VASCULAR RETRIEVAL

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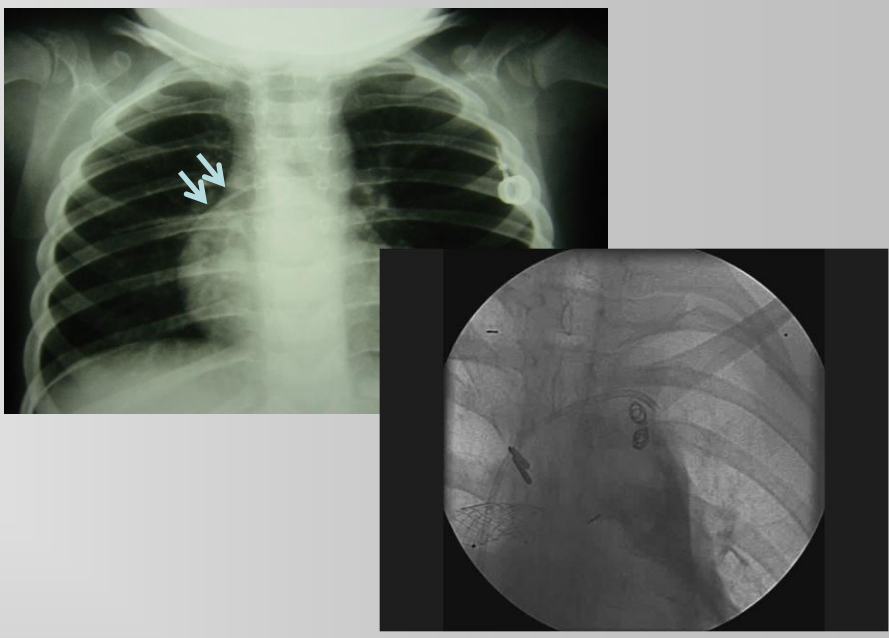
FOREIGN BODIES IN THE VASCULAR SYSTEM

In most cases iatrogenic!

- Catheters
- Therapeutic devices



Possible complications of foreign bodies

- Vascular or cardiac trauma
- Infection
- Arrythmias
- Thrombosis / ischemia

Retrieving Foreign Bodies

- **Be prepared in advance !**

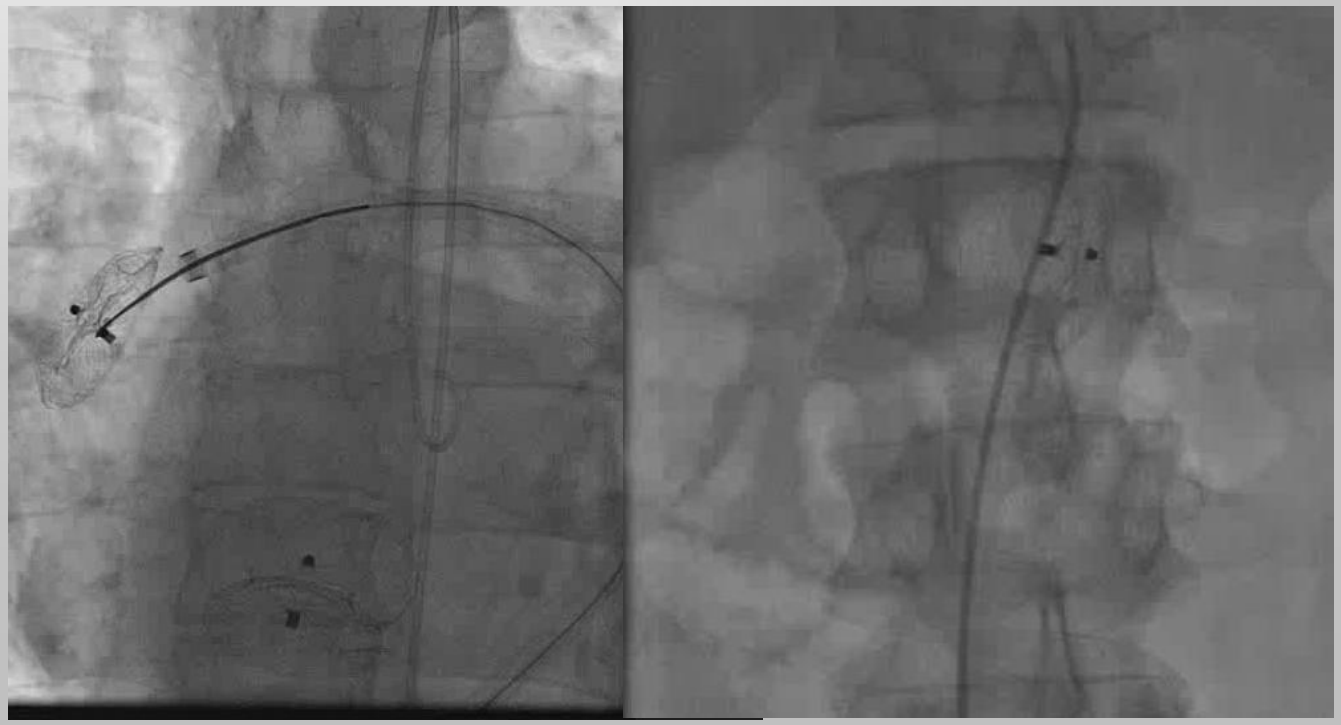
  - Retrieval devices should be available
  - Long sheaths, with back-bleed valves
  - Guide wires (gliding, standard, stiff)
  - Deflector wires
  - Preferentially biplane fluoroscopy

Retrieving Foreign Bodies

- **Embolized materials**

  Most frequently to systemic veins, right atrium, and pulmonary arteries

  Also to left atrium, and systemic circulation



Retrieving Foreign Bodies

- **General approach**

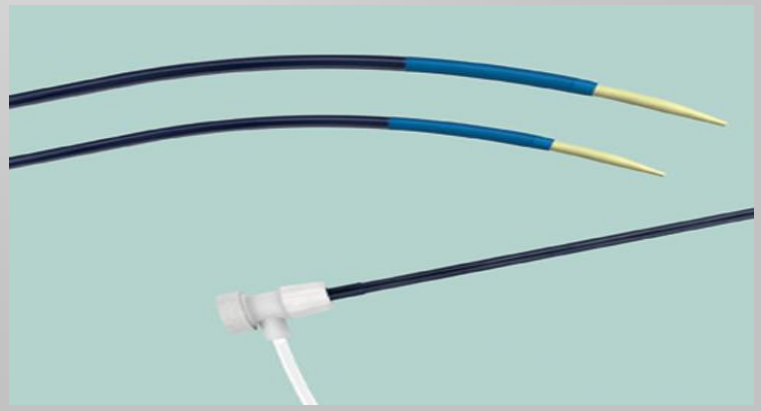
1. Identify the foreign body
2. Define its location
3. **Plan the procedure !**

Retrieving Foreign Bodies

Planning

In most cases use a long sheath!

- 2 or 3 Fr larger than the original sheath
- Consider Flexor™, Arrowflex™, kink resistant sheaths
- 8 Fr for most indwelling catheters and up to 14 Fr for some devices
- Backbleed valve
- Consider bevelling the tip



Retrieving Foreign Bodies

- **The Guiding catheter option**

- When significant catheter manipulation is predicted

- For large, stiff, bulky foreign bodies

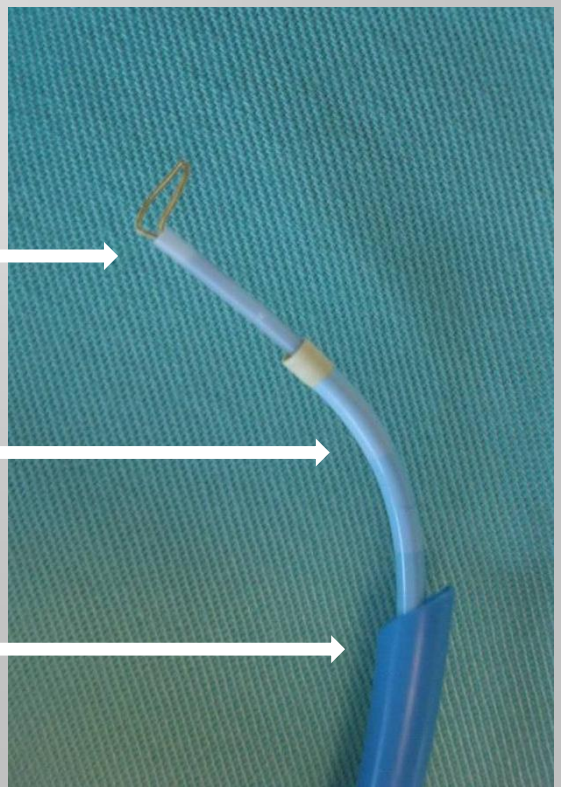
Retrieval device

inside a

Guiding catheter

inside a

Large sheath



Retrieving Foreign Bodies

- **A Guiding catheter allows for**

- Better positioning and control of retrieval device
- Extra support to pull the foreign body into the sheath
- Prevents “accordioning” / kinking of the sheath

Retrieving Foreign Bodies

- **Retrieval devices**
  - Snares
  - Baskets
  - Forceps
  - Other (needle´s eye, laser sheath)

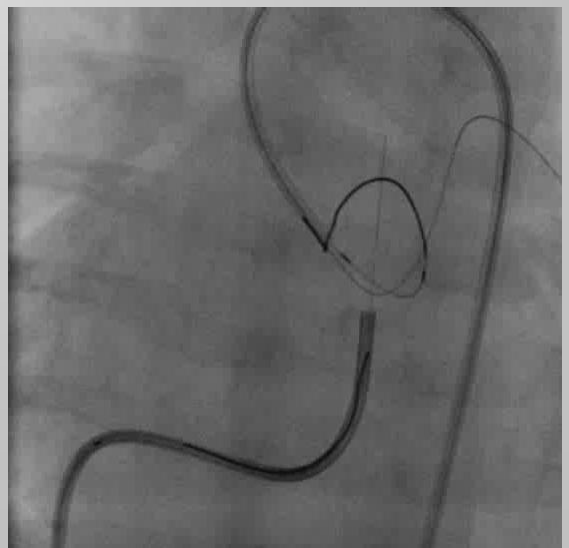
Retrieving Foreign Bodies

- **Snares**
  - The simplest devices
  - Easy to use
  - Require a free end / portion of the object
  - Essential in every catheterization laboratory
  - Excellent for catheters / wires

Retrieving Foreign Bodies

➢ Home made Snares

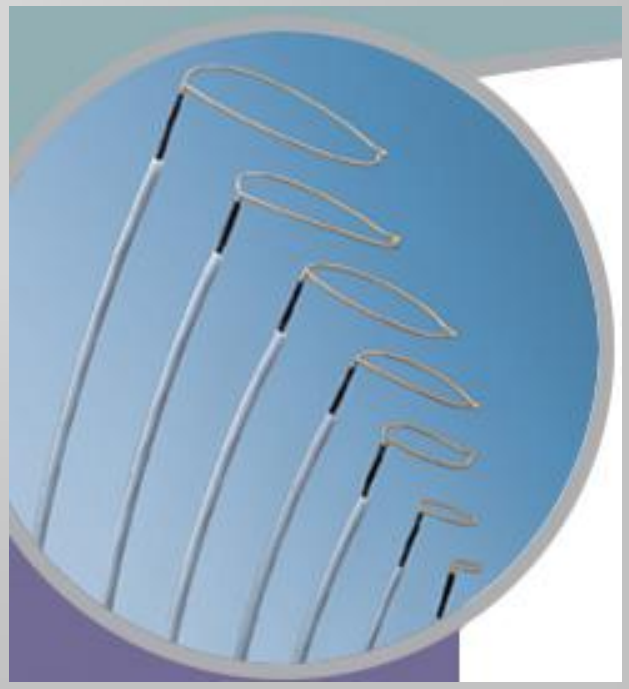
- Rigid end hole catheter or a cut balloon
- 0,018” long guide wire
- The 2 ends are inserted through the tip of the catheter or the 2 holes of the cut balloon and looped at the desired diameter
- Always available but deform easily and are difficult to manipulate
- Poor resistance



Retrieving Foreign Bodies

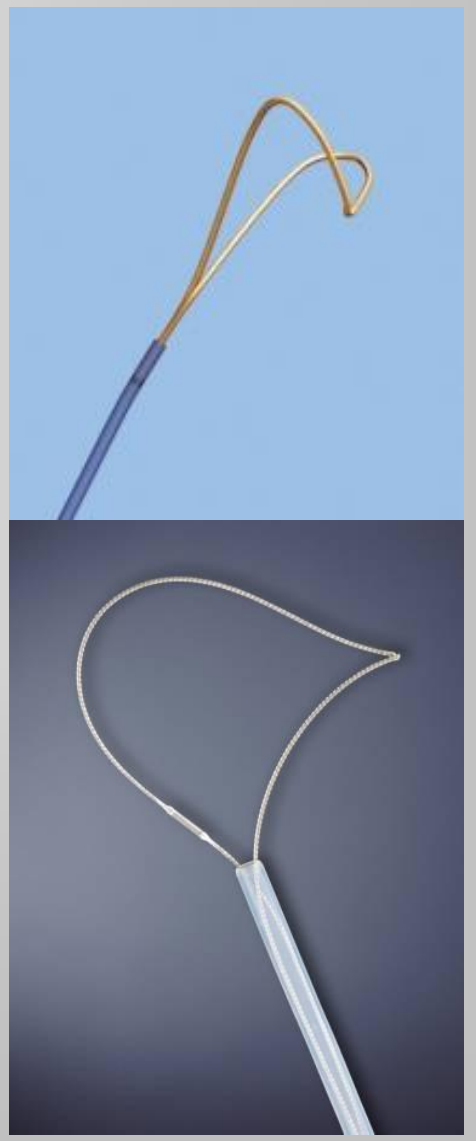
➢ Goose Neck™ (EV3)

- Nitinol string wire
- Aligns perpendicular to the catheter
- Loop very flexible, but resistant
- Diameters between 5 and 35 mm
- Sheath 4 Fr to 6 Fr
- Micro snares (3 Fr)



Retrieving Foreign Bodies

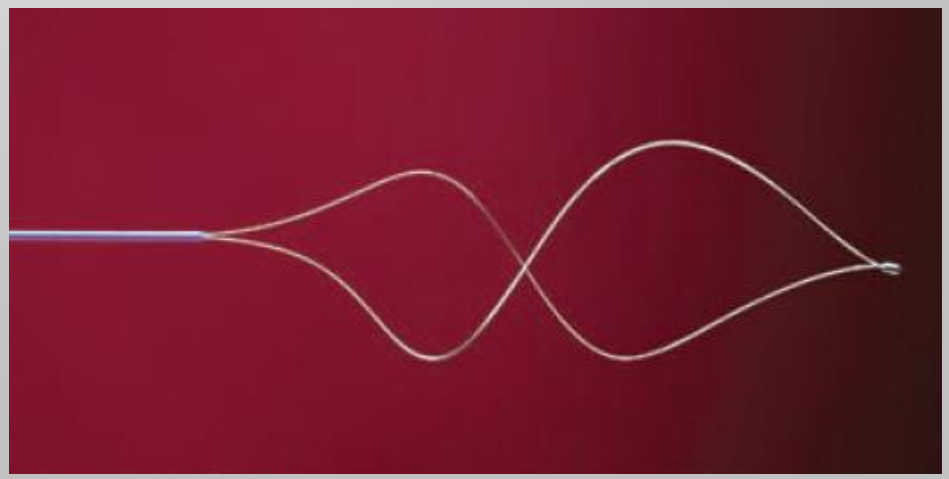
- **Andra Snare™ (Andromed)**
  - Nitinol snare, preangled tip
  - Shapable introducer
  - Loop size 5-35 mm; introducers 4-6 Fr
  - Micro-snares: 2-7mm (3 Fr)
- **Angled Wire Loop™ (Cook)**
  - Similar angle tip
  - Loop size 5-35 mm; introducers 5 - 7 Fr



Retrieving Foreign Bodies

Expro / Expro Elite™ (Radius)

- Two loops of wire welded distally
- When opened, the 2 wires have a spiral shape
- 0,035” catheter !
- Sizes 5 to 35 mm
- Excellent for rotational grasp of foreign bodies, specially in small vessels (peripheral pulmonary arteries)
- Fragile!



