Inferior Vena Cava Filters
Indications, Complications, etc

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FOMA D-II /MHJ Symposium
April 14th, 2011
DISCLOSURES

Nothing, Nothing,
Venous Thrombosis
A Leading Cause of Death in the US

- VTE kills 4 to 5 times more people annually than breast cancer\textsuperscript{1,2}
- Pulmonary embolism is the cause of death in \textasciitilde 240,000 patients per year in the US\textsuperscript{1}
- In-hospital case fatality rate of VTED\textsuperscript{1} = 12%
- PE: 1-year mortality rate of 39% in the elderly\textsuperscript{3}
- DVT: 1-year mortality rate of 21% in the elderly\textsuperscript{3}

PE may be the #1 preventable cause of death in hospitalized patients\textsuperscript{4}

Deep Venous Thrombosis Spectrum

- **Calf Deep Venous Thrombosis**: Low
- **Femoral-Popliteal Deep Venous Thrombosis**: Low to High
- **Iliofemoral Deep Venous Thrombosis**: High to High

<table>
<thead>
<tr>
<th>Risk of Acute Leg Complications &amp; Pulmonary Emboli</th>
<th>Risk of Post-Thrombotic Syndrome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>High</td>
<td>High</td>
</tr>
</tbody>
</table>

*First Coast Cardiovascular Institute, P.A.*
Basic Tenets of Natural History of VTE

- ~90% of cases of DVT begin in calf veins
  - Isolated calf DVT are asymptomatic
- ~25% of untreated calf DVT propagate to proximal deep veins
- ~40% of patients with symptomatic DVT have asymptomatic PE on lung scans

Kearon C. CMAJ 2003168:183-94
A Well Accepted High Risk Group......
High Risk Group - Trauma

- O’Malley and Ross: J Trauma, 1990
  - 2.3% incidence PE in 1316 trauma patients in 1 yr
  - 24% were fatal
  - majority of PEs were in first week after injury
  - high risk groups
    - PELVIC FRACTURE
    - AGE > 55 YEARS OLD
    - MULTISYSTEM TRAUMA
    - CENTRAL VEIN CANNULATION
### High Risk Group - Trauma

  - **Serial Venography**: 716 patients prospectively

<table>
<thead>
<tr>
<th>INJURY</th>
<th>DVT RATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Face</td>
<td>50%</td>
</tr>
<tr>
<td>Head</td>
<td>54%</td>
</tr>
<tr>
<td>Spine</td>
<td>62%</td>
</tr>
<tr>
<td>LE fx</td>
<td>69%</td>
</tr>
<tr>
<td>Pelvic fx</td>
<td>61%</td>
</tr>
</tbody>
</table>

**High risk groups**: OLDER AGE, TRANSFUSION, SURGERY, Fx of FEMUR or TIBIA, SPINAL CORD INJURY
Prevention is Now Possible……..
Thoughtful and Proactive
Use of Retrievable IVC Filters

Radiology 2002;225:835-44

Trapped Embolic Material
Inferior Vena Cava Filter Placement: Accepted Indications
JVIR 2003;14:S271-S275

- Patients with PE or IVC/Iliac/Femoral/Popliteal DVT AND one or more of the following
  - Absolute contraindication to anticoagulation
  - Complication of anticoagulation
  - Failure of anticoagulation
    - Recurrent PE despite adequate anticoagulation
    - Inability to achieve adequate anticoagulation
  - Massive PE and persistent venous thrombosis in a patient at risk of recurrent PE
  - Free floating iliac or IVC thrombus
  - Severe cardiopulmonary disease and proximal DVT
  - Poor compliance with anticoagulation regimen
Inferior Vena Cava Filter Placement: Accepted Indications

SIR Standards Committee
JVIR 2003;14:S271-S275

• Other Accepted Indications

  • **Severe trauma without documented DVT/PE**
    • Closed Head Injury
    • Spinal Trauma
    • Multiple long bone fractures/pelvic fracture

  • **High risk patients**
    • Immobilized, ICU, *Pre-operative prophylaxis* in patient with multiple risk factors for VTE, bariatric surgery
### TABLE 29.1 Indications for IVC Filter Placement

