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66<sup>th</sup> Annual Scientific Session & Expo

## All Hands on Deck:

# *How to Prevent or Manage Complications of Aortoiliac Intervention*

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# Disclosures

- Honoraria: Medtronic, CSI, Gore
- Research grants (institutional):
  - NIH RO1, VA CCTA
  - Merck, Astra Zeneca
- Intellectual property: HygeiaTel, Mdcareglobal



# Aortoiliac Endovascular Intervention

- Accepted and effective treatment for patients with symptomatic peripheral artery disease
- Durability surpasses other lower extremity endovascular procedures
- Complications rare, but can be catastrophic

# Potential Complication of Aortoiliac Artery Intervention



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## Procedure Related

- Access site complications
- Dissection
- Perforation/rupture
- Late aneurysm formation
- Pseudoaneurysm
- Distal embolization
- Compromised/closure of internal iliac artery

## Device Related

- Stent or graft thrombosis
- Stent embolization/migration
- Stent crush, stent loss
- Septic infection/septic endarteritis
- Trauma during non-vascular surgery/procedures (vertebra, bowel etc)
- Renal parenchymal infarct, bleed

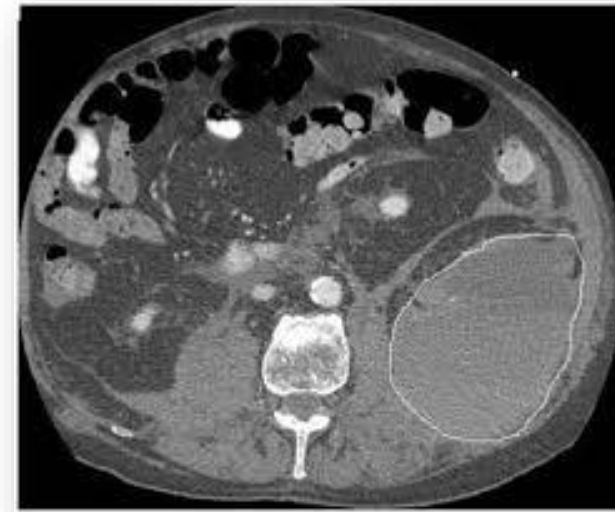


# Complications of Aortoiliac Intervention

- Complications are now rare, however can become quickly life-threatening
- Reported frequency: 8-23%
  - 15% not requiring specific treatment
  - Of the remaining: 70% endovascular Rx; 15% surgical
- Majority access site related

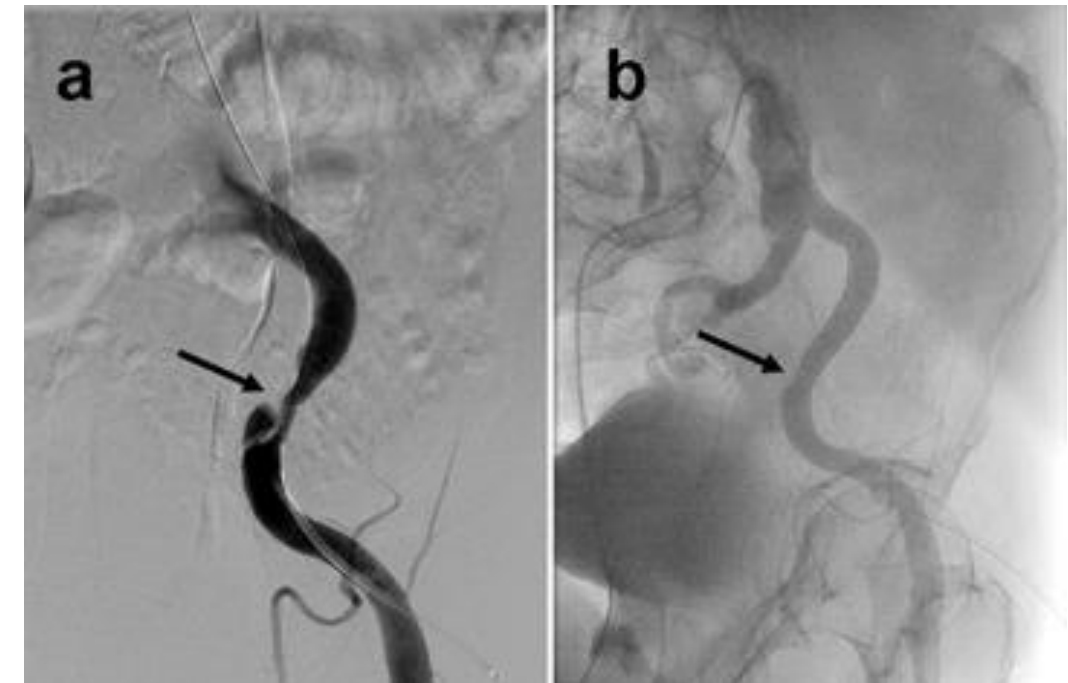
# Complications of Aortoiliac Intervention

- **Access site complications:** decreasing in frequency
  - Groin hematoma
  - Retroperitoneal hematoma
  - Pseudoaneurysm
  - Arteriovenous fistula
- Planning US/CT/MRA; US guided access, post-access angio, sheath pressure, pre-closure, contralateral angio guided access



# Complications of Aortoiliac Intervention

- **Dissection:** frequency ~7.1%
  - Now decreasing in frequency
  - Many can be observed
  - Retrograde extension of dissection into the distal aorta
  - External iliac location, extensive  
Successfully treated with stents (s/p true-lumen confirmation)





