

# CIRA Case of the Week

## August 2016

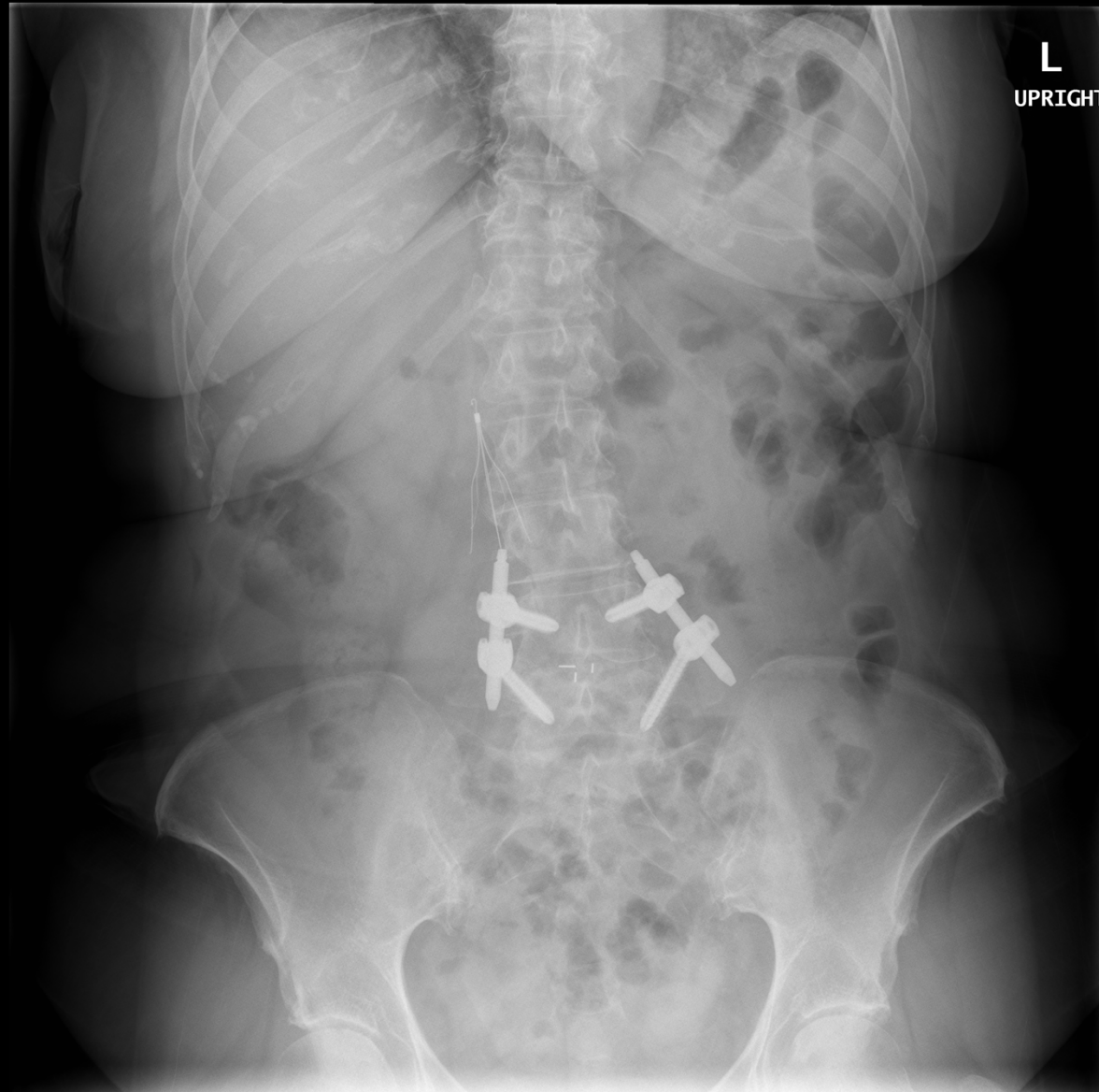
Case Courtesy of Drs. Murad Bandali and  
Eric Herget

