

Vascular assessment and the diabetic foot

Jo Krysa

- Arterial assessment
- Venous disease

Vascular assessment

- History
- Examination
- Investigations
- Management

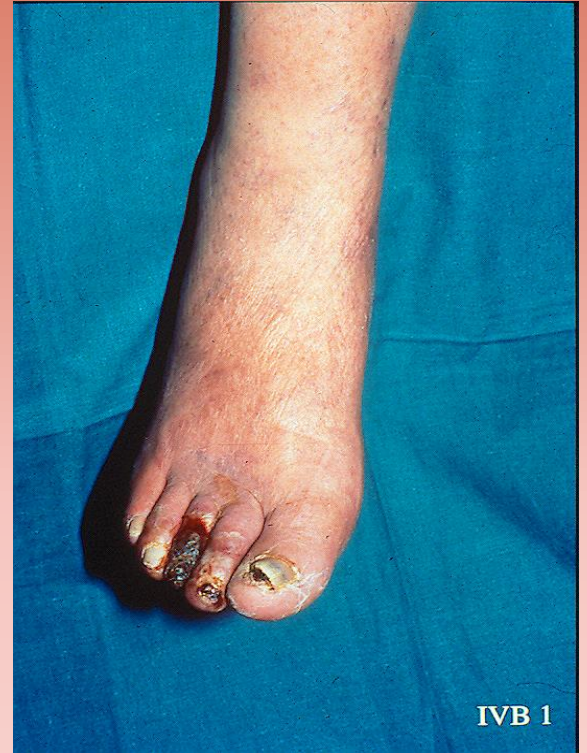
History

- Claudication
- Rest pain
- Ulcer (where, when, size, base, surrounding skin, pain)
- Risk factors
- Past history
- Medications
- Social history

Examination

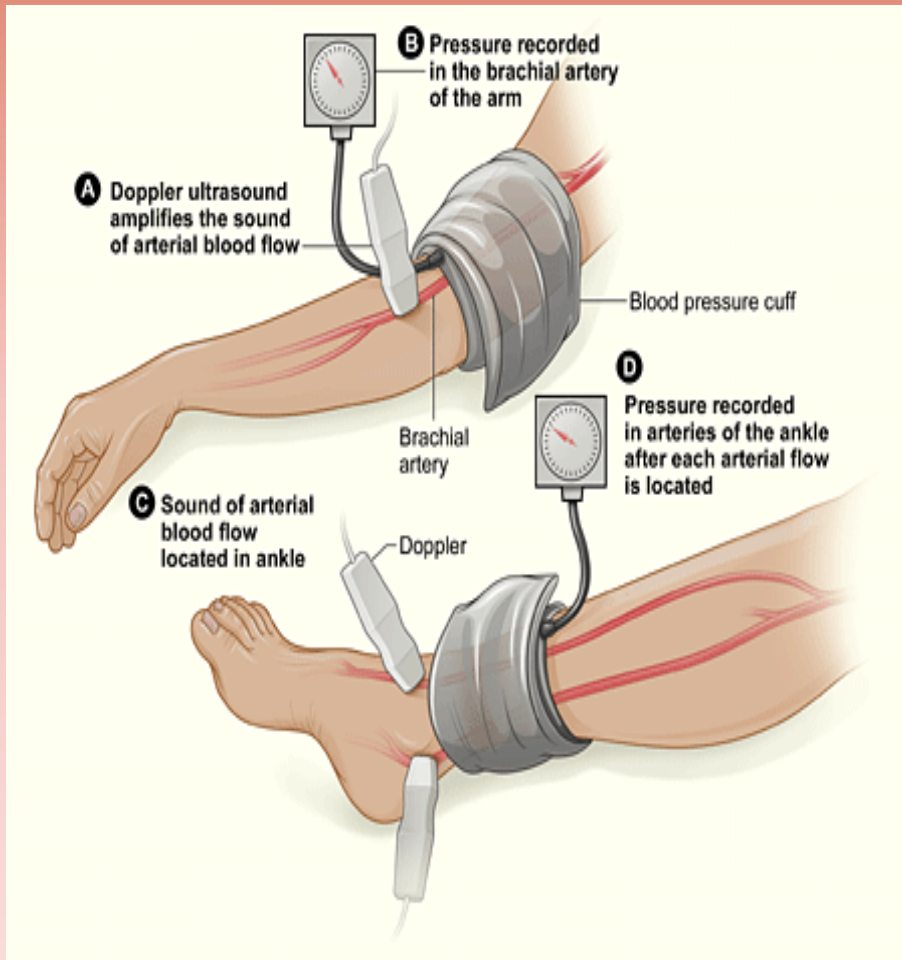
LOOK

FEEL





Ankle Brachial Index (ABI)



0.96 normal

< 0.95 onset of abnormal

< 0.8 (Claudication)

< 0.5

multi-level disease;
occlusion

< 0.4

ischemic & rest pain

Calcified Arterial Wall

Not reliable pressures

Diabetic

ESRF

Long Term Corticosteroid
therapy

ABI > 1.4

High Closing Pressure

Low opening Pressures

Full Segmental Pressures



- Full PVR/ Segmental Pressures
- Location disease
- 4 cuff test
 - better at differentiating inflow disease from femoral arterial disease
 - 20 mmHg or > drop in pressure considered significant stenosis

Pulse Volume Record (PVR)

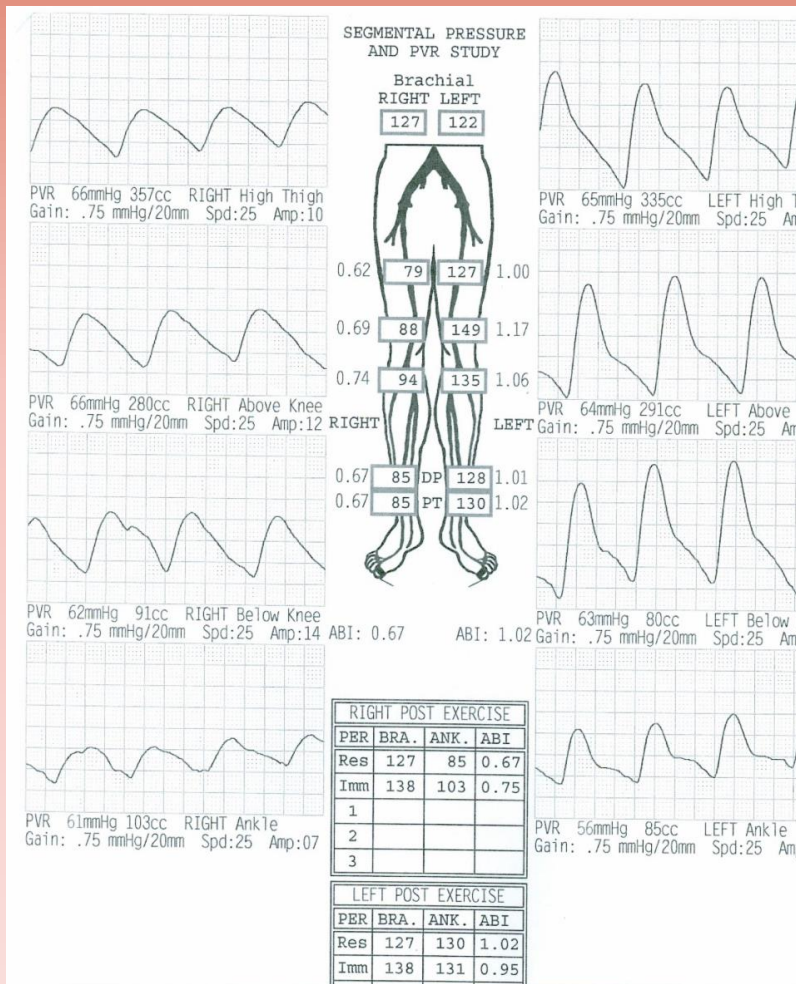
Measure Limb Volume related to each cardiac Cycle

