

Assessing vascular access with CT and Angiography

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Patient selection

- Suitable clinical candidate
- Suitable aortic root anatomy
- **Iliac and femoral anatomy**

- Femoral access
- Pre-procedure imaging of paramount importance:
- Angiography
- CT scan
- Pros and cons
- Vessel dimensions
- Calcification
- Tortuosity

Why is vascular assessment important?

- Vascular complications reported in 2 – 17% of patients
- Serious vascular complications predict poorer survival
 - Increased mortality in patients with vascular complications
 - OR 2.4 – 8.5
- Prolongs hospital stay
- Increases cost of procedure

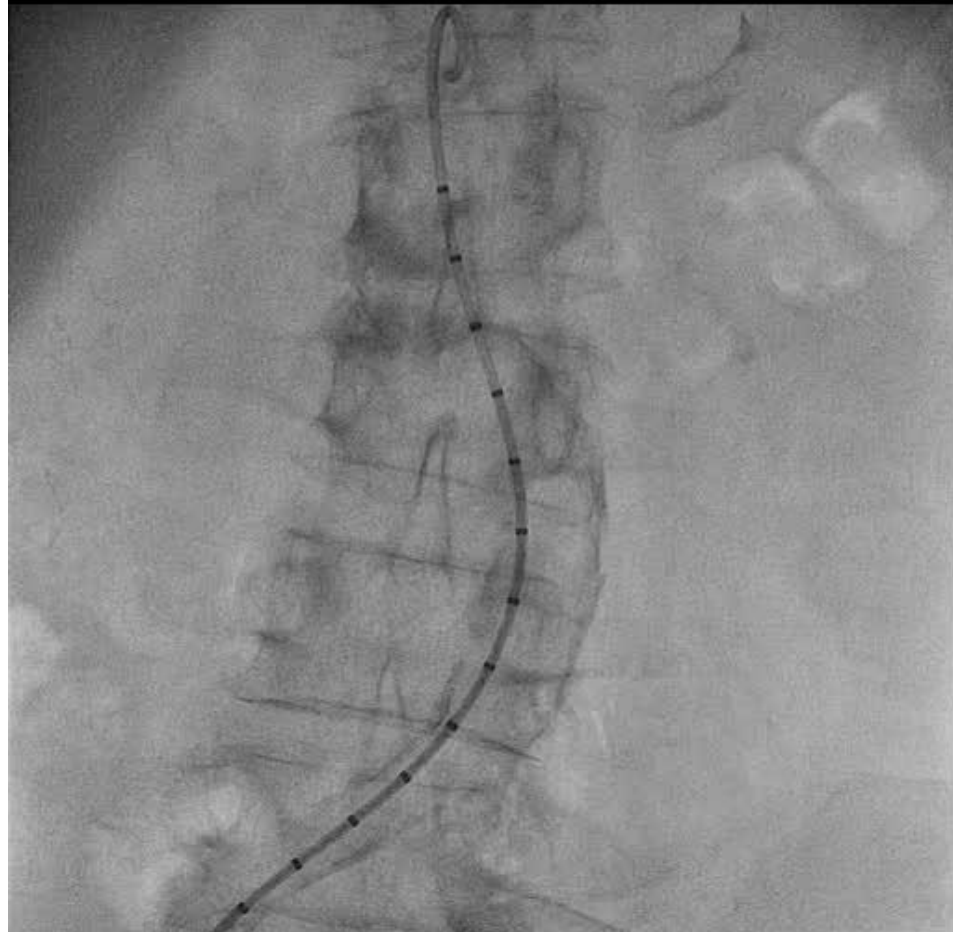
Complications of the iliofemoral arteries

- 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

Angiography

- Advantages:
 - Easy to perform (during cardiac catheterization)
 - Lower cost (part of cardiac angiography)
 - Lower contrast load (15 – 20ml only)
 - Lower radiation dose
- Disadvantages:
 - No 3-dimensional appreciation of vasculature
 - Qualitative assessment of calcification
 - May miss stenosis/ narrowings due to eccentric plaque

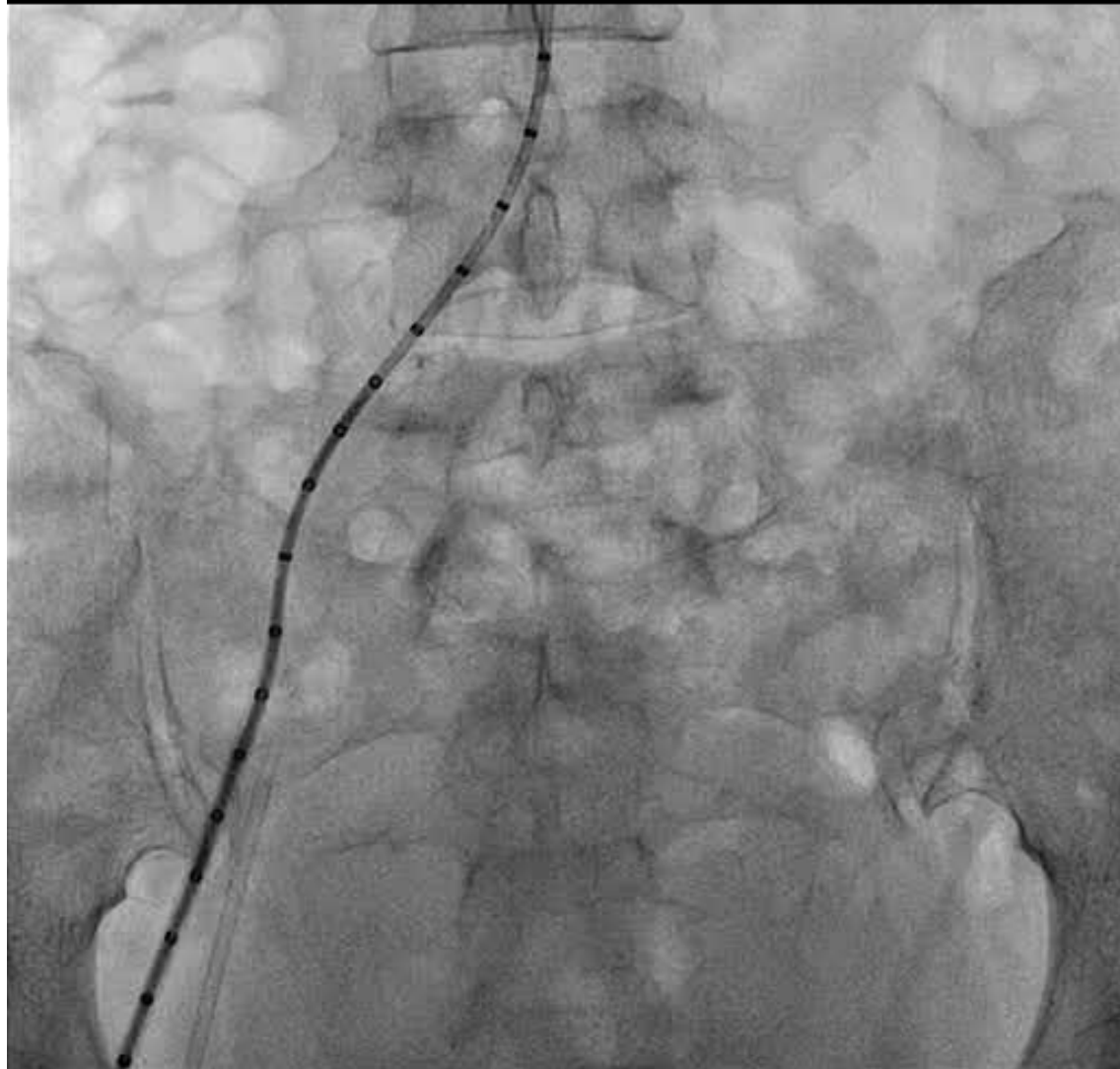
Lossy compression - not intended for diagnosis