# Complications of Aortoiliac Intervention

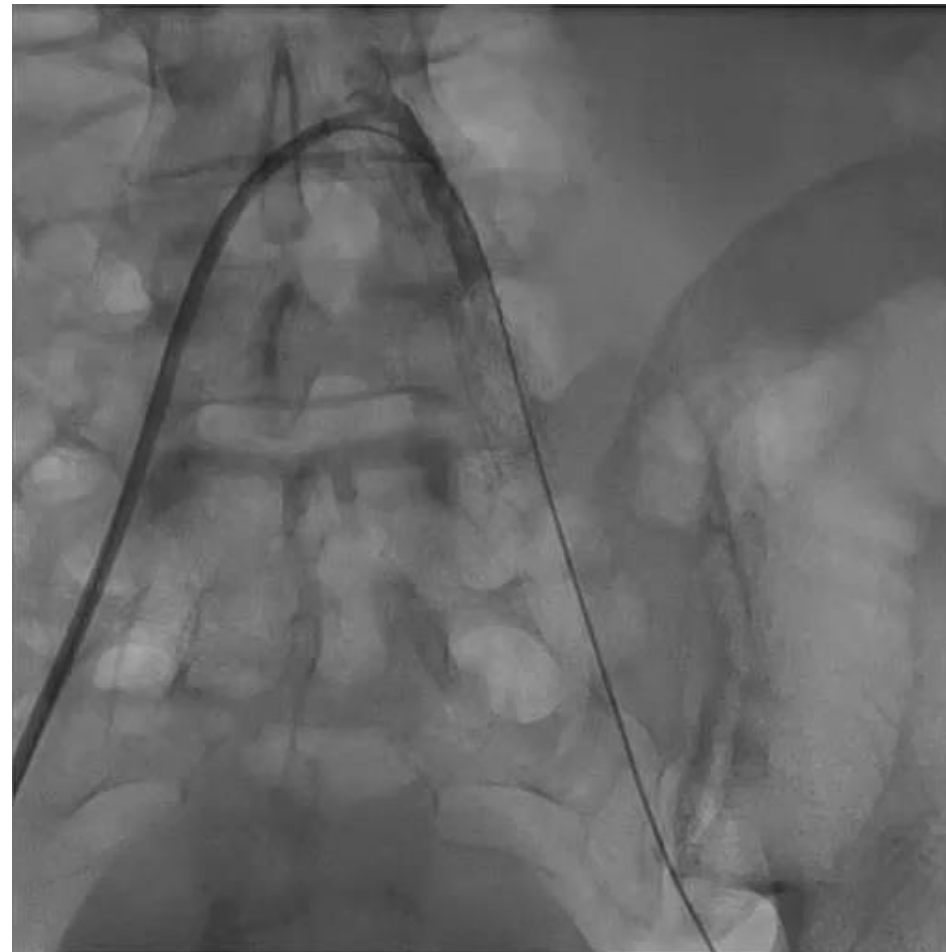
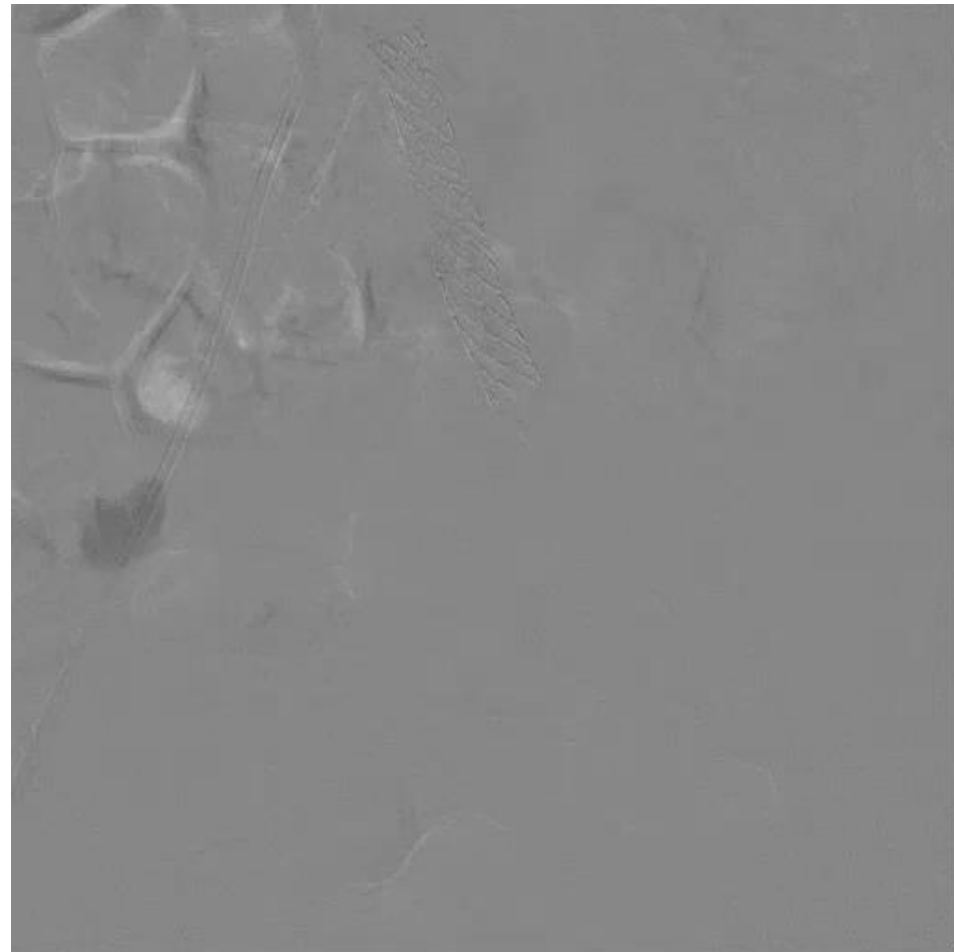
- **Rupture:** Rare (0.8%), but catastrophic
  - Calcified vessels, CTO
  - Oversized balloons
  - External iliac artery location
  - Chronic steroid therapy, diabetes mellitus, female gender
- Balloon occlusion, reversal of anticoagulation, covered stent (long covered stents of external iliac); collateral feeders; stent grafts for pseudoaneurysms