Blood forced into leg in systole

Girth limb increases

Air in Cuff temporarily displaced

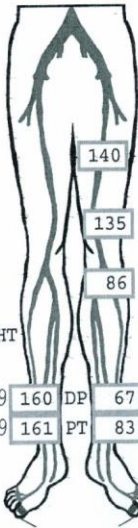
Interpretation



- Assessment of pulse contour amplitude
- Volume of blood coming into the cuff at that segment
- Proximal disease affect contour of PVR's distally
- PVR not affected by calcified artery walls

SEGMENTAL PRESSURE AND PVR STUDY

Brachial
RIGHT LEFT
135 133



PVR 0mmHg 0cc RIGHT High Thigh
Gain: .75 mmHg/20mm Spd:25 Amp:00

PVR 0mmHg 0cc RIGHT Above Knee
Gain: .75 mmHg/20mm Spd:25 Amp:00

PVR 61mmHg 69cc RIGHT Below Knee
Gain: .75 mmHg/20mm Spd:25 Amp:00

PVR 61mmHg 98cc RIGHT Ankle
Gain: .75 mmHg/20mm Spd:25 Amp:18

RIGHT

1.19 DP 160
1.19 PT 161
ABI: 1.19

LEFT

0.61 DP 67
0.61 PT 83
ABI: 0.61

RIGHT POST EXERCISE

PER	BRA.	ANK.	ABI
Res	135	161	1.19
Imm	174	183	1.05
1			
2			
3			

LEFT POST EXERCISE

PER	BRA.	ANK.	ABI
Res	135	83	0.61
Imm	174	22	0.13

PVR 66mmHg 622cc LEFT High Thigh
Gain: .75 mmHg/20mm Spd:25 Amp:1

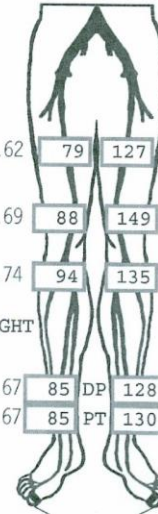
PVR 66mmHg 501cc LEFT Above Knee
Gain: .75 mmHg/20mm Spd:25 Amp:1

PVR 61mmHg 85cc LEFT Below Knee
Gain: .75 mmHg/20mm Spd:25 Amp:

PVR 60mmHg 93cc LEFT Ankle
Gain: .75 mmHg/20mm Spd:25 Amp:

SEGMENTAL PRESSURE AND PVR STUDY

Brachial
RIGHT LEFT
127 122



PVR 66mmHg 357cc RIGHT High Thigh
Gain: .75 mmHg/20mm Spd:25 Amp:10

PVR 66mmHg 280cc RIGHT Above Knee
Gain: .75 mmHg/20mm Spd:25 Amp:12

PVR 62mmHg 91cc RIGHT Below Knee
Gain: .75 mmHg/20mm Spd:25 Amp:14

PVR 61mmHg 103cc RIGHT Ankle
Gain: .75 mmHg/20mm Spd:25 Amp:07

RIGHT

0.67 DP 85
0.67 PT 85
ABI: 0.67

LEFT

1.02 DP 128
1.02 PT 130
ABI: 1.02

RIGHT POST EXERCISE

PER	BRA.	ANK.	ABI
Res	127	85	0.67
Imm	138	103	0.75
1			
2			
3			

LEFT POST EXERCISE

PER	BRA.	ANK.	ABI
Res	127	130	1.02
Imm	138	131	0.95

PVR 65mmHg 335cc LEFT High T
Gain: .75 mmHg/20mm Spd:25 Am

PVR 64mmHg 291cc LEFT Above
Gain: .75 mmHg/20mm Spd:25 Am

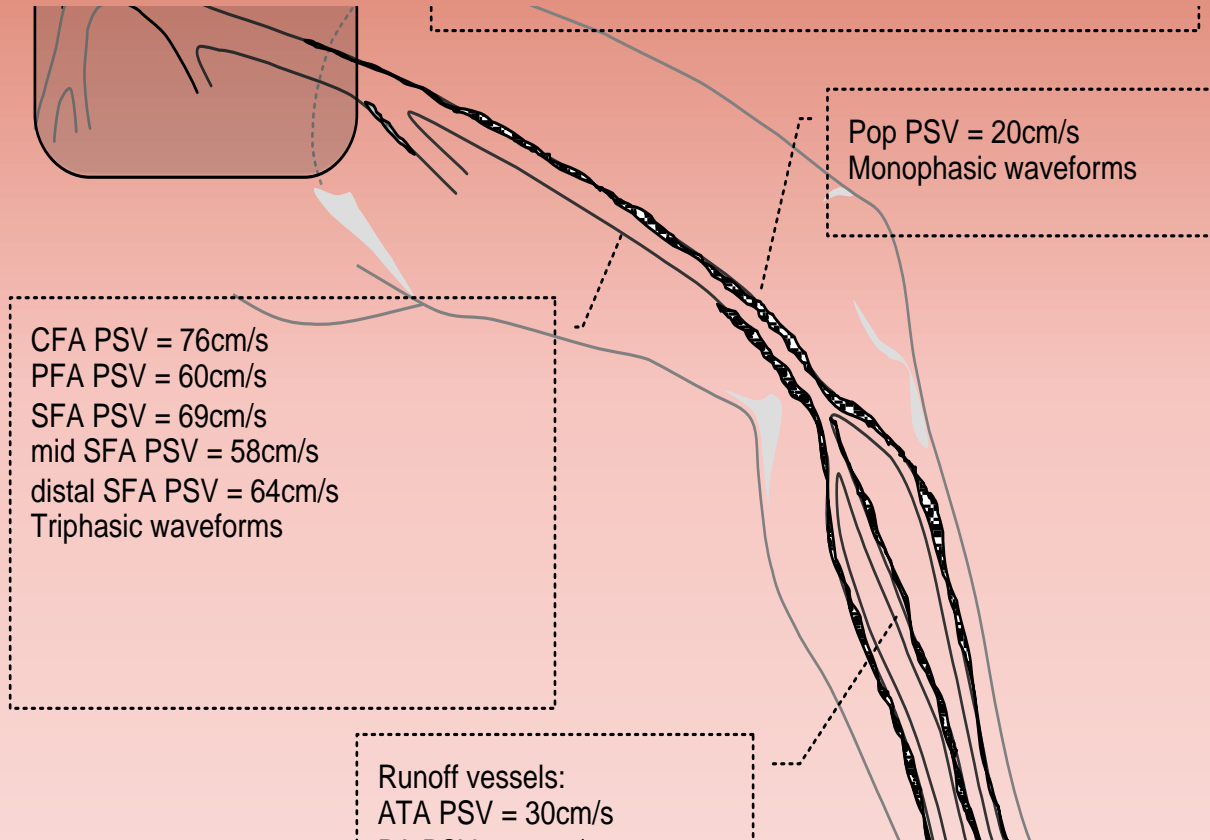
PVR 63mmHg 80cc LEFT Below
Gain: .75 mmHg/20mm Spd:25 Am