Lossy compression - not intended for diagnosis



Lossy compression - not intended for diagnosis



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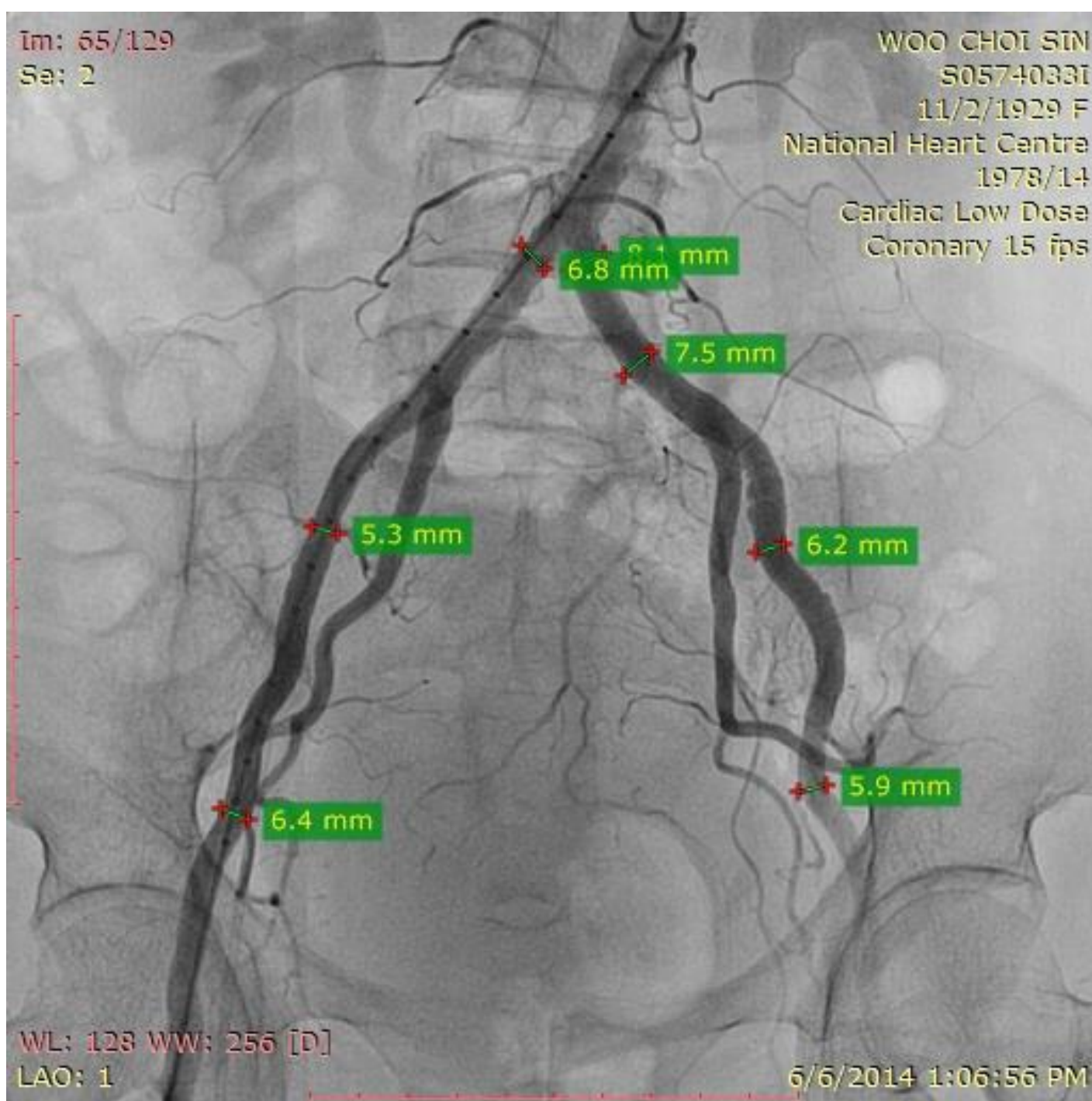
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National Heart Centre