# 72 y/o Diabetic male with LLE Claudication



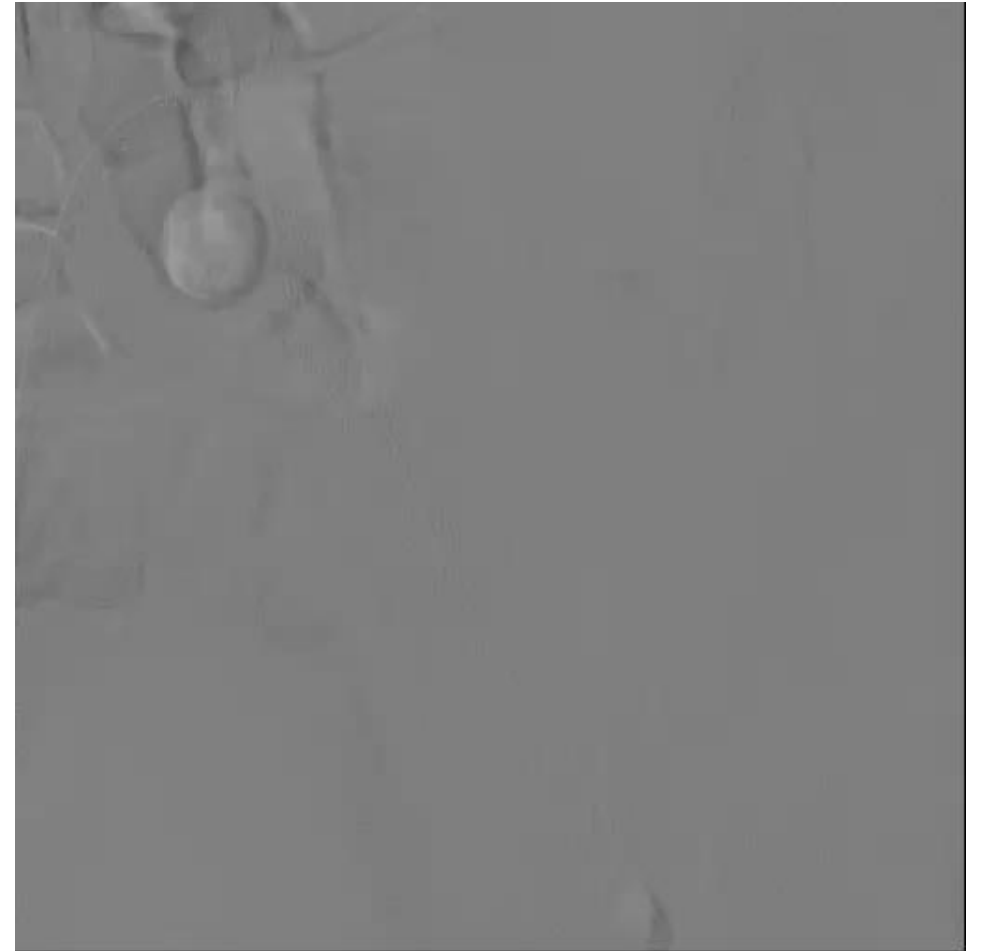
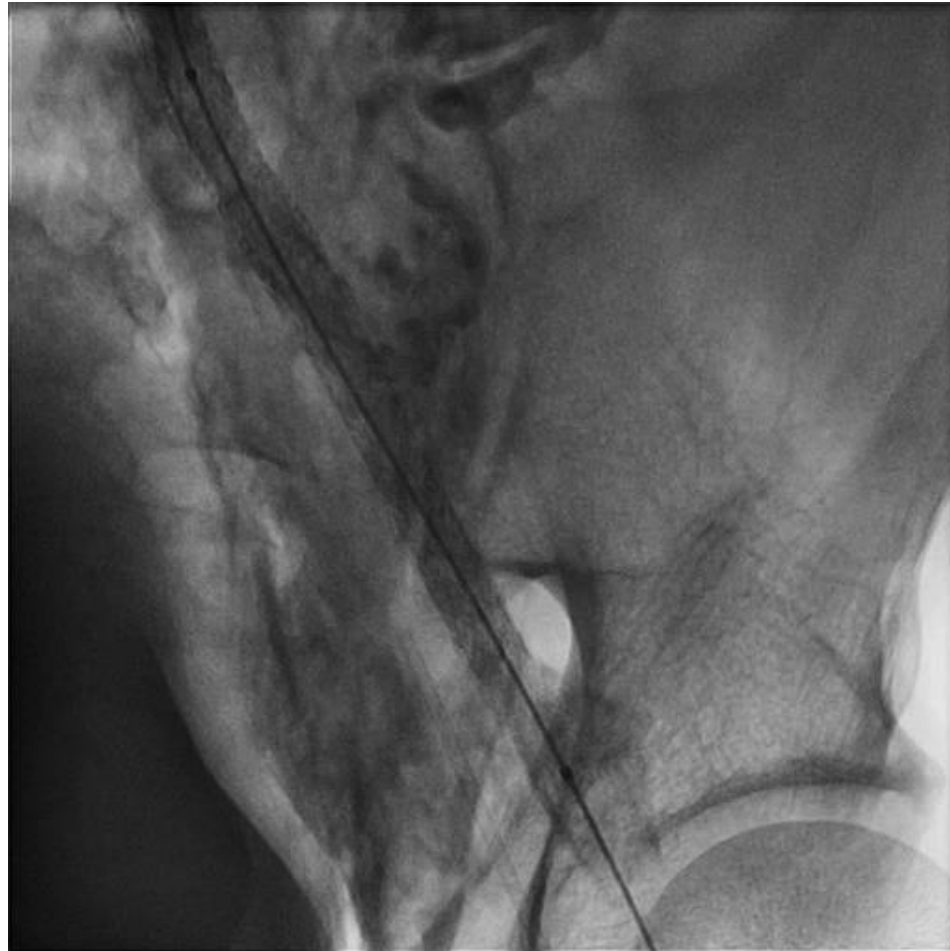
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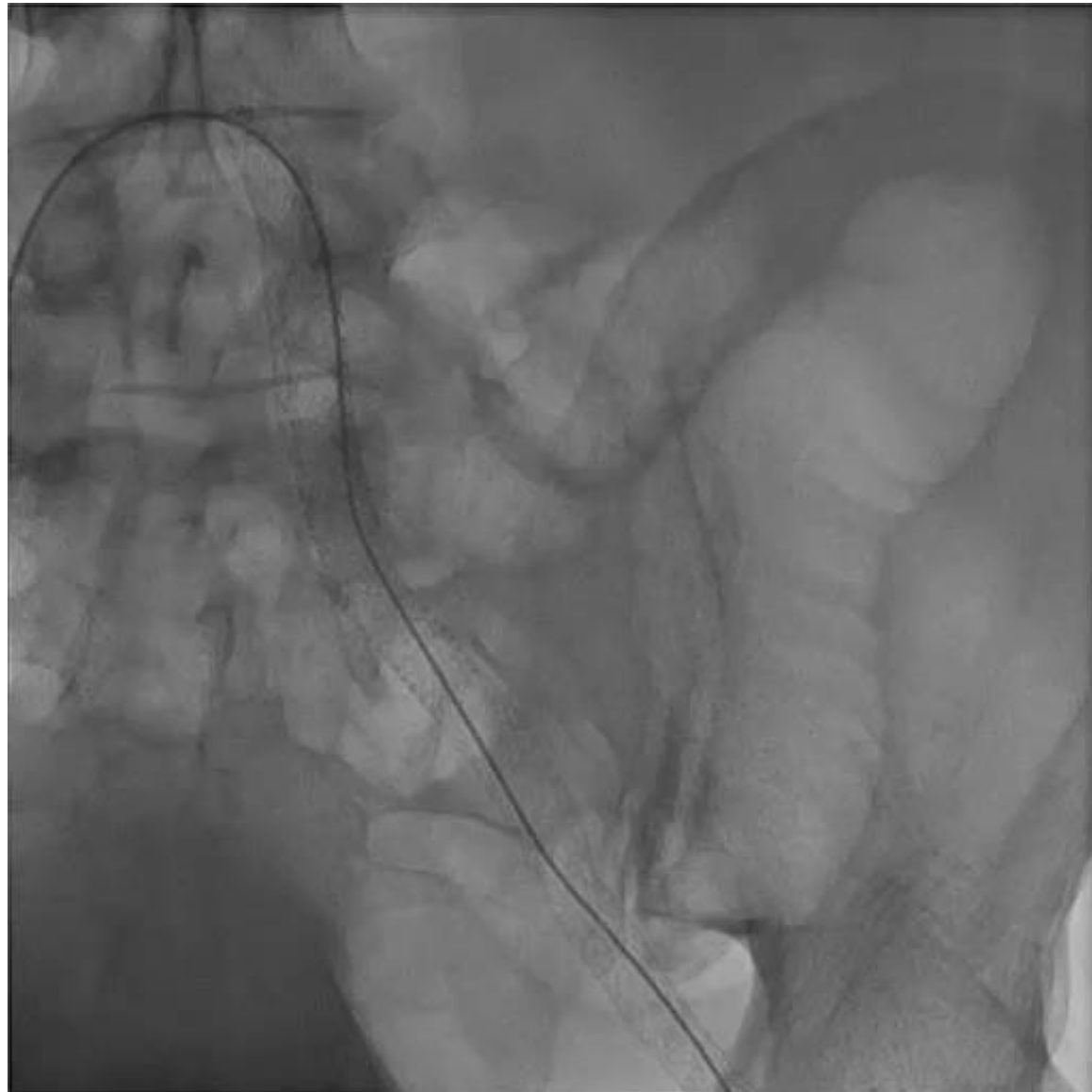
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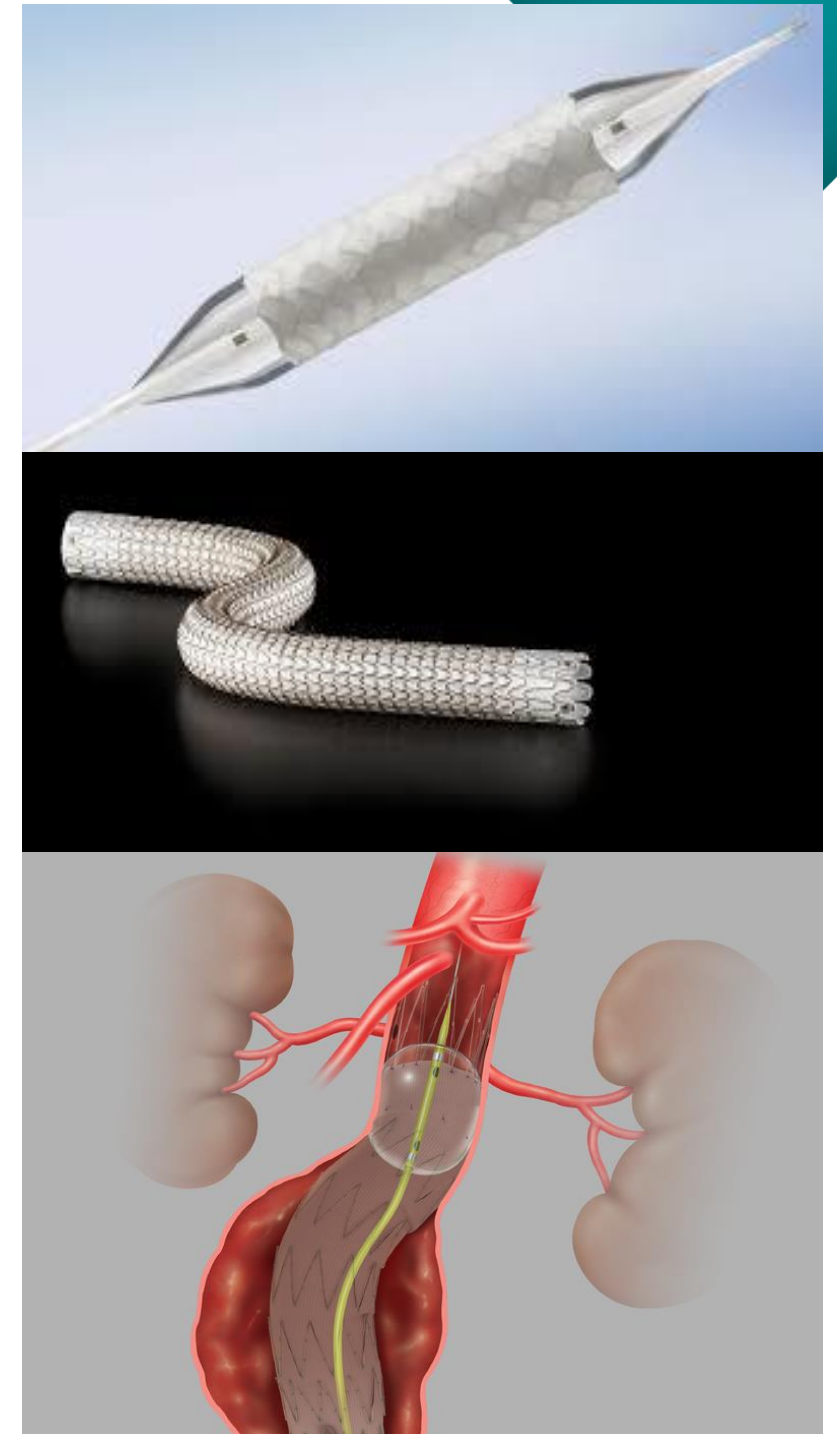