PVR 56mmHg 85cc LEFT Ankle
Gain: .75 mmHg/20mm Spd:25 Amp

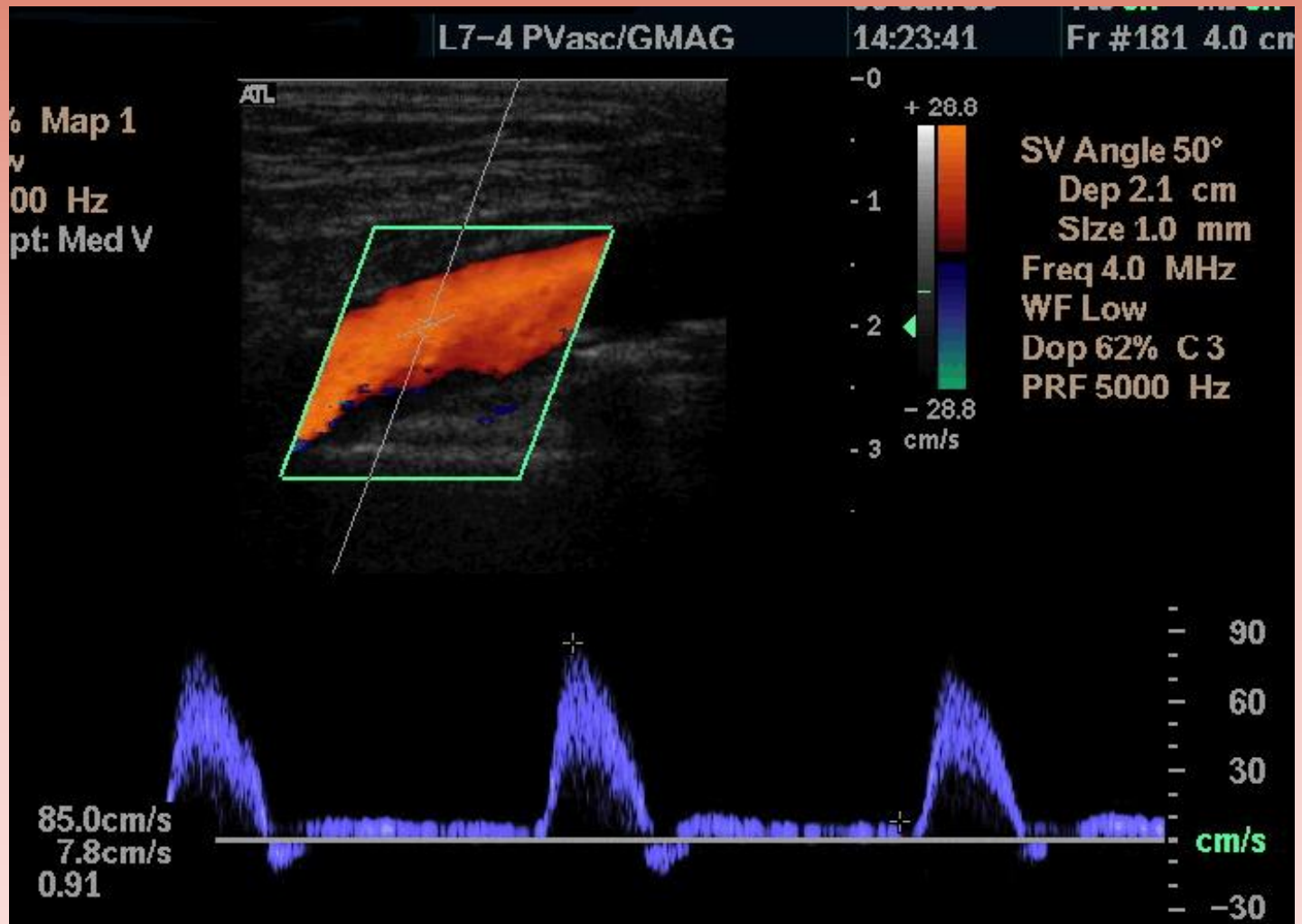
Investigations

- Duplex
- CTA
- DSA

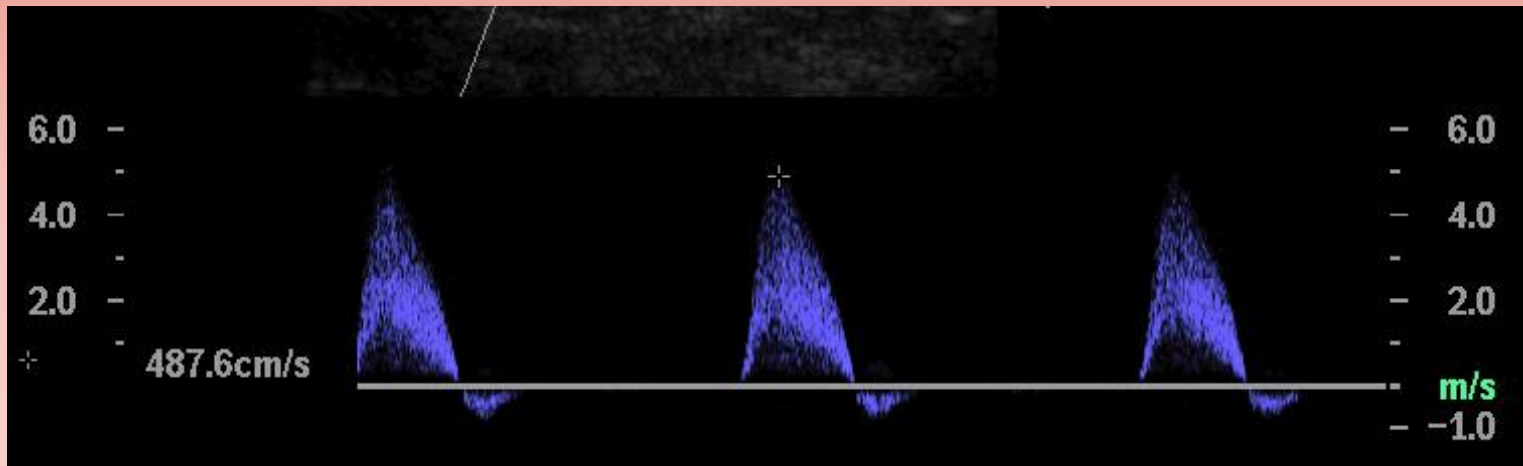