Retrieving Foreign Bodies

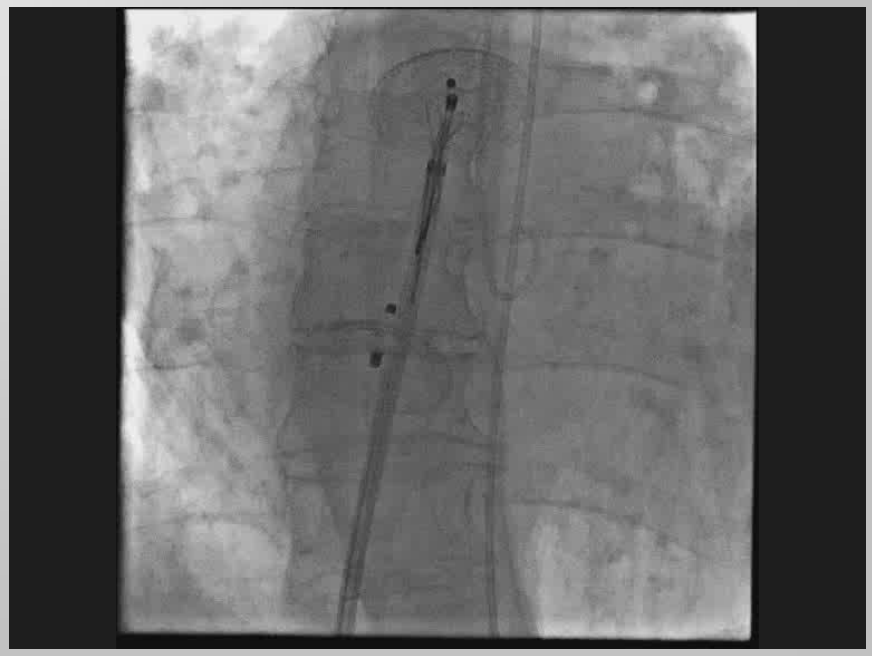
➢ Multi-snare™ (PFM)

- Two perpendicular loops
- Distal loop 90º to the catheter
- Proximal loop parallel to the catheter
- Sizes 5 to 40 mm (sheath 4 Fr to 6 Fr)
- Micro-snares 2- 6 mm
- Good for objects perpendicular and aligned with the vessel, or that are mobile

Retrieving Foreign Bodies

➢ En Snare™ (Merit Medical)

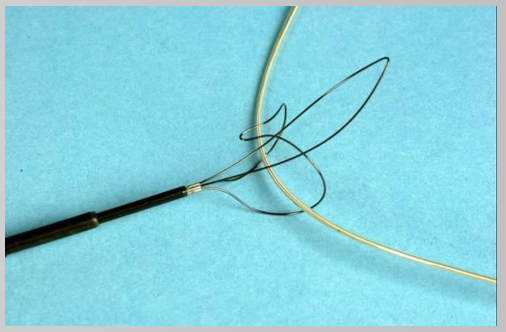
- 3 separate interlaced loops of Nitinol with angles of approach
- Allows for good alignement
- Diameters 6 to 45 mm (6 - 7 Fr)
- Micro En Snare 2 to 8 mm (3 Fr)

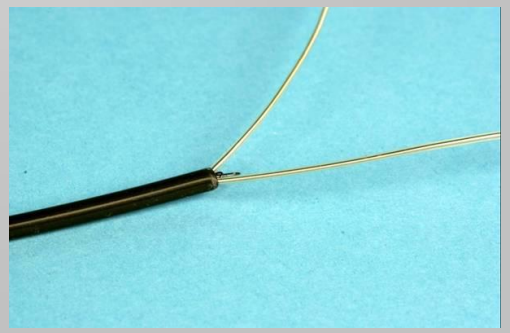


Retrieving Foreign Bodies

Needle´s Eye™ (Cook)

- **"Eye" – Metal loop bending on itself**
- Thread – Double strand of metal wire, straight, which enters the "eye"
- Excellent for foreign bodies without a free end
- 12 Fr internal sheath
- Long 16 Fr outer sheath

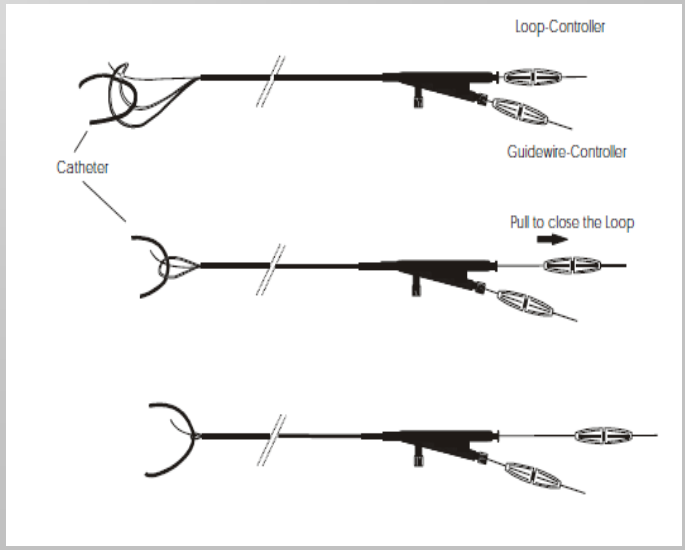




Retrieving Foreign Bodies

➢ Loop Master Snare™ (Andromed)

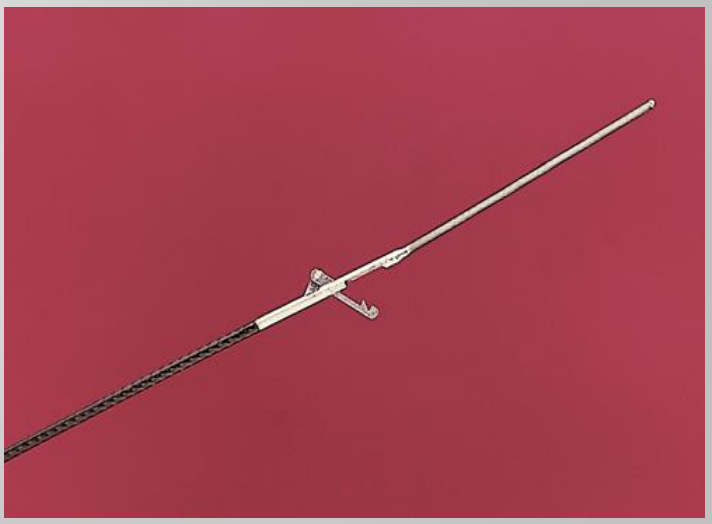
- Nitinol snare
- Distal guide wire
- 25 mm loop, 8Fr
- Designed to retrieve foreign bodies without a free end (catheters, wires, pacemaker leads)



Retrieving Foreign Bodies

➢ Vascular retrieval Forceps™ (Cook)

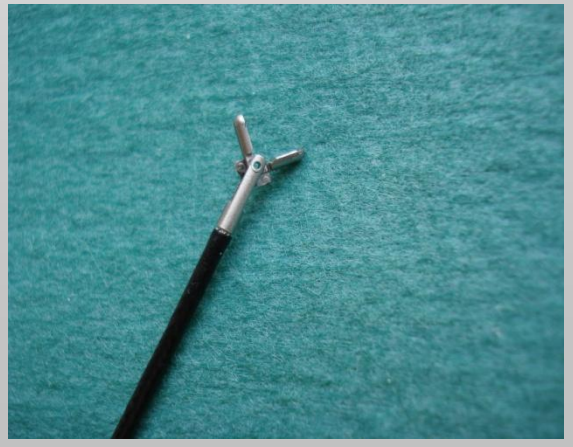
- Distal guide wire
- Size 3 Fr
- Stainless steel "Jaw" – excellent for coils, other devices in position perpendicular to the catheter
- Introduced through a small guiding catheter
- Use a sheath according to the size of the foreign body!

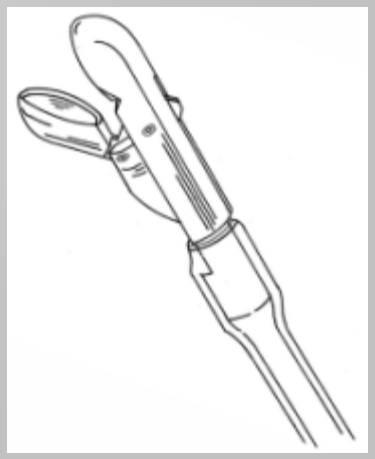


Retrieving Foreign Bodies

➢ Bioptome Forceps

- 5-7 Fr
- Used to grasp, expose or reorient a foreign body
- Open the bioptome jaws within the tip of the sheath
- Mouth of bioptome has small size
- Designed for cutting and not grasping
- Poor traction force





Retrieving Foreign Bodies

- **Basket retrieval devices**
  - **Retrieval basket ™ (Boston Scientific)**
  - **Dotter basket ™ (Cook)**
  - 3 to 5 strands of metal wire forming a helical basket
  - Wires attached proximally and at the tips
  - Between 6 and 10 cm length
  - Usually larger and stiffer than other devices
  - Sheath at least 2-3 Fr larger than the carrier catheter

Retrieving a Catheter Fragment

STEP BY STEP APPROACH:

- Obtain a thorough history and ascertain the type and location of catheter
- Select the retrieving device: single or multiple loop snare.

  (Usually a 10 to 25 mm loop diameter)
- Select the guiding catheter or sheath to use.
- Obtain informed consent.
- Access the femoral vein percutaneously with a short introducer.
- Heparinize (100 IU/kg iv).
- Advance a diagnostic catheter to the desired location

RETRIEVING A CATHETER FRAGMENT

STEP BY STEP APPROACH:

-Advance an exchange wire beyond the fragment position and exchange the diagnostic catheter for the selected guiding catheter (or sheath)

- Advance the snare catheter until it exits the guiding catheter or sheath

- Then advance the snare until the loop is around the proximal end of the foreign body

- By advancing the snare catheter the loop of the system is closed

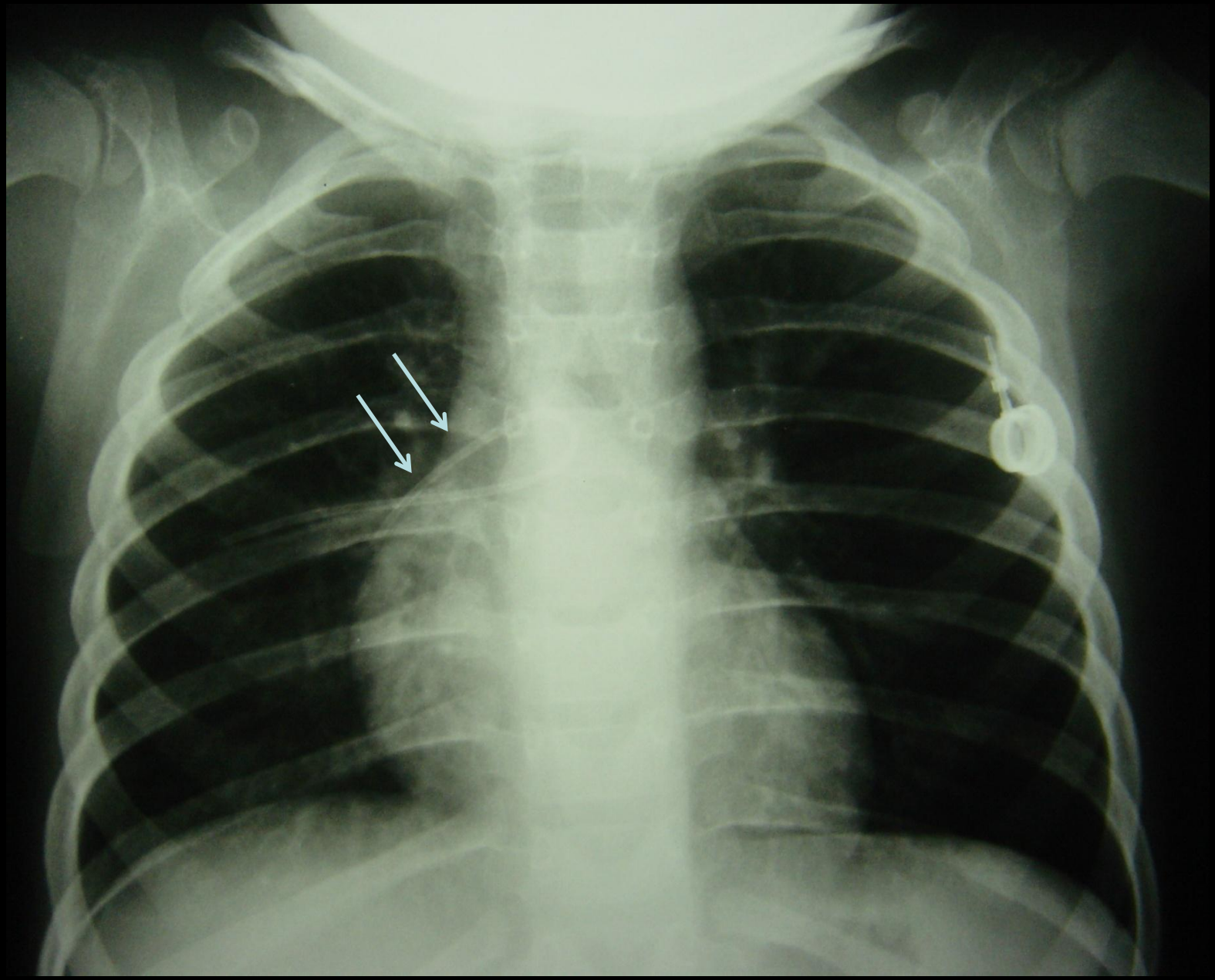
- To retrieve the indwelling catheter, maintain tension and pull the central core and snare catheter, while advancing the guiding catheter or sheath