<table>
<thead>
<tr>
<th>Category</th>
<th>Indications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classic/widely accepted indications</td>
<td></td>
</tr>
<tr>
<td>Documented DVT/PE with:</td>
<td></td>
</tr>
<tr>
<td>1. Contraindication to anti-coagulation</td>
<td></td>
</tr>
<tr>
<td>2. Complication of anti-coagulation</td>
<td></td>
</tr>
<tr>
<td>3. Failure of therapeutic anti-coagulation</td>
<td></td>
</tr>
<tr>
<td>Relative indications</td>
<td></td>
</tr>
<tr>
<td>Documented DVT/PE with:</td>
<td></td>
</tr>
<tr>
<td>1. Poor cardiopulmonary reserve</td>
<td></td>
</tr>
<tr>
<td>2. Free-floating IVC thrombus (“widow-maker” clot)</td>
<td></td>
</tr>
<tr>
<td>3. High risk for anti-coagulation (frequent falls, ataxia)</td>
<td></td>
</tr>
<tr>
<td>4. Non-compliant patient or inability to maintain therapeutic anticoagulation</td>
<td></td>
</tr>
<tr>
<td>5. Planned pharmacomechanical thrombolysis of ilio-caval DVT</td>
<td></td>
</tr>
<tr>
<td>Prophylactic indications</td>
<td></td>
</tr>
<tr>
<td>No DVT/PE and anti-coagulation contraindicated:</td>
<td></td>
</tr>
<tr>
<td>1. Multiple trauma</td>
<td></td>
</tr>
<tr>
<td>2. History of DVT/PE with high-risk surgery (bariatric surgery, hip replacement, etc.)</td>
<td></td>
</tr>
</tbody>
</table>

IVC, inferior vena cava; DVT, deep venous thrombosis; PT, pulmonary embolus.
Hepatic vein confluence
Accessory hepatic vein
Right renal vein
Right gonadal vein
Inferior vena cava
Lumbar veins
Right common iliac vein
Left adrenal vein
Left renal vein
Left gonadal vein
Ascending lumbar veins
ACCESSORY HEPATIC VEIN

RENAL VEINS
IVC Thrombus

Supra-renal filter

Infra-renal filter
<table>
<thead>
<tr>
<th>1. Renal/gonadal vein thrombosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. IVC thrombus precluding infrarenal filter placement</td>
</tr>
<tr>
<td>3. Thrombus above an infrarenal filter</td>
</tr>
<tr>
<td>4. Continued PE through existing filter (lower extremity source) without room for additional infrarenal filter</td>
</tr>
<tr>
<td>5. IVC filter placement in pregnancy</td>
</tr>
</tbody>
</table>
### Table 29.4: Anatomic Considerations for Filter Placement

<table>
<thead>
<tr>
<th>Anatomic Issue</th>
<th>Potential Solution(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mega cava (IVC &gt; 30 mm)</td>
<td>Vena-Tech LP up to 35 mm (off-label)</td>
</tr>
<tr>
<td></td>
<td>Bird’s Nest up to 40 mm</td>
</tr>
<tr>
<td></td>
<td>Single filter in each CFV</td>
</tr>
<tr>
<td>IVC thrombus</td>
<td>Infrarenal filter above thrombus if room</td>
</tr>
<tr>
<td></td>
<td>Suprarenal filter</td>
</tr>
<tr>
<td>Duplicated IVC</td>
<td>1 filter in each IVC</td>
</tr>
<tr>
<td>Accessory, circumaortic, retroaortic renal veins</td>
<td>Infrarenal filter below lowest renal if room</td>
</tr>
<tr>
<td></td>
<td>Suprarenal filter</td>
</tr>
<tr>
<td>Pregnancy</td>
<td>Suprarenal filter</td>
</tr>
<tr>
<td>CFV, common femoral vein; IVC, inferior vena cava.</td>
<td></td>
</tr>
</tbody>
</table>
Which Filter would u like?
Permanent Vena Caval Filters
History Of Caval Interruption

• First suggested by Trousseau in 1868
• First IVC ligation done 1940s
• First Surgically implanted endovascular filter was the Mobin-Uddin Umbrella filter 1967
  – ALL above suffered from significant morbidity and mortality including thrombosis, leg swelling, recurrent PE, etc..
Vena Cava Filters

