CRUMPLED SHEATHS, DEVICE DISCONNECTION, WANDERING CATHETER TIPS AND CUT DOWNS: NEVER ASSUME AN ASD CLOSURE WILL BE STRAIGHTFORWARD!

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History and Physical:

42 kg, 8 year old boy with a moderate secundum ASD. He presented with non-specific chest pains and fatigue. Due to an aunt having an ASD he was screened with echocardiography. Examinations findings were very subtle with fixed splitting of S2 and a quiet ejection systolic murmur.

Imaging

Echocardiogram showed a moderate sized secundum ASD with a deficient retro-aortic rim. All other rims appeared adequate. There was mild to moderate right heart dilation. Total septal length on 4 chamber apical view was 43/44mm.

Transoesophageal echo at time of the catheterization measured the defect at approximately 15x21mm. Balloon sizing of the defect measured 23mm.

Indication for Intervention

Right heart dilation.
Qp:Qs was 2.5:1.

Intervention

A 37mm Gore® Cardioform ASD occluder was chosen. Deployment was difficult due to the device slipping off the deficient retro-aortic rim. A second device was required after performing multiple deployments with the first one. On this occasion 12Fr Cook Medical Performer™ Mullins Guidance Sheath was placed to offer a different angle of approach. In a similar fashion to the first device we struggled to straddle the device over the aorta. Recapture of the device became more troublesome. On the last deployment attempt, the occluder deployed in a deformed fashion. Recapture was immediately attempted. The tip of the device would not come inside the Gore delivery catheter or the guiding Mullins sheath. The locking loop was visible protruding from the sheath and would not fold down into it. The system was brought into the IVC. We placed a 6Fr short sheath in the RIJ, through it placed a bioptome in the IVC and grasped the locking loop from above, hoping this may line the device tip up and allow it to fully re-sheath. This did not result in full capture of the device. With the downwards pulling motions, the long sheath then "accordianed" in the IVC. The mandril of the device also perforated through the side of the sheath. In order to remove the sheath and device contents safely we replaced the bioptome from above with a 20mm loop snare. We snared the distal sheath and pulled upwards to straighten it in the IVC. Once more straightened, we started to remove the sheath from the groin. The snare/snare catheter was advanced, with continuous tension, as the sheath was being removed to keep it straight and best avoid IVC injury. There was further tension just as the exposed distal device was coming through the subcutaneous tissue. Full removal was

accomplished after extending the skin and subcutaneous tissue incision and with the help of gentle tissue retraction to enlarge the access tunnel. Access was maintained by the externalization of the snare catheter in the groin (from the RIJ access). The snare was removed and a wire passed up the snare catheter, allowing insertion of a new short 12 Fr short sheath in the femoral vein. The procedure was then performed again, successfully, using a 22mm Amplatzer septal occluder. During Amplatzer device deployment a small radio-opaque band was noted in the left upper lobe, suspected to be the tip of the snare catheter. Angiography confirmed position of the foreign body in a posterior, distal branch of the left pulmonary artery. A brief attempt was made to snare and remove the small foreign body but due to distal position in a very small PA branch, this was not successful.

Learning Points of the Procedure:

- Consider locking the device and reassessing position (even with suboptimal fluoroscopic positioning of the disc petals), when after multiple deployment attempts it is the best you can get
- Reconsider "one more deployment" when device recapture is not longer smooth
- Not all sheaths are made the same! Consider sheath material before you pull on it.
- Beware of the snare catheter "stuck on" tip

