

VIVA@LINC

Vena Cava Filters

How to Optimize Treatment Strategy

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V I V A 19

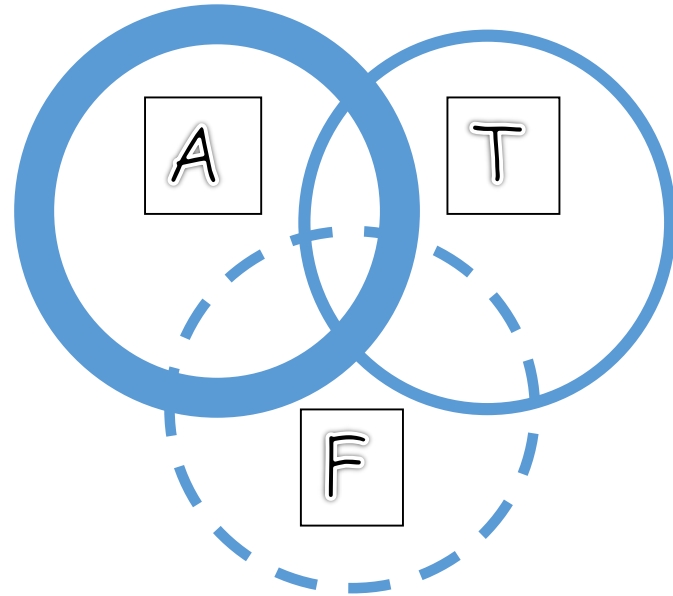
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Disclosures

- Consultant: Phillips, Endologix, Shockwave, Abbott, BSC, Medtronic, PQ Bypass
- VIVA Physicians 501c3 Board Member
- Stock Ownership: None
- Research Trials: Bolton, Gore, Medtronic, Endologix, Surmodics, Boston Scientific, NIH

Treatment of VTE

- Anticoagulation
 - Prevent new thrombus
- Thrombolysis / thrombectomy
 - Remove thrombus
- Filters
 - Prevent PE



IVC Interruption

- 1784: Femoral vein ligation
- 1893: IVC ligation
- 1963: IVC clip
- 1967: Mobin Uddin 'Umbrella'
- 1969: Greenfield Filter
 - Venous cut-down
- 1982: Bird's Nest Filter
 - First percutaneous device
- 2003: Optional filters in USA

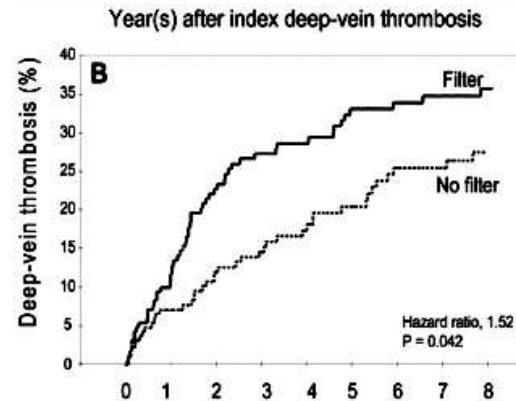
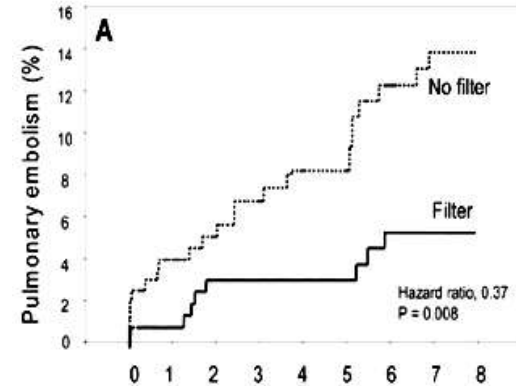


Do Filters Work?

- PE during first 12 days Rx:
 - 1.1% with filter, no mortality
 - 4.8% no filter, ½ lethal
 - $P < .05$
- PE at 8 years
 - 9 (6.2%), 2 fatal, with filter
 - 24 (15.1%) 5 fatal, no filter
 - $P = 0.008$
- VTE at 8 years
 - 40.2% with filter
 - 42.4% without filter

Decousus NEJM 1998;338:409-15

PREPIC Investigators, Circulation 2005;112:416



Clinical Indications For IVC Filters

- “Classic” or “Absolute”
 - VTE and inability to be anticoagulated
- “Extended” or “Relative”
 - VTE and increased risk of bleeding or adverse VTE event
 - No VTE and increased risk adverse VTE event