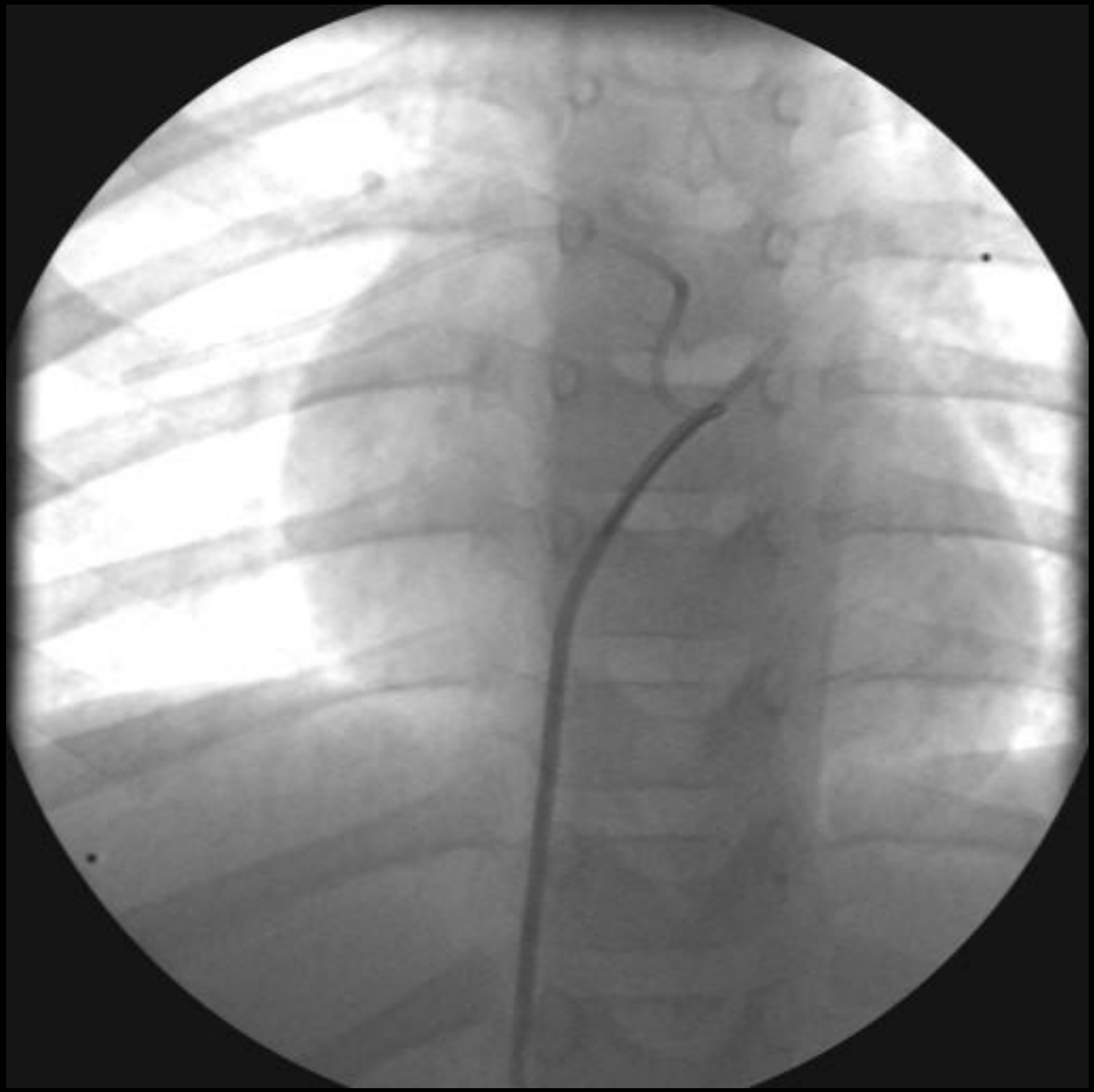
RETRIEVING FOREIGN BODIES

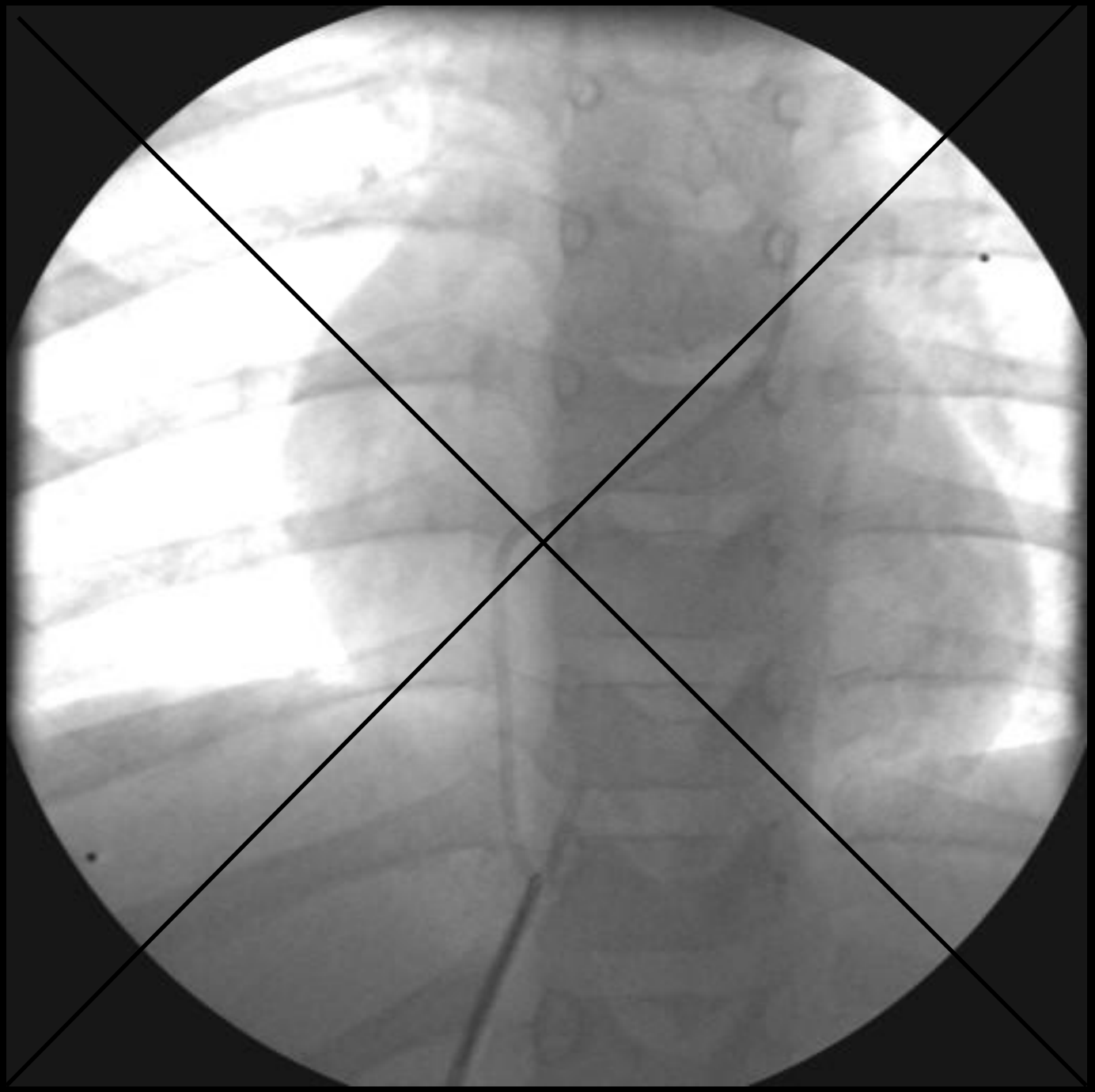
➢ **VERY IMPORTANT**

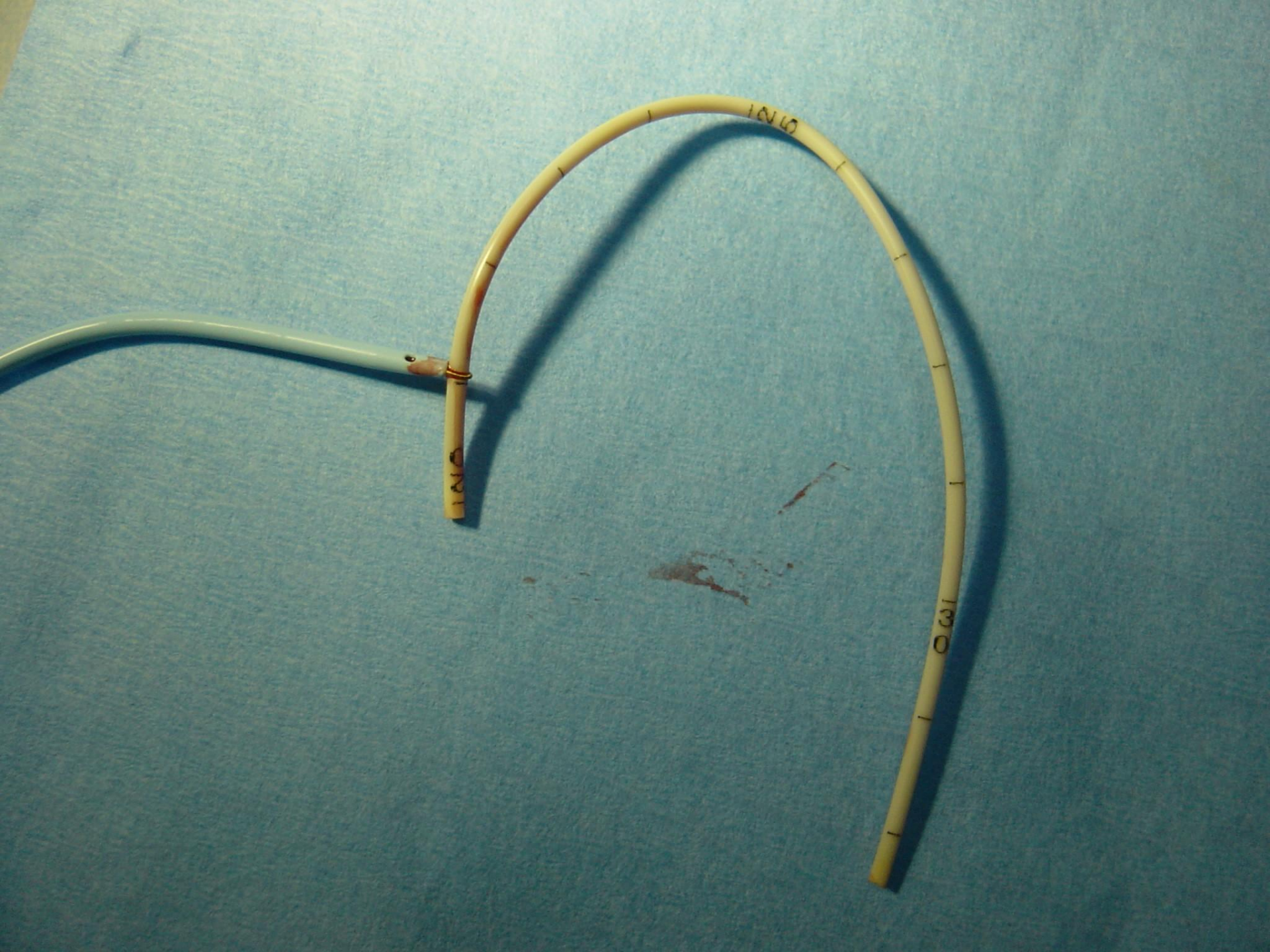
Remove completely the foreign body into a sheath