Report of LL Shows Runoff



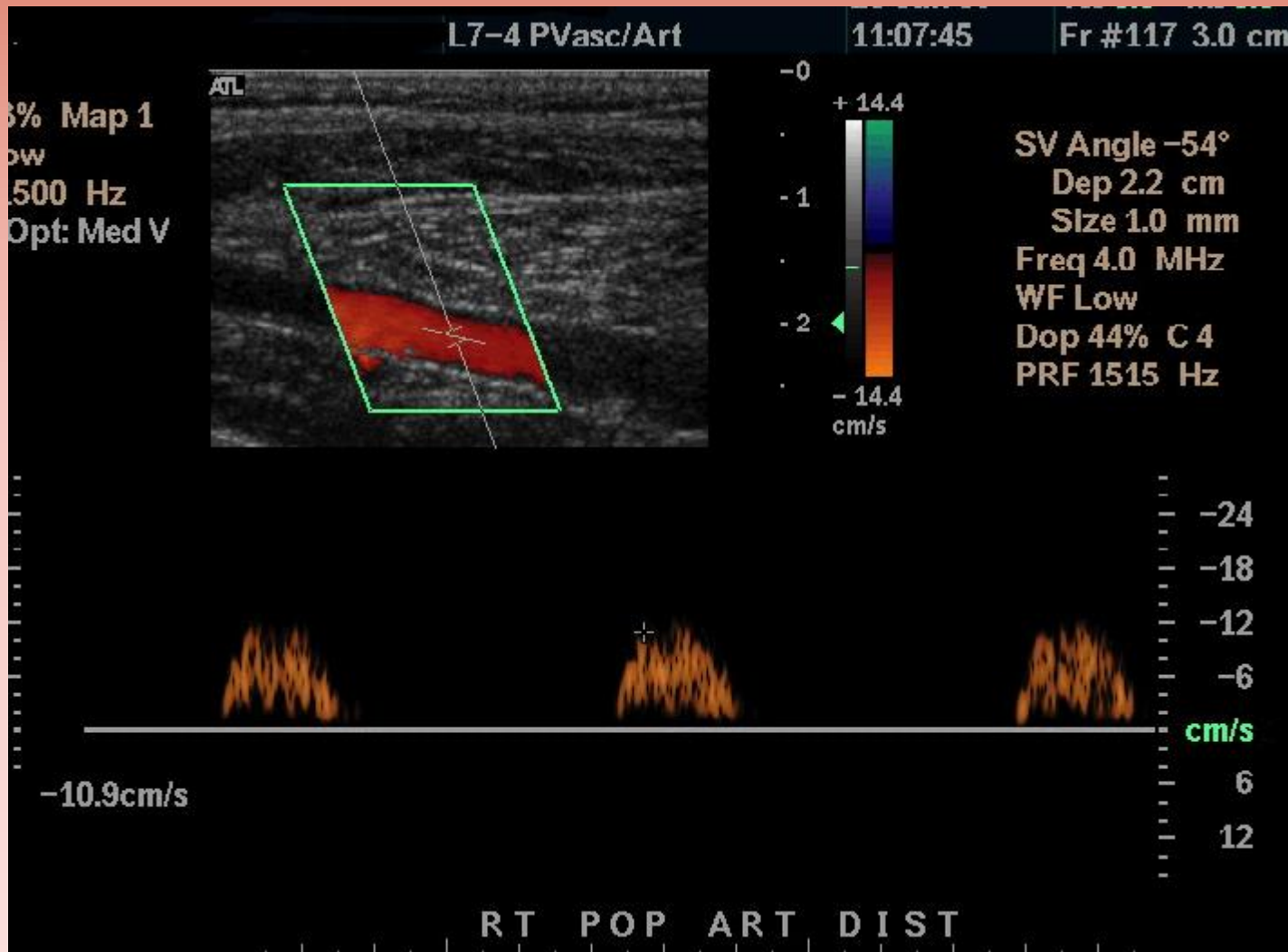
Tri Phasic waveform



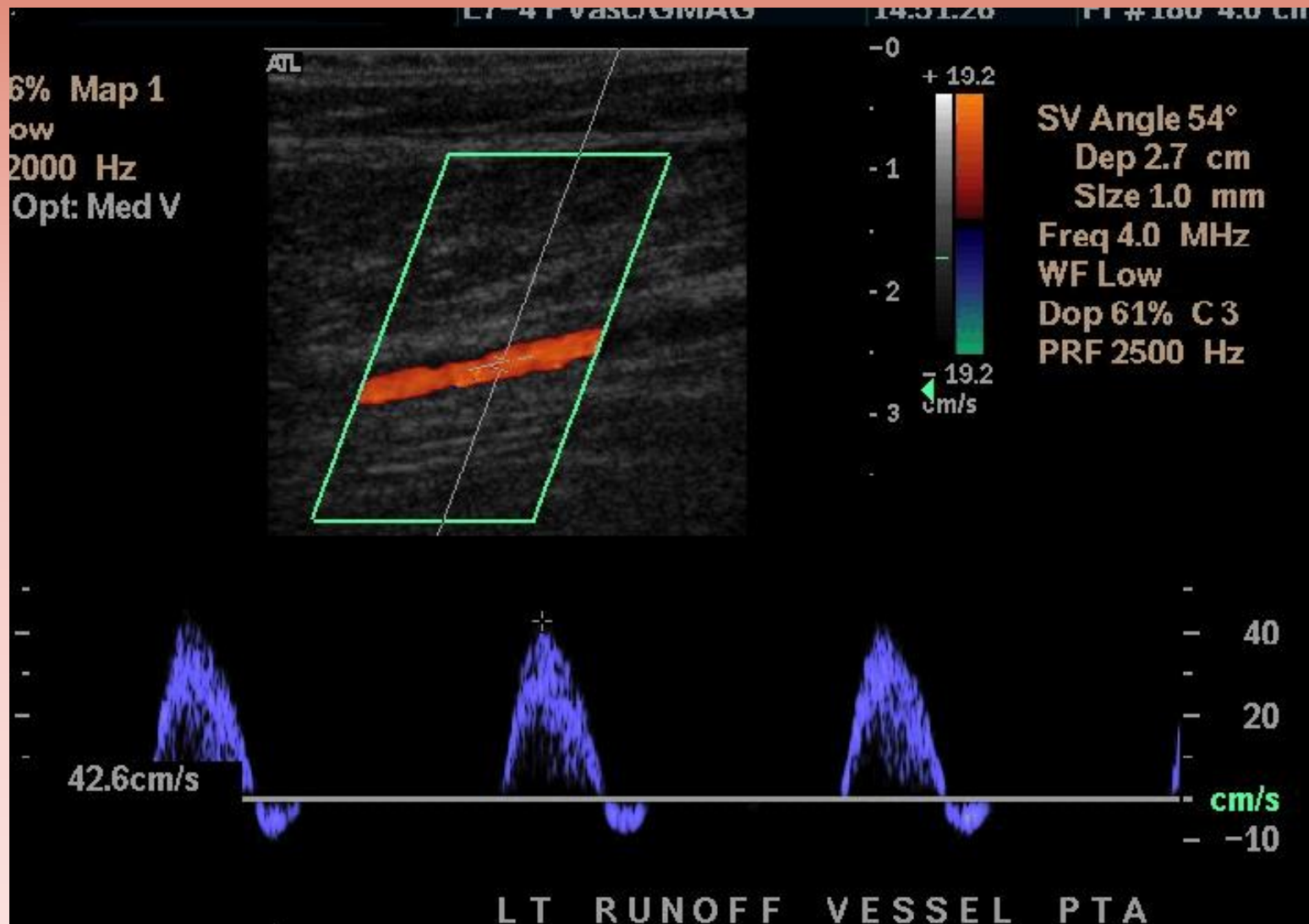
Stenosis > 75%