• First introduced: **Greenfield Filter—1973**
  – Placed via **cutdown** (venotomy) with 29.5 Fr sheath
• First **percutaneous** Filter by **Greenfield** reported in 1984
• Currently @ least 9 FDA-approved IVC Filters in US market
<table>
<thead>
<tr>
<th>Filter</th>
<th>Maximum IVC Diameter (mm)</th>
<th>Access Route</th>
<th>Retrieval Route</th>
<th>Length (mm)</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Retrievable</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Celect (Cook)</td>
<td>30</td>
<td>J/F</td>
<td>J</td>
<td>45–50</td>
<td>Conichrome</td>
</tr>
<tr>
<td>Günther-Tulip (Cook)</td>
<td>30</td>
<td>J/F</td>
<td>J</td>
<td>45–50</td>
<td>Conichrome</td>
</tr>
<tr>
<td>G2 (Bard)</td>
<td>28</td>
<td>J/F</td>
<td>J</td>
<td>40</td>
<td>Nitinol</td>
</tr>
<tr>
<td>G2 Express (Bard)</td>
<td>28</td>
<td>J/F</td>
<td>J</td>
<td>40</td>
<td>Nitinol</td>
</tr>
<tr>
<td>OptEase (Cordis)</td>
<td>30</td>
<td>J/F/AC</td>
<td>F</td>
<td>54–67</td>
<td>Nitinol</td>
</tr>
<tr>
<td><strong>Permanent</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Simon Nitinol (Bard)</td>
<td>28</td>
<td>J/F/AC</td>
<td>N/A</td>
<td>45</td>
<td>Nitinol</td>
</tr>
<tr>
<td>Vena Tech LGM (Braun)</td>
<td>28</td>
<td>J/F</td>
<td>N/A</td>
<td>43</td>
<td>Phynox</td>
</tr>
<tr>
<td>Vena Tech LP (Braun)</td>
<td>28 (35 mm in Europe)</td>
<td>J/F/AC</td>
<td>N/A</td>
<td>43</td>
<td>Phynox</td>
</tr>
<tr>
<td>Bird’s Nest (Cook)</td>
<td>40</td>
<td>J/F</td>
<td>N/A</td>
<td>&gt;70</td>
<td>Stainless steel*</td>
</tr>
<tr>
<td>TrapEase (Cordis)</td>
<td>30</td>
<td>J/F/AC</td>
<td>N/A</td>
<td>54–67</td>
<td>Nitinol</td>
</tr>
<tr>
<td>Titanium Greenfield (Boston Scientific)</td>
<td>28</td>
<td>J/F</td>
<td>N/A</td>
<td>49</td>
<td>Stainless steel*</td>
</tr>
<tr>
<td>12 Fr OTW Greenfield (Boston Scientific)</td>
<td>28</td>
<td>J/F</td>
<td>N/A</td>
<td>49</td>
<td>Stainless steel*</td>
</tr>
</tbody>
</table>

*Stainless steel filters are not MRI compatible.
J, jugular; F, femoral; AC, antecubital or upper arm vein; N/A, not applicable.
<table>
<thead>
<tr>
<th>Technical Problem</th>
<th>Potential Solution(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sheath kinking</td>
<td>Advance sheath/filter several centimeters as unit to pass kink</td>
</tr>
<tr>
<td></td>
<td>Beware of filter penetration of sheath</td>
</tr>
<tr>
<td></td>
<td>Different access</td>
</tr>
<tr>
<td></td>
<td>Different device</td>
</tr>
<tr>
<td>Incomplete expansion/crossed legs</td>
<td>Venography to assess, typically leave alone</td>
</tr>
<tr>
<td></td>
<td>Place second filter above if;</td>
</tr>
<tr>
<td></td>
<td>Concern for migration</td>
</tr>
<tr>
<td></td>
<td>Concern for inadequate PE protection</td>
</tr>
<tr>
<td></td>
<td>Reposition with care</td>
</tr>
<tr>
<td>Filter completely fails to open</td>
<td>Venogram to assess</td>
</tr>
<tr>
<td></td>
<td>Place second filter above</td>
</tr>
<tr>
<td></td>
<td>Rarely retrieve</td>
</tr>
</tbody>
</table>