before withdrawing it through the heart

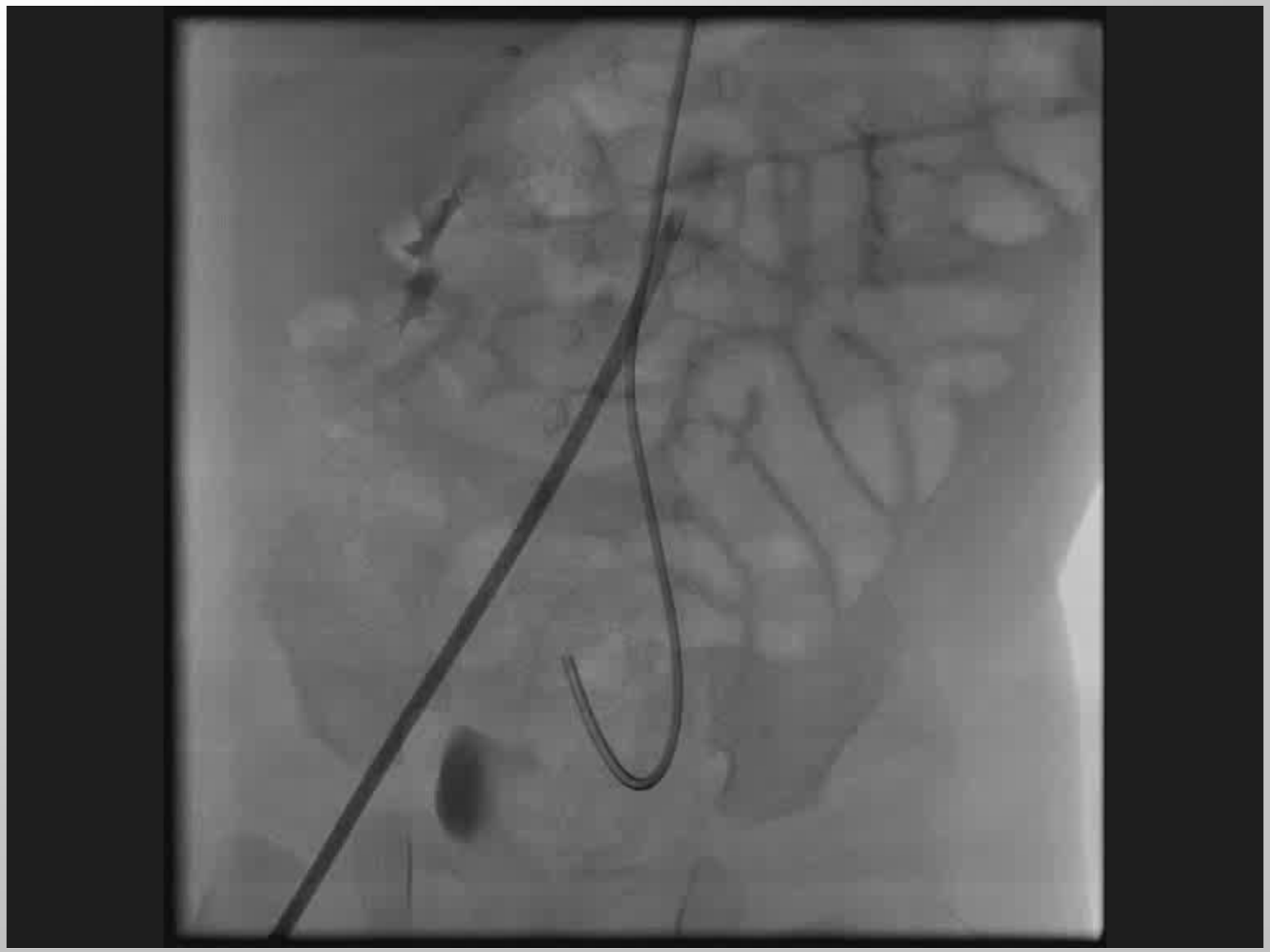








RETRIEVAL EMBOLIZED UMBILICAL CATHETER



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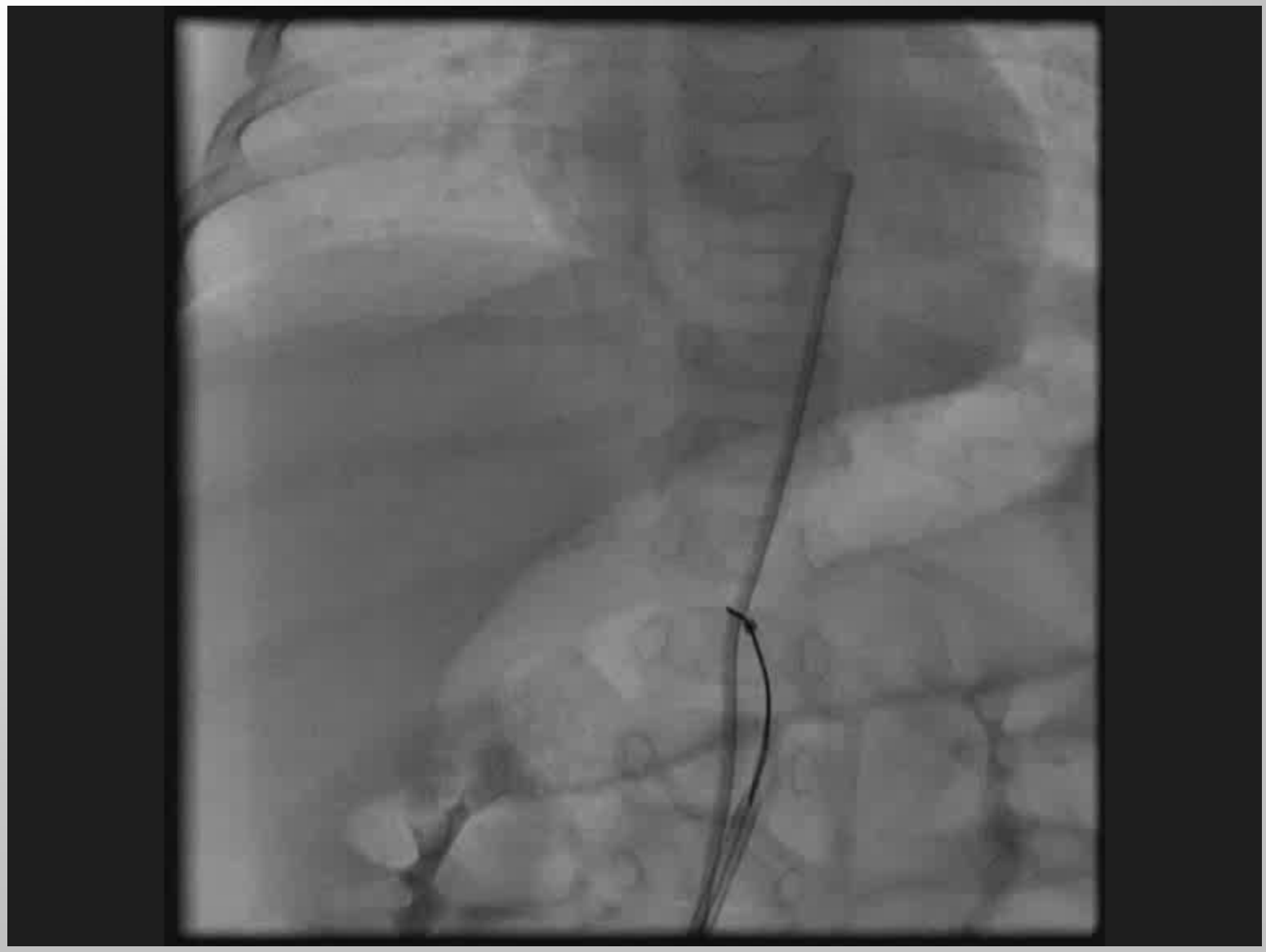

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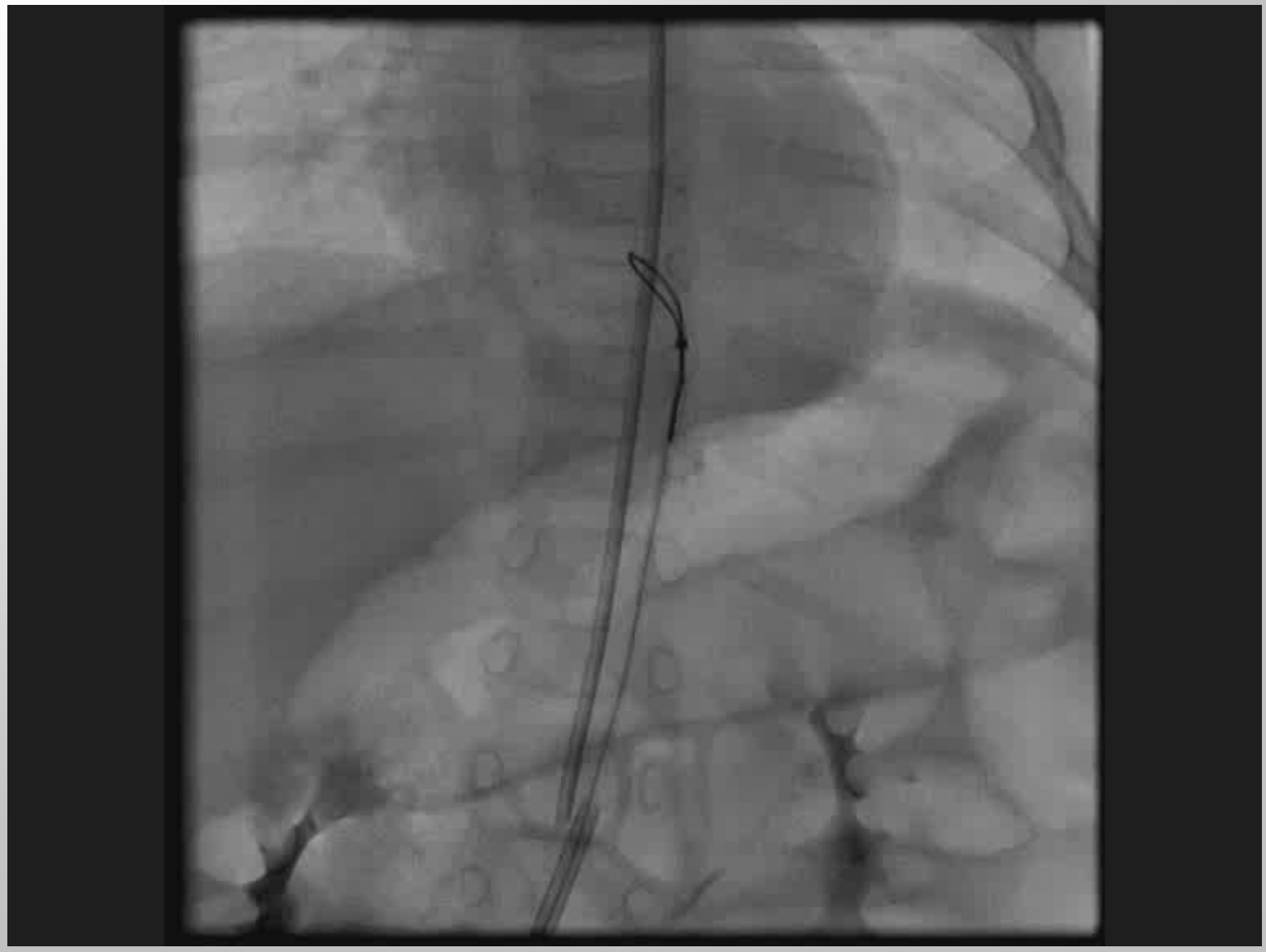

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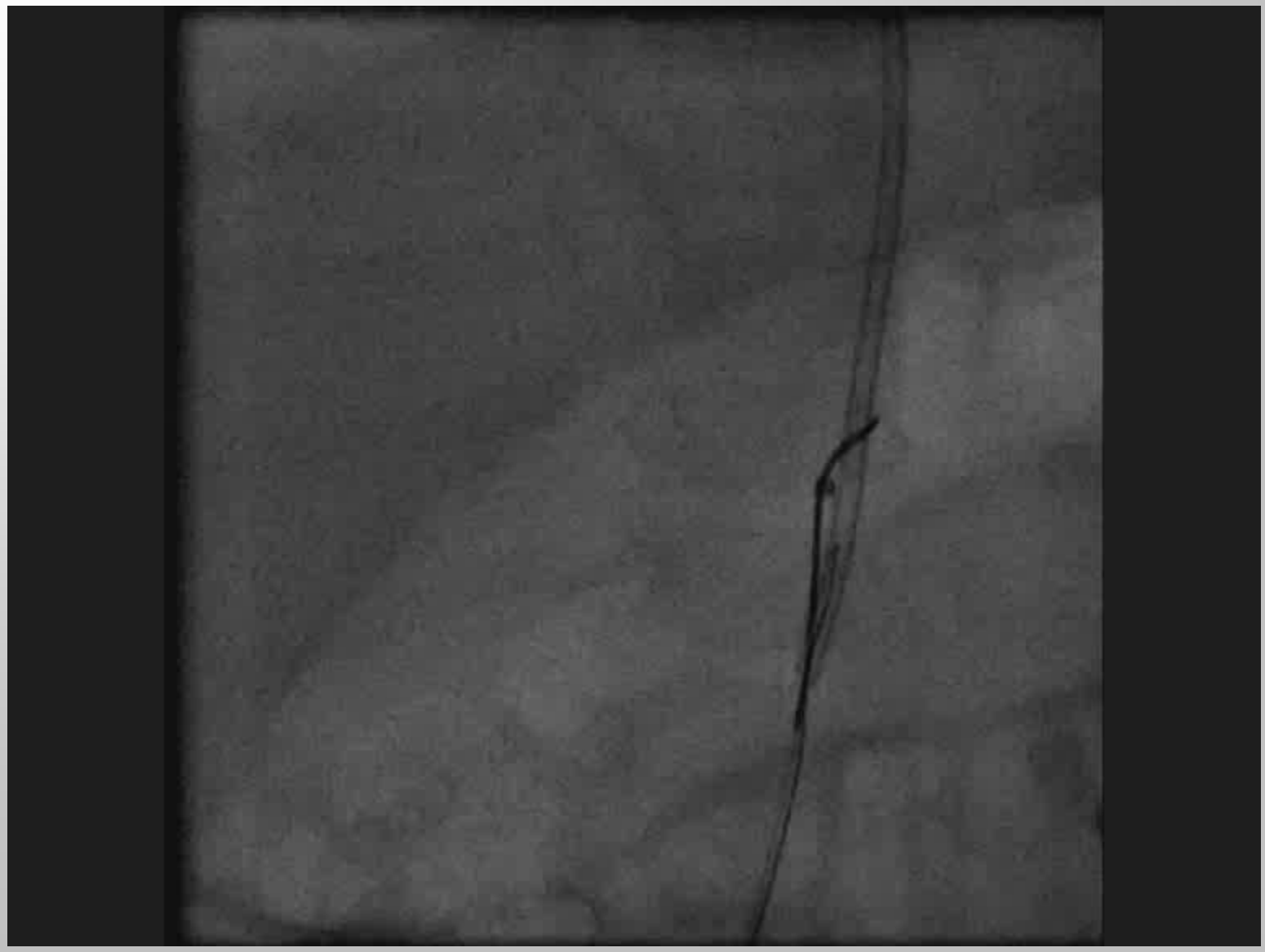