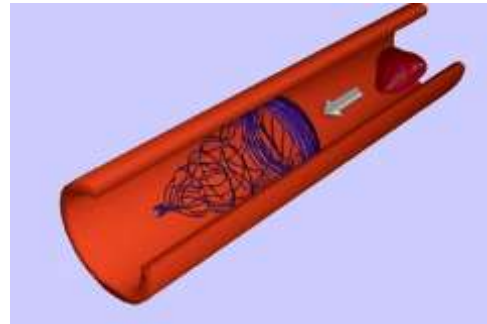
FDA Indications For IVC Filters*

- Prevention of recurrent PE when
 - PE when anticoagulant therapy is contraindicated
 - VTE with failure of anticoagulation
 - Emergency treatment following massive PE where anticipated benefits of conventional therapy are reduced
 - Chronic recurrent PE with failed or contraindicated anticoagulation

https://www.cookmedical.com/data/IFU_PDF/I-IGTCFS-65-1-FEM-TULIP-0906-338-01EN.PDF

New Trends

- Bioconvertible filter, opens after 60 days
 - Approved with new indication
 - “Transient high risk of PE”
- Completely absorbable IVC filter
 - Polydioxanone
 - Traps to 10 weeks



• https://www.accessdata.fda.gov/cdrh_docs/pdf16/K162875.pdf

FDA Indications Bio-Convertible Filter

- Approved Feb 2017
 - Bio-converts by 60 days
- Prevent recurrent PE... *transient* high risk of PE
 - PE when anticoagulant therapy is contraindicated
 - VTE with failure of anticoagulation
 - Emergency treatment following massive PE where anticipated benefits of conventional therapy are reduced

https://www.accessdata.fda.gov/cdrh_docs/pdf16/K162875.pdf

Suprarenal IVC Filter

- Presence of IVC thrombus precluding infrarenal IVC placement
- Filter placement during pregnancy
- Thrombus extending above previous IVC filter
- Gonadal vein thrombus
- Anatomic Variants (duplicated IVC, low insertion left renal vein)
- Significant extrinsic compression or intrinsic narrowing of IVC
- Intraabdominal or pelvic mass in pts undergoing operative IVC mobilization

IVC Filters In PE

- Do we need to do this?
 - Yes
- When – for sure?
 - Inability to be anticoagulated
 - Bona fide failure of anticoagulation
- When – maybe?
 - Unstable PE
 - CTEPH

Venogram

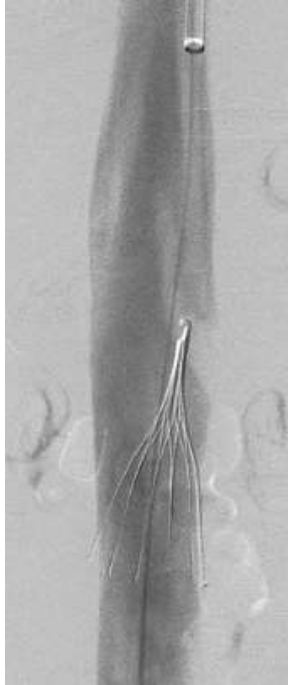


- Location of renal veins
- Size
- Anatomic variants
- Location of clot
- Wire position



Always perform cavagram to assess filter integrity, position, alignment and thrombus.

