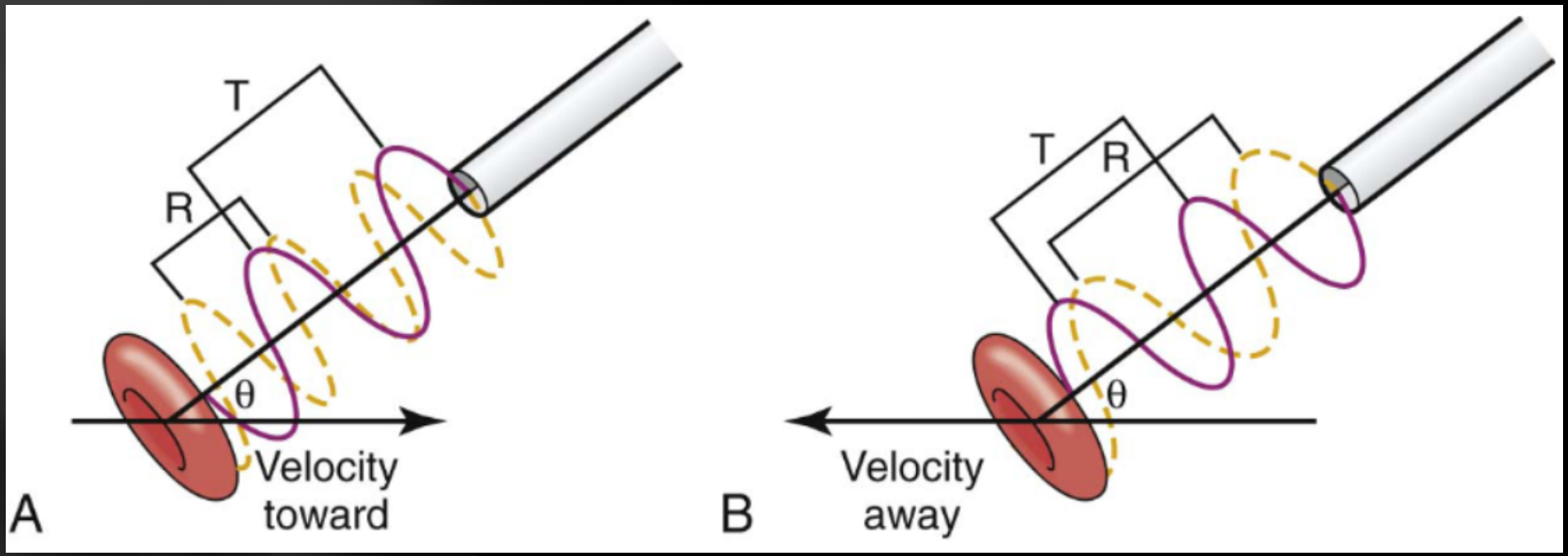
VASCULAR INVESTIGATIONS

Abdulmajeed Altoijry, MD, MSc, FRCSC
Assistant Professor & Consultant Vascular Surgeon
King Saud University Medical City
King Saud University

- Sensitive:
- Operator dependent:
- Toxic:
- Therapeutic:

HANDHELD DOPPLER

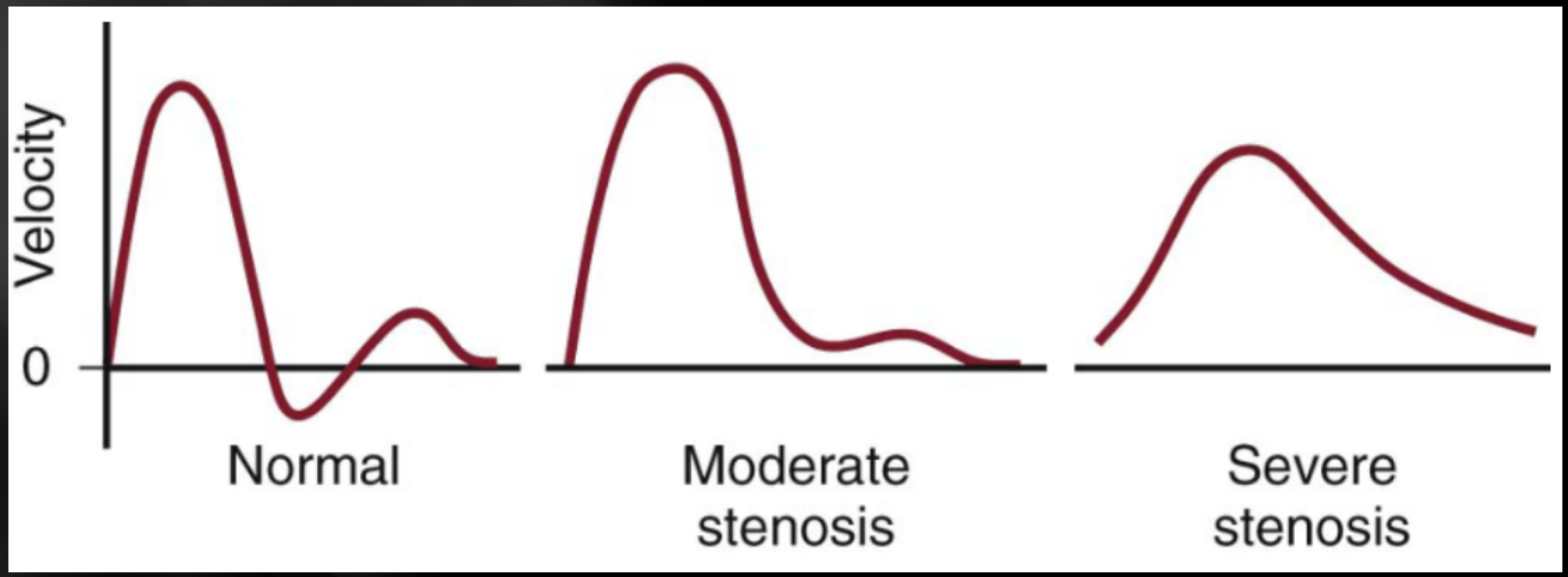
HANDHELD DOPPLER

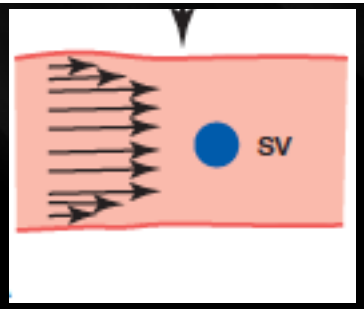


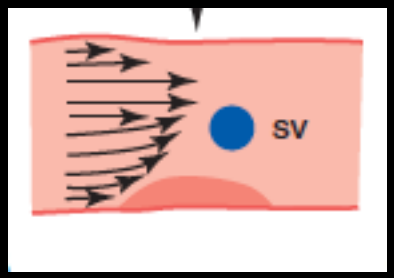
PPT Note:

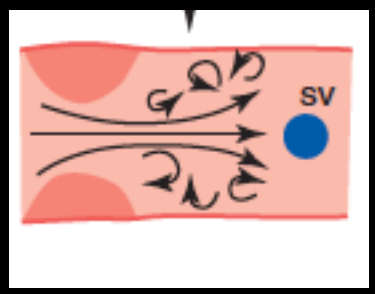
The Doppler device compares the frequency of backscattered sound from moving red blood cells with the transmitting frequency to determine the frequency shift, which is proportional to the speed of the flowing blood, the transmitting frequency, and the cosine of the Doppler angle, θ. The drawing shows a Doppler probe transmitting ultrasound at a wavelength T to a red blood cell moving in a direction indicated by an arrow. The red cell is moving toward the probe in (A) and away from the probe in (B). The angle between the ultrasound beam and the direction of red cell velocity is given by θ. The frequency of the ultrasound that is transmitted is the same in both cases (red line). The ultrasound signal that is received (yellow line) has a shorter wavelength (R) in (A) and a longer wavelength in (B).