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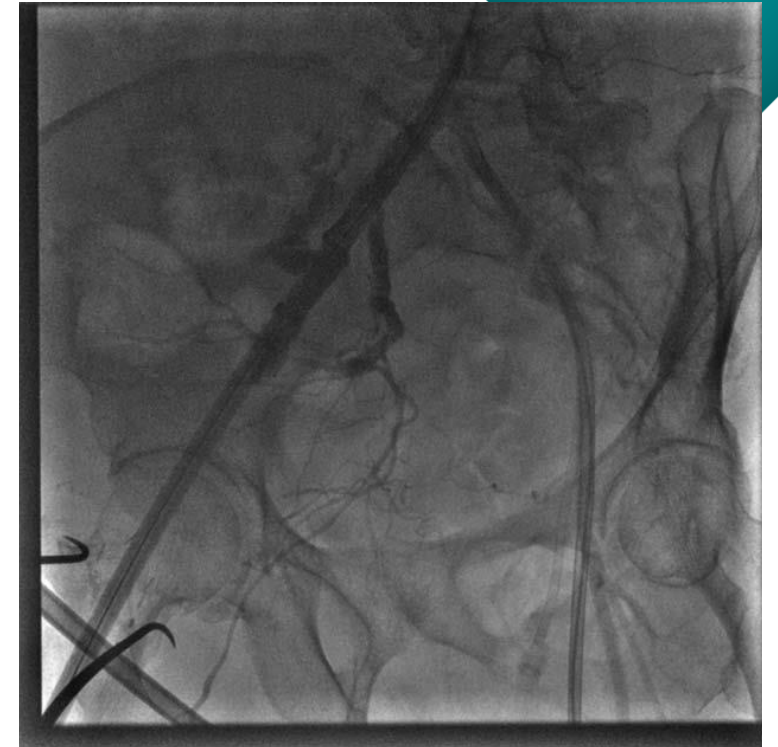
# Sheath Compatibility

- All ICAST covered stents are 7F sheath compatible
- Viabahn: 7-8 mm: 8F; 9 mm: 9F; 10-11 mm: 11F; 13 mm: 12F
- Coda balloon: 14F
- Tyshak: 18-25 mm: 9F



# Managing Iliac Artery Avulsion: 'Artery on a Stick'

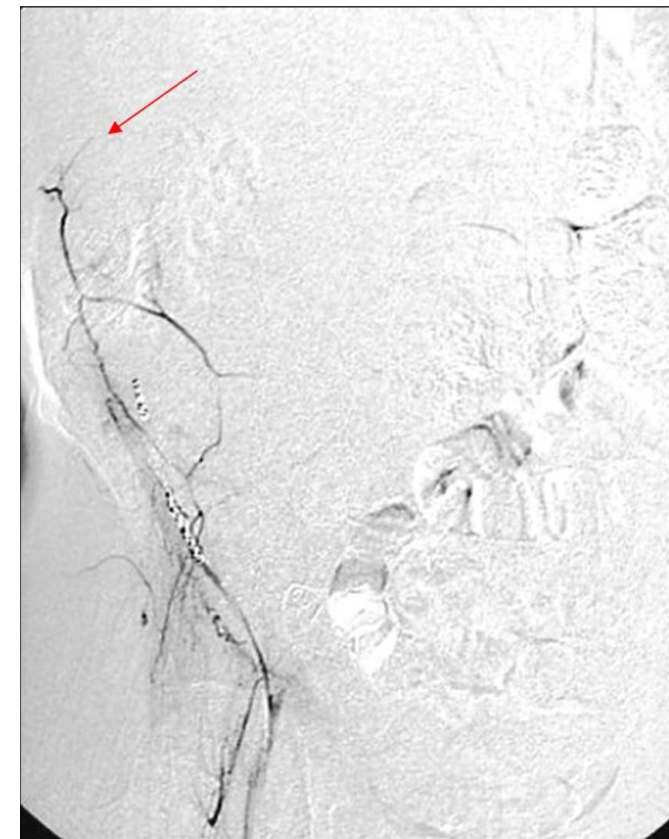
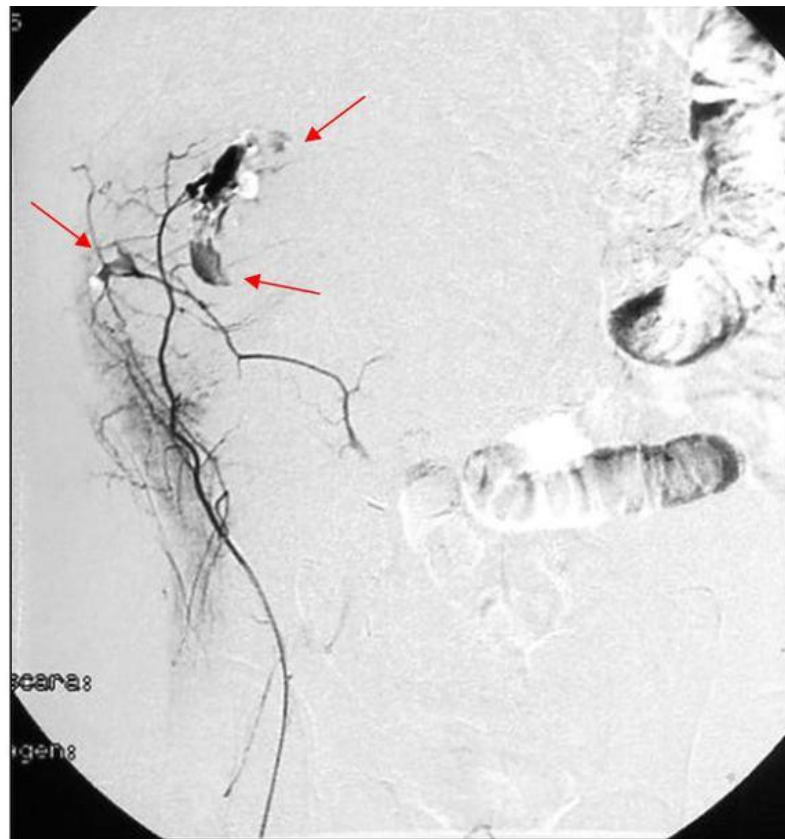
- Do not remove sheath, when avulsion suspected
- Distal aortic balloon occlusion (Coda; 12F)
- C/L access & Viabahn deployment (in sheath distally)
- Ipsilateral anchor balloon at proximal stent edge, gradual retrieval of sheath & placement of overlapping Viabahn(s); subsequent externalization & clamping of CFA
- Distal aortic balloon deflated
- Hemashield graft sewn into Viabahn and to CFA, end-to-end