PE, pulmonary embolus.
<table>
<thead>
<tr>
<th>Outcomes/Complications</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Recurrent PE</td>
<td>5%</td>
</tr>
<tr>
<td>Symptomatic IVC thrombosis</td>
<td>5–10%</td>
</tr>
<tr>
<td>Clinically significant filter penetration</td>
<td>&lt;1%</td>
</tr>
<tr>
<td>Clinically significant migration</td>
<td>&lt;1%</td>
</tr>
<tr>
<td>Mortality</td>
<td>&lt;1%</td>
</tr>
<tr>
<td>Complication</td>
<td>Management</td>
</tr>
<tr>
<td>--------------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Migration into the heart</td>
<td>Attempt retrieval if feasible and experienced operator</td>
</tr>
<tr>
<td></td>
<td>Consult for surgical removal</td>
</tr>
<tr>
<td>Asymptomatic IVC thrombosis</td>
<td>Do nothing</td>
</tr>
<tr>
<td>Symptomatic IVC thrombosis</td>
<td>Pharmaco mechanical thrombolysis if able</td>
</tr>
<tr>
<td></td>
<td>Leg elevation and compression stockings</td>
</tr>
<tr>
<td>Clinically significant filter penetration</td>
<td>Surgical referral</td>
</tr>
<tr>
<td>PE through indwelling IVC filter</td>
<td>Anticoagulate if no contraindications</td>
</tr>
<tr>
<td></td>
<td>Additional IVC filter below existing infrarenal filter if room, suprarenal filter if no room</td>
</tr>
<tr>
<td></td>
<td>Consider alternate sources (renal, gonadal veins)</td>
</tr>
<tr>
<td></td>
<td>Suprarenal filter</td>
</tr>
<tr>
<td></td>
<td>Consider alternate sources (upper extremity) SVC filter if clinically indicated</td>
</tr>
</tbody>
</table>
The Goal....
Impact of Retrievable VCFs?

• Significant
• Appropriate for
  – Major trauma patients
  – DVT and Transient contraindication for anticoagulation
  – During IlioFemoral DVT thrombolysis
• Pharmacotherapy and prophylaxis still appropriate for the majority of patients at risk or with established VTE
Limitations of Permanent IVC Filters

- 12 - 30% caval thrombosis rate
- 2.4 – 2.9% recurrent PE
- 0.8% fatal PE
- Coumadin?
IVC Filter
Caval Thrombosis and Recurrent PE

[Graph showing various caval occlusion and recurrent PE rates for different devices, including Vena Tech, Gunther Tulip, Simon Nitinol, Titanium, TrapEase, Stainless Steel Greenfield, Stainless Steel over-the-wire Greenfield, and Bird's Nest.]
Prophylaxis with Vena Cava Filters

High Risk Trauma Patients

- 299 trauma patients
- **Retrospective** analysis
- PE Rates:
  - 0.31% (1989-1992)
  - vs
  - 0.48% (1992-1998)

Increased use of prophylactic vena cava filters failed to decrease overall incidence of PE

## Permanent IVC Filters

### Results

<table>
<thead>
<tr>
<th></th>
<th>Filter</th>
<th>No Filter</th>
<th>Enoxaparin</th>
<th>UFH (adj dose)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PE rate</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Early (12D)</td>
<td>1.1%</td>
<td>4.8%</td>
<td>1.6%</td>
<td>4.2%</td>
</tr>
<tr>
<td>Late (2 yrs)</td>
<td>3.4%</td>
<td>6.3%</td>
<td>3.9%</td>
<td>5.7%</td>
</tr>
<tr>
<td><strong>Recurrent DVT (2 yrs)</strong></td>
<td><strong>20.8%</strong></td>
<td>11.8%</td>
<td>16.6%</td>
<td>15.8%</td>
</tr>
<tr>
<td><strong>Bleeding</strong></td>
<td>8.8%</td>
<td>11.8%</td>
<td>8.5%</td>
<td>12.0%</td>
</tr>
</tbody>
</table>