Filter Tilt

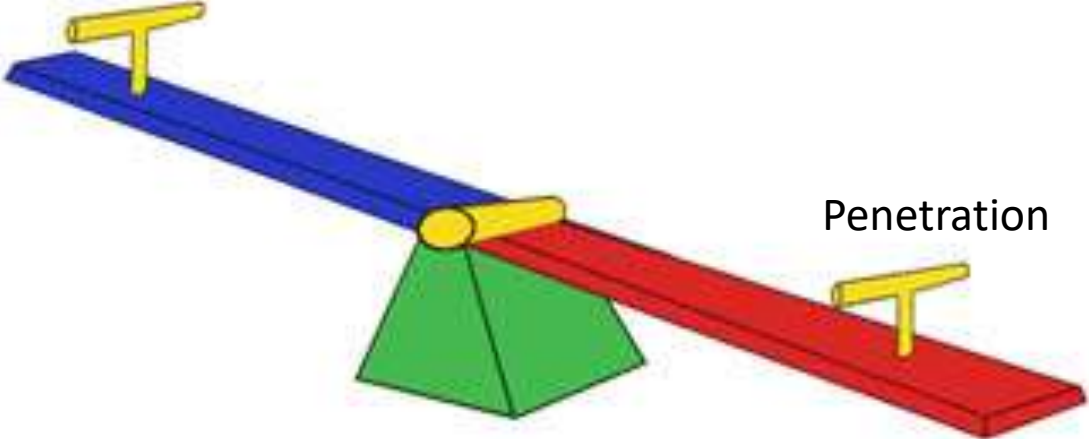


- Filter efficiency drops w tilting
- Traps clot to center
- Allows for lysis

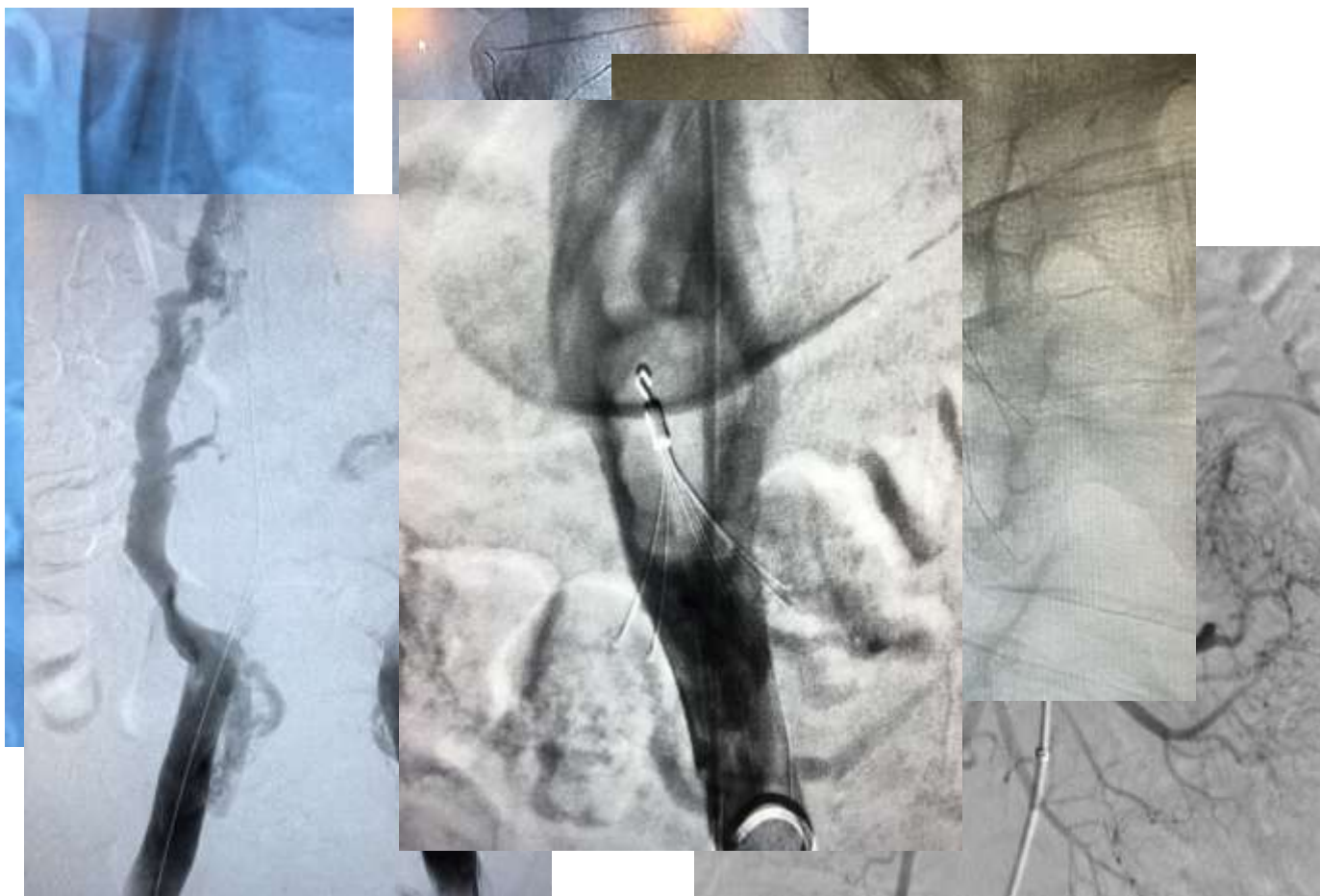
Complications of IVC filters

- Recurrent pulmonary embolism
- Migration
- Embolization of filter or parts
- Fracture
- Penetration of IVC and perforation of adjacent structures
- Thrombosis of IVC
- Insertion site thrombosis

