

# How to manage TAVI related vascular complications

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# Definition

- VARC-2 consensus statement
- Complications caused by:
  - Wire
  - Catheter
  - Anything related to vascular access (including LV perforation and pseudoaneurysm)
- Only major vascular complications are considered important clinical end points

- Why is it important?
- Increased mortality in patients with vascular complications
  - OR 2.4 – 8.5
- Prolonged hospitalization
  
- Incidence:
- 2 – 17% major vascular complications across the literature
  - Predominantly transfemoral TAVIs
  
- Prevention, early recognition and prompt treatment are vital

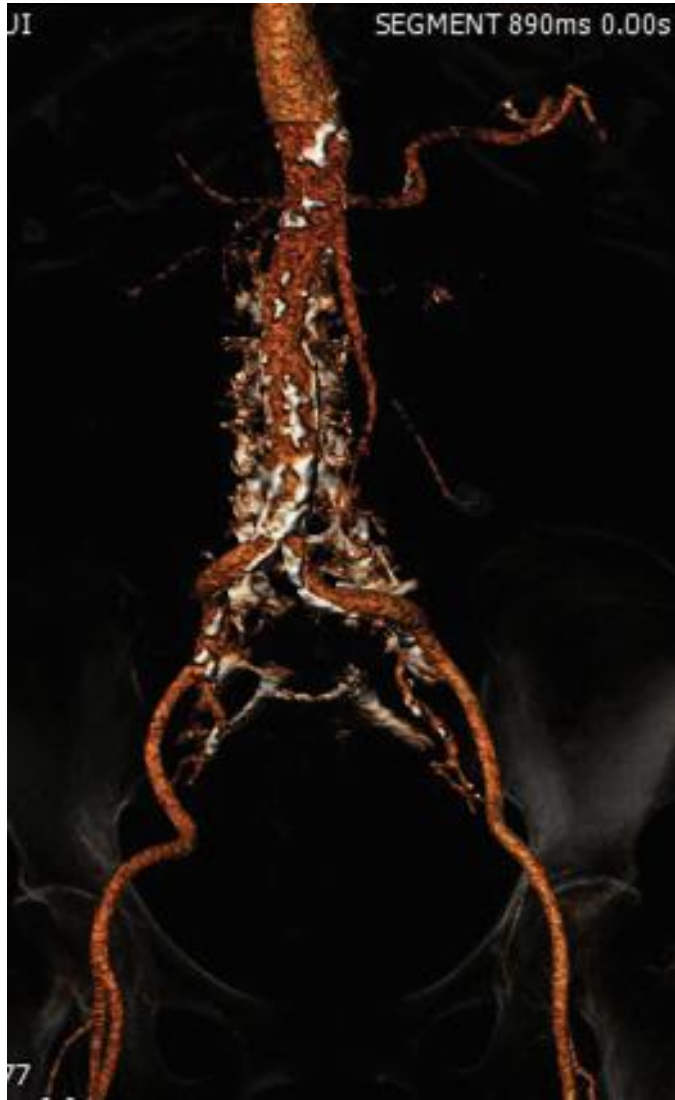
# Pre-procedure planning

- Accurate vessel size and calcification assessment critical
- Invasive angiography
- CTA (especially with use of centre lines)
- Ultrasonography