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## CASE PRESENTATION

- 65 year-old female presents to Interventional Radiology Clinic for inferior vena cava (IVC) filter removal.
- Relatively healthy
- 45 days prior to presentation, while vacationing in the United States, she developed an unprovoked right popliteal vein thrombosis leading to right lower leg compartment syndrome requiring surgical fasciotomy
- Cook Guenther Tulip IVC filter placed in the infra-renal IVC in the perioperative period

# CASE PRESENTATION



## PROCEDURE

- 14 days later she was brought to the Angiography suite
- Placed in supine position
- Right IJ access
- Venocavogram – no evidence of thrombus within the IVC filter

# PROCEDURE

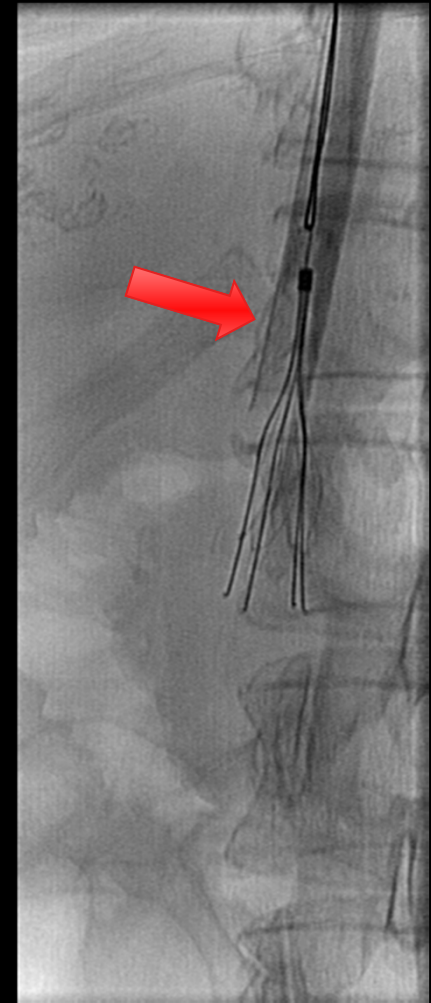
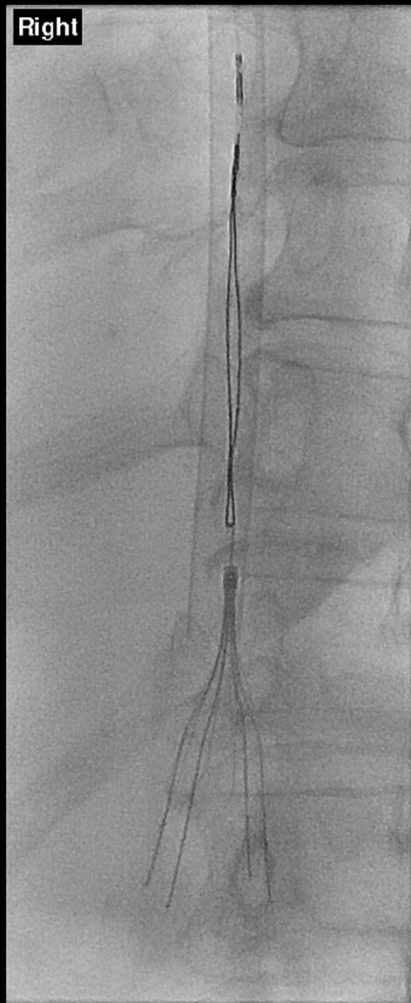


## PROCEDURE

- IVC filter retrieval kit with Guenther-Tulip Snare (11 French sheath)
- Great difficulty snaring the filter hook
- Pig-tail catheter (5-fr) catheter advanced to agitate the filter apex
- Filter successfully snared however 11-french capture sheath could not be advanced over the filter