HANDHELD DOPPLER

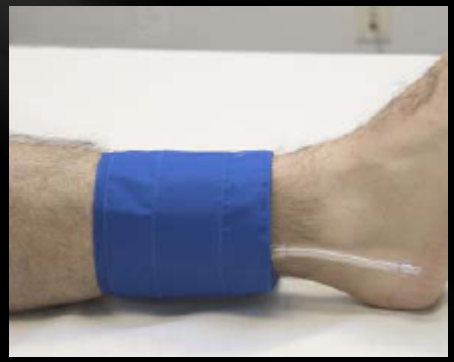




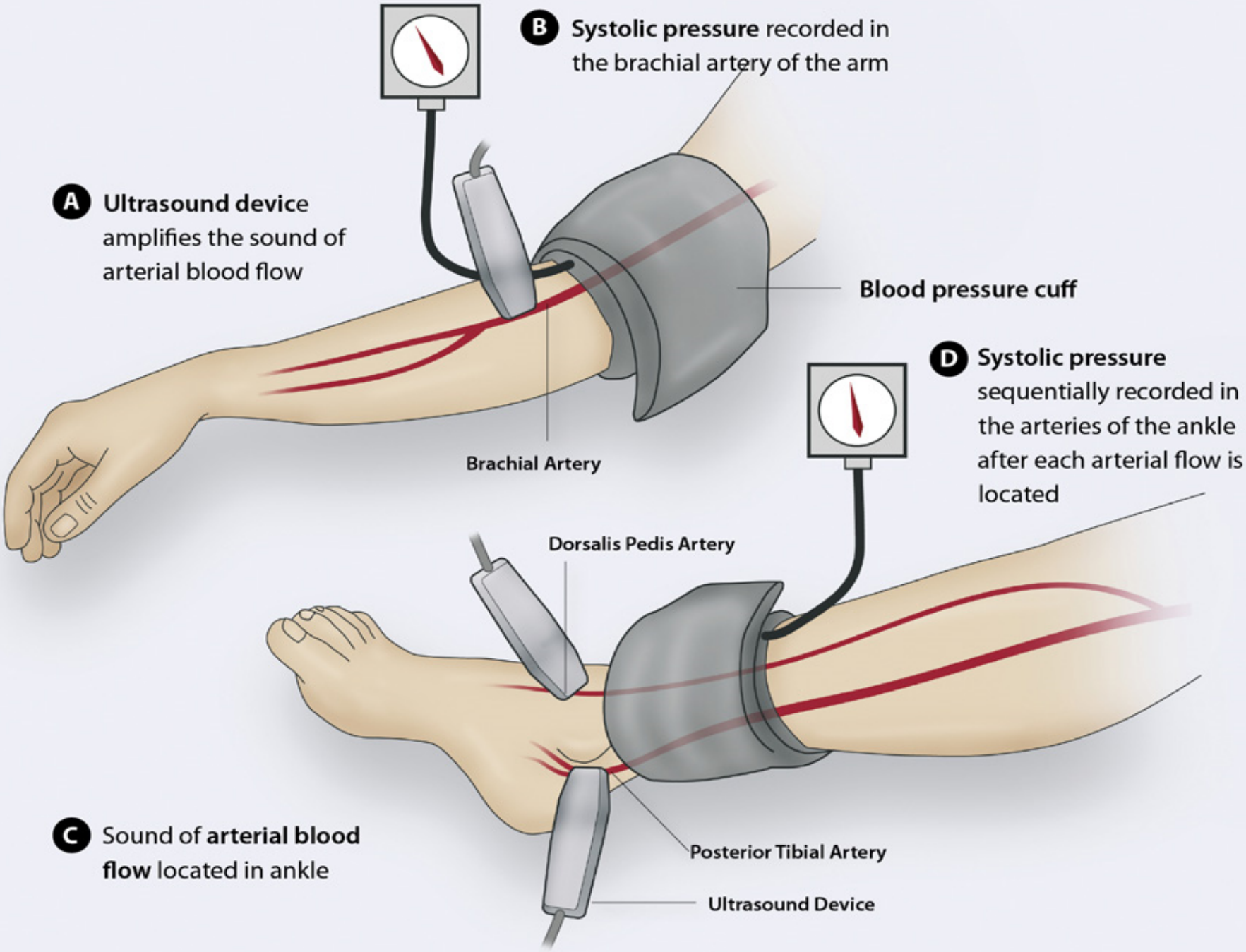