Migration

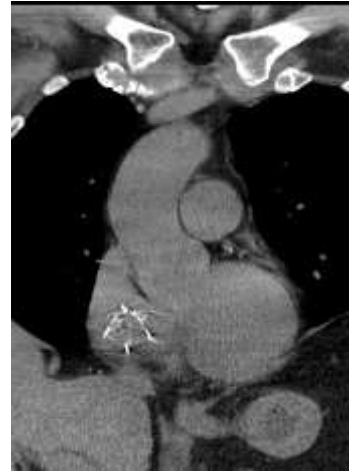


Penetration



Device Migration

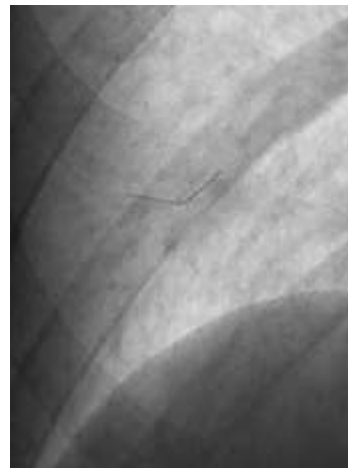
- Movement of device >2cm along IVC beyond initial placement
- Migration rates $\geq 10\%$ reported among following devices:
 - Bard Recovery (0-10%)
 - Bard G2 (12-25%)
 - Titanium Greenfield (7.5-15%)
 - Cook Günther Tulip (2.4-12.5%)
 - Vena Tech LGM (6-18.4%)



Deso, et al. *Seminars IR*. 2017

Device Fracture

- Breakage or separation of any filter component due to structural failure
- Bard filters associated with highest reported rates of fracture
 - Bard Recovery: 5.5-25%; estimated incidence - 39.5% at 65.7 months
 - Bard G2 devices (G2, G2X, Eclipse, Meridian): 1.2-12%; highest reported rate 38% at 60 months
 - Simon Nitinol: 10-16%
- OptEase/TrapEase: up to 50%



Deso, et al. *Seminars IR*. 2017

Filter perforating IVC

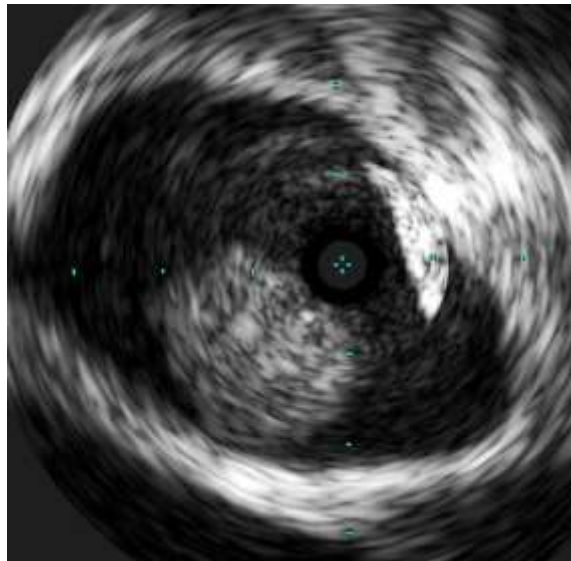


IVC Occlusion

- Acute or chronic thrombotic IVC occlusion following filter placement
- The highest reported rate of IVC occlusion:
 - TrapEase/OptEase filters 28.6%
 - Chronic IVC occlusion with Simon Nitinol filter 3.5 to 50%
 - VenaTech LGM as high as 65% at 9 years



Deso, et al. *Seminars IR*. 2017



Can advanced techniques change how we look at dwell time?

Is there a time limit on retrieval?

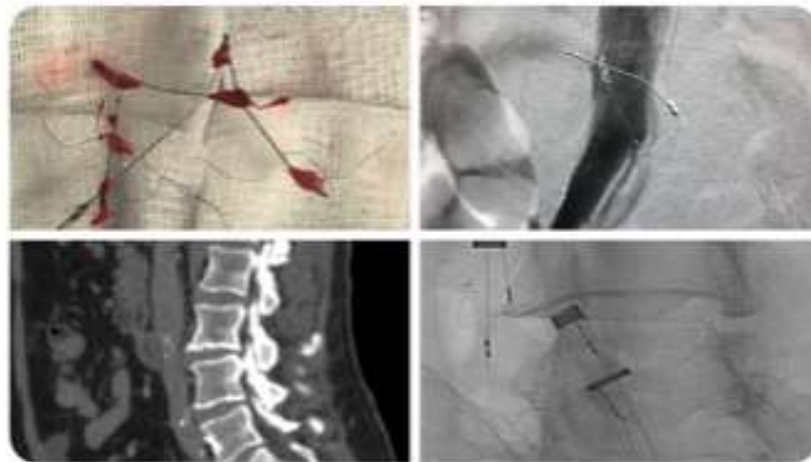
Is complex IVC filter retrieval safe?