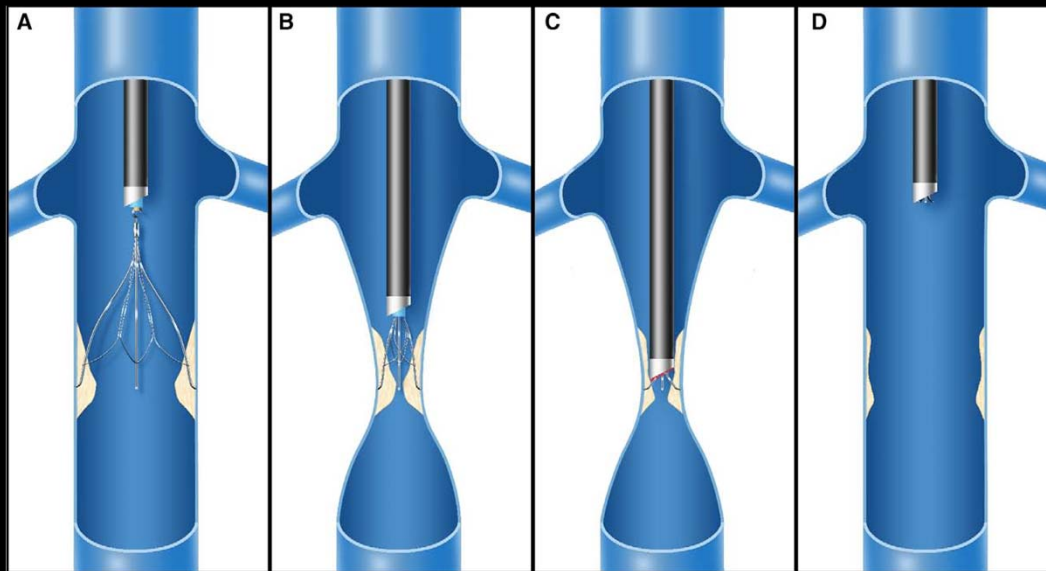
## PROCEDURE

- Telescoping sheath: 16 Fr --> 20 Fr = Not Successful



# PROCEDURE

- **Multidisciplinary Discussion:**
  - Laser-assisted dissection was considered to remove presumed adherent thrombus/fibrin cap
    - Use initially validated by Kuo et al. to assist in embedded filter struts
    - Was in use at the time by Electrophysiology Service
  - Telescoping mechanical sheath was suggested