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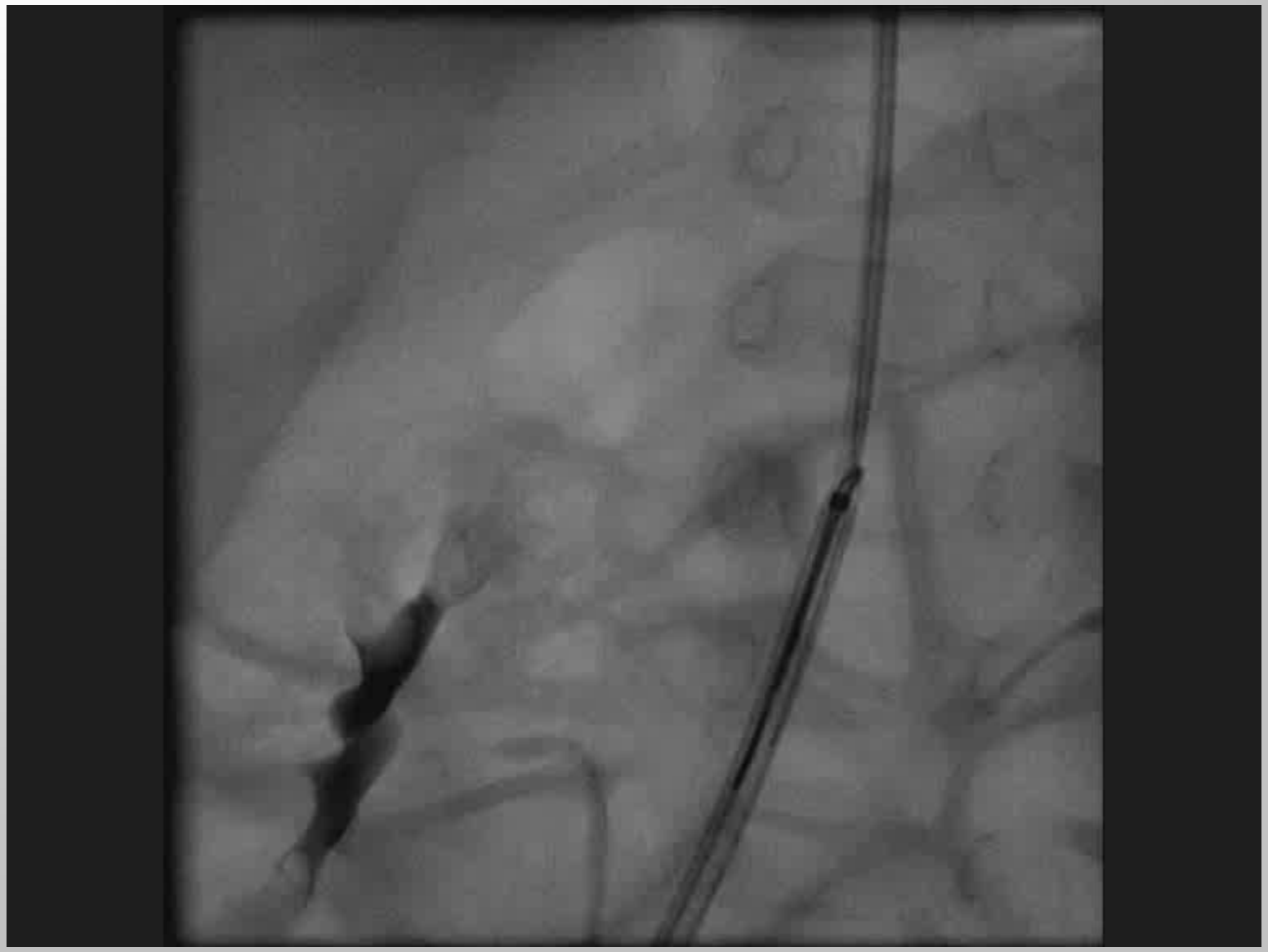
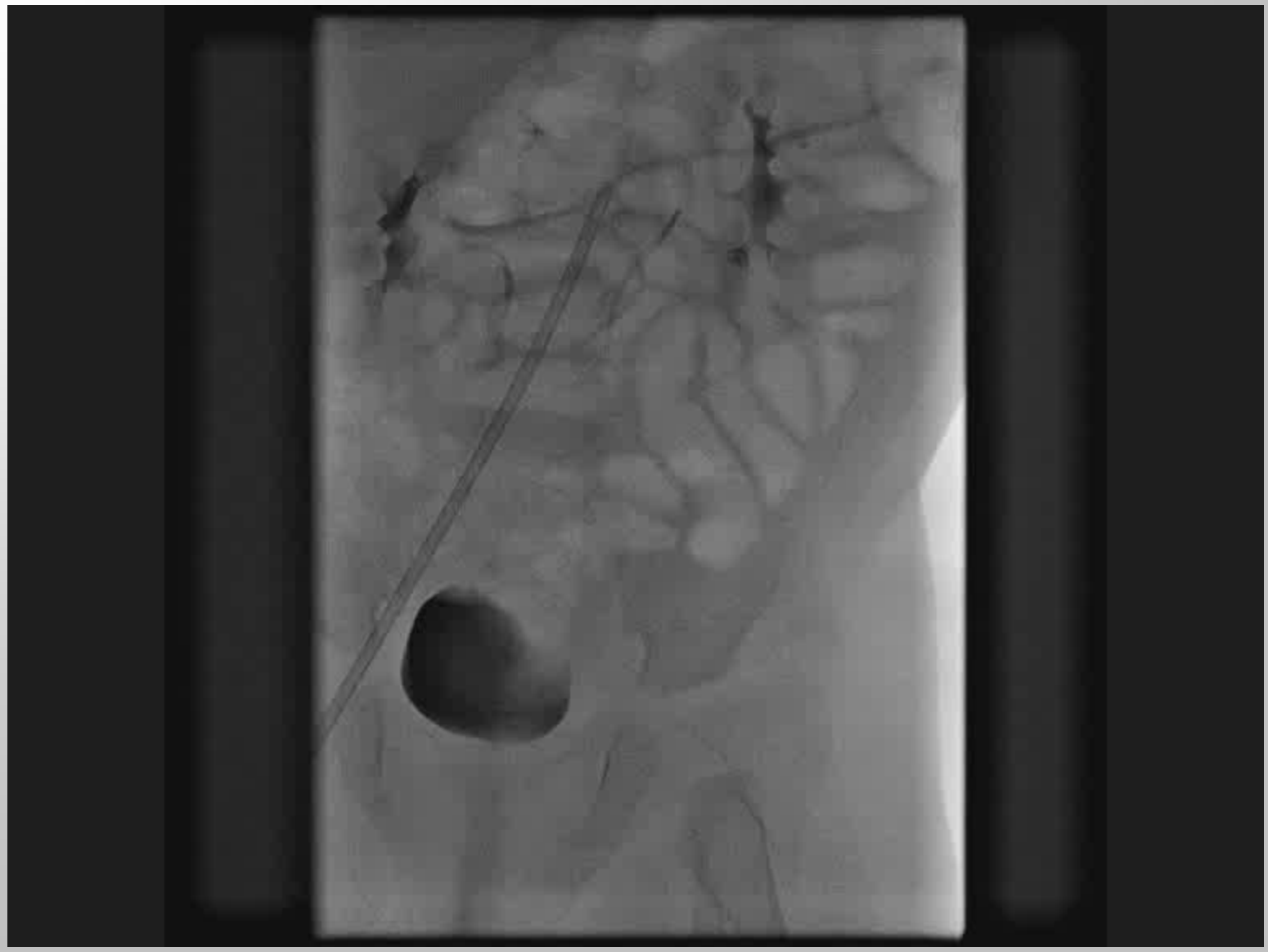
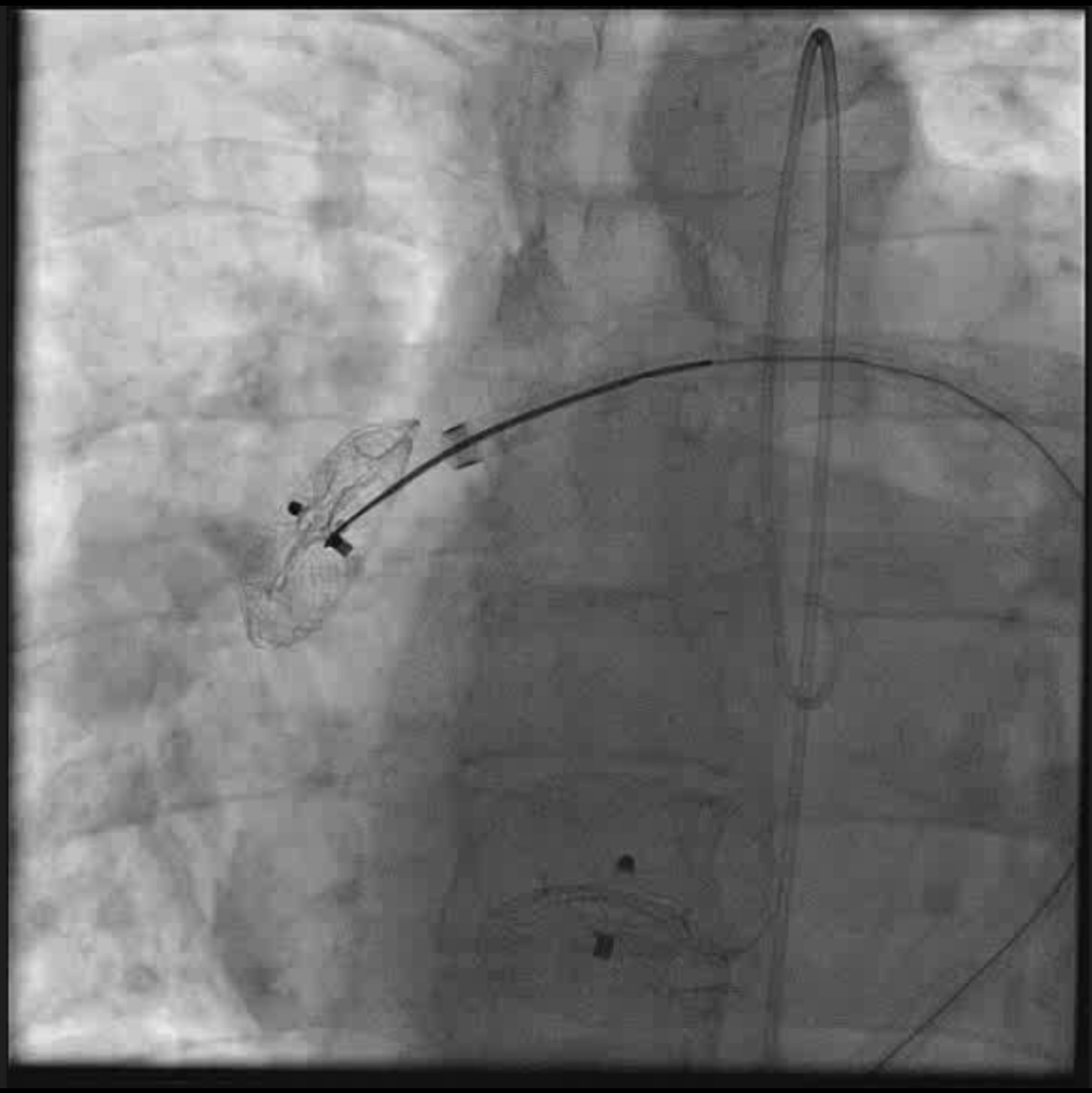


RETRIEVAL EMBOLIZED UMBILICAL CATHETER



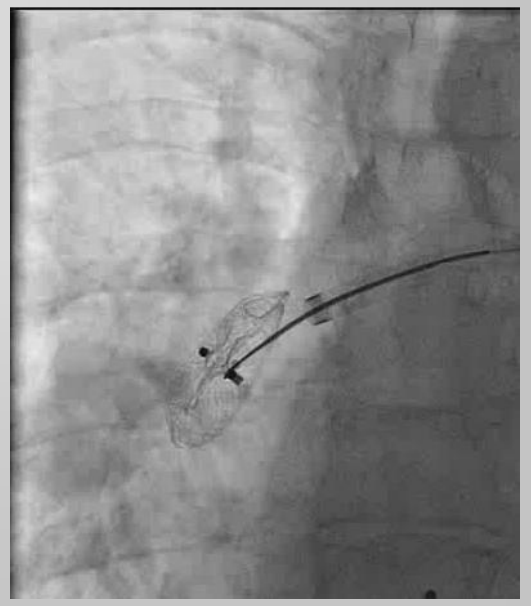


Retrieving Foreign Bodies

- **If a foreign body is captured but not retrievable into the sheath**

Option 1

- Release device in a secure position
- Replace sheath over the wire
- Use a larger sheath



Retrieving Foreign Bodies

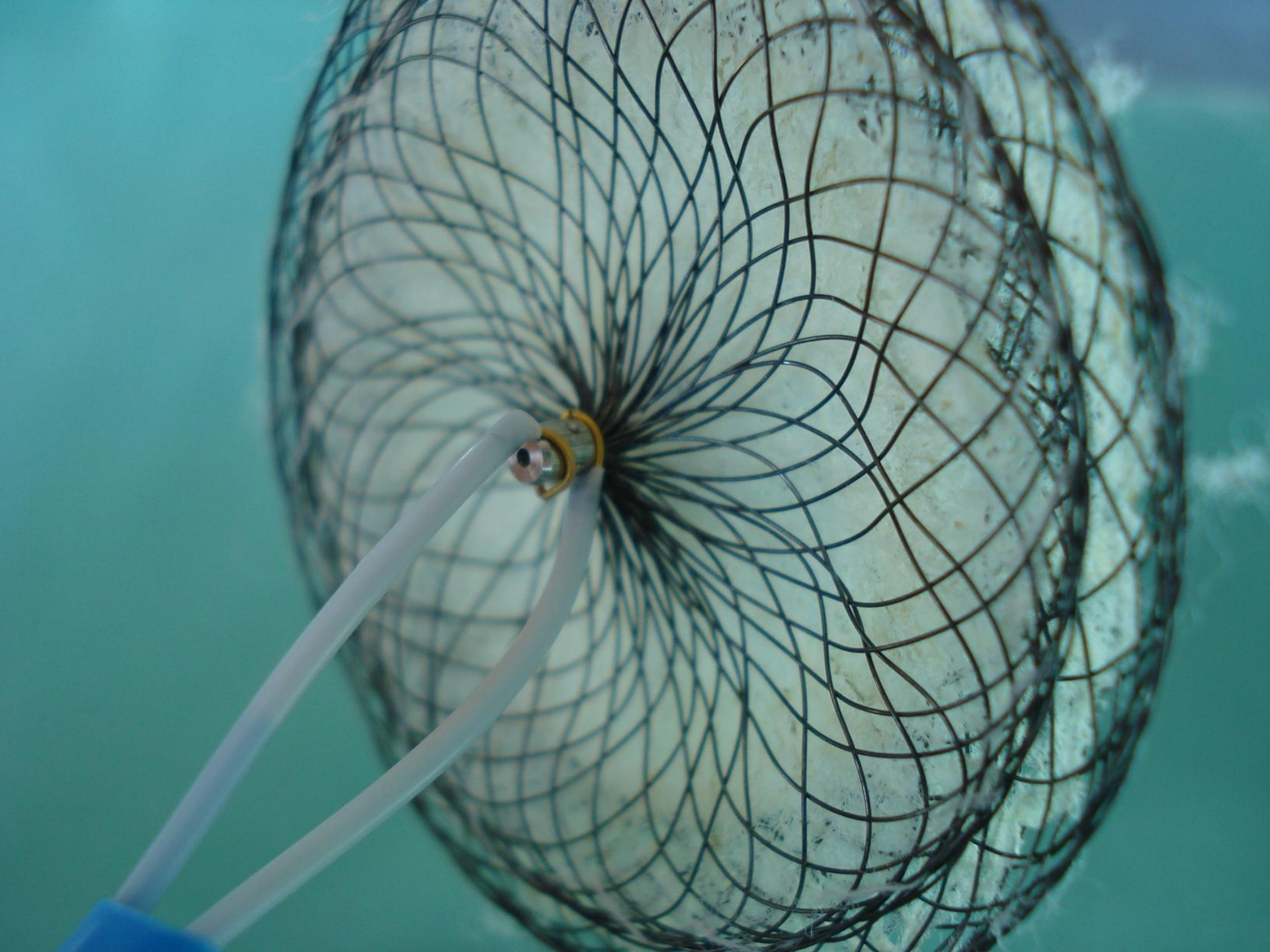
- **If a foreign body is captured but not retrievable into the sheath**