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Cardiac Low Dose

Coronary 15 fps



CT angiography

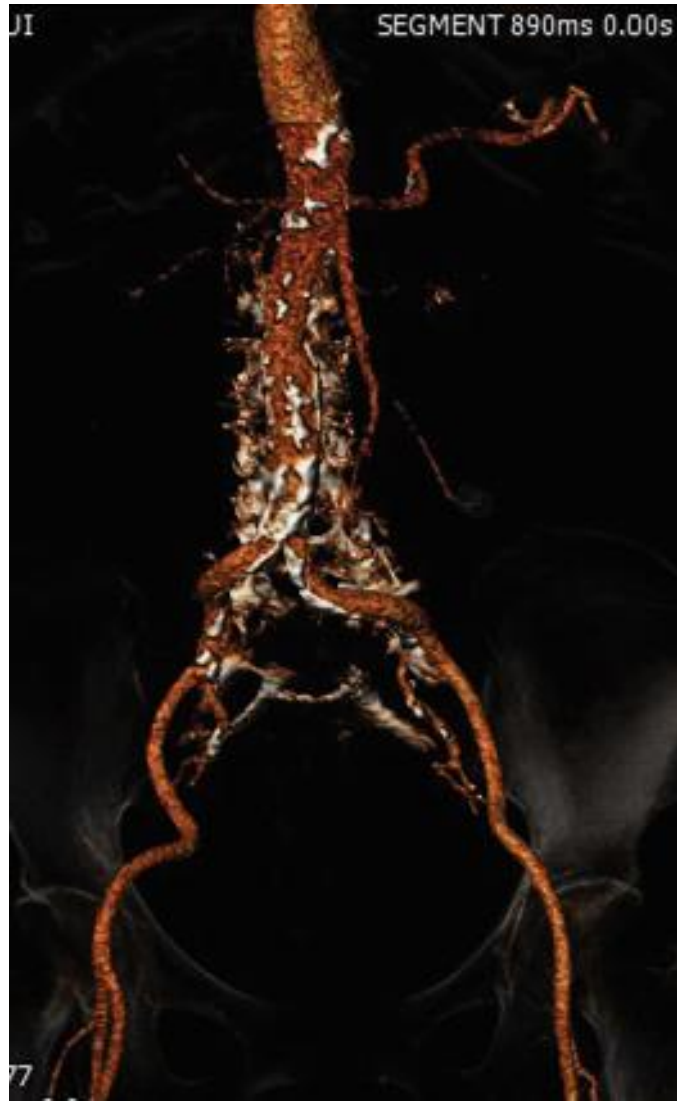
- Advantages:
 - Better spatial resolution
 - Enhanced appreciation of vessel size
 - 3-dimensional appreciation of tortuosity
 - Quantitative assessment of calcification
- Disadvantages:
 - Adds cost
 - Increased contrast load (80 – 100ml)
 - High radiation dose

CT angiography

- CTA particularly useful when deploying preclosure devices → helps to assess presence and location of calcium at the CFA
- Also helps to assess for soft unstable plaques and dissections in vasculature