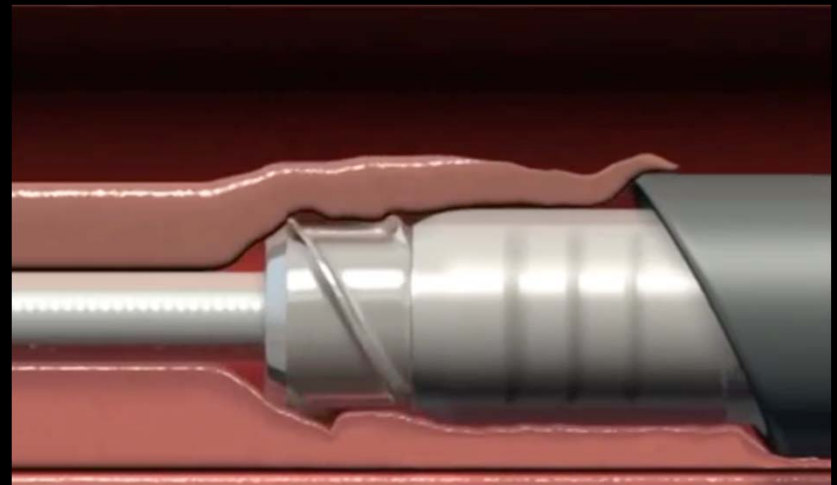
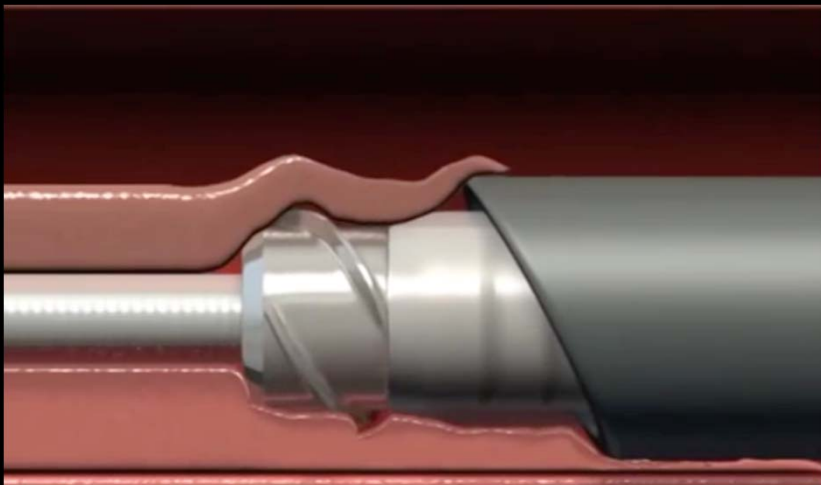
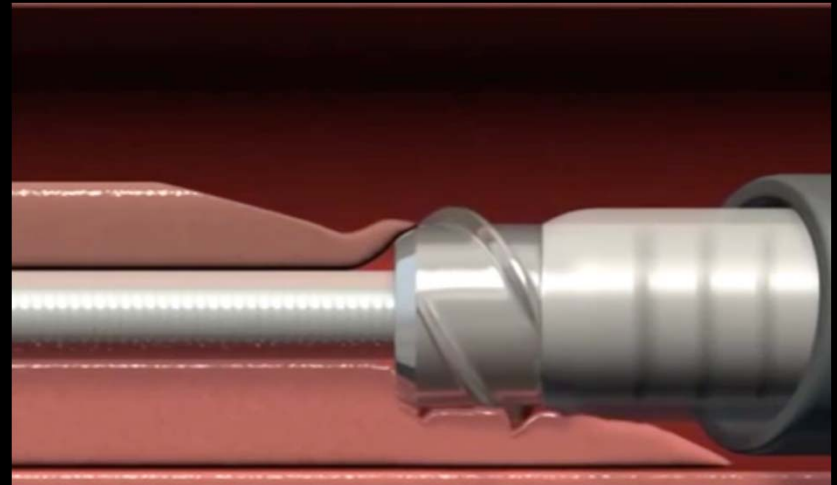
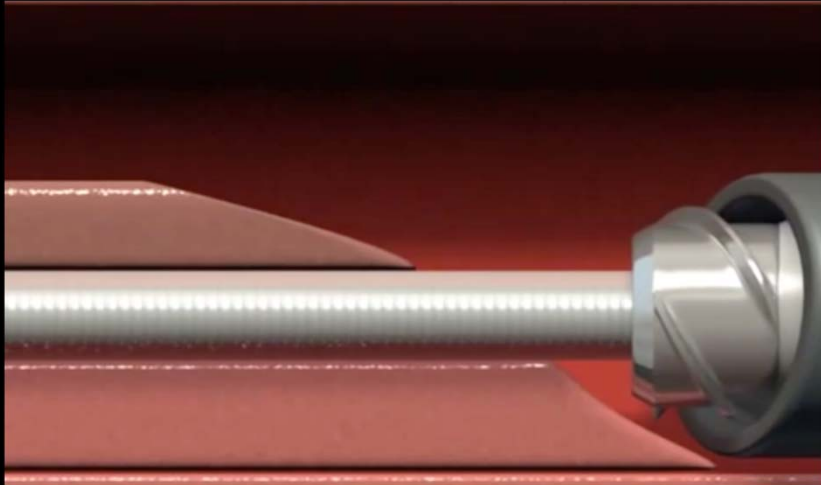