400 patients

Prospective Randomized


No Mortality Benefit with Filter
Venal Cava Filters

Conclusions

- No difference in PE rate between filters and enoxaparin
- Significant increase in rate of DVT with the use of permanent IVC filters
- No difference in the mortality rates

Inferior Vena Cava Filter Placement: Accepted Indications
SIR Standards Committee
JVIR 2003;14:S271-S275

- Patients with PE or IVC/Iliac/Femoral/Popliteal DVT AND one or more of the following
  - Absolute contraindication to anticoagulation
  - Complication of anticoagulation
  - Failure of anticoagulation
    - Recurrent PE despite *adequate* anticoagulation
    - Inability to achieve adequate anticoagulation
  - Massive PE and persistent venous thrombosis in a patient at risk of recurrent PE
  - Free floating iliac or IVC thrombus
  - Severe cardiopulmonary disease and proximal DVT
  - Poor compliance with anticoagulation regimen
Inferior Vena Cava Filter Placement: Accepted Indications

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  - Absolute contraindication to anticoagulation
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  - Failure of anticoagulation
  - Recurrent PE despite adequate anticoagulation
  - Inability to achieve adequate anticoagulation
  - Massive PE and persistent venous thrombosis in a patient at risk of recurrent PE
  - Free floating iliac or IVC thrombus
  - Severe cardiopulmonary disease and proximal DVT

But Have Retrievable IVC Filters Lowered the Bar???
Argument for **Retrievable Filters**

- Many clinical scenarios have a limited “high risk” time period for VTE.
- Newer retrievable filters can stay in longer.
- If retrievable filters have the same safety and efficacy profile as a permanent filter, why would you ever use a permanent filter?
- Better suited for “prophylactic”, high-risk scenarios, especially in younger patients.
The Perfect Filter

- Easy to put in—small lumen, small introducer, flexible, low profile, easy to see under fluoro (IR, surgeons).
- Safe—no “events”.
- Efficacious—totally prevents PE.
- Good at maintaining caval patency (good blood flow).
- Able to be used in any diameter IVC.
- Totally MRI safe.
- Zero-rate of thrombogenicity.
- Access from any site—femoral, brachial, jugular.
- Retrievable at any time by anyone (surgeons/IR/intensivists).
Use of Retrievable IVC Filters

- 32 patients treated with RECOVERY VCF
- Indications (not mutually exclusive)
  - Pulmonary Embolism (16)
  - Recent DVT (20)
  - Primary Prophylaxis (2)
- Procedural success in 100% of patients
- Retrieval successful in 24/24 patients
  - Mean implantation time 53 days (5-134 days)
- No complications
60 consecutive high risk surgical patients undergoing bariatric surgery
  - Mean BMI $61 + 10 \text{ kg/m}^2$

All received Gunther-Tulip retrievable IVC filter (Cook, Inc)
  - 6 patients refused retrieval

Mean dwell time $63 \pm 30 \text{ days}$

Of the 54 retrievals, 5 were unsuccessful
  - All due to severe tilt
    - 3/3 successful on secondary retrieval attempts

No complications

J Vasc Surg 2007;45:784-8
How Safe is Retrieval of IVC Filters in Anticoagulated Patients?

- Retrospective study of 115 retrievals in 110 patients
  - Group 1: Therapeutic anticoagulation (65 attempts)
    - Median INR 2.35
  - Group 2: Prophylactic anticoagulation (23 attempts)
  - Group 3: No anticoagulation (27 attempts)
- 10 retrievals unsuccessful
- *No hemorrhagic complications in any patient*

Published on line: http://chestjournals.org/cgi/content/abstract/chest.06-2897v1
Retrieval Devices
Recovery Filter Cone

C.R. Bard, Inc.
Recovery Retrieval
Questions Remain…

• How often are retrievable (optional) filters actually retrieved?
• If left indwelling, are they as effective as the permanent counterparts?
• How long can they really be left indwelling?
• Will long-term risk of DVT be similar/less/more with retrievable vs permanent IVC filters?
Retrievable Filters

• Use of RF to protect pt during “a window of vulnerability” seems reasonable
• July 2003 Recovery (Bard) FDA approved RF in United States
• Two others, OptEase (Cordis) and Günther-Tulip and Celect (Cook), now also approved
• A total of 11 devices have been tested in humans in Canada and Europe
• Many other currently under testing
Impact of Retrievable IVC Filters
Clinical Scenarios for RF/optional Filter

1. Trauma
Rationale—Limited period at “high risk” for VTE due to injuries and forced immobilization; young patients; many can’t undergo traditional prophylaxis with anticoagulation 2nd to bleeding diathesis.