# Circumflex Iliac Artery Perforation Micro-coil Embolization



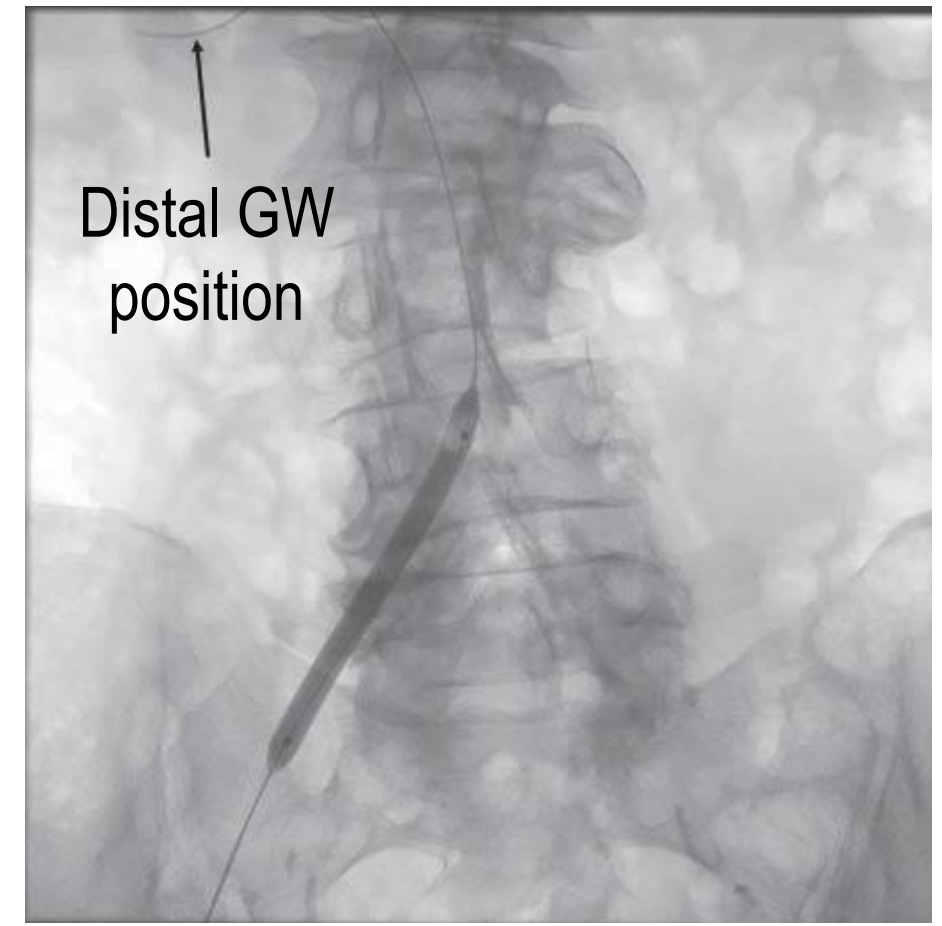
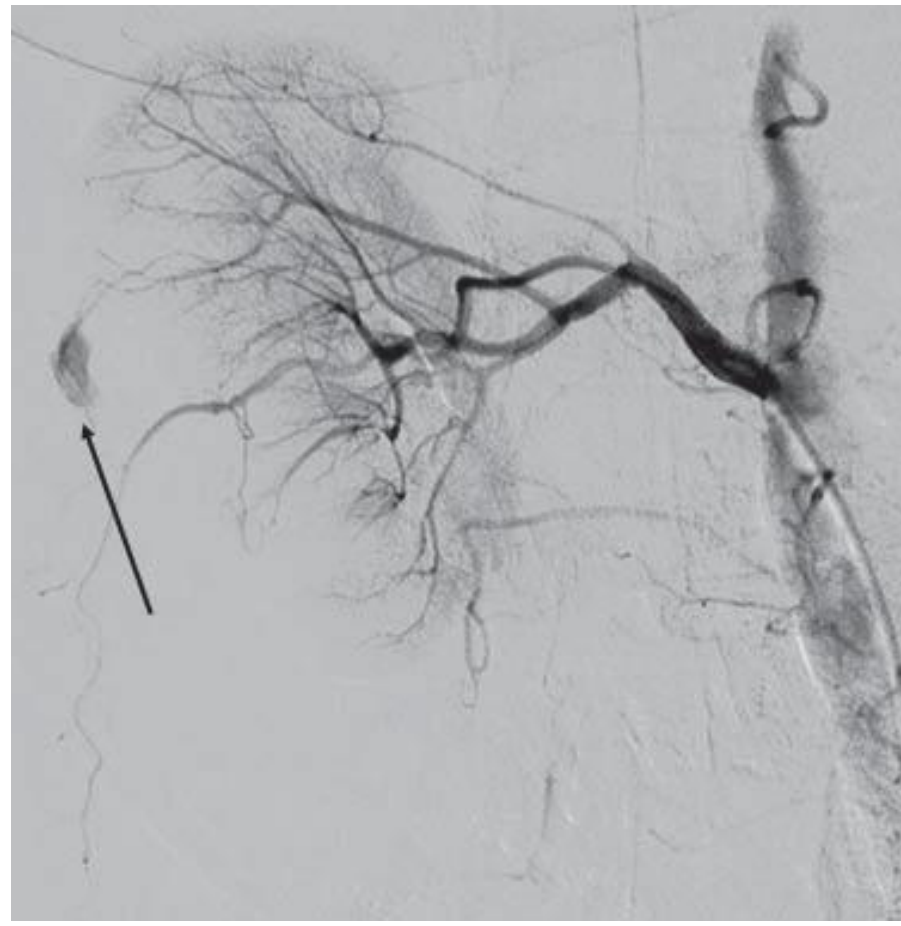
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# Flank Pain After Successful Common Iliac Artery Intervention



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# Transcaval Access: TAVR, Impella



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Inpatient survival was 96% and 30-day survival 92%  
(nitinol cardiac closure device in one of 99 patients)