## PROCEDURE

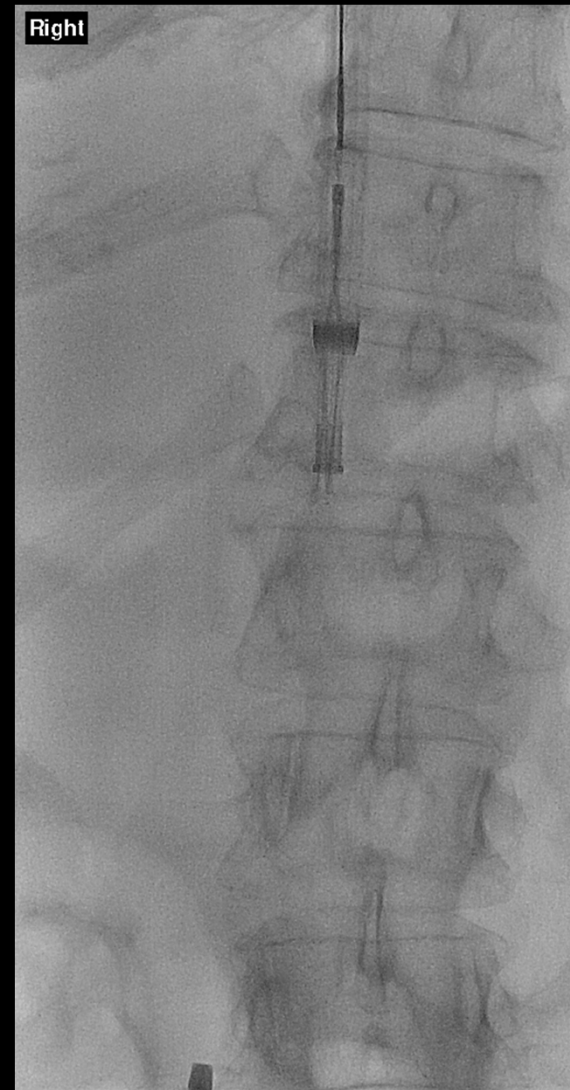
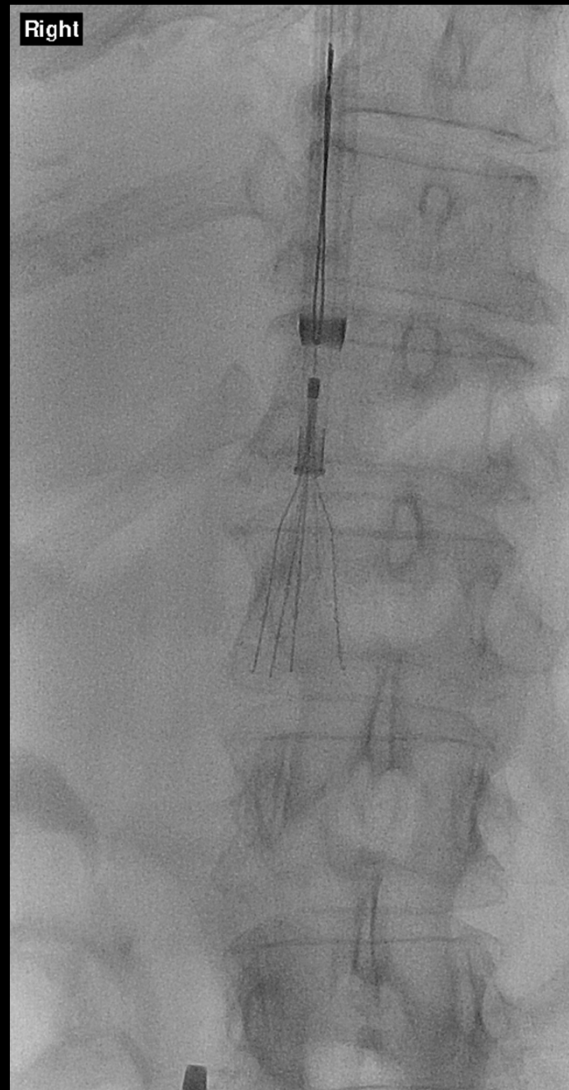
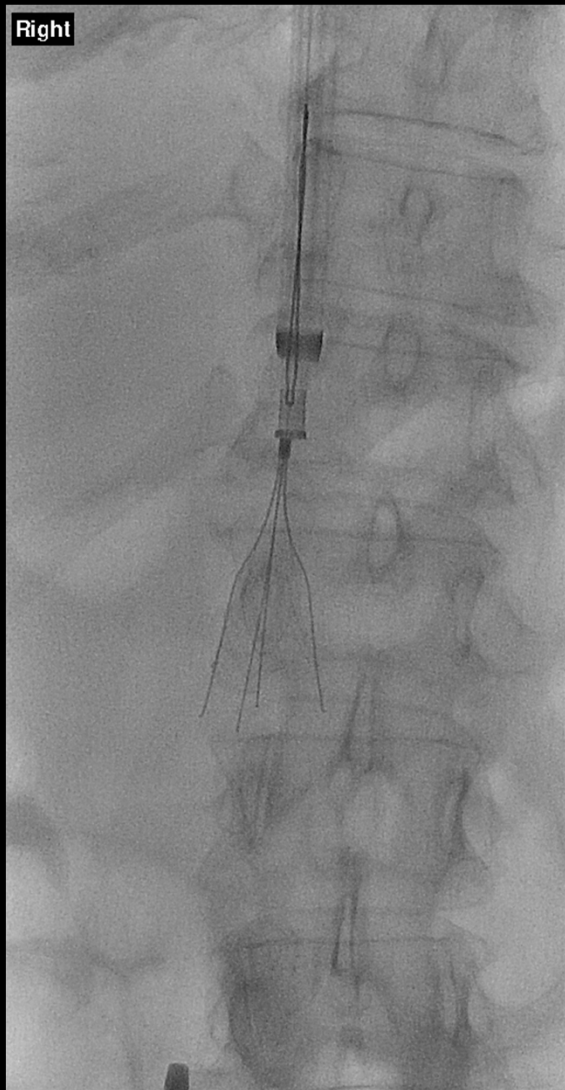
- Evolution Mechanical Dilator Sheath Set (Cook Medical, Bloomington, IN)
  - Inner sheath: 9, 11, 13 French
  - Outer sheath: 17, 19, 21 French
  - Length: 40.6 cm
  - Braided metallic “cutting” tip on the inner sheath which is manually controlled by a trigger-handle on its opposite end