ANKLE BRACHIAL INDEX



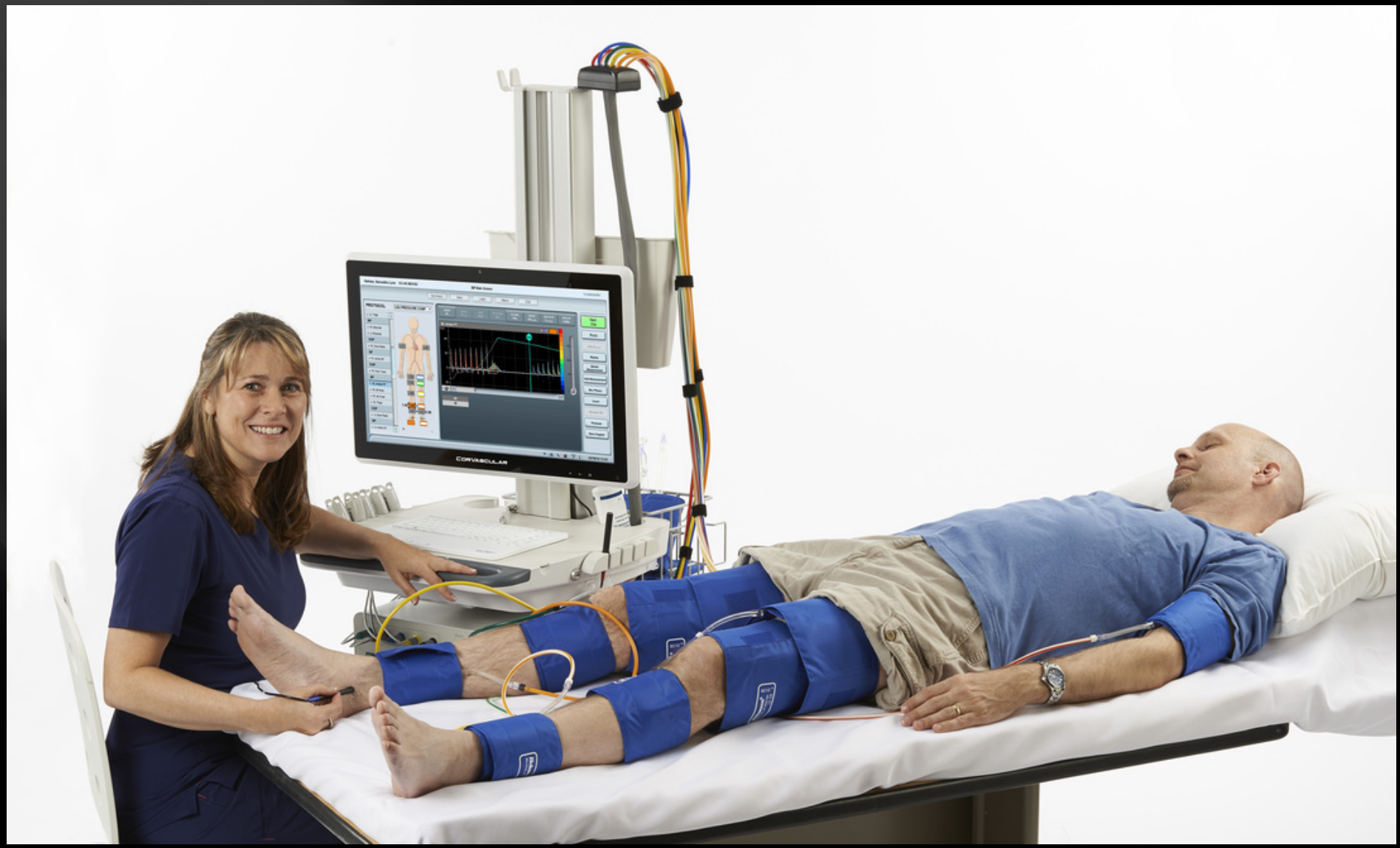
ABI= ANKLE SBP(PT OR DP)/HIGHEST ARM SBP

