients
- Findings suggest: filter retrieval in patients considered being therapeutically anticoagulated is safe with respect to hemorrhagic complications
- Based on the results: routine interruption or reversal of anticoagulation for retrieval of IVC filters may not be necessary.
An inferior venacavogram was performed
An EN Snare was advanced through a 12 Fr sheath and multiple attempts were made to snare the filter. These proved to be unsuccessful. A 4 French Omni flush catheter was advanced over an exchange length Bentson wire through the sheath and looped around the filter.

A second access site was then created in the right internal jugular vein. The snare was then advanced to the inferior vena cava. The exchange length Bentson wire was then snared and pulled out through the sheath.

At this point, there was through and through access with the Bentson wire. The filter was attempted to be repositioned using this technique but proved to be unsuccessful.

The 6 French sheath was exchanged for a 6 French 55 cm Brite tip sheath, which was advanced down to the level of the filter. A 6 mm x 4 cm Mustang balloon was then advanced over the wire and inflated adjacent to the filter. Again this was used in an attempt to dislodge the hook from the caval wall but also proved to be unsuccessful.
TREATMENT FOLLOWING FAILED RETRIEVAL

- Following the failed IVC filter retrieval, the patient was restarted on Coumadin two days later without a heparin bridge.

- It has been established that there is a rebound hypercoagulability for approximately two months following discontinuation of oral anticoagulants (Cundiff, DK Medscape J Med. 2008; 10(11): 258.)

- The retrieval attempts also likely resulted in some denuded endothelium.
CHIEF COMPLAINT & HPI: 4 DAYS AFTER RETRIEVAL ATTEMPT

- 4 days later, the patient presented to the ED c/o right lower quadrant abdominal pain and right lower extremity pain, worse with standing.

- No palpable LE pulses on physical exam by ED physician.

- CTA was ordered.
CTA
6) What is the Diagnosis?

A: No acute abnormality.
B: Acute infra-renal aortic thrombosis.
C: IVC thrombosis with extension into iliofemoral veins.
D: Abdominal aortic hemorrhage.
6) What is the Diagnosis?
A: No acute abnormality.
B: Acute infra-renal aortic thrombosis.
C: IVC thrombosis with extension into iliofemoral veins.
D: Abdominal aortic hemorrhage.

CONTINUE WITH CASE
6) What is the Diagnosis?

A: No acute abnormality.

B: Acute infra-renal aortic thrombosis.

C: IVC thrombosis with extension into iliofemoral veins.

D: Abdominal aortic hemorrhage.
CTA FINDINGS

- Findings
  - IVC thrombosis extending from IVC filter into iliofemoral veins
  - IVC filter strut perforating the IVC with possible duodenal involvement
  - Infra-renal aortic occlusion (chronic)
INTERVENTION

- Acute IVC Thrombosis Treatment Options
  - Anticoagulation alone
  - Catheter directed thrombolysis
  - Mechanical thrombolysis
  - Pulse-spray pharmomechanical thrombolysis
  - Angiovac
INTERVENTION

- AngioVac
  - Intended for use as a venous drainage cannula during extracorporeal bypass for up to six hours

- Cannula is also indicated for removal of soft, fresh thrombi or emboli utilizing extracorporeal bypass
INTERVENTION: ANGIOVAC

Before thrombectomy and IVC filter removal

After thrombectomy and removal of the IVC filter
INTERVENTION: ANGIOVAC

· Retrieved thrombus
CLINICAL SUMMARY

- Initially Presented with PE
  - Treated with OAC and an IVC filter was placed

- 14 month follow-up CTA and LE US negative
  - Taken off OAC and scheduled for an IVC filter retrieval

- Following failed IVC filter retrieval
  - Placed back on OAC without heparin bridge

- 4 days following retrieval attempt, CTA showed IVC thrombosis extending from IVC filter into iliofemoral veins
  - Thrombosis treated with IV heparin, AngioVac and IVC filter retrieval
  - Long term anticoagulation resumed
  - Patient doing well at one year follow-up with no further VTE events
SUMMARY OF CLINICAL TEACHING POINTS

- Should this patient have received a filter – *No, for patients with acute PEs who are treated with anticoagulants, the ACCP recommends against the use of an IVC filter*

- Do IVC filters decrease long-term mortality in patients with a PE? *No, there is no difference in intermediate or long-term mortality in patients with or without an IVC filter placed for a PE*

- When is it acceptable to remove an IVC filter - *As soon as protection from a PE is no longer needed and the risk of a PE is acceptably low*

- Is it safe to retrieve an IVC filter if a patient is therapeutically anticoagulated - *Filter retrieval in therapeutically anticoagulated patients is safe with respect to hemorrhagic complications*
REFERENCES & FURTHER READING