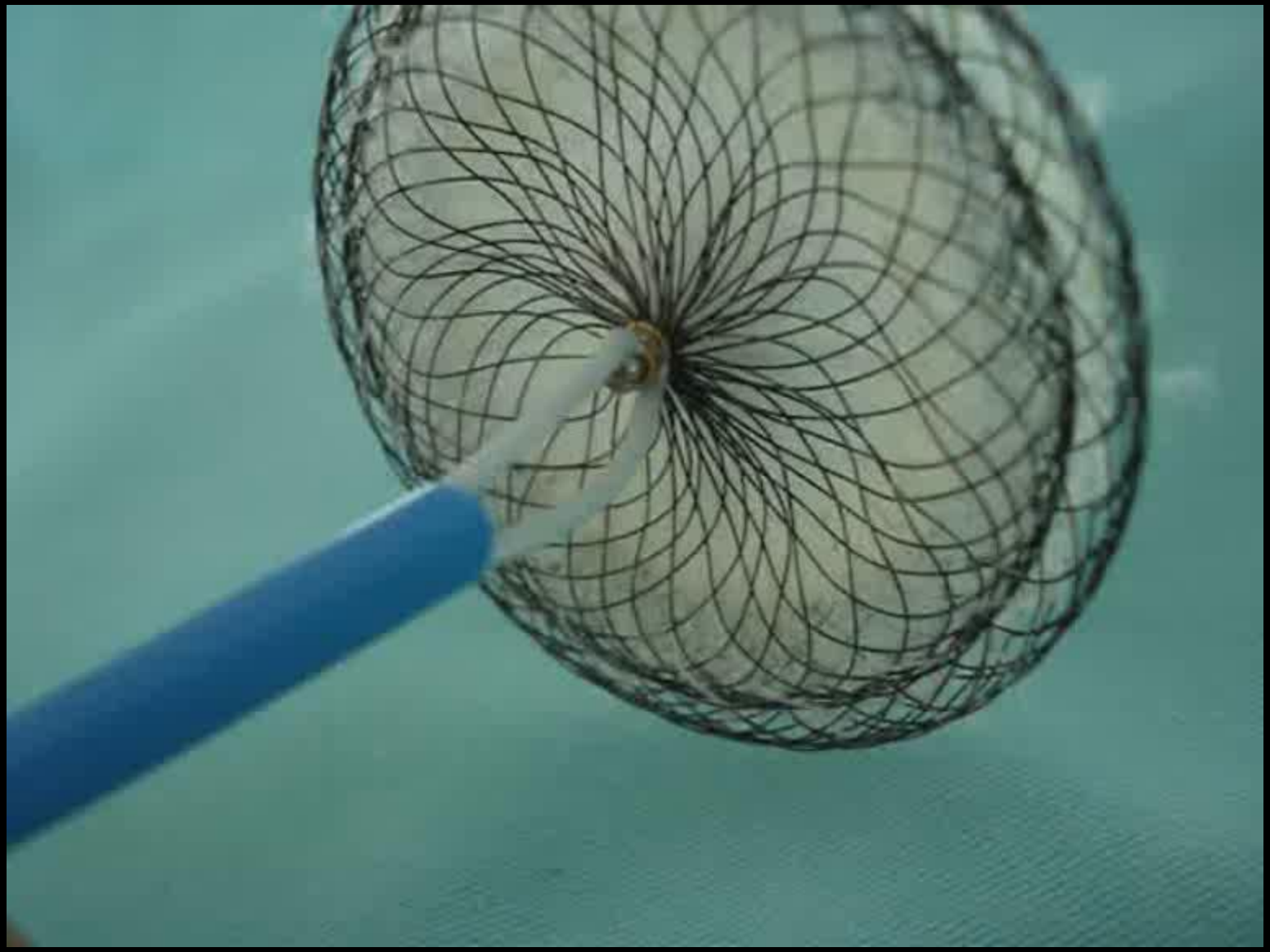
Option 2

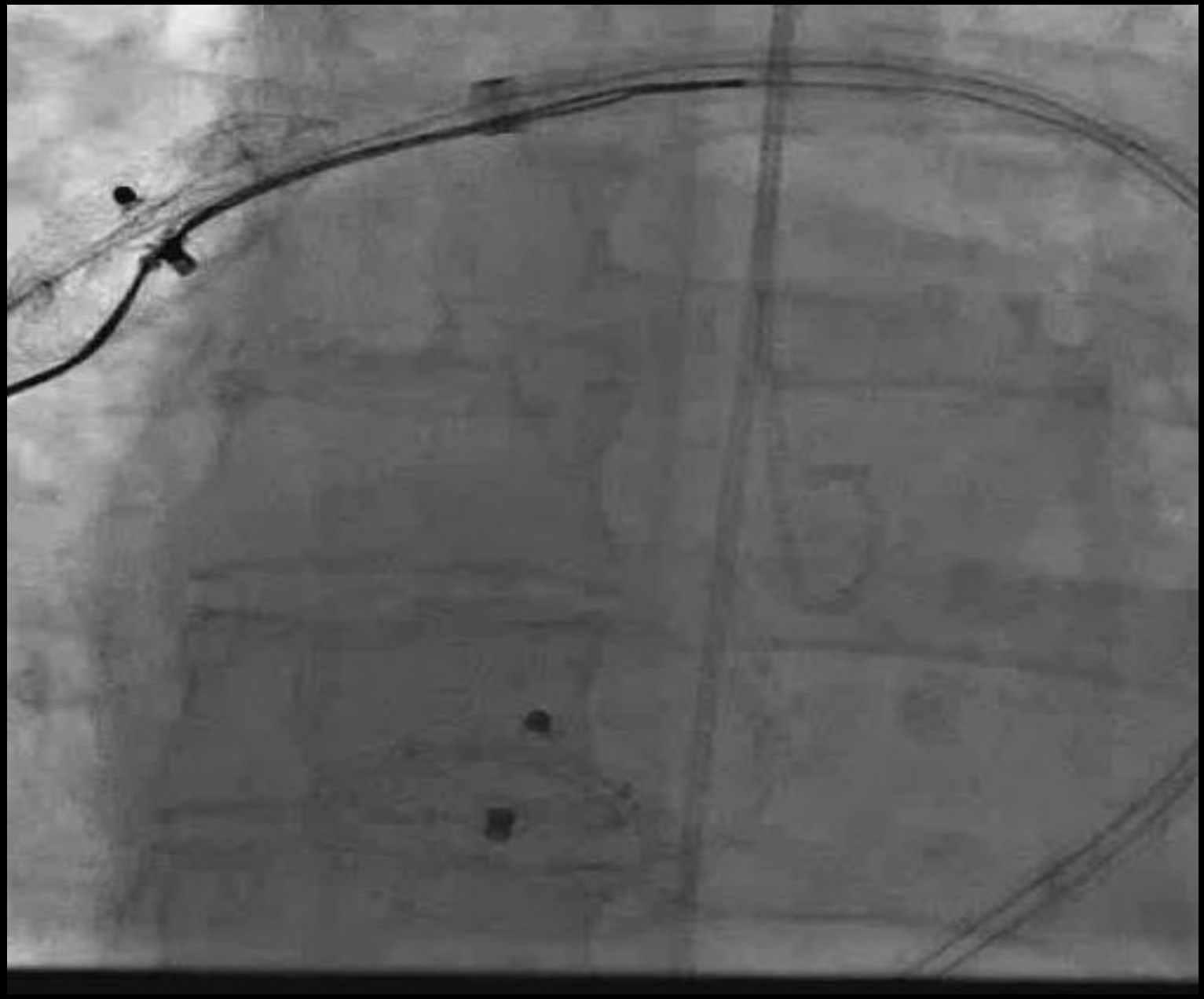
- Baloon dilate the tip of the sheath

Option 3

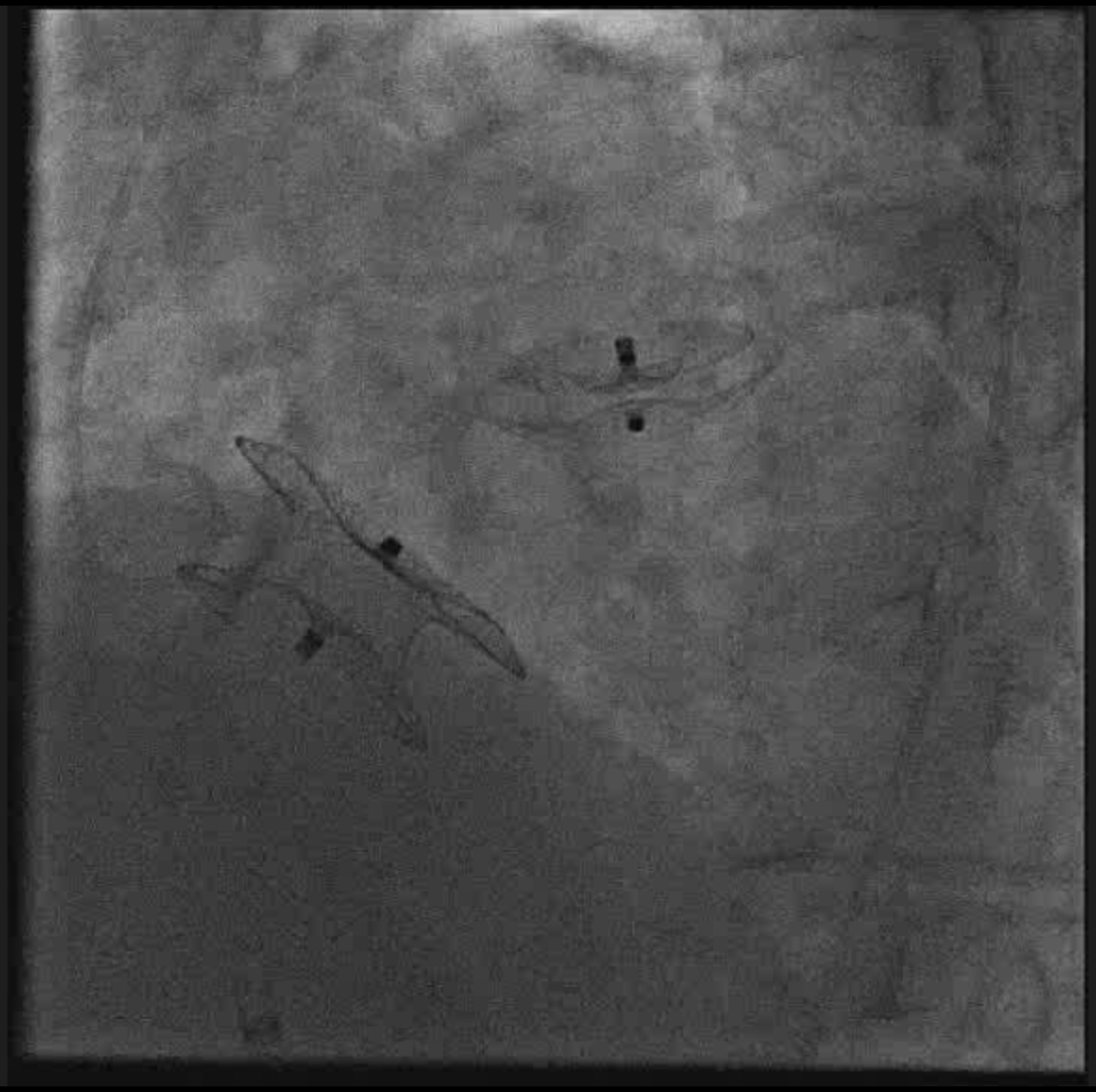
- Use a second snare or an En snare