MDCT – Peripheral artery

- Minimal diameters & Calcifications



R iliac



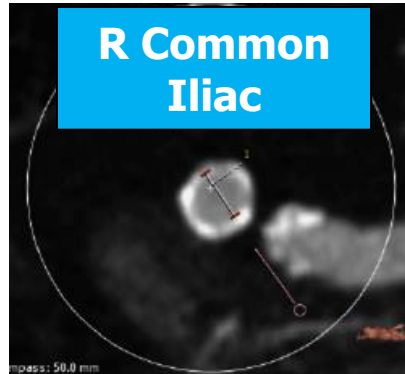
← 12 mm

← 7 mm

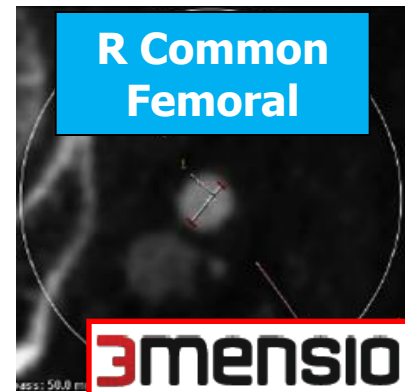
← 6.3 mm



Aorta



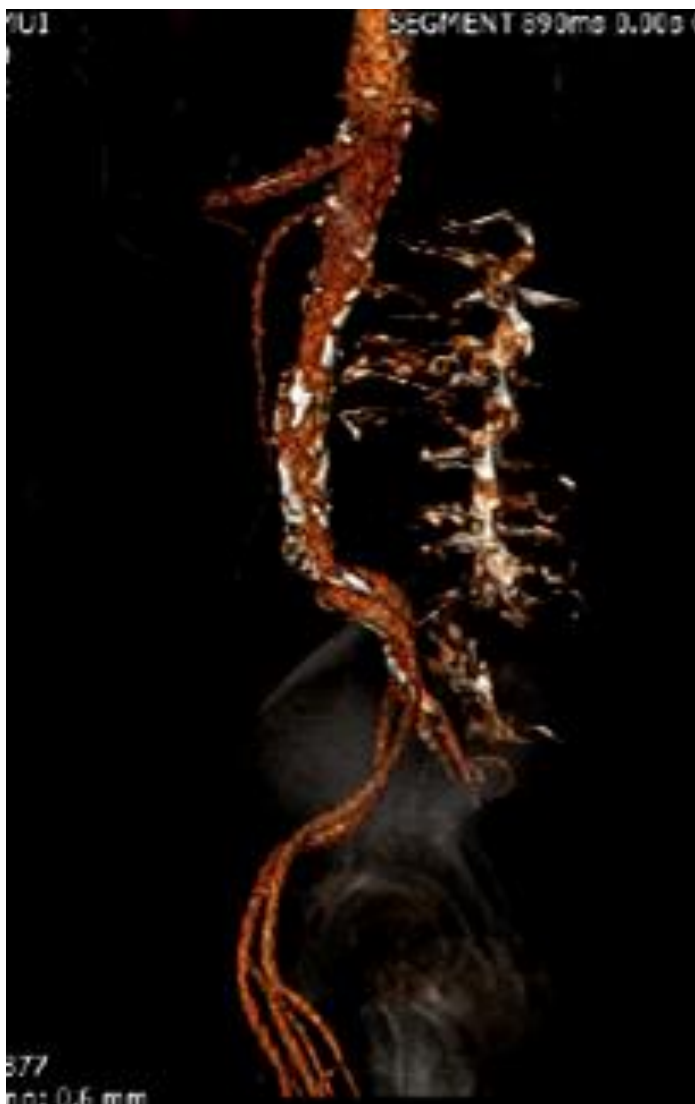
R Common Iliac