## Favorable

Clear access point in the aorta

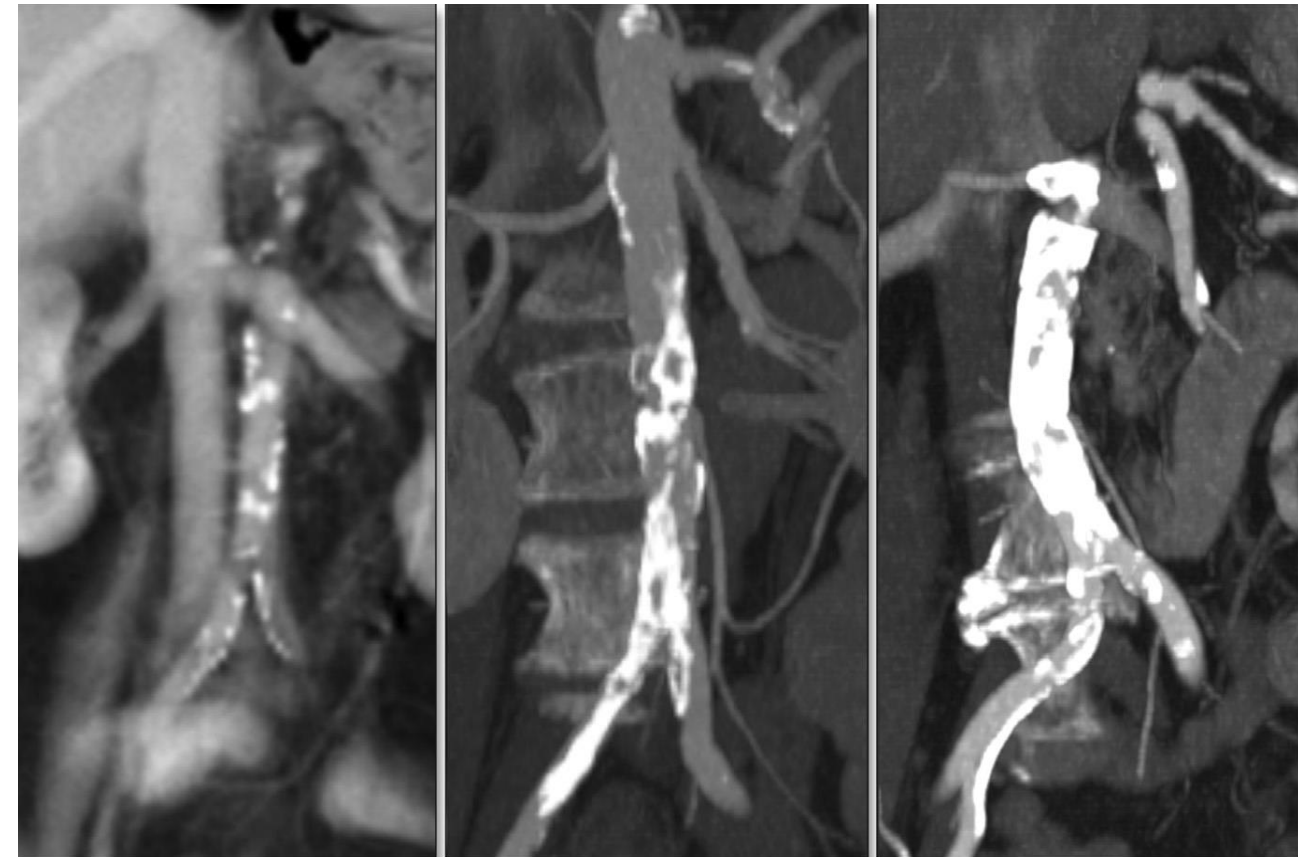
$\leq 8$  mm lat. distance between aorta and caval lumens

Calcification grade 0-2

No important interposed structures: lumbar veins, renal veins; hemiazygous vein, bowel