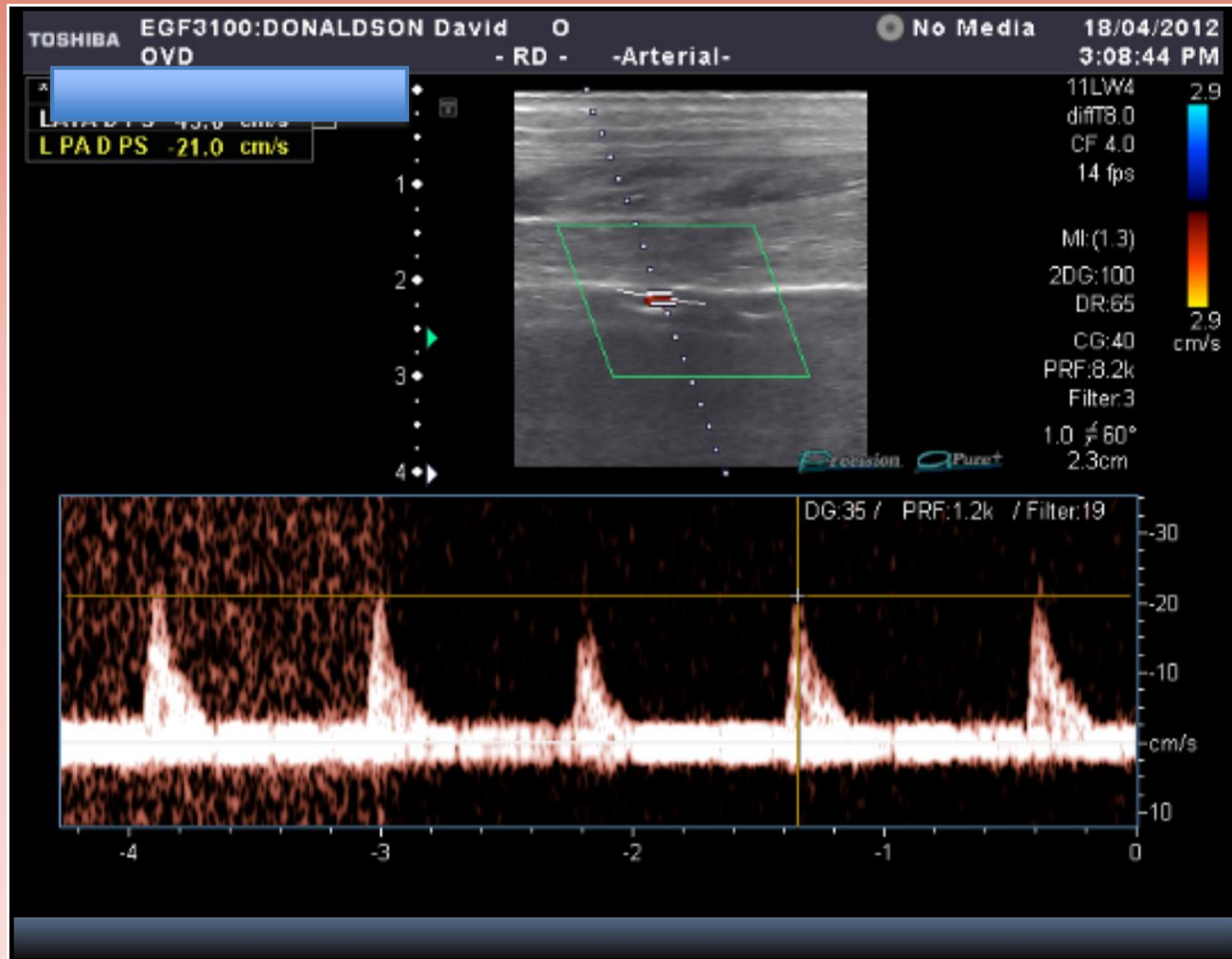
Monophasic waveform



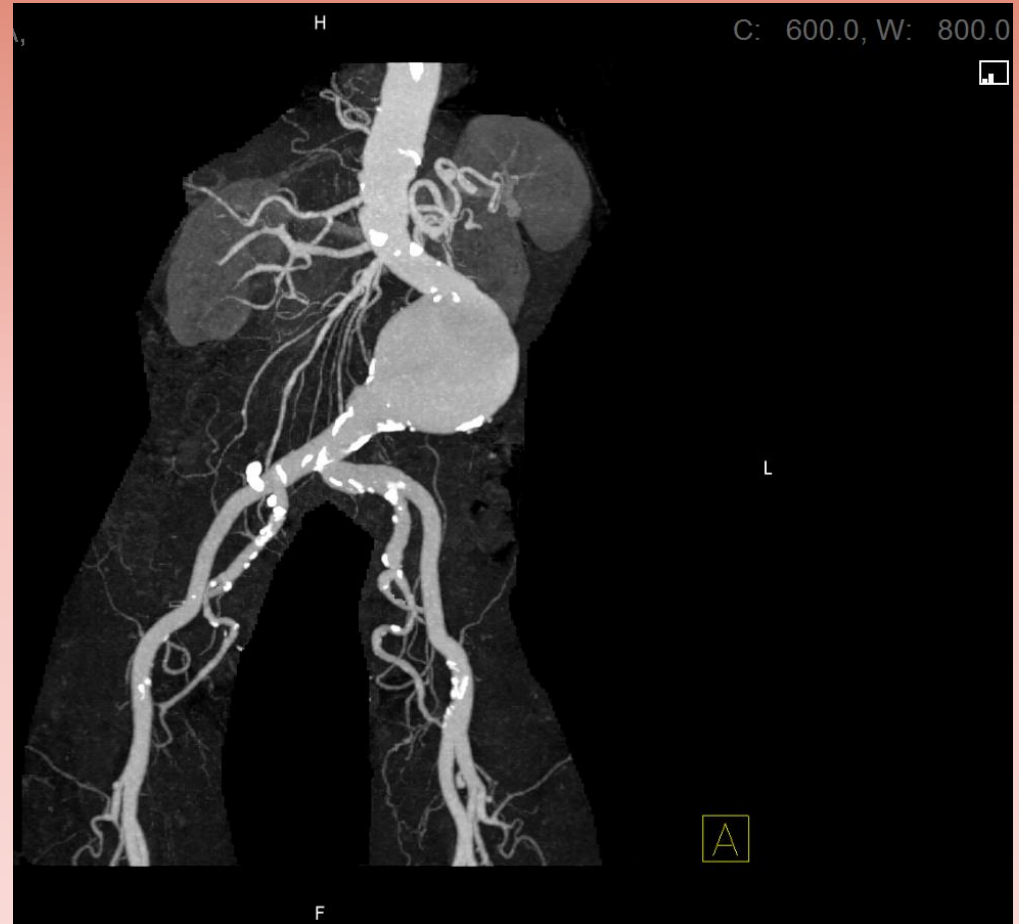
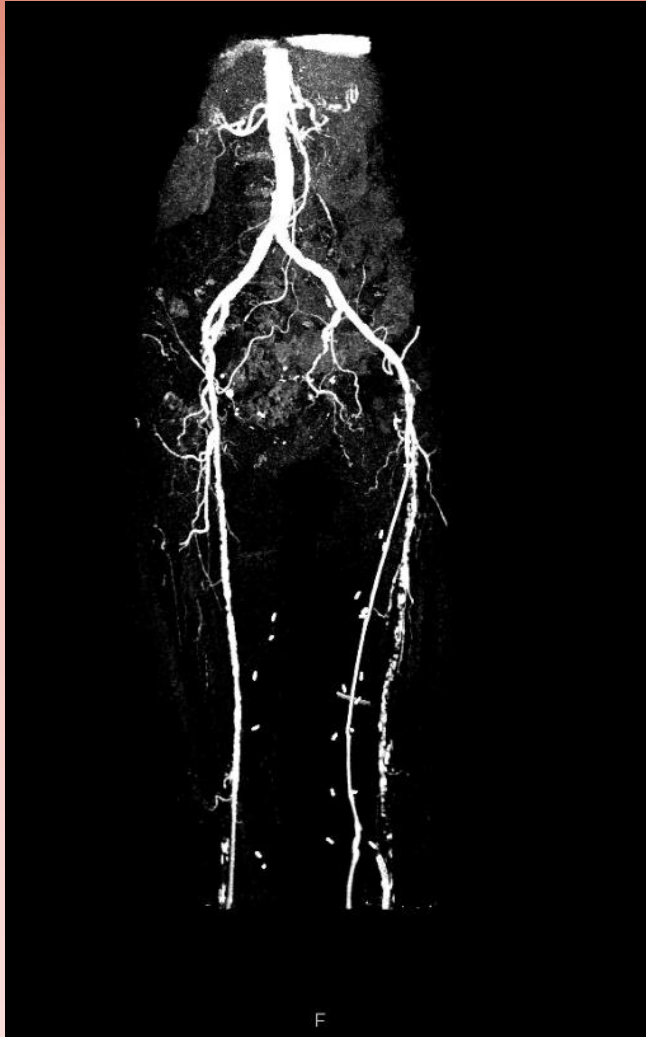
Good caliber runoff No Calcification