# PROCEDURE



# PROCEDURE



## POST-PROCEDURE

- Purse-string suture for right IJ hemostasis
- Patient discharged home after 4 hours of bedrest
- Vague generalized abdominal pain for 48 hours which was self-limited
- No major complications

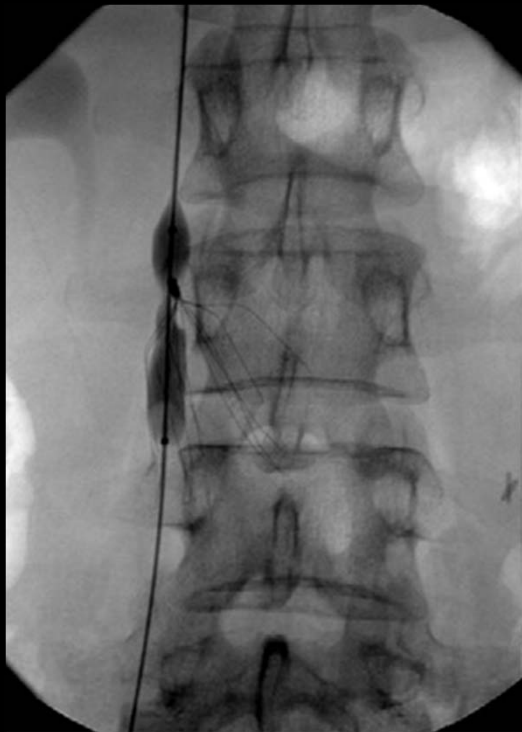
## DISCUSSION

- There has been a rapid increase in the number of IVC filters being placed in the past decade
- With this, there has been growing emphasis in the media on prolonged in-dwelling IVC filter related complications and as such an increasing emphasis on prompt filter removal
- Complications include:
  - Caval thrombosis
  - Filter fracture and/or migration
  - Caval/adjacent vessel perforation
  - Adjacent organ embedment/penetration

- Factors affecting complex IVC filter removal:
  1. Filter tilting
  2. Fibrous Cap
  3. Embedded struts
  4. Operator experience