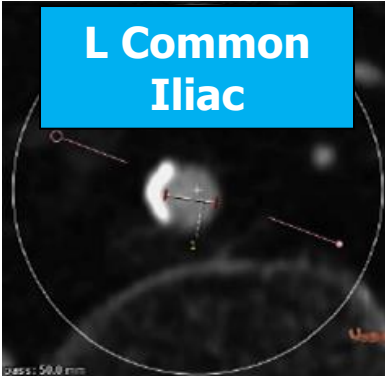
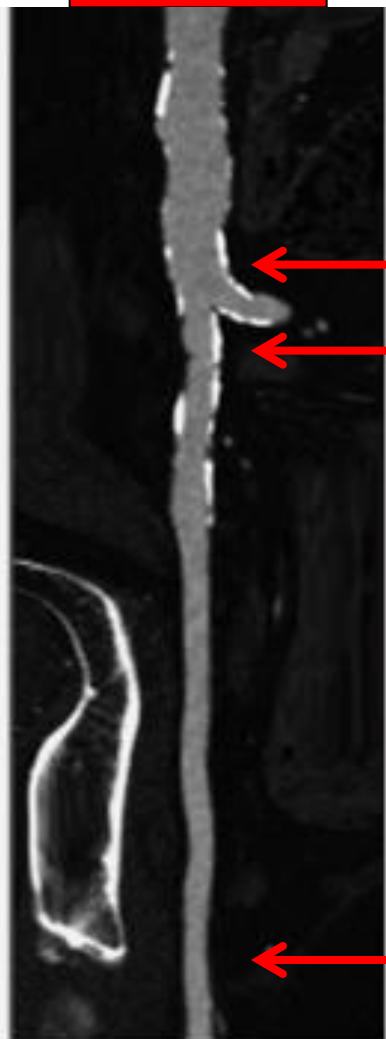
R Common Femoral

MDCT – Peripheral artery

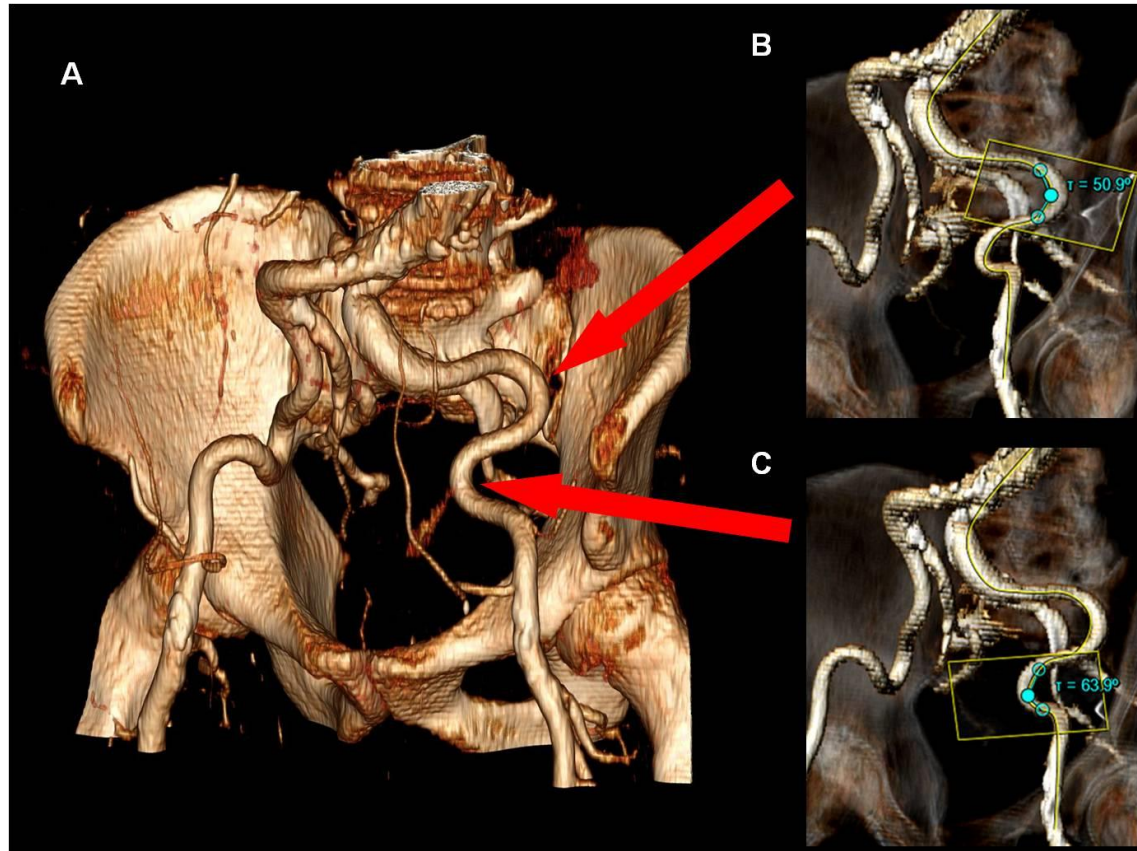
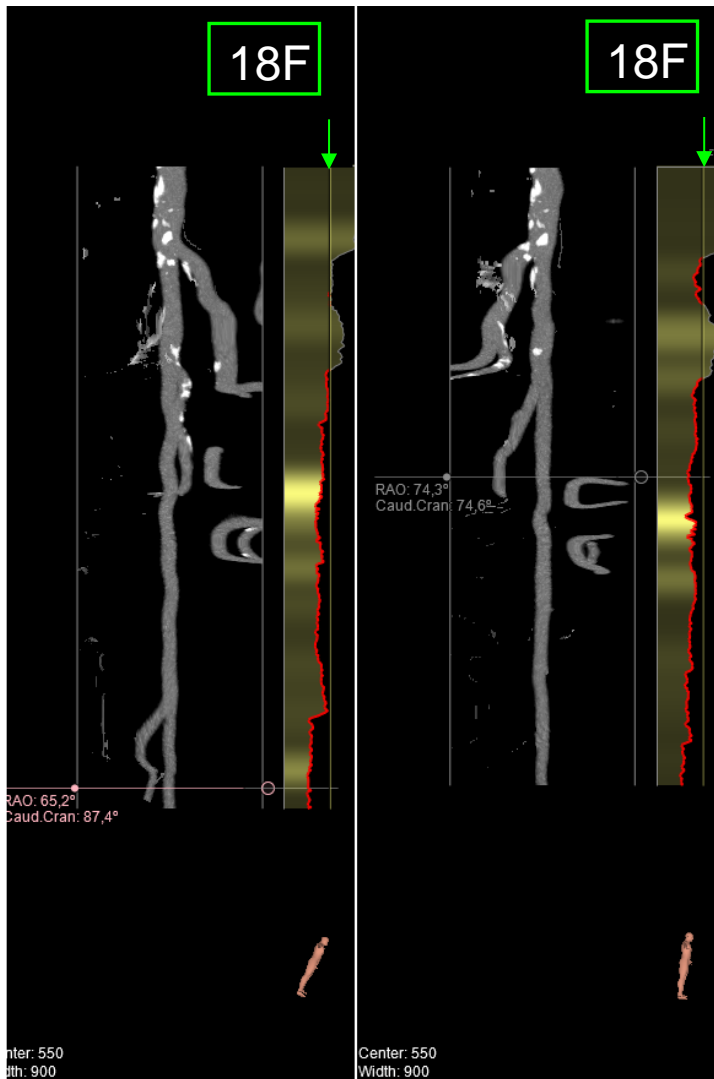
- Minimal diameters & Calcifications