$>10$  mm below the renal arteries;  $>10$  mm above aortic bifurcation

Absence of aortic aneurysm or ectasia

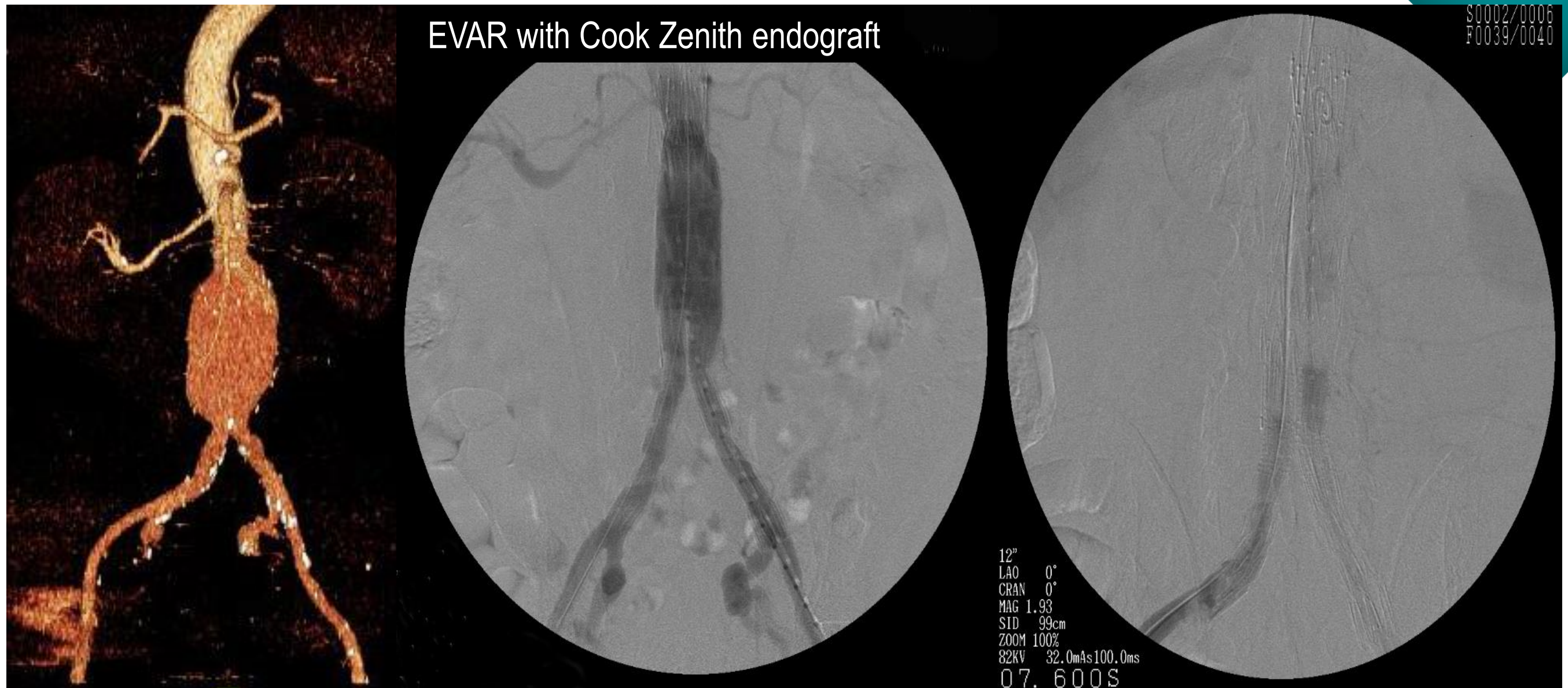




# Thrombosed Aortic Endograft



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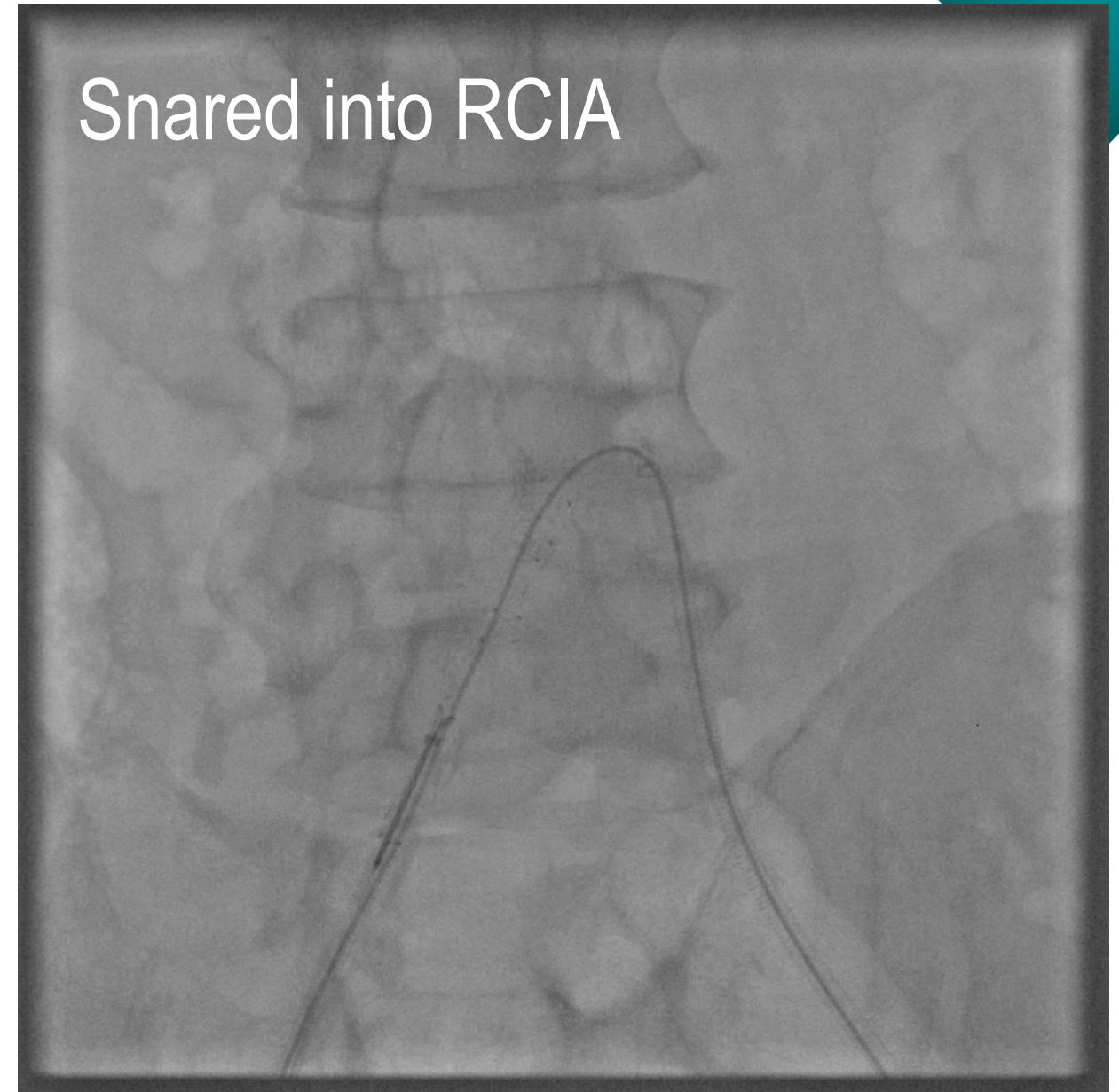
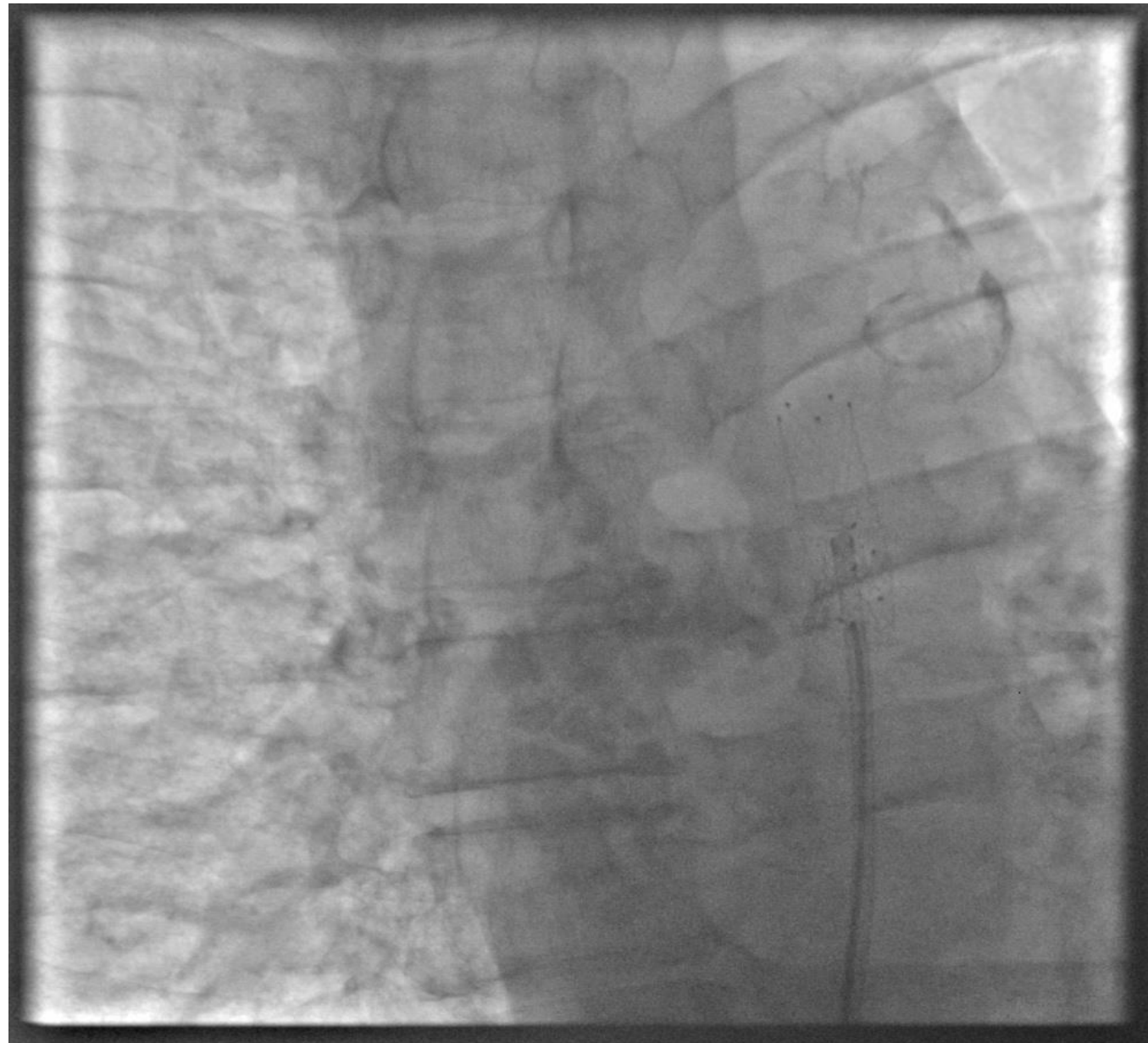
Infrarenal neck length =33 mm; Proximal diameter =23 mm;  
Aortic bifurcation diameter =20 mm; Iliacs =14-15 mm