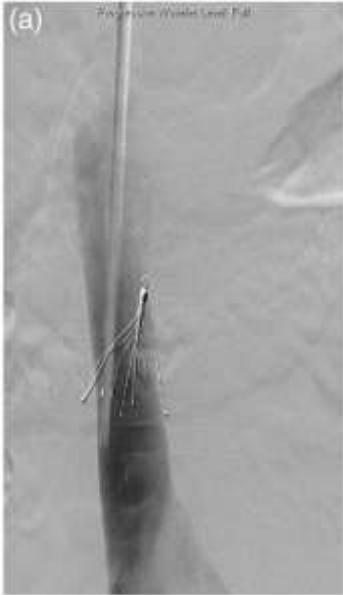
Pushing Boundaries on Retrieval

- No time limitations
- Permanent devices
- Intentional device disruption
- Social media favorite

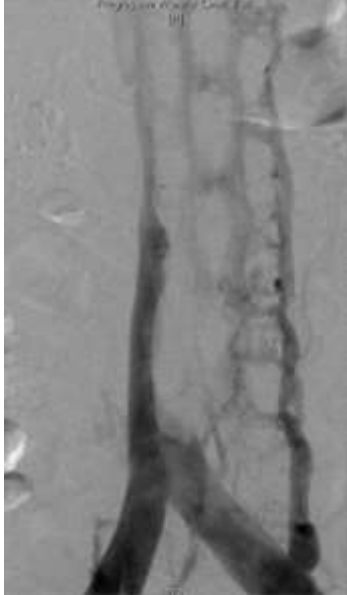
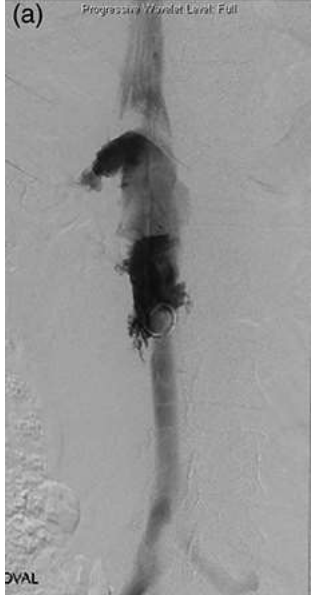
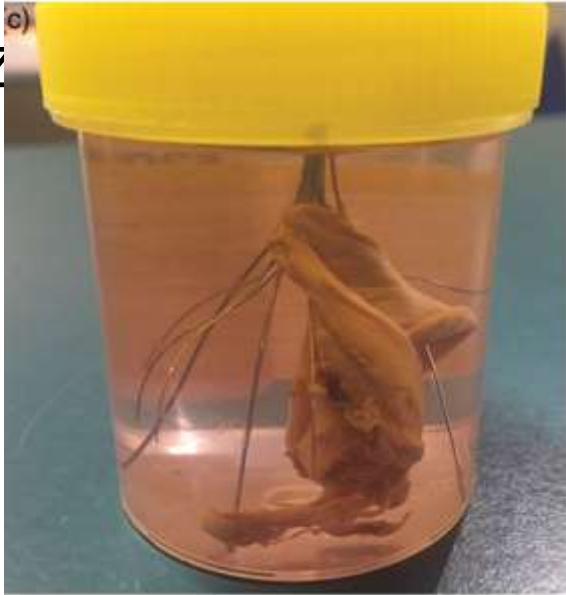
Bird's nest filterectomy. Why not also from the spine. And the iliacs. And a decade old. Check mate my friend.



Retrieval Requires Scientific Study



↓



Summary

- PE causes death
- First line treatment of PE is medical
- Filters prevent PE
- Filters have device-related morbidities
- Use filters when risk of death from PE outweighs risks of the filter

Conclusion

- IVC filter complications are rare
 - True incidence unknown as of yet (and may never be)
 - But, they do occur, and can be **catastrophic**
 - With follow-up may be avoidable → prompt retrieval
 - **Millions** of patients with devices that are no longer indicated → individualized, expert assessment for a retrieval procedure
- Retrieval of IVC filters is safe only early in its implantation
 - Like anything, outcomes for complex procedures are better at high volume centers, and can be done **safely** for very old filters
 - Have to be careful, **not “must retrieve at all costs”**

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