

## INTRODUCTION

- Inferior Vena Cava (IVC) filters are placed to prevent pulmonary embolism (PE) in patients with deep venous thromboembolism (DVT) and one or more of the following:
  - Progression of DVT despite anticoagulation
  - PE despite anticoagulation
  - Complications of anticoagulation, or
  - Contraindication to anticoagulation
- IVC filters are designed as either optional (retrievable) or permanent, and filter selection is based on the indication for placement
- Optional filters are intended for retrieval within weeks of placement when the increased risk of PE decreases
- We present a case of complex retrieval of two IVC filters in the same patient with a history of chronic venous thromboembolism and post thrombotic syndrome

## CASE REPORT

- A 63 year-old male with a history of trauma 15 years prior had two separate IVC filters placed during his treatment; initially, a permanent filter was placed, with an additional retrievable filter placed cephalad to this due to recurrent pulmonary emboli
- The patient subsequently developed progressive chronic venous insufficiency and post thrombotic syndrome of left lower extremity
- The patient wanted these filters removed due to their possible contribution to his chronic leg swelling and pain and his concern for long-term complications

## OPERATIVE PLAN

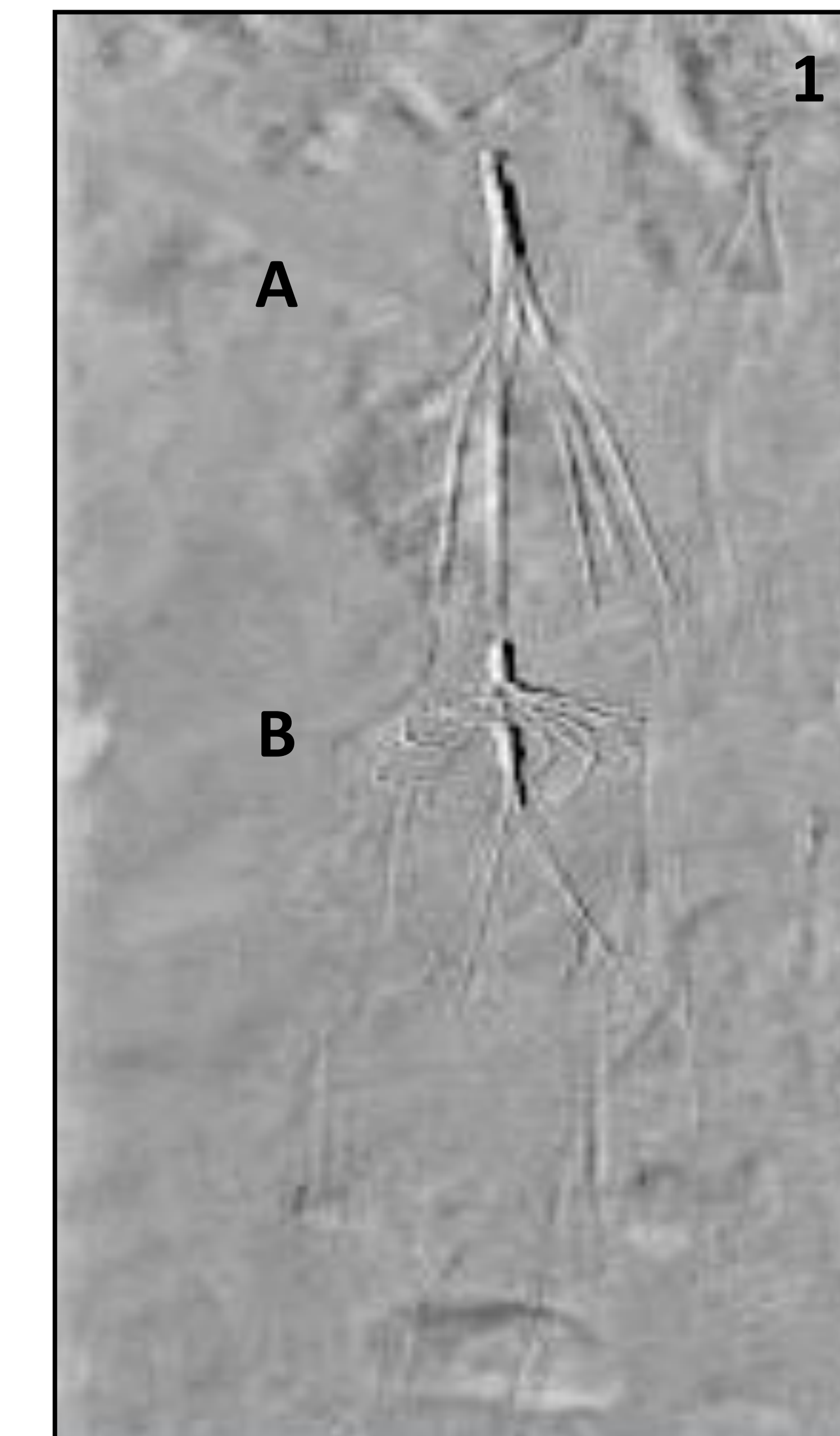
- Combined right internal jugular and left femoral vein access was established
- Table I summarizes retrieval techniques:

### Retrieval techniques for IVC filter removal

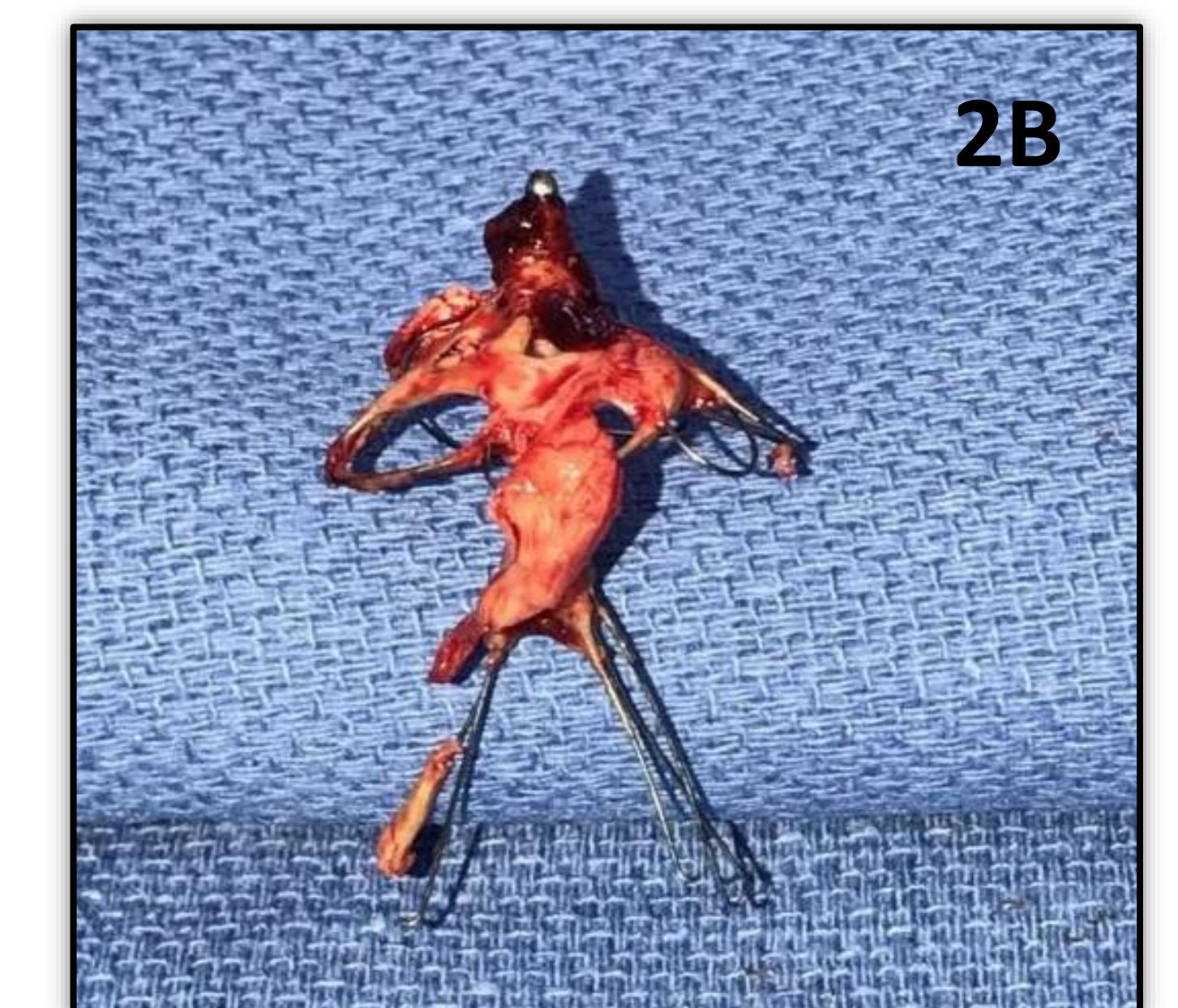
Standard	Advanced
Wire loop-and-snare (sling)	Balloon displacement
	Endobronchial Forceps
	Thermal Laser-Assist Sheath
	Open Extraction

- The superior IVC filter (**Image 1, A**) was removed with standard techniques using a snare to engage the apex of the filter, collapsing it into the retrieval sheath, and extracting it via the jugular approach (**Image 2A**)
- The inferior (permanent) IVC filter (**Image 1, B**) was embedded into the IVC wall at the crown and legs
- Advanced retrieval techniques were needed for successful retrieval:
  - Lasso of the upper crown using a looped flexible wire
  - Bidirectional access from above and below
  - Balloon separation of the IVC filter from the caval wall
  - Laser sheath extraction to cut the embedded scar tissue
- Once freed from the caval wall, the filter would not collapse and remained expanded outside the sheath
- Extraction required surgical exposure of the right internal jugular vein and careful removal through the heart under live fluoroscopic guidance (**Figure 2B**)
- The left iliac vein was then stented to treat chronic stenosis and improve venous outflow from the leg

## INTRAOPERATIVE IMAGES



**Figure 1:** Digital subtracted fluoroscopic image showing two stacked IVC filters:  
1A: Superior retrievable filter  
1B: Inferior permanent filter



**Figure 2:** Extracted IVC filters:  
A: Superior retrievable filter with a small amount of chronic thrombus  
B: Inferior permanent filter with significant adherent scar tissue

## CONCLUSION

- Careful patient selection and review of indications for an IVC filter are imperative at index procedure
- For optional IVC filters, a retrieval plan should be strategized from the beginning and executed when safe
- In select patients, retrieval is possible for permanent IVC filters and for filters left in for long periods of time using advanced hybrid open and endovascular techniques