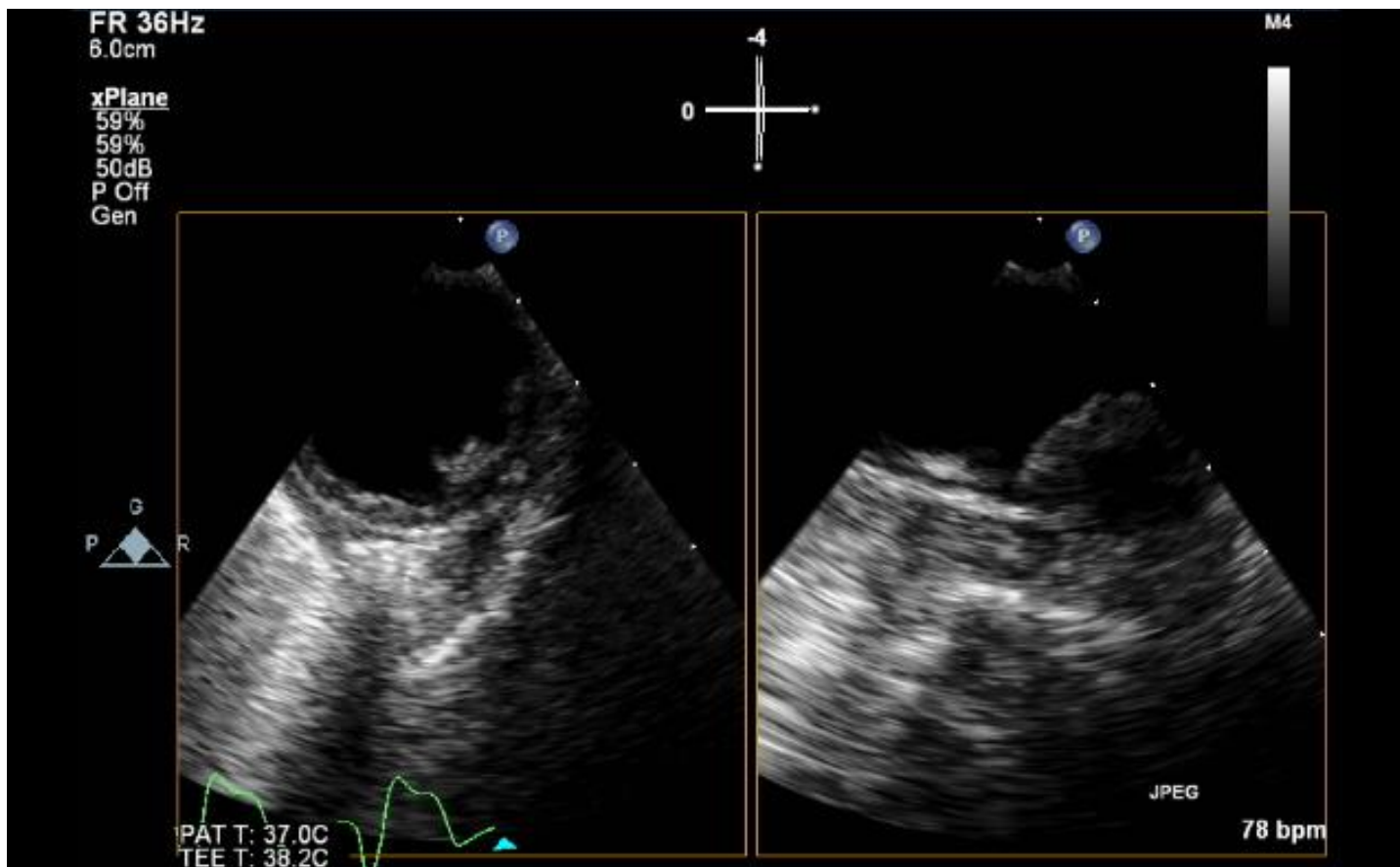
L iliac



1. Lumen diameter
2. Calcification
3. Tortuosity



1. Intra-luminal plaque
2. Calcification



➔ A concern for retrograde approach

Pre-TAVI Evaluation

MDCT