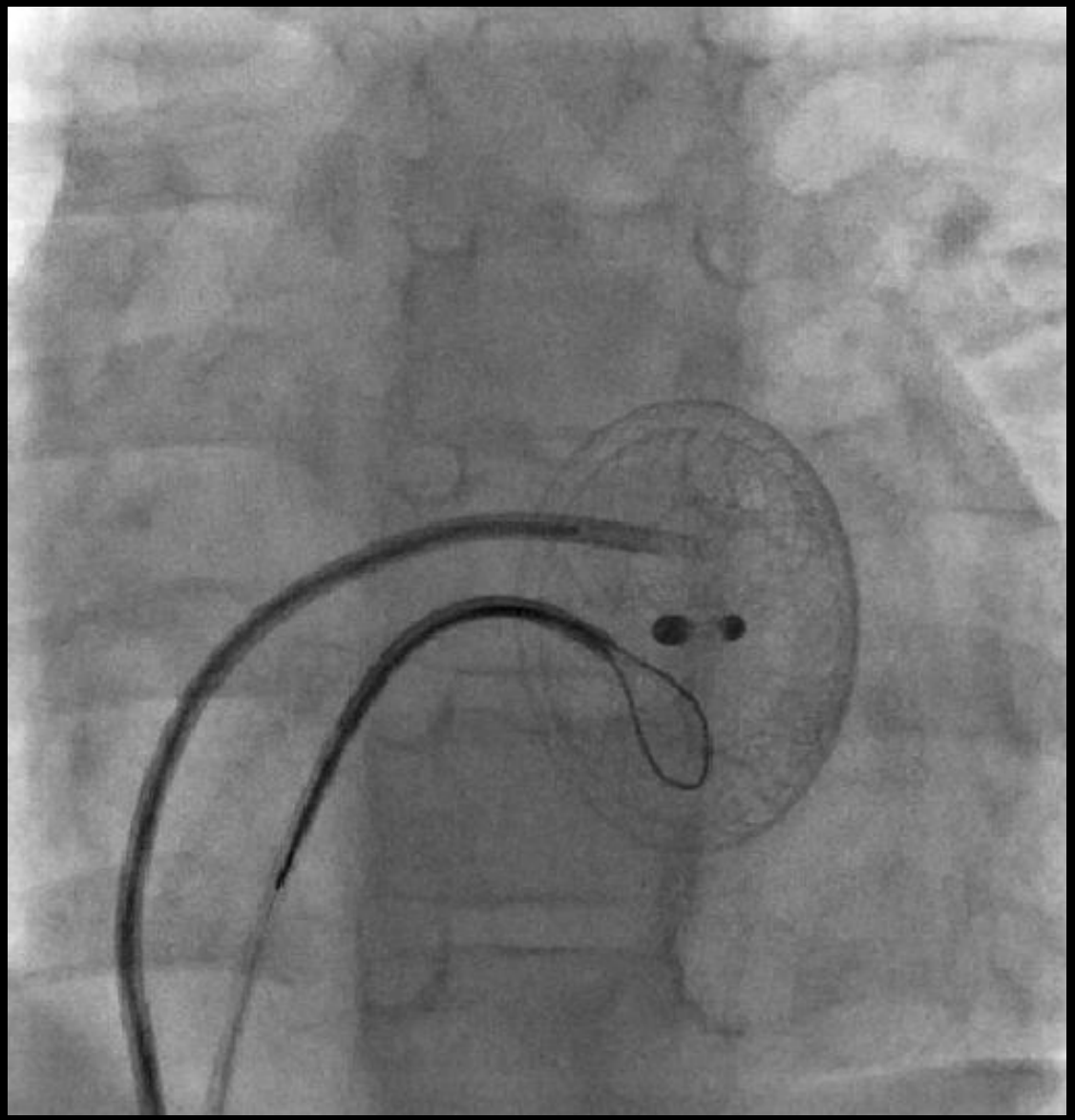


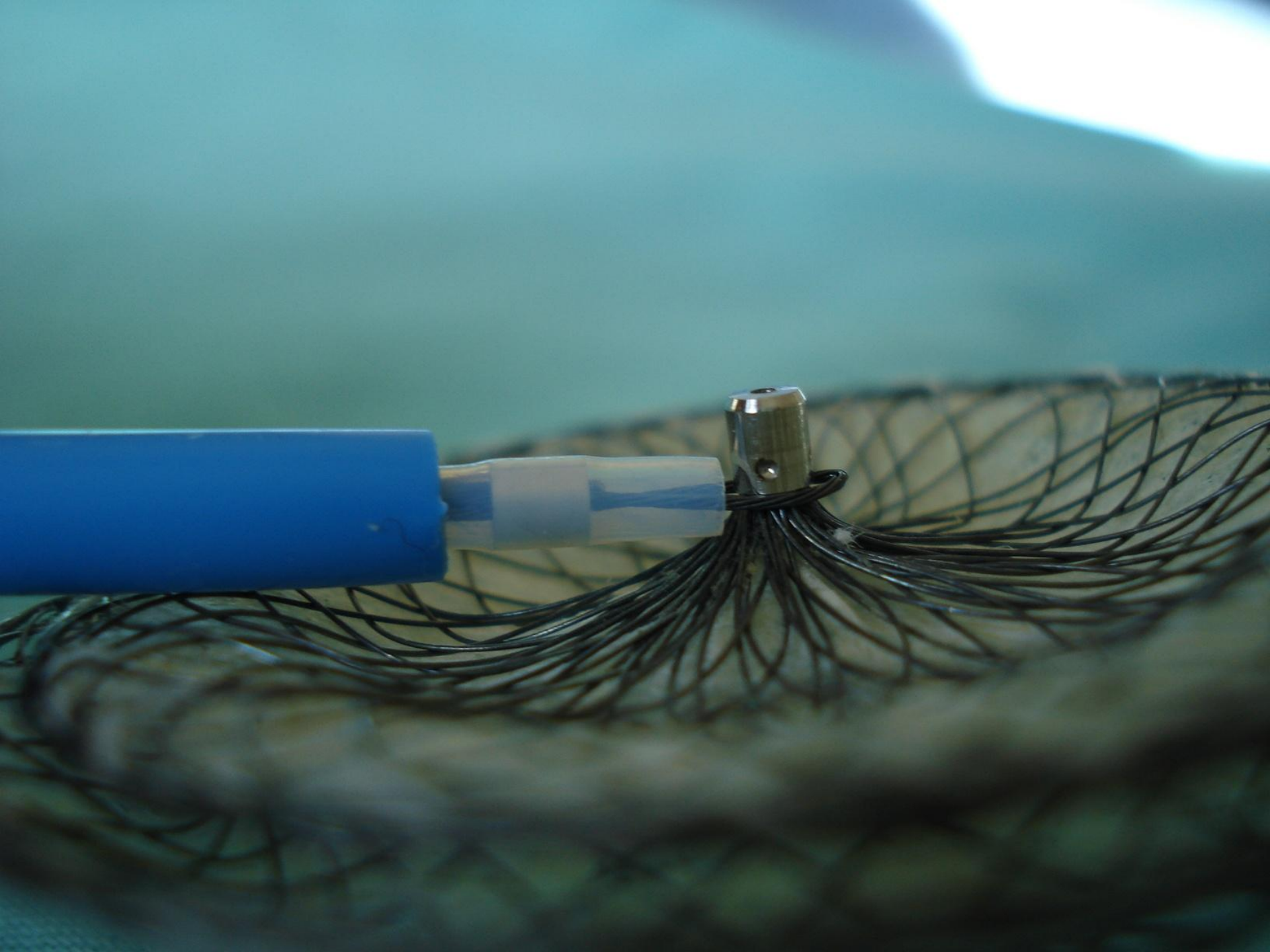


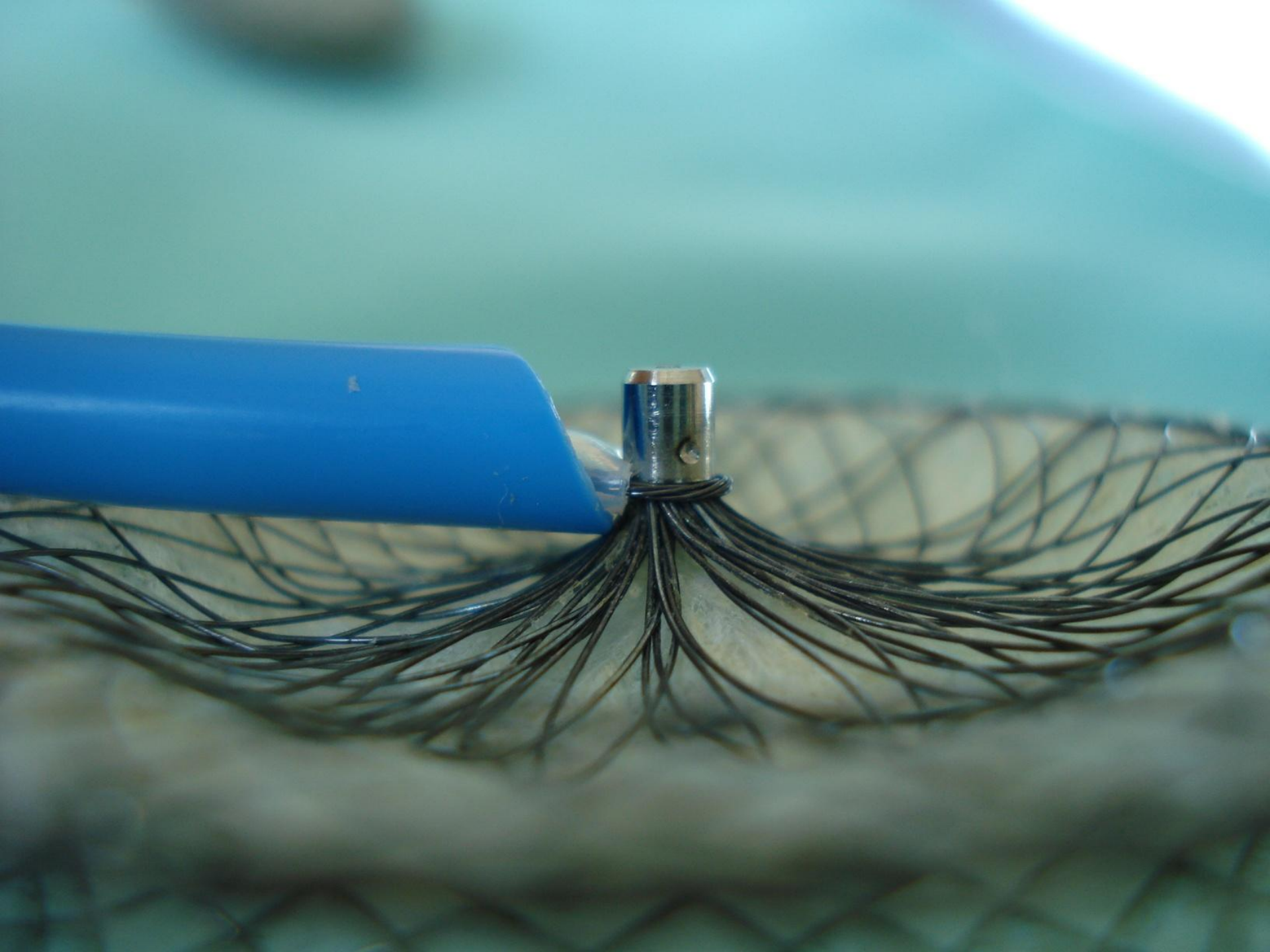


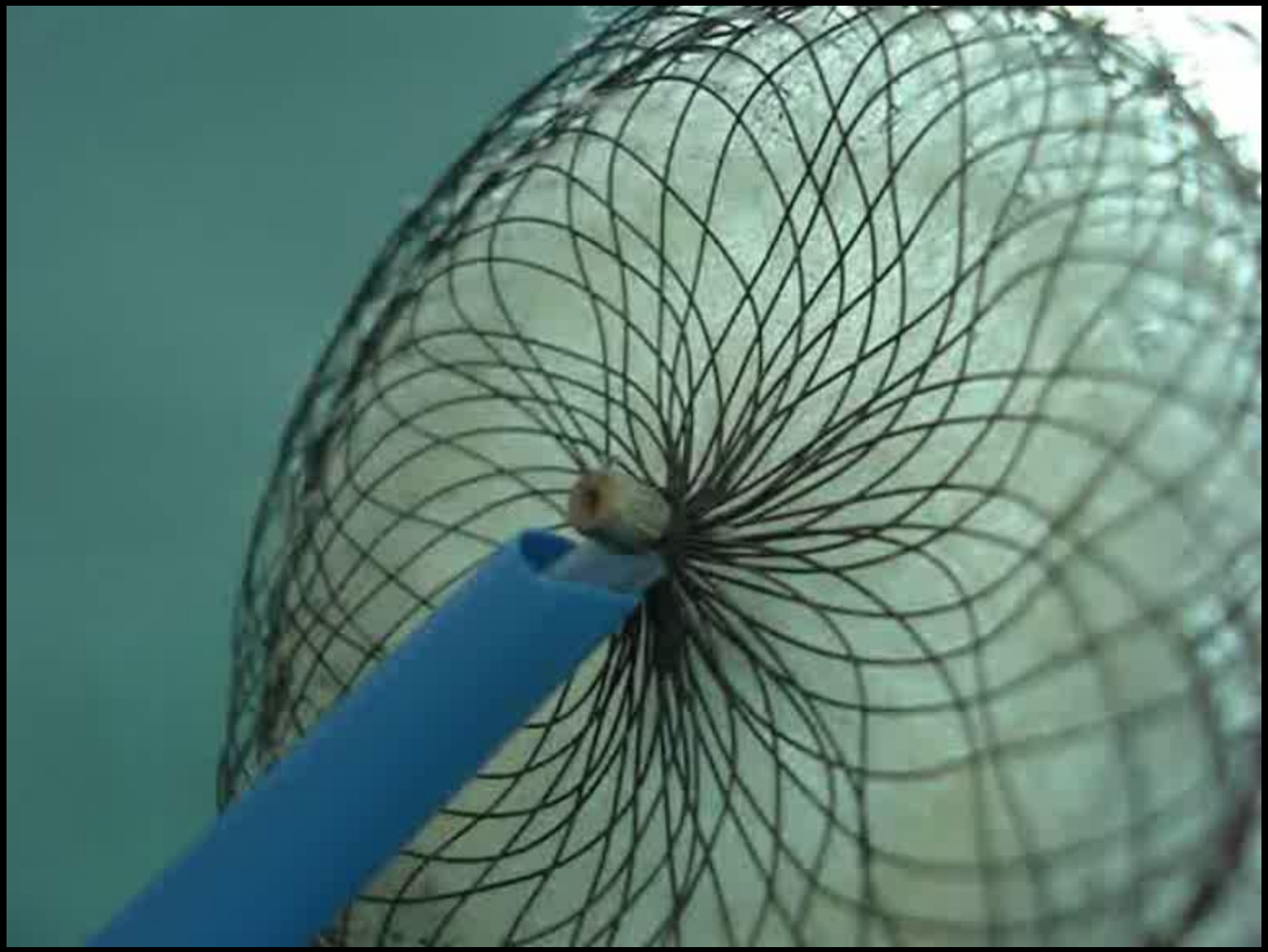
Device embolization is the most frequent cause for retrieval in paediatric cardiology !