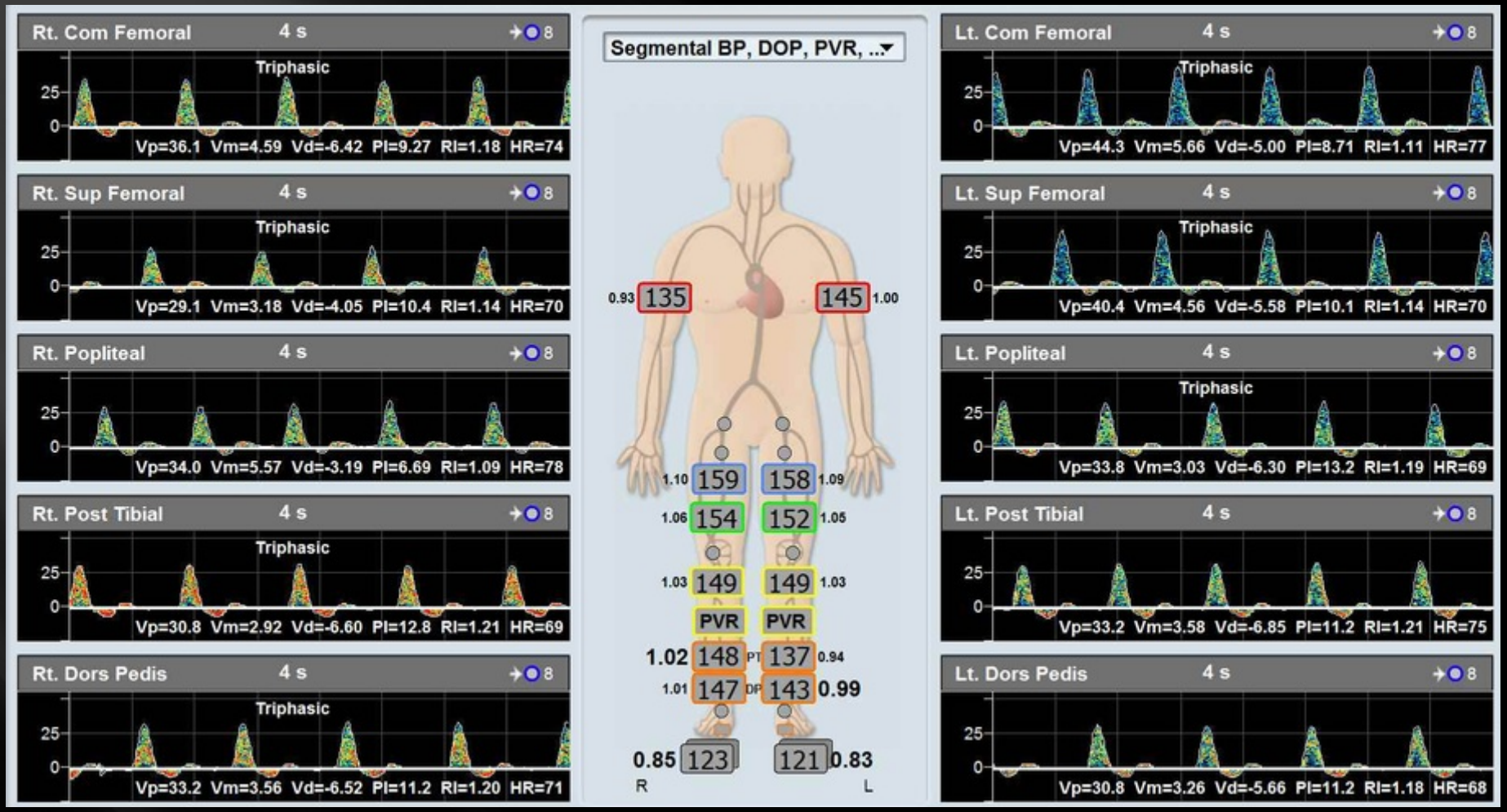

B Systolic pressure recorded in the brachial artery of the arm
A Ultrasound device amplifies the sound of arterial blood flow
Blood pressure cuff
Brachial Artery
D Systolic pressure sequentially recorded in the arteries of the ankle after each arterial flow is located
Dorsalis Pedis Artery
C Sound of arterial blood flow located in ankle
Posterior Tibial Artery
Ultrasound Device

Interpretation of ABI	
>1.30	Noncompressible
1.00–1.29	Normal
0.91–0.99	Borderline (equivocal)
0.41–0.90	Mild to moderate peripheral arterial disease
0.00–0.40	Severe peripheral arterial disease

The ABI has limited use in evaluating calcified vessels that are not compressible as in Diabetics

SEGMENTAL PRESSURE



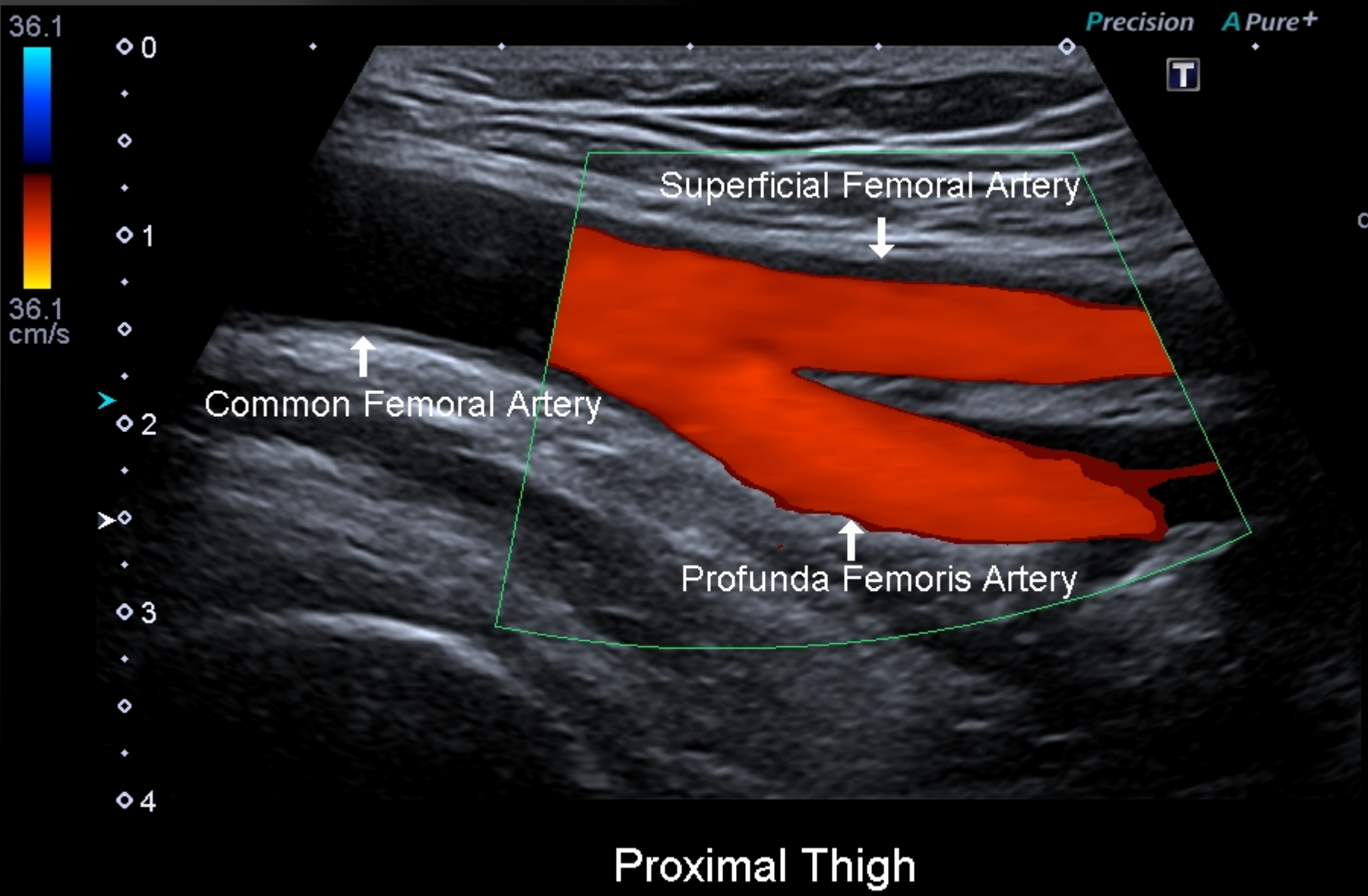

Rt. Com Femoral 4 s
Triphasic
Vp=36.1 Vm=4.59 Vd=-6.42 PI=9.27 RI=1.18 HR=74
Rt. Sup Femoral 4 s
Triphasic
Vp=29.1 Vm=3.18 Vd=-4.05 PI=10.4 RI=1.14 HR=70
Rt. Popliteal 4 s
Vp=34.0 Vm=5.57 Vd=-3.19 PI=6.69 RI=1.09 HR=78
Rt. Post Tibial 4 s
Triphasic
Vp=30.8 Vm=2.92 Vd=-6.60 PI=12.8 RI=1.21 HR=69
Rt. Dors Pedis 4 s
Triphasic
Vp=33.2 Vm=3.56 Vd=-6.52 PI=11.2 RI=1.20 HR=71
Segmental BP, DOP, PVR, ...
0.93 135
145 1.00
1.10 159
158 1.09
1.06 154
152 1.05
1.03 149
149 1.03
PVR
PVR
1.02 148 PT
137 0.94
1.01 147 DP
143 0.99
0.85 123
121 0.83
R
L
Lt. Com Femoral 4 s
Triphasic
Vp=44.3 Vm=5.66 Vd=-5.00 PI=8.71 RI=1.11 HR=77
Lt. Sup Femoral 4 s
Triphasic
Vp=40.4 Vm=4.56 Vd=-5.58 PI=10.1 RI=1.14 HR=70
Lt. Popliteal 4 s
Triphasic
Vp=33.8 Vm=3.03 Vd=-6.30 PI=13.2 RI=1.19 HR=69
Lt. Post Tibial 4 s
Vp=33.2 Vm=3.58 Vd=-6.85 PI=11.2 RI=1.21 HR=75
Lt. Dors Pedis 4 s
Vp=30.8 Vm=3.26 Vd=-5.66 PI=11.2 RI=1.18 HR=68