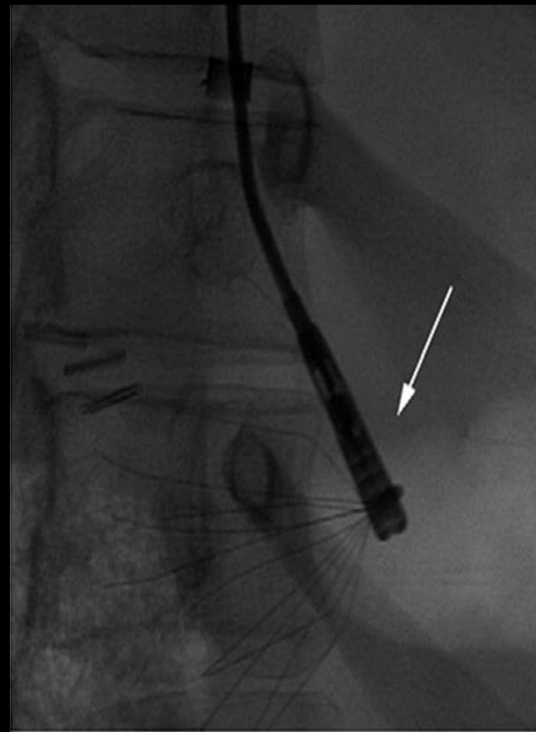
## DISCUSSION

- Dissection Techniques for embedded filters:



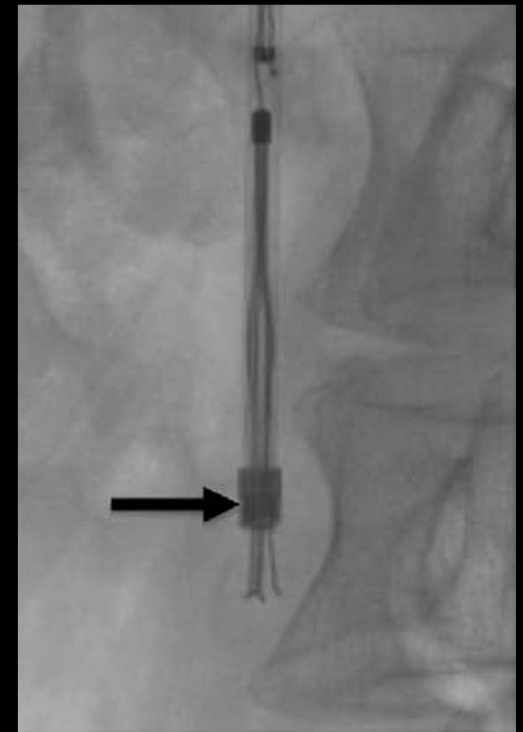
Lynch 2009

Balloon-Displacement  
Technique



Stavropoulos et al. 2008

Micro-dissection with  
endobronchial forceps



Kuo et al. 2013

Endovenous thermal  
dissection with laser  
sheath

## DISCUSSION

- Advantages of Mechanical Dilator Sheath:
  - Lower Cost
  - Portability
  - Disposability
  - Readily Available
- Disadvantages:
  - Has not been adequately studied (n=1)
  - Theoretically carries similar risks as other IVC filter dissection techniques

## TAKE HOME POINTS

- Incidence of IVC filter placement is progressively increasing and the need for filter removal along with it
- IVC filter removal can be complex and challenging and knowledge of many techniques and devices is paramount for technical success
- Mechanical dilator sheaths may be a useful substitute in situations where other, more advanced, devices are not readily available

## REFERENCES

1. Kuo WT, Cupp JS, Louie JD, et al. Complex retrieval of embedded IVC filters: Alternative techniques and histologic tissue analysis. *Cardiovasc Intervent Radiol*. 2012;35(3):588-597.
2. Iliescu B, Haskal ZJ. Advanced techniques for removal of retrievable inferior venacava filters. *Cardiovasc Intervent Radiol*. 2012;35(4):741-750.
3. Stavropoulos SW, Dixon RG, Burke CT, et al. Embedded Inferior Vena Cava Filter Removal: Use of Endobronchial Forceps. *J Vasc Interv Radiol*. 2008;19(9):1297-1301.
4. Lynch FC. Balloon-assisted Removal of Tilted Inferior Vena Cava Filters with Embedded Tips. *J Vasc Interv Radiol*. 2009;20(9):1210-1214.
5. Dello Russo A, Biddau R, Pelargonio G, et al. Lead extraction: A new effective tool to overcome fibrous binding sites. *J Interv Card Electrophysiol*. 2009;24(2):147-150.
6. Evolution Mechanical Dilator Sheath Set. Retrieved from [www.cookmedical.com](http://www.cookmedical.com).