INFERIOR VENA CAVA FILTER PLACEMENT: CLINICAL INDICATIONS

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Disclosures

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• BrightWater Medical
• Morris Innovative

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• Boston Scientific Corporation
• Medtronic

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• BrightWater Medical
• Boston Scientific Corporation
• Morris Innovative
Pulmonary Embolus (PE)

- **Background**
  - 600,000 cases PE/year in US
  - 200,000 deaths/yr attributed to PE
  - 40% proximal DVT without treatment will result in PE

- **History**
  - Anticoagulation cornerstone of therapy
  - Failure of anticoagulation well-known in certain scenarios
  - Various forms of venous/caval interruption
    - Surgical plication, clips, stapling
    - 1960’s - First filter (Mobin Uddin) to maintain flow, trap thrombus
      - 6 radial anchors with silastic membrane (permanent)
      - Assd with high rates caval occlusion
      - Removed from market 1983
Evidence for IVCF placement

• Numerous studies demonstrating safety/efficacy
  • Limited data on establishing mortality benefit
    • Lack of randomized studies
    • PREPIC
      • 400 acute DVT pts – anticoagulation vs IVCF + anticoagulation
      • Reduction in symptomatic PE in IVCF group
      • No difference in mortality out to 8y
  • Fullen, et al. 1973
    • 129 pts w/ femur fx – IVCF vs no IVCF (no anticoagulation either group)
    • Lower incidence PE, lower mortality IVCF group
  • PREPIC 2 underway


Clinical Indications IVCF Placement

- IVC/iliofemoral DVT
- Anticoagulation failure*
- Anticoagulation contraindicated#
- Pending surgery
- Recent intracranial hemorrhage
- Recent solid organ injury
- Recent gastrointestinal, pelvic, or retroperitoneal hemorrhage

*Complication of anticoagulation (bleed)

*PE while on anticoagulation

*Unable to achieve therapeutic anticoagulation

#Pending surgery
Recent intracranial hemorrhage
Recent solid organ injury
Recent gastrointestinal, pelvic, or retroperitoneal hemorrhage

ACCP, SIR, UK NICE
IVC filter use

- Estimated 50% “off-label” use (e.g. suprarenal, SVC)
  - Easier, lower-profile delivery systems
  - Retrievability
- 1 out of 8 pts receive filter as an early intervention for DVT
- Additional 20% of all IVCF placed “prophylactically”
  - Preoperative
  - Trauma, expected prolonged immobilation
  - Massive PE with residual DVT (+/-)
IVCF contraindications (relative)

- Bacteremia
- Uncontrolled systemic infection
- Uncorrectable, severe coagulopathy
Filter options

- Permanent
- Optional/Retrievable/Removable
- Temporary
Currently available FDA-approved IVCF in US

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Filter</th>
<th>Type</th>
<th>Material</th>
<th>Shape</th>
<th>Delivery sheath inner diameter (Fr)</th>
<th>Max caval diameter (mm)</th>
<th>Deployed length (mm)</th>
<th>Access site options</th>
<th>IFU retrieval window (d)</th>
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IVCF Placement

• Typically right IJ or right common femoral vein access
  • Alternatively popliteal, brachial/basilic
• No need to discontinue anticoagulation for placement
  • Low profile delivery systems
• Venography/IVC-gram
  • Identify renal veins, confluence of common iliac veins, any venous anomalies (duplication – 1% prevalence)
  • IVUS, CO$_2$ can be used adjunctively (CRI pts)
• Infrarenal deployment
IVCF placement
## Potential complications

<table>
<thead>
<tr>
<th>Complication of indwelling IVC filter</th>
<th>Reported rate (%)</th>
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<tr>
<td>IVC penetration</td>
<td>0–41</td>
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<tr>
<td>IVC occlusion</td>
<td>2–30</td>
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<tr>
<td>Filter migration</td>
<td>0–18</td>
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<tr>
<td>Filter fracture</td>
<td>2–10</td>
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<td>Recurrent PE</td>
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<td>Death</td>
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</table>

Abbreviations: IVC, inferior vena cava; PE, pulmonary embolism.

Source: Adapted from Caplin et al. 38

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WARNING!
Do you have an IVC filter?

These filters can malfunction, perforate internal organs or cause deadly side effects.

If you or a loved one received an IVC FILTER and the device moved fractured tilted irretrievable

You may be entitled to financial compensation!

Have you experienced complications from an IVC filter?

Unfortunately, a number of IVC filters are extremely dangerous; some have even caused deaths.
When to remove?

- Patient-dependent
  - In general, when out of “risk window” for PE
    - Risk:benefit between 30-60d
  - FDA: “when clinically appropriate”
- SIR Consensus Panel
  - IVCF no longer needed
  - Risk of PE is acceptably low
  - Pt not anticipated to return to a “high-risk state” for PE
  - Life expectancy reasonable to realize benefit of removal
  - IVCF can be safely removed
  - Pt consent

**IVCF removal/retrieval**

- Significant public/FDA scrutiny
- Angel, et al. - review of 37 studies
  - Mean retrieval rate = 34%
- Real world experience significantly less
  - Probably closer to 10-15%
  - Failure in follow-up/scheduling
  - Filter tilt, embedded tip
  - Endothelialization
  - Cancer, limited life expectancy
  - Unresolved clinical indications
- Dedicated follow-up programs improve retrieval rates
  - Schedule follow-up visit at time of placement
  - 7-14-fold improvement

“Simple” IVCF removal
“Complex” IVCF removal
Who should get an IVC Filter?

Iliac/femoral DVT with contraindication to anticoagulation or PE/bleeding while on anticoagulation

When should an IVC filter be removed?

As soon as pt is out of risk window for PE or whenever pt is therapeutic on anticoagulation
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