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Series: 9

Left

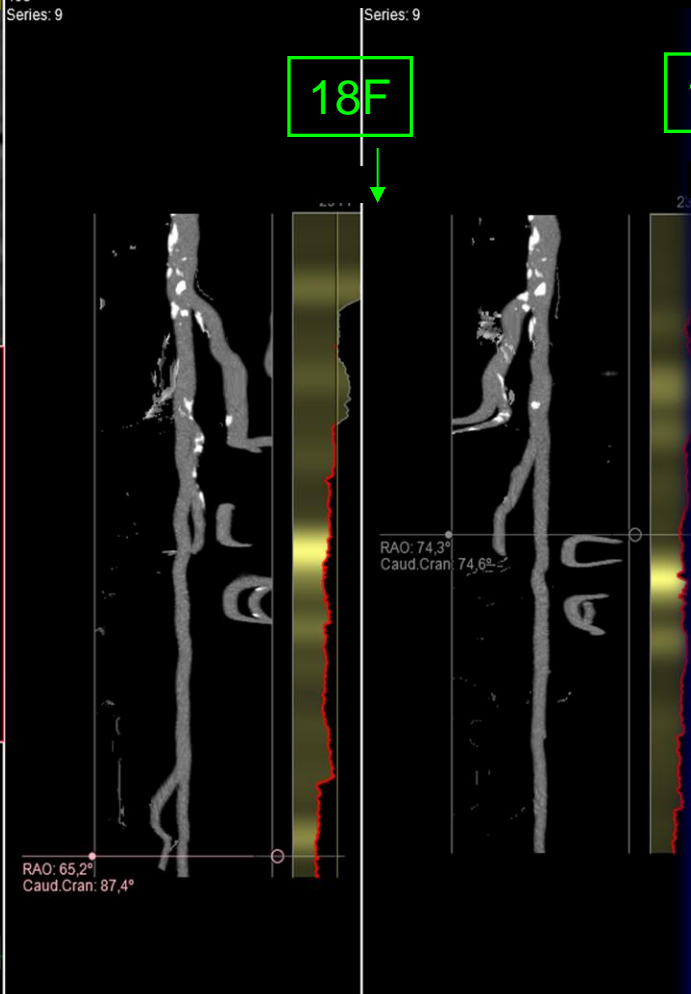
Right

Peripheral arteries and Aorta

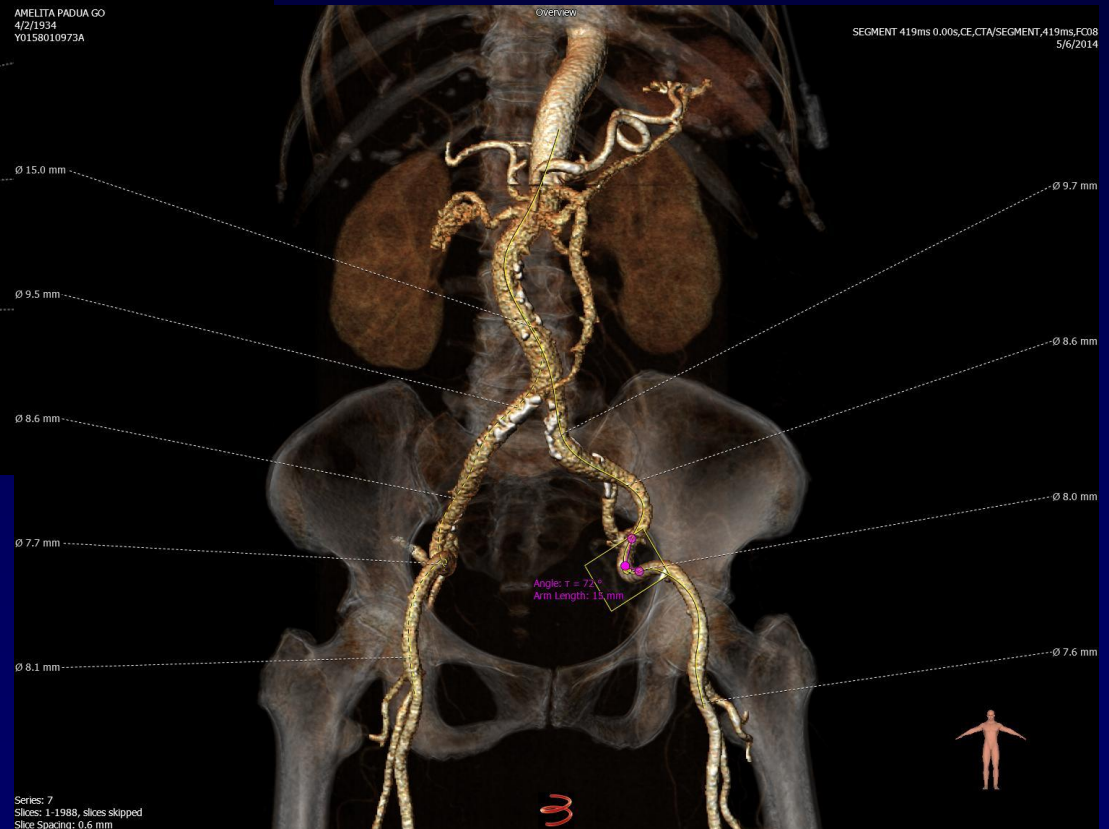
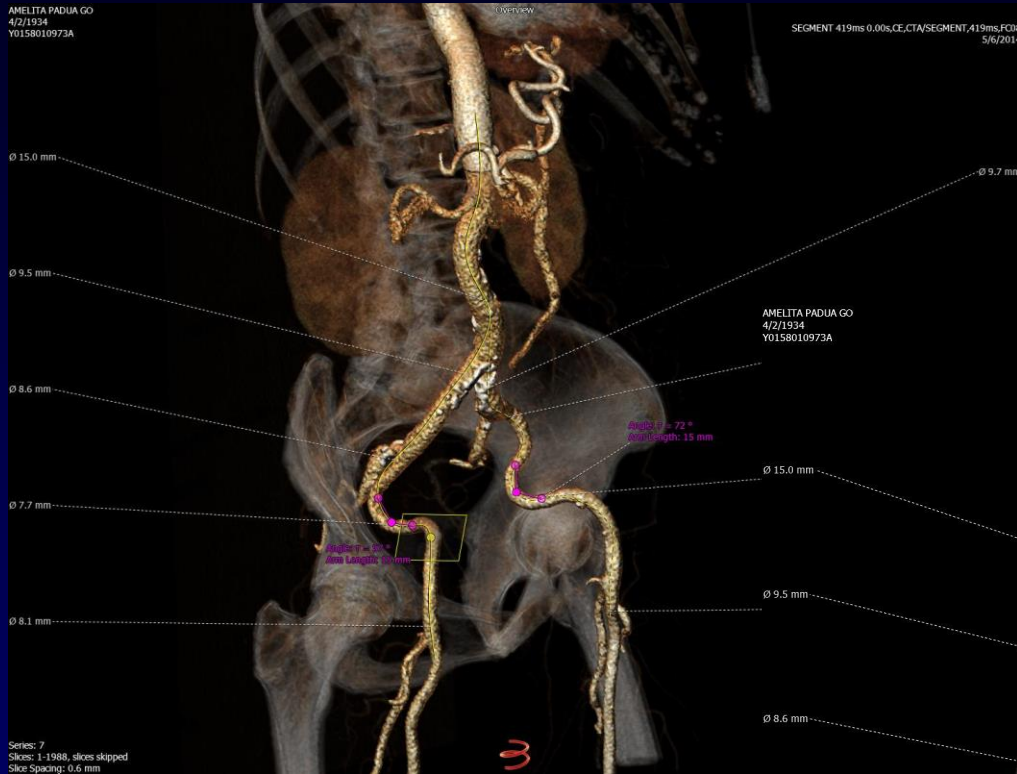
18F