# MDCT – Peripheral artery

- Minimal diameters & Calcifications

**R iliac**



**12 mm**

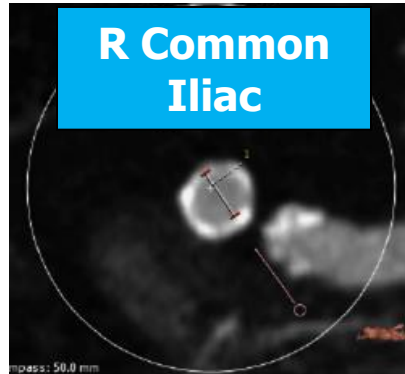
**7 mm**

**6.3 mm**

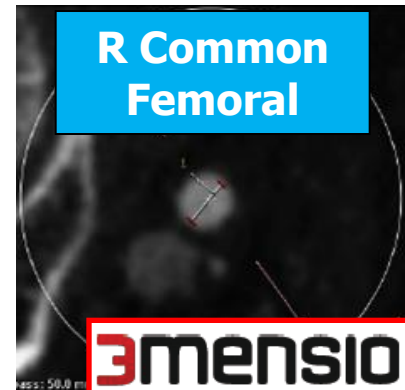
**Aorta**



**R Common Iliac**

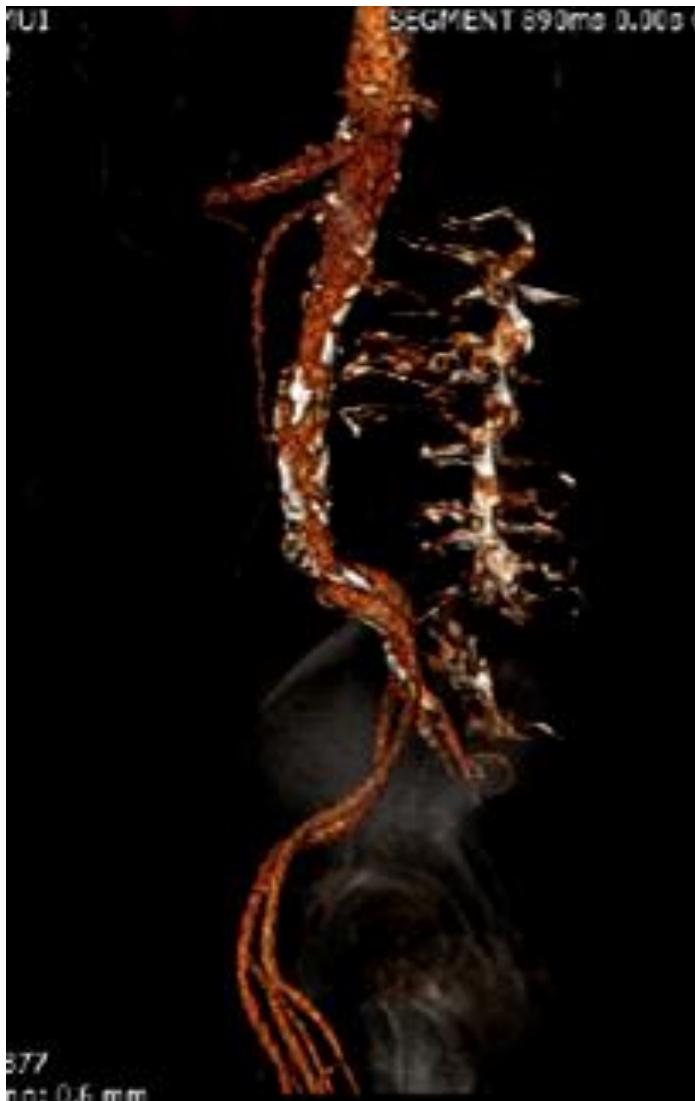


**R Common Femoral**



# MDCT – Peripheral artery

- Minimal diameters & Calcifications



**L iliac**



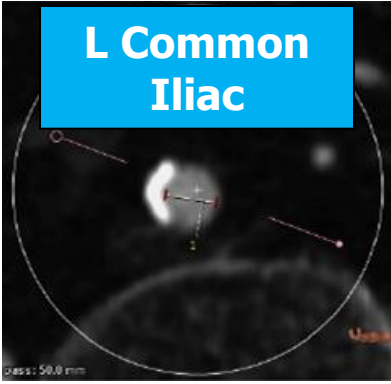
← 12 mm

← 6.9 mm

← 6 mm



**Aorta**



**L Common Iliac**



**L Common Femoral**

# Complications of the iliofemoral arteries

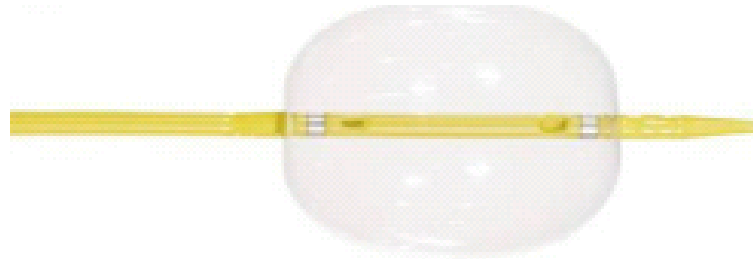
- Predisposing factors:
  - Small vessel size
  - Moderate-severe calcification
  - Centre experience
  - Female gender
- Sheath-to-femoral artery ratio (SFAR) > 1.05 → very strong predictor
- Iliofemoral tortuosity NOT a predictor