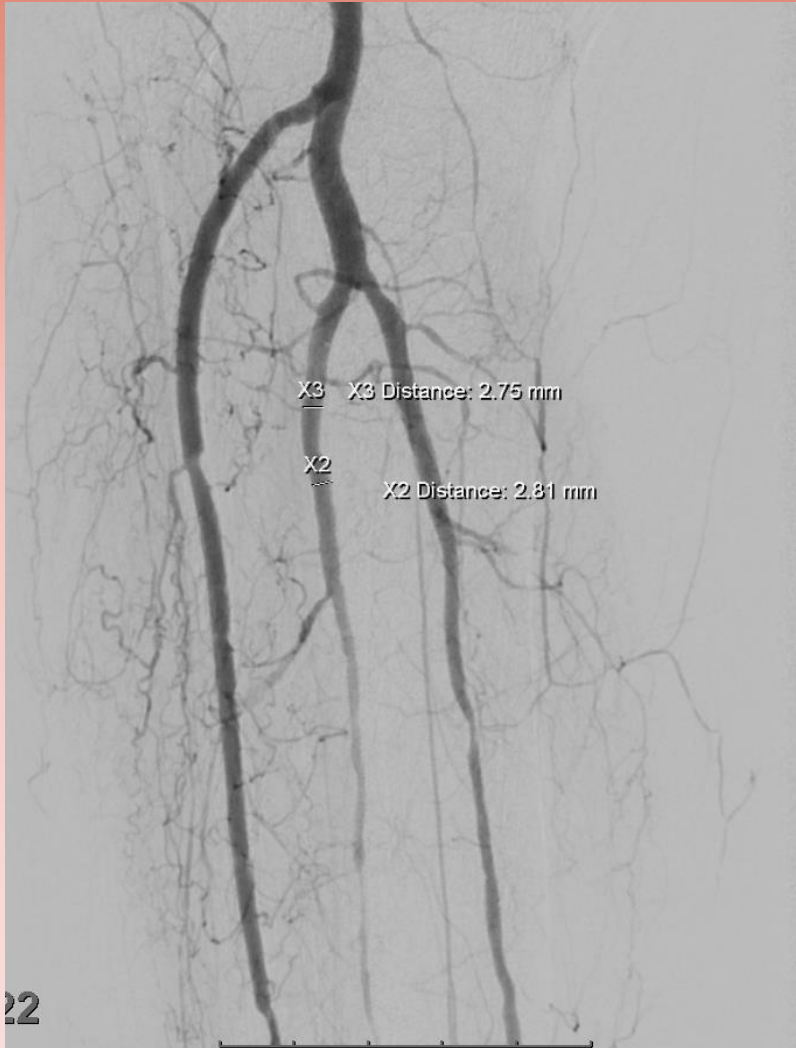
Calcified run off



CT angiogram

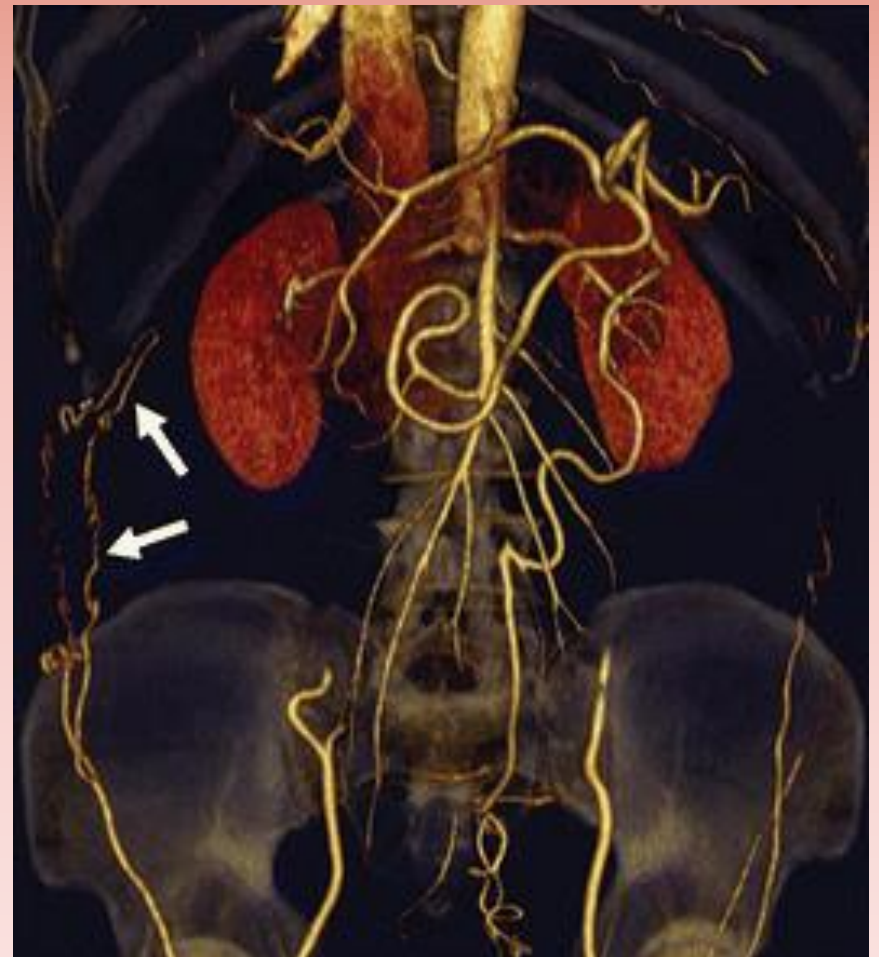


Digital subtraction angiography (DSA)



Lower Limbs - claudication

- Conservative management:
- Stop smoking
- Walking
- Statins
- Control diabetes
- Control hypertension
- Aspirin

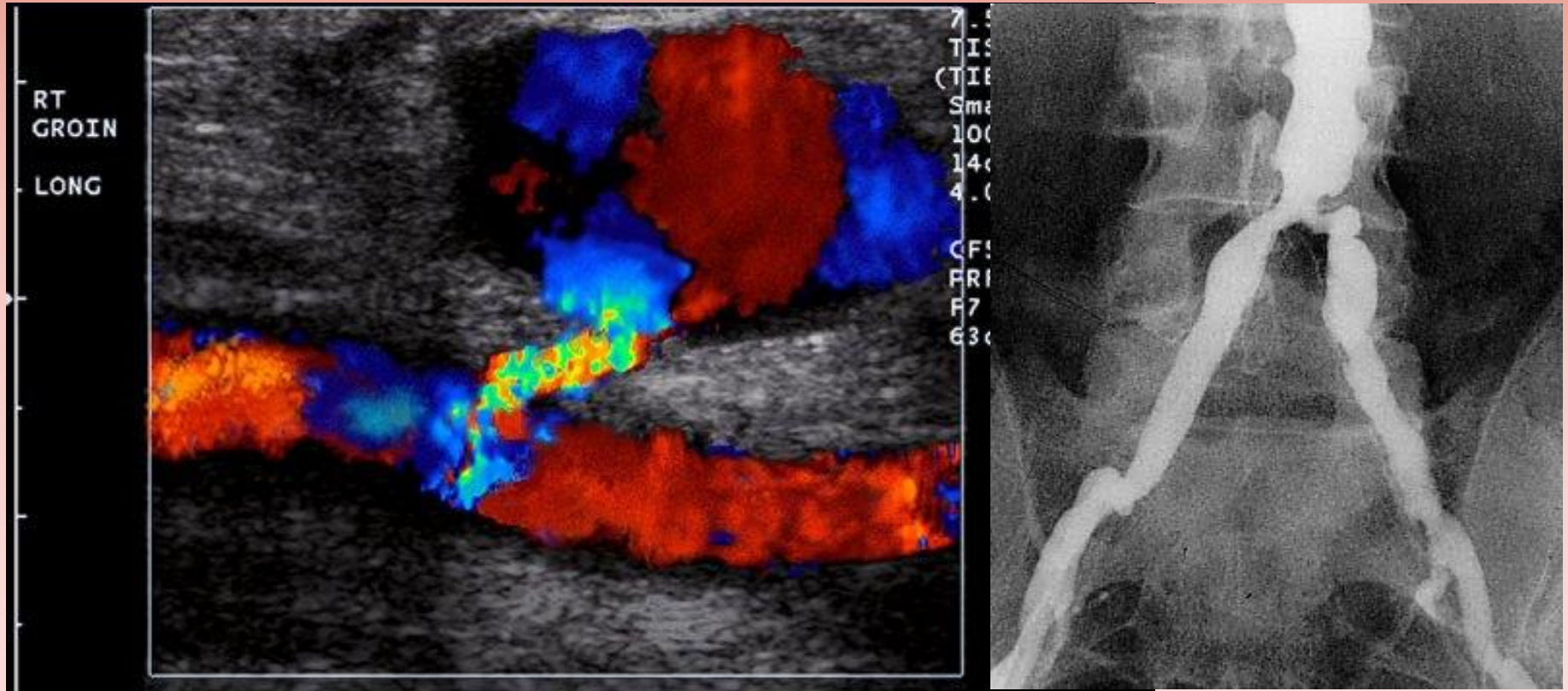


Critical foot ischaemia

- Deteriorating claudication
- Nocturnal rest pain
- Ulceration or gangrene
- ABI usually <0.5