Post-op Day 10

# Iliac Stent Loss During PCI



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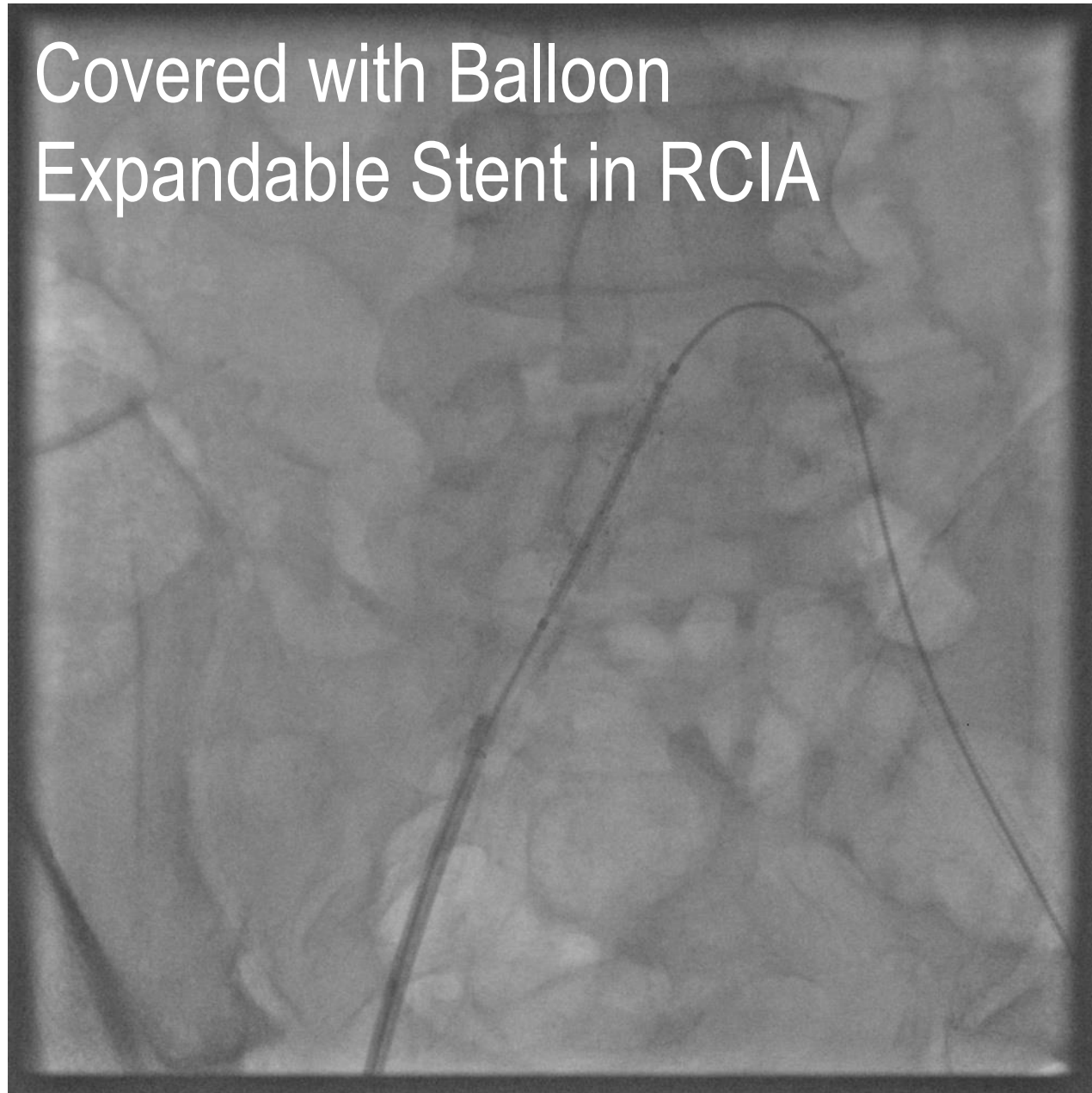


# Iliac Stent Loss During PCI



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Covered with Balloon  
Expandable Stent in RCIA



# Clinical Case

Following your first RCFA vascular access for planned placement of the large caliber sheath during transfemoral TAVR procedure under general anesthesia, post-access angiogram is depicted in **Figure 1**. Your next best step should include which of the following:

- A. Reversal of anticoagulation
- B. Contralateral CFA access
- C. Abort case and refer to vascular surgery
- D. Proceed with TAVR via contralateral CFA access, with 6F Pigtail catheter advanced via RCFA

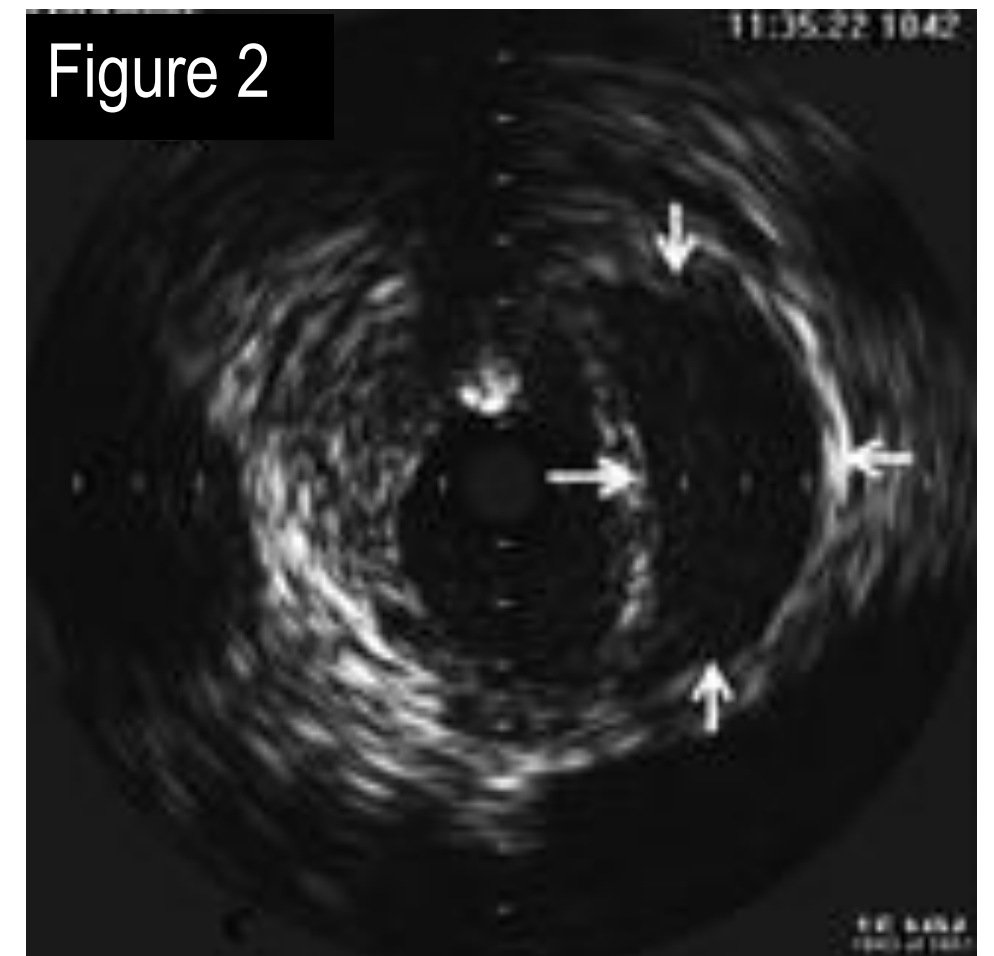


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Figure 2





# How to Avoid Aortoiliac Complications.

## *Anticipate, Prepare & Execute*

- Vascular access planning (multimodality imaging), alternate access
- US guided vascular access: ‘12-o-clock puncture’; patient pre-dilation
- Post-access angiogram (DSA), hemodynamics, waveform
- Don’t leave a complication ‘unaddressed’, IVUS, C/L access
- Pre-closure, post-closure angiogram, observation, backup



# How to Avoid Aortoiliac Complications.

## *Anticipate, Prepare & Execute*

- Case planning; labs; medications; Know your inventory & locate (IBDNO: *'identify, but do not open'*); sheath compatibility
- Avoid *'poke-and hope'* approach
- Plan for bilateral CFA, brachial artery approach (CIA CTO)
- Cross with low-profile guide-wires, exchange, escalate, confirm
- Re-enter in iliacs >aorta, balloon re-entry
- *'Top-hat'* strategy to treat aorto-iliac disease
- Appropriate sizing (IVUS, QCA), avoid oversizing, respect pain, DSA



# How to Avoid Aortoiliac Complications.

## *Anticipate, Prepare & Execute*

- Distal aortic balloon occlusion: bail out or pre-emptive during large sheath removals
- Covered stents: extended coverage
- Micro-coils (delivery catheter), fat embolization
- Reversal of anticoagulation, fluids & blood products
- Surgical back-up





# Complications of Aortoiliac Intervention

## *Take-home message*

- Complications are now rare, however can be catastrophic
- Aortic balloon occlusion & covered stents effective
- Case planning & knowledge of inventory & device compatibility paramount



## All Hands on Deck:

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# *Respond Don't React...*