Vena Cava Filters

How to Optimize Treatment Strategy

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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

Kaufman JVIR 2006;17:449-459
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

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 with 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 ≥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
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”
Attend the conference live from your computer!

November 3-7, 2019
at Wynn Las Vegas, Nevada, USA
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