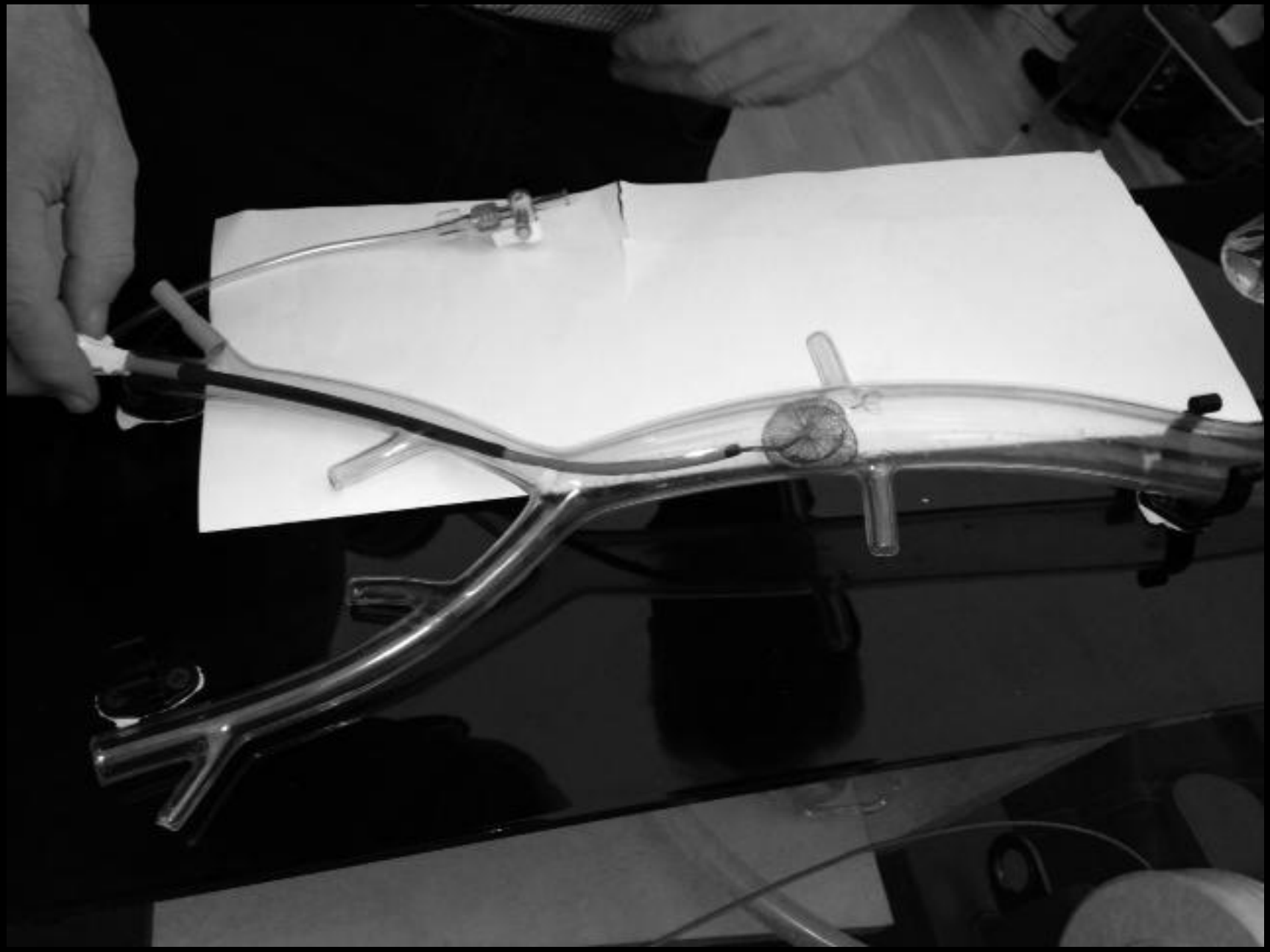






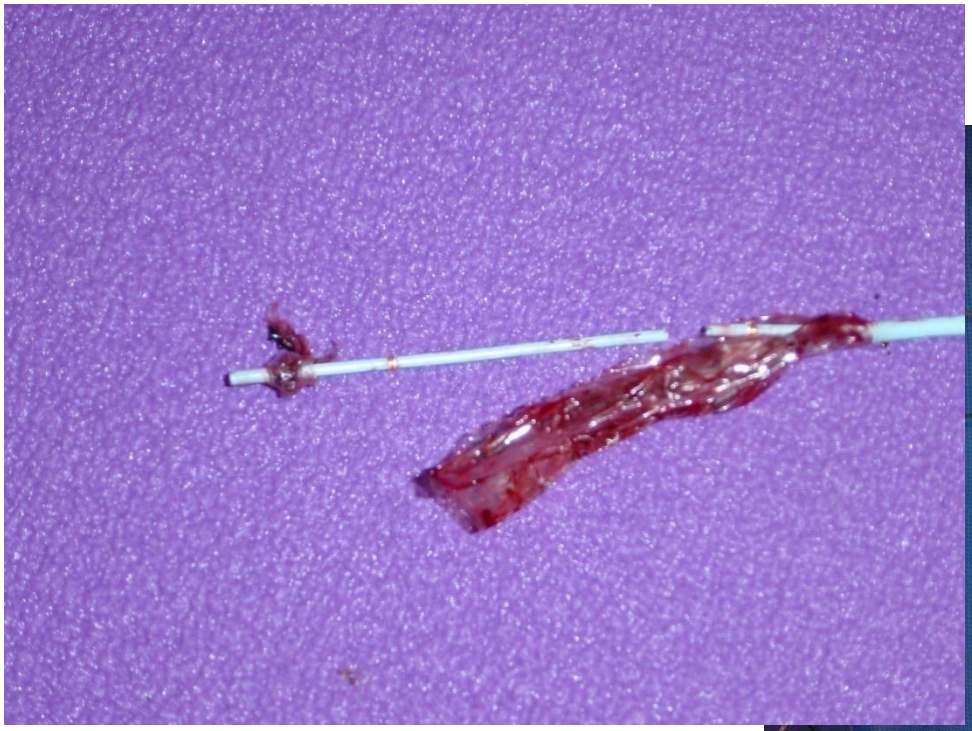


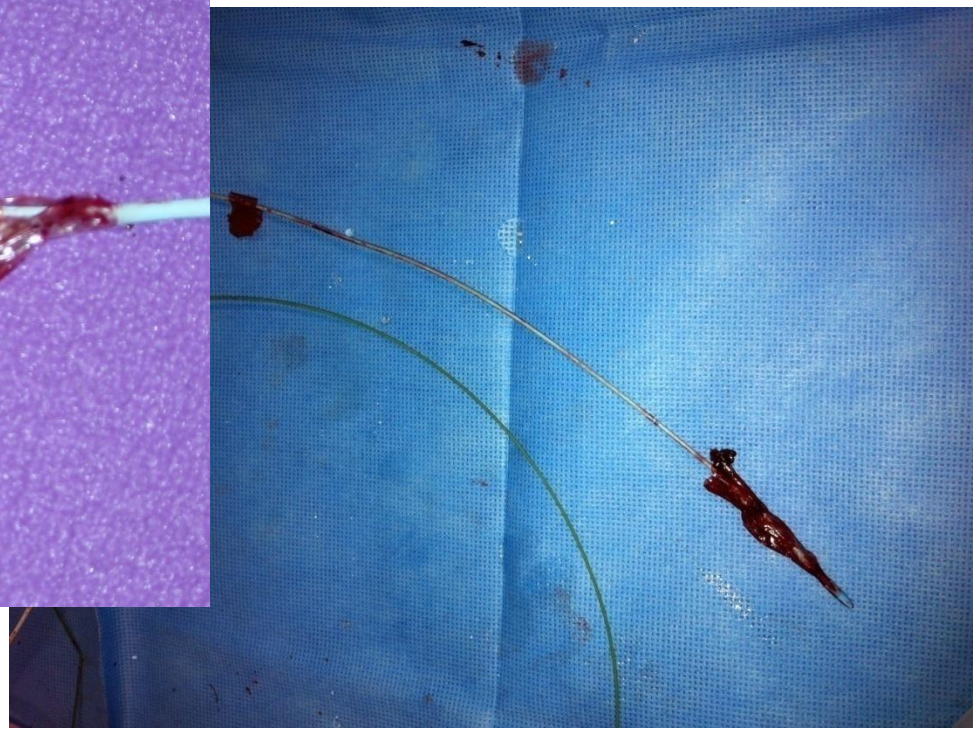




Retrieving Foreign Bodies

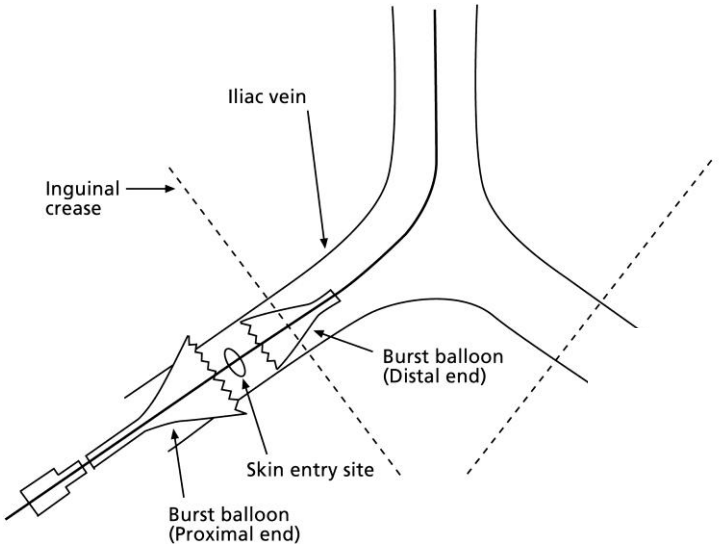
- **Transverse Balloon Rupture**

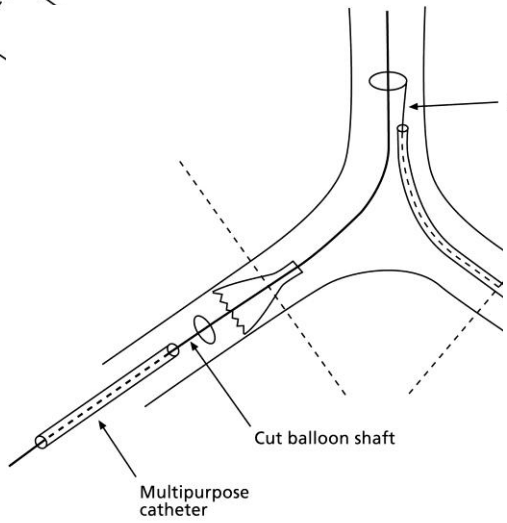


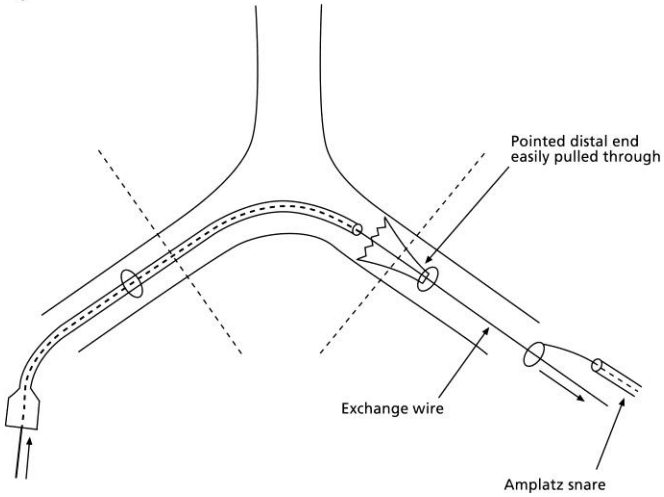


RETRIEVING FOREIGN BODIES

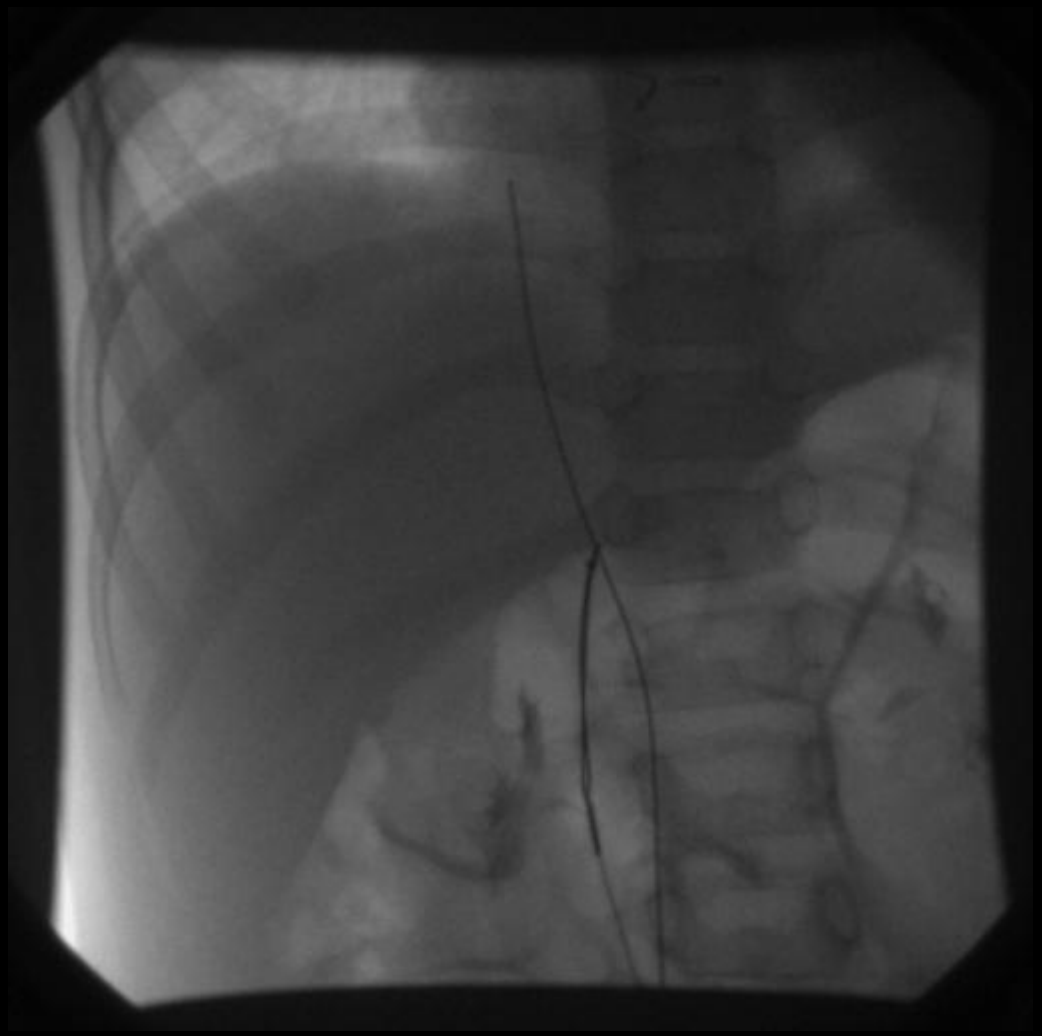
- **Transverse Balloon Rupture**

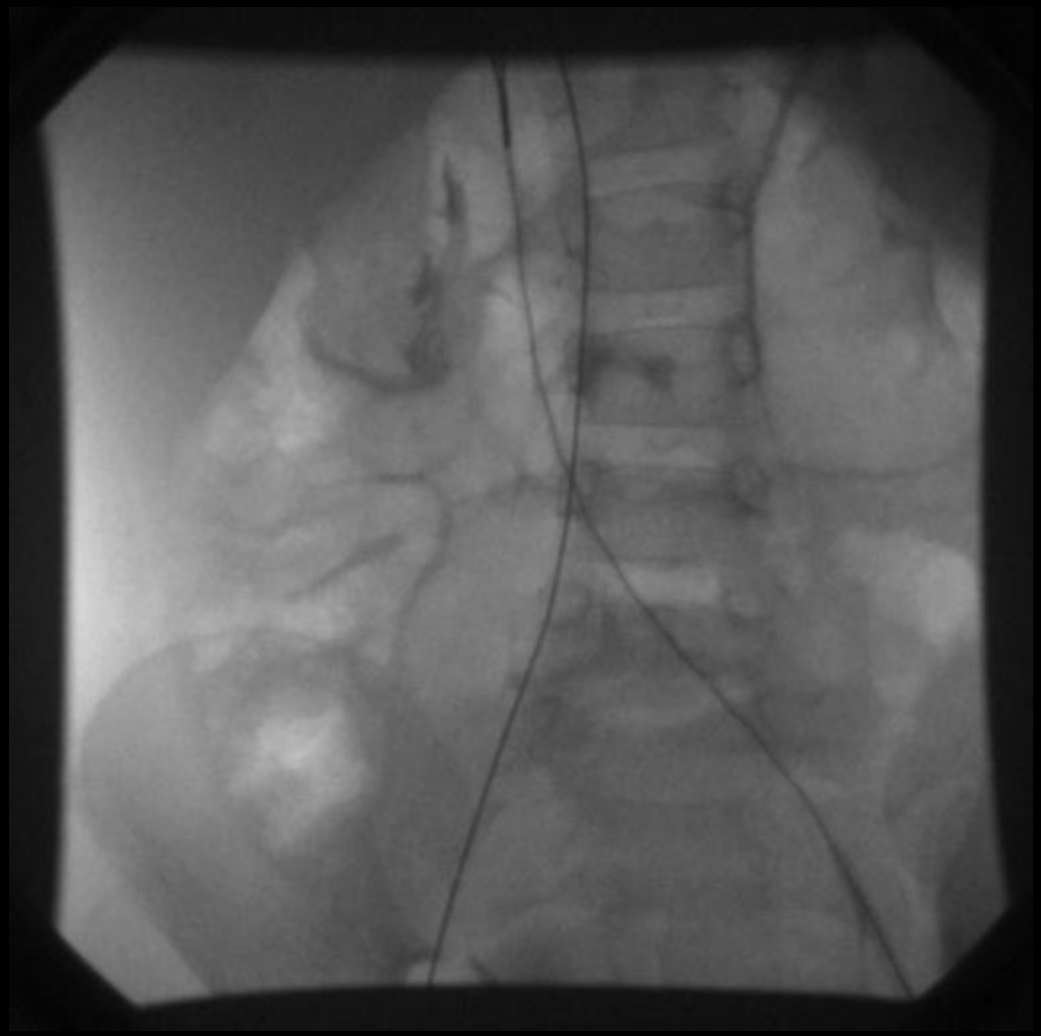


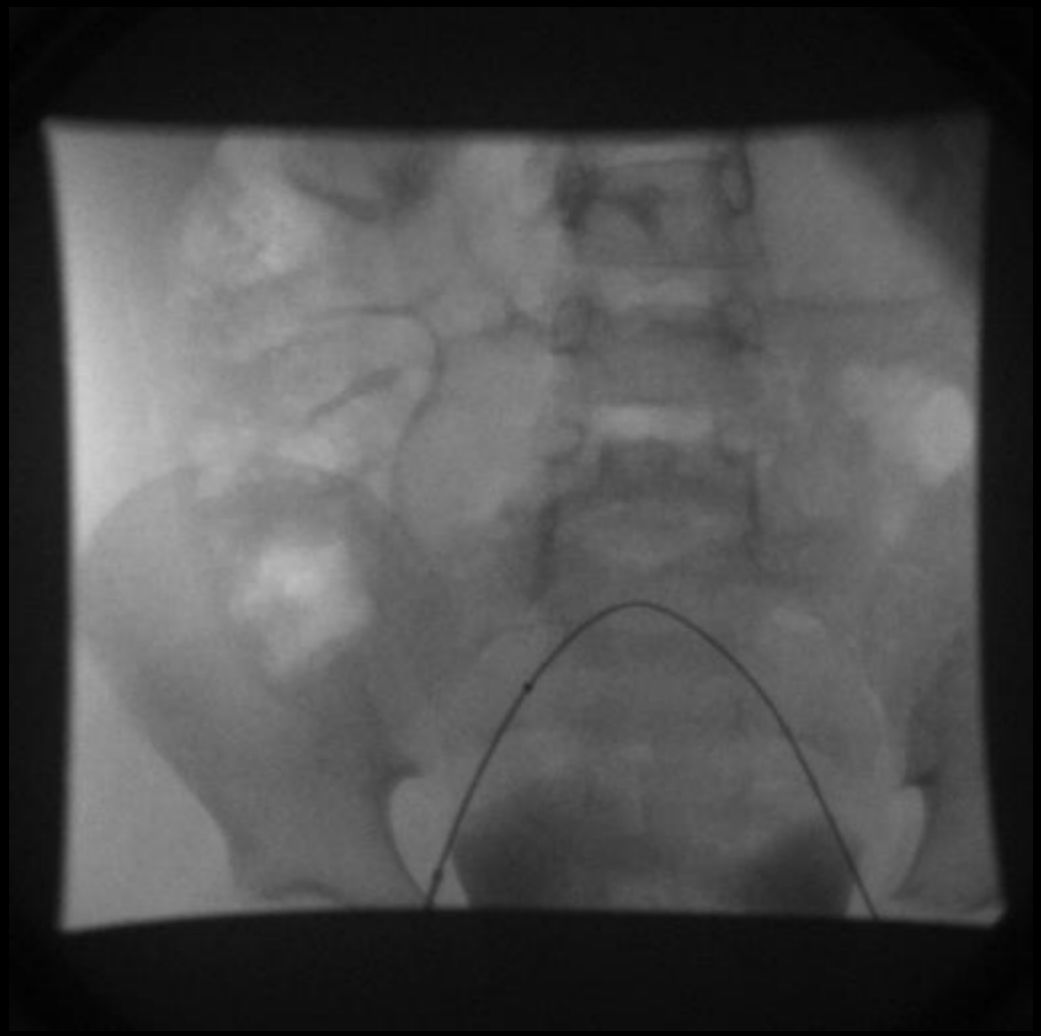




Courtesy Dr Jo de Giovanni







Retrieving Foreign Bodies

- **Complications of retrieval procedures**
  - Air and clot embolism
  - Radiation exposure
  - Valvular or ventricular device entrapment
  - Damage to vascular or cardiac structures
  - Arrhythmias

Retrieving Foreign Bodies

Final remarks

- Embolized? Is the patient going to need surgery anyway? Consider surgical retrieval
- Before you start capturing, plan the procedure adequately
- Have the necessary equipment available
- Removal of most intravascular foreign bodies is possible by percutaneous techniques