- Sensitive: ✓
- Operator dependent: ✓✓✓
- Toxic: ✗
- Therapeutic: ✗

DUPLEX ULTRASOUND

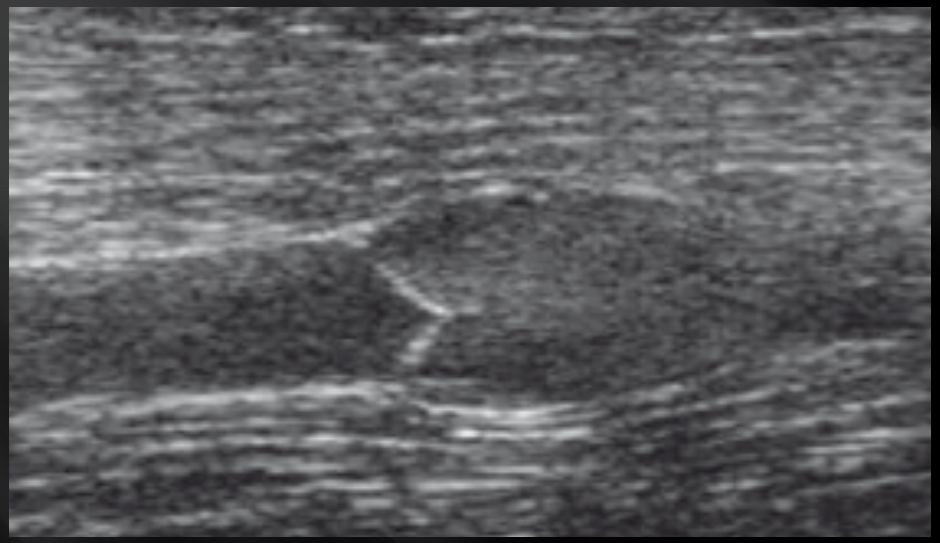
B - mode + Color Doppler

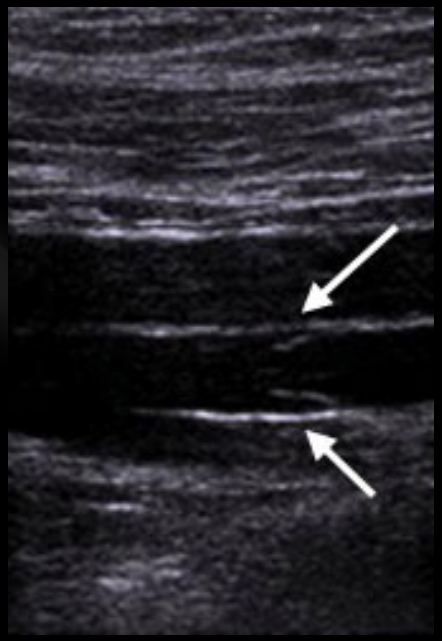
DUPLEX ULTRASOUND

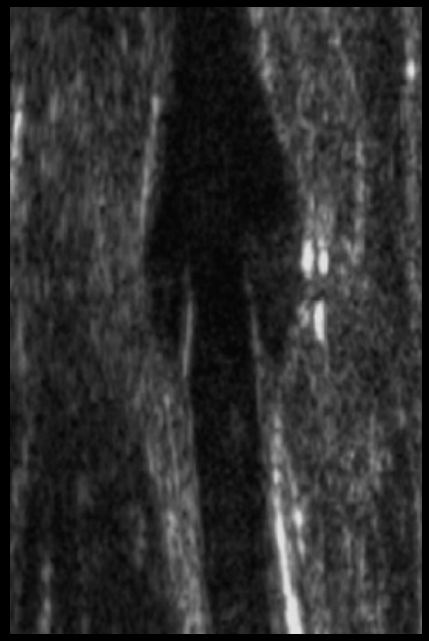


Proximal Thigh

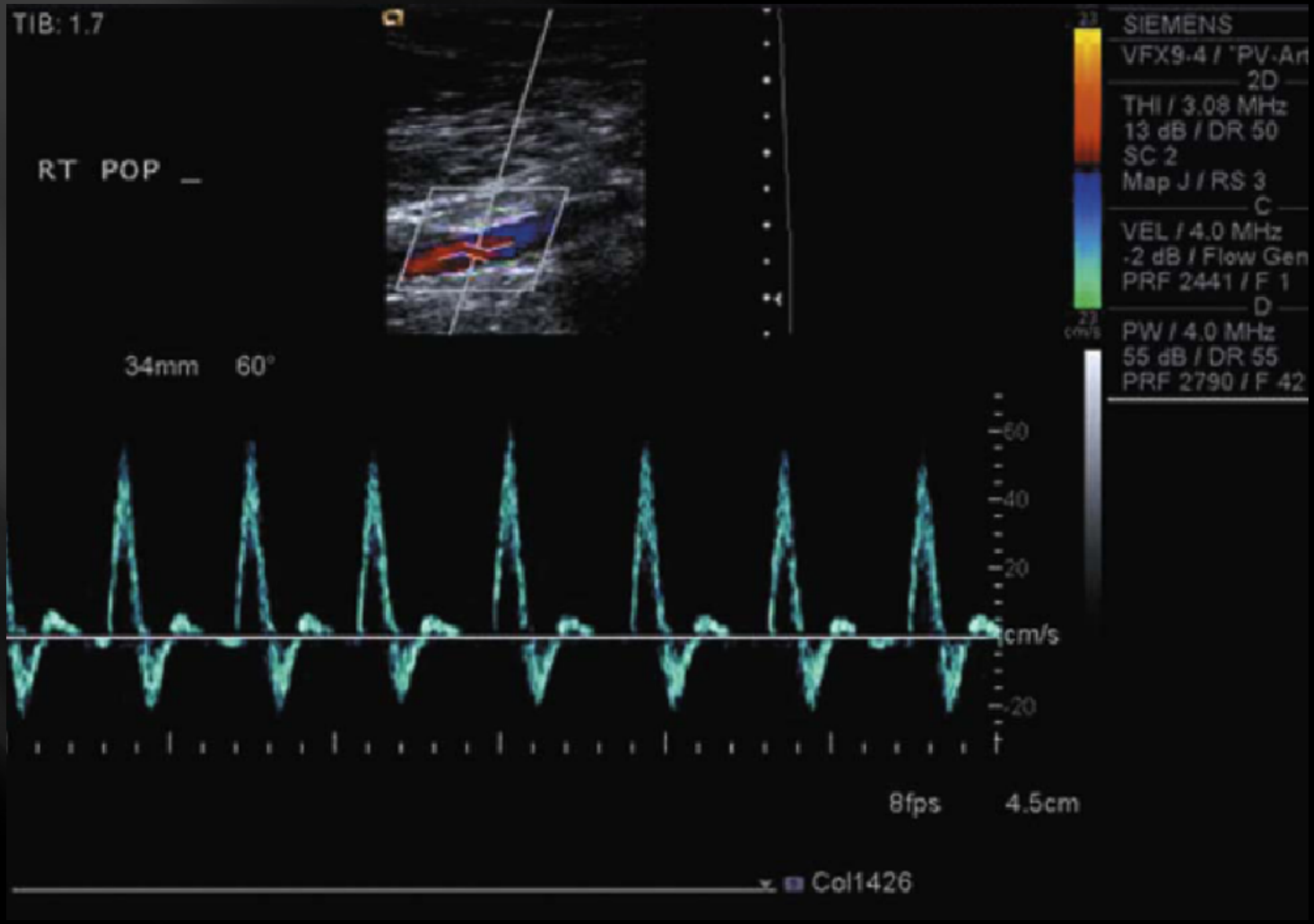
DUPLEX ULTRASOUND