Lower Limb Imaging

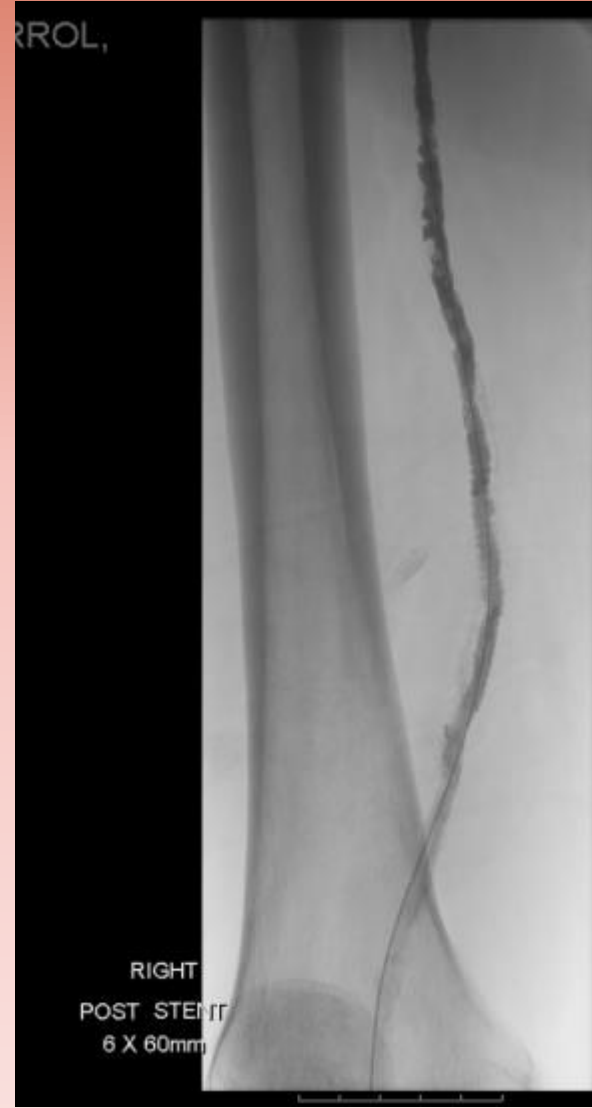
- Ultrasound / angiogram to assess the length of the lesion