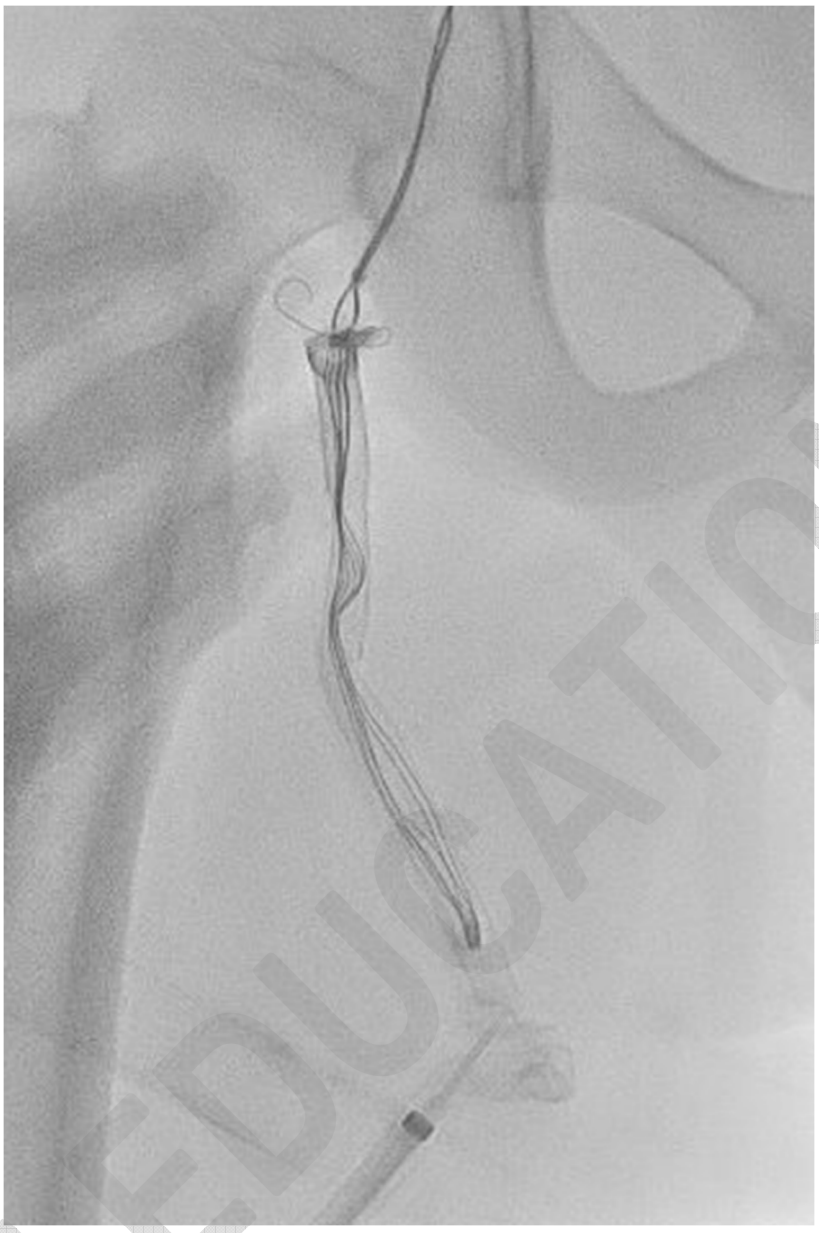

Image 1:

Externalization of the sheath. Device tip and locking loop remain in the subcutaneous tissue, snared from above. A section of externalized sheath is seen crumpled and twisted with the device mandril protruding through it.

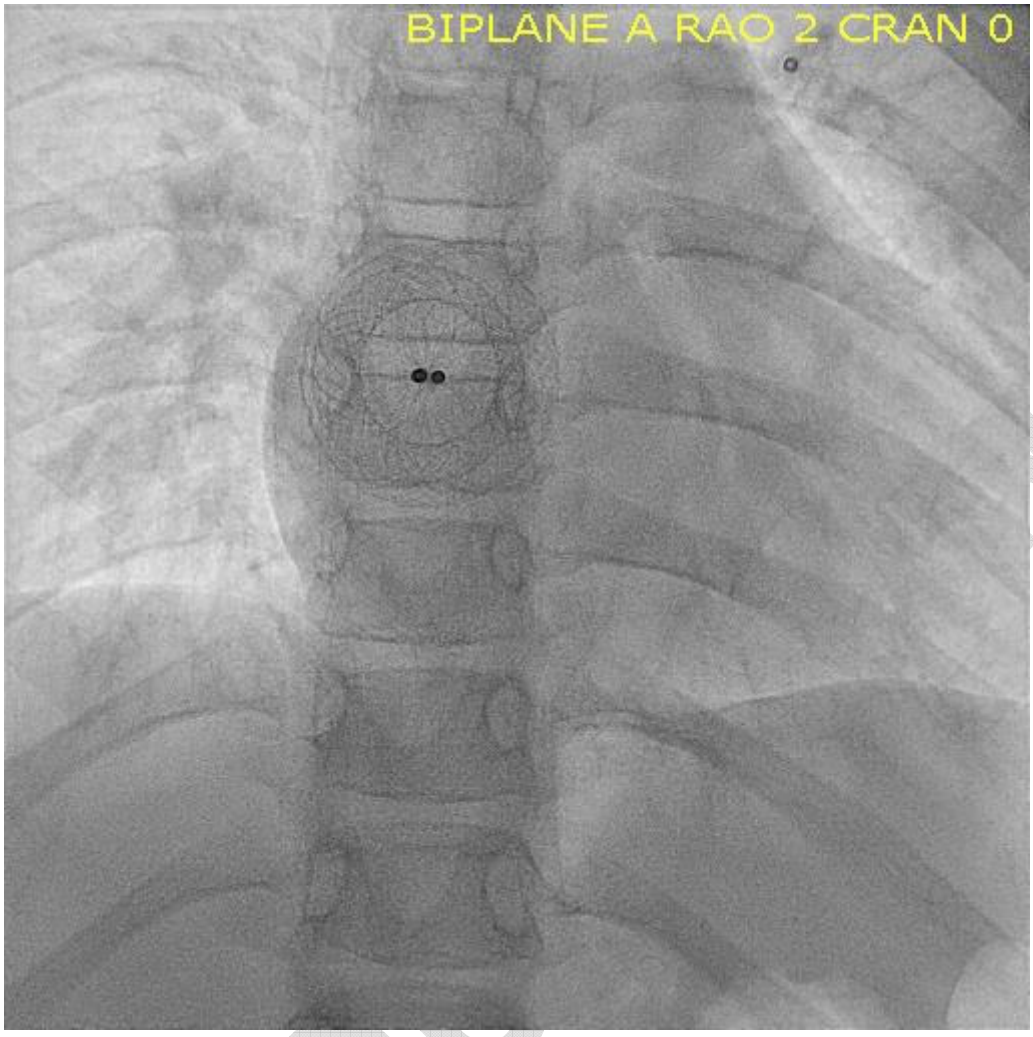

Image 2: Amplatzer septal occluder in place. Small, radiopaque foreign body seen in the left upper lobe.