Studies:
Clinical Scenarios for RF

2. Critical Care

Rationale—Critical illness, pharmacologic sedation and paralysis for mechanical ventilations renders ICU patients immobilized and at high risk for VTE; bleeding diathesis 2nd to anticoagulation prophylaxis can complicate recovery from multisystem illness.

Studies:
3. Periop with VTE

Rationale—must stop anticoagulation for procedure; surgery places patient at high risk; anticoagulation can be resumed after risk of bleeding from procedure decreased- then filter removed.

Studies:
4. Upper Extremity DVT/PE

Rationale—↑ing incidence of DVT (poss. due to larger CVP lines used in ICU); 12-16% ass. risk of PE; many of same ICU pts have contraindications or failure of anticoagulation; concern over a permanent device in SVC makes RF preferable.

Studies:
5. Pregnancy and VTE

Rationale—self-limited ↑ in thrombogenicity (time period of pregnancy); traditional anticoagulation with Coumadin contraindicated due to teratogenesis.

Studies:
Clinical Scenarios for RF

6. Thrombolytic Therapy

Rationale—during lytic Rx patients theoretically at very high risk for clots dislodging and PE; once lytic Rx complete, this risk is gone.

Studies:


Acute LEFT iliofemoral DVT: Contrast venography

[prone position]
Post lytic venography of the LEFT common iliac vein [prone position]

May-Thurner Syndrome residual stenosis

Treated with PTV and stent
7. Total Joint Procedures
Rationale—risk is high for first two weeks post-surgery even with anticoagulation.

Studies:
Clinical Scenarios for RF

8. Bariatric Surgery
Rationale—pts at high risk during periop period; esp. those with pre-existing VTE

Filter Growth for these indications is going up yearly..
Retrievable/Optional Vena Cava Filters

- **What is the attraction?**
  - Trauma patient
    - Transient contraindication to anticoagulation
  - Patient undergoing high-risk surgery
  - High Risk PE (get over the early risk)
  - Young patient with iliofemoral venous thrombosis
    - Thrombolytic therapy
Current Management of DVT

Diagnosis of DVT

Anticoagulation

Distal (Calf Vein)

Serial DUS to Exclude Propagation

IVC Filter:
• Contraind. to Anticoag.
• Protection during Lysis

Iliac/CFV

• Pharmacologic Lysis (no contraind.)
• Mechanical Thrombectomy
  • (± Lysis)
• Iliac Stent (if residual stenosis)
• Surgical Thrombectomy
  • Failed Lysis
  • Contraind. to Lysis
  • Failed Thrombectomy

Circulation 2004;110 [Suppl I]:I-27-I-34
Venous Thromboembolism

- Common disorder
- Often underdiagnosed
- If untreated, results in major morbidity and mortality
- Therapy has become quite safe and sophisticated
- Prevention is key: recognize high risk patients and use prophylaxis wisely
## Therapeutic Goals and Treatment Options for DVT

<table>
<thead>
<tr>
<th>Goals of Therapy</th>
<th>Supportive Care</th>
<th>IVC Filter</th>
<th>Heparin</th>
<th>LMWH</th>
<th>Thrombolysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prevent Embolization</td>
<td>★</td>
<td>★</td>
<td>★</td>
<td></td>
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</tr>
<tr>
<td>Prevent Extension</td>
<td>★</td>
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<tr>
<td>Reduce Recurrence</td>
<td>★</td>
<td>★</td>
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<tr>
<td>Restore Patency</td>
<td>★</td>
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<tr>
<td>Prevent Post-thrombotic Syndrome</td>
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</tr>
</tbody>
</table>
Optional Or Retrievable Filters

* Please Use them per guidelines (avoid overuse or underuse)

* Take out when risk or risks resolved

* Hope that use of RF will decrease bleeding and recurrent DVT or IVCF thrombosis
My diaper has no filter!!!!