Manufacturer	Sheath	Sheath Internal Diameter, F	Sheath External Diameter, mm
Edwards Lifesciences	RetroFlex 3 introducer sheath	22	8.4
		24	9.2
	NovaFlex introducer sheath	18	7.2*
		19	7.5
		Expandable Sheath	14
	16		6.6*
	18		7.2*
20	7.8*		
Cook Medical	Check-Flo Introducer	18	7.2
St. Jude Medical	Ultimum	18	6.8
		20	7.6
		22	8.2
Onset Medical	SoloPath Balloon Expandable Transfemoral Introducer	19	7.3†
		20	7.7†
		21	8†
Gore Medical	DrySheath	16	6.2
		18	6.8
		20	7.5



- Iliofemoral dissections:
  - Minor dissections can possibly be left alone
  - More complex dissections can be treated with
    - Prolonged balloon inflation
    - Stent placement
    - Covered stent
    - Surgical repair
- Iliofemoral rupture:
  - If ipsilateral wire still in-situ, advance the dilator/ sheath immediately to tamponade rupture site
  - Occlusion balloon (eg Coda balloon) from the ipsilateral/ contralateral access to the distal aorta

- For small perforation, cross over balloon for 10 min may seal leak
- Covered stent may seal perforation
- Many cases will require surgical repair



- Stenosis/ thrombosis:
  - Percutaneous closure can result in stenosis of the CFA → if severe, balloon inflation can help
  - Thrombosis can be treated with thrombectomy (eg Angiojet), angioplasty or surgical revascularization

- Pseudoaneurysms:
  - Painful, pulsatile mass
  - Predisposing factors:
    - Increasing sheath size, age
    - Female sex, BMI, current anticoagulation,
    - Cannulation other than CFA, calcification
    - Combined arterial/venous punctures, inadequate compression
  - Can close spontaneously
  - Can carefully observe if size < 3cm / no associated pain/ no need for anticoagulation
  - Treatment options:
    - Ultrasound guided compression
    - U/S guided thrombin injection
    - Surgical repair

- Artery avulsion:
  - Rare;
  - Immediate balloon occlusion and surgical repair
- Failed Prostar/ Perclose closure:
  - Usually treated with surgical repair
  - Prolonged manual compression
  - Balloon tamponade
  - Stent implantation
- Access site bleeding:
  - Manual compression
  - Cross over balloon occlusion
  - Stent graft placement

- Aortic dissection:
  - 0 – 1.9%
  - High fatality
  - Surgical repair with graft
  - Endoluminal stent graft
  
- Aortic rupture
  - Mainly of the annulus
  - Very high fatality rate even with emergency
  - Contained ruptures with more benign course reported
  - More often with Sapien valve although reported with CoreValve
  - Meticulous annular sizing to avoid gross prosthesis oversizing of critical importance esp if valve is very calcified

- Retroperitoneal hemorrhage
  - If suspected, CTA should be performed
  - Most can be managed with fluid/ blood resuscitation
  - If still unstable, temporary balloon occlusion of the bleeding site
  - Iliac artery perforation → covered stent
  - Small branch perforation (eg inferior epigastric) → coil embolization, balloon tamponade, covered stent
  - Surgical repair
  
- XXX

# Conclusion:

- Vascular complications can be expected since sheaths are still relatively large
- The best treatment is prevention!
- Adequate pre-procedure imaging to assess vessel size and calcification critical
- Have equipment ready in the lab in case of vascular complications
- Peripheral balloons, occlusion balloons, peripheral stents, covered stents etc.
- Be ready to consult surgical colleagues for assistance.

Thank you