18F

1. Luminal diameter
2. Calcification
3. Tortuosity



Cases

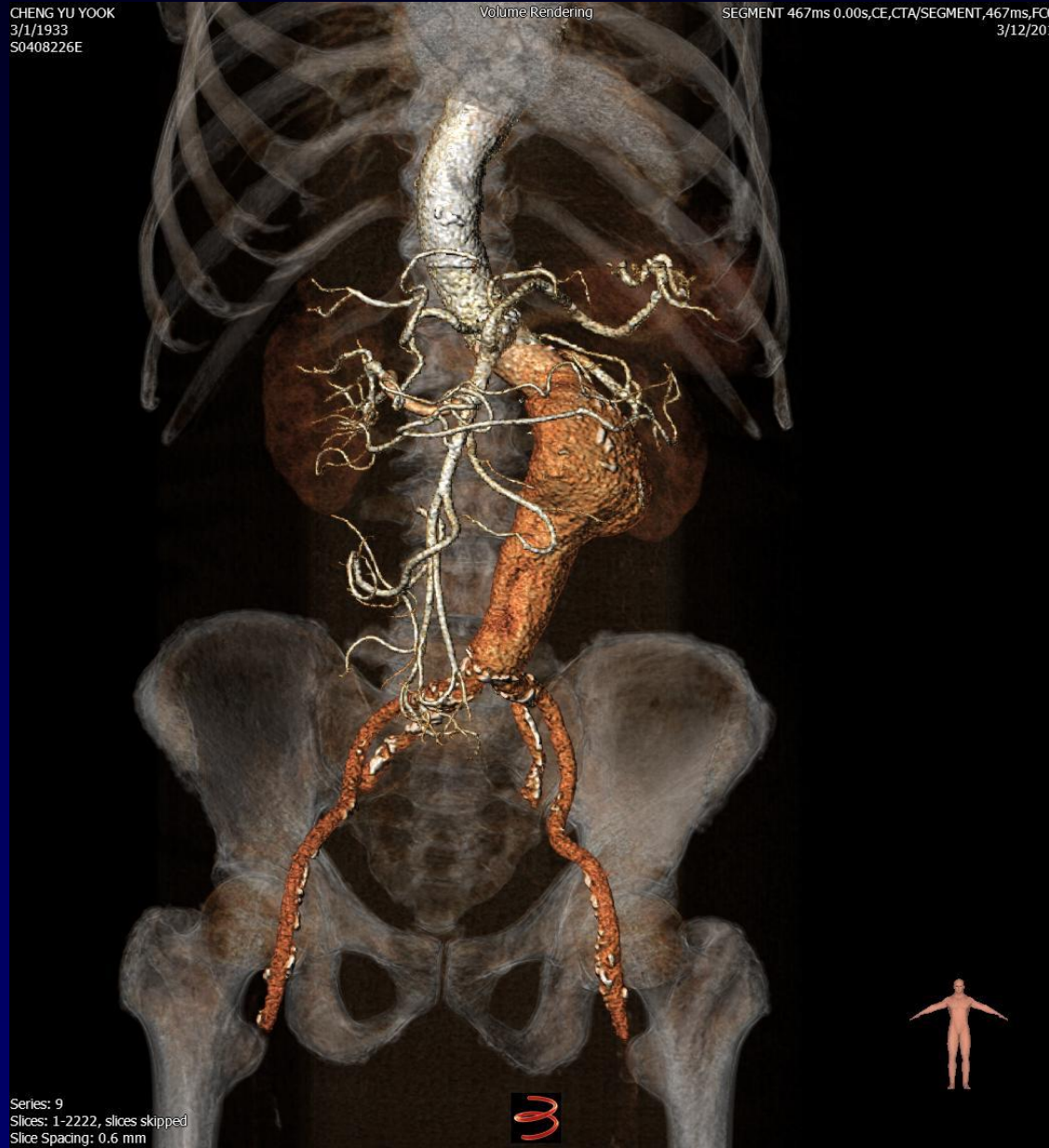


Cases

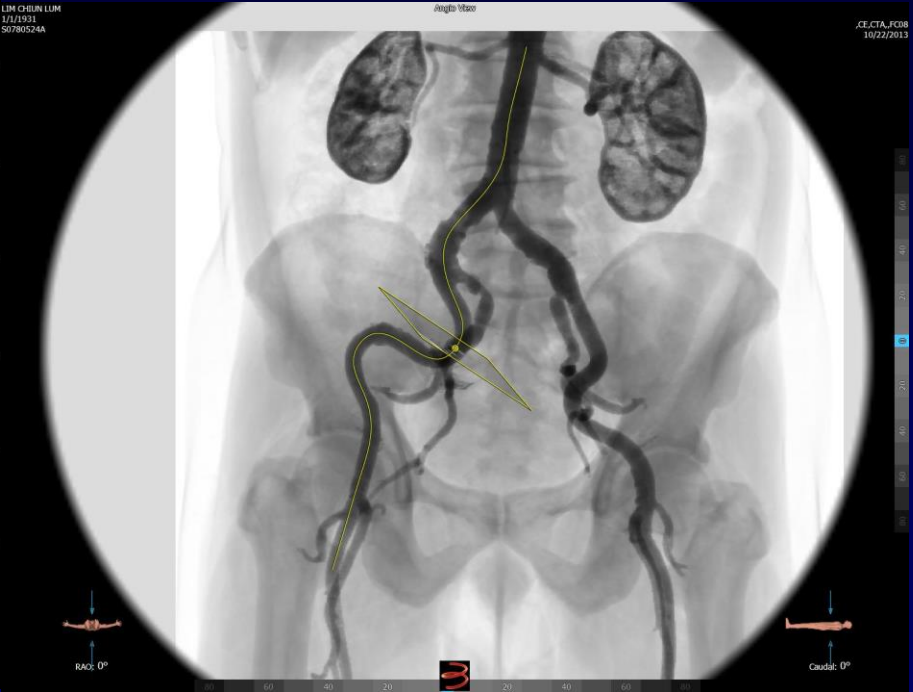
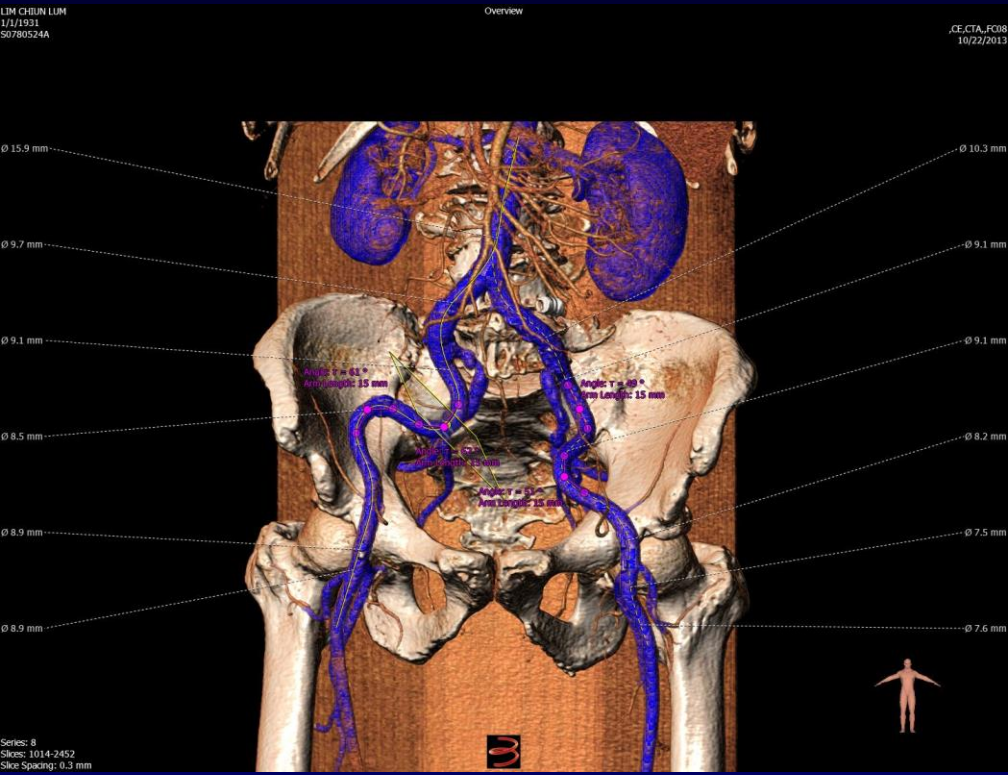
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Volume Rendering

SEGMENT 467ms 0.00s,CE,CTA/SEGMENT,467ms,FC08
3/12/2014



Cases



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

Table 1 Diameters of the eSheath in its unexpanded and expanded state.

Model	Sheath ID (unexpanded)	Sheath OD (unexpanded)	Sheath OD (expanded)	Loader ID	Compatible NovaFlex+ device	Minimum vessel diameter ^a
916ES23	16F (5.3 mm)	6.7 mm	Up to 8.9 mm	21F	9355NF23 (23 mm THV)	6.0 mm
918ES26	18F (5.9 mm)	7.2 mm	Up to 8.9 mm	21F	9355NF26 (26 mm THV)	6.5 mm
920ES29	20F (6.7 mm)	8.0 mm	Up to 9.9 mm	23F	9355NF29 (29 mm THV)	7.0 mm

ID: inner diameter; OD: outer diameter; THV: transcatheter heart valve.

^a Minimal vessel diameter requirement.

CoreValve 23mm, 26mm, 29mm, 31mm → all pass through 18F St. Jude or Cook sheath

Minimum vessel diameter \geq 6.0mm

Minimum vessel diameter applies to vessels that are relatively free of calcium

Conclusion

- 1. Vascular complications remains significant and is associated with a poorer outcome.
- 2. Vessel size, calcification and tortuosity need to be assessed.
- 3. Angiography is easy to perform, cheap and uses less contrast and radiation.
- 4. CTA provides better 3-dimensional assessment of vessel size, calcification and tortuosity but requires more contrast load and radiation dose.