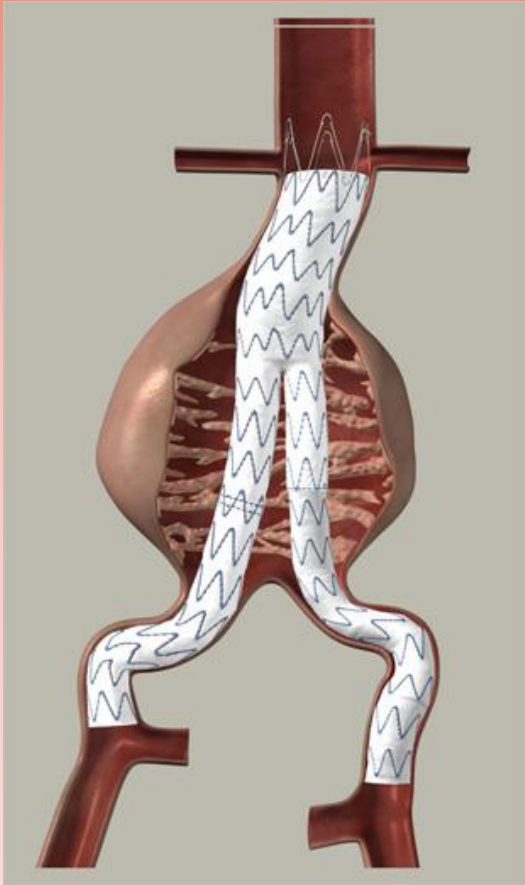
Angioplasty



Stenting



Stentgraft



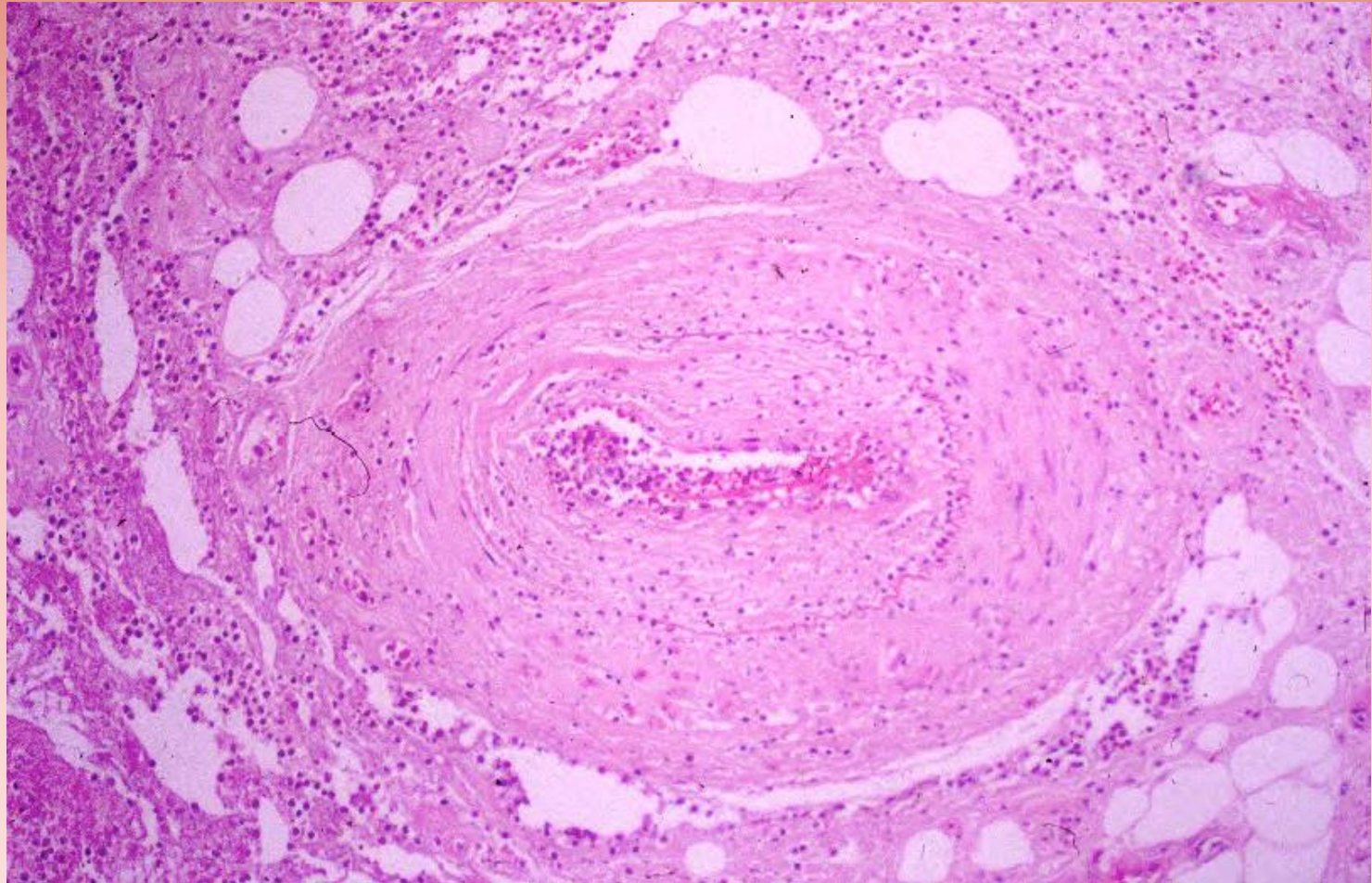
Lower Limbs - Surgery

- Bypass
 - rest pain
 - ischaemic ulcers
 - gangrene

- Amputation



Septic arteritis and thrombosis – Foot Attack!



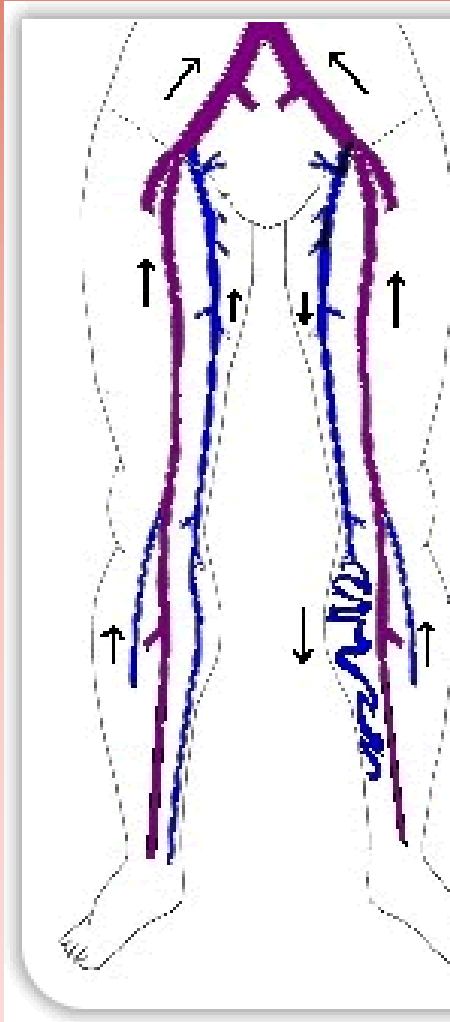
Distal arterial disease



Questions

Venous disease

Venous disease



Superficial

Deep

Obstruction

Incompetence



Superficial

Deep

Obstruction

Incompetence

Varicose veins

- Simple
- Associated with ulcers or skin changes



Simple varicose veins

- Grade 2 compression
- Funding for intervention restricted
- Please refer if:
 - Bleeding (urgent)
 - Skin changes
 - Ulceration
 - Superficial thrombophlebitis

Varicose veins with pre ulcer skin changes

- Grade 2 compression stockings
- Venous duplex
 - Exclude deep system pathology
 - Identify incompetent veins
- Treatment:
 - Endovenous ablation
 - Sclerotherapy
 - Open surgery



Venous ulcer

- Exclude arterial component
- Compression bandage
- If resistant
 - Biopsy
 - Ulcer excision
 - Skin grafting
- Once healed
 - Assessment for varicose veins treatment







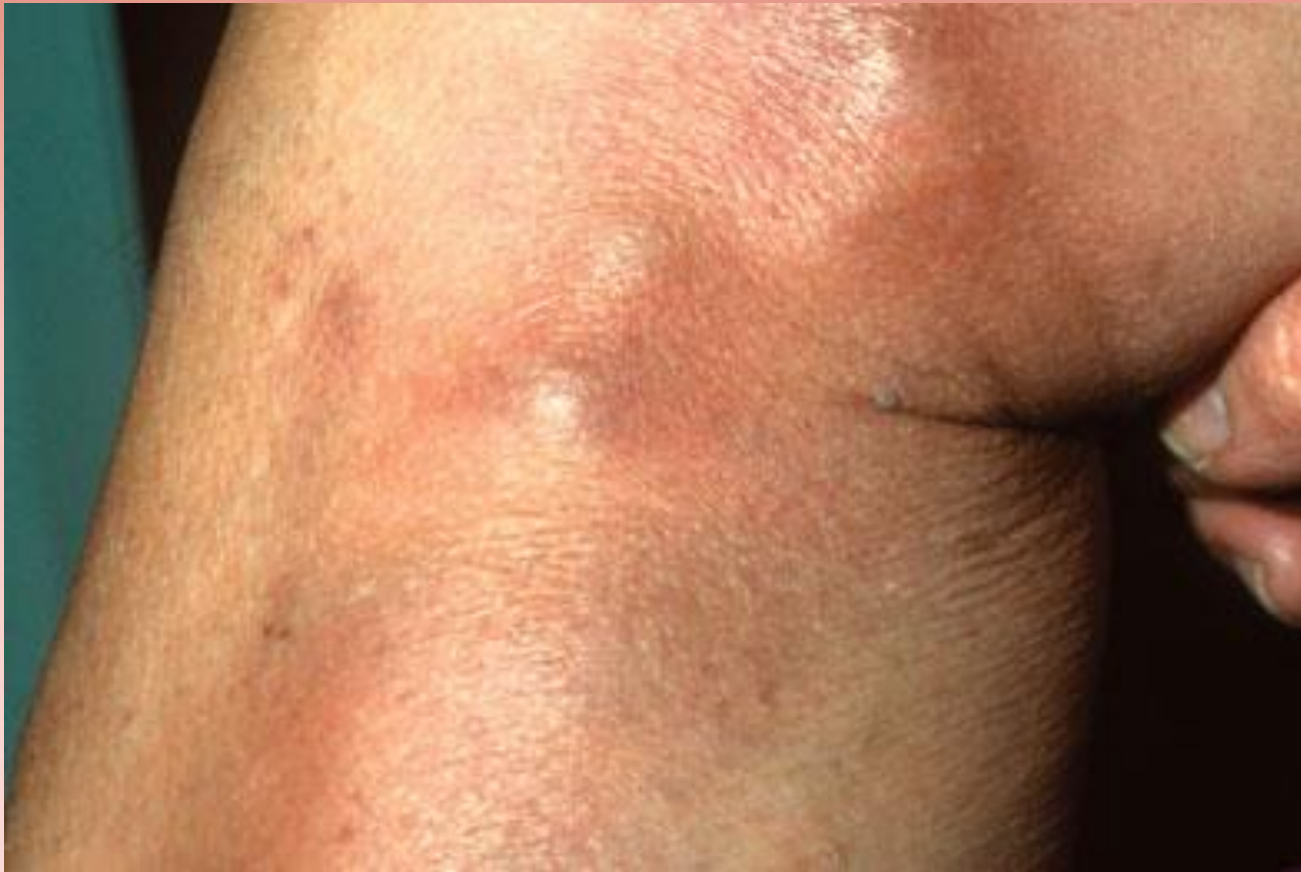
Superficial

Deep

Obstruction

Incompetence

Superficial thrombophlebitis



Superficial

Deep

Obstruction

Incompetence

DVT

- Risk factors
- Calf versus proximal DVT
- Acute management
 - Site
 - Outflow
 - Underlying pathology
 - Long term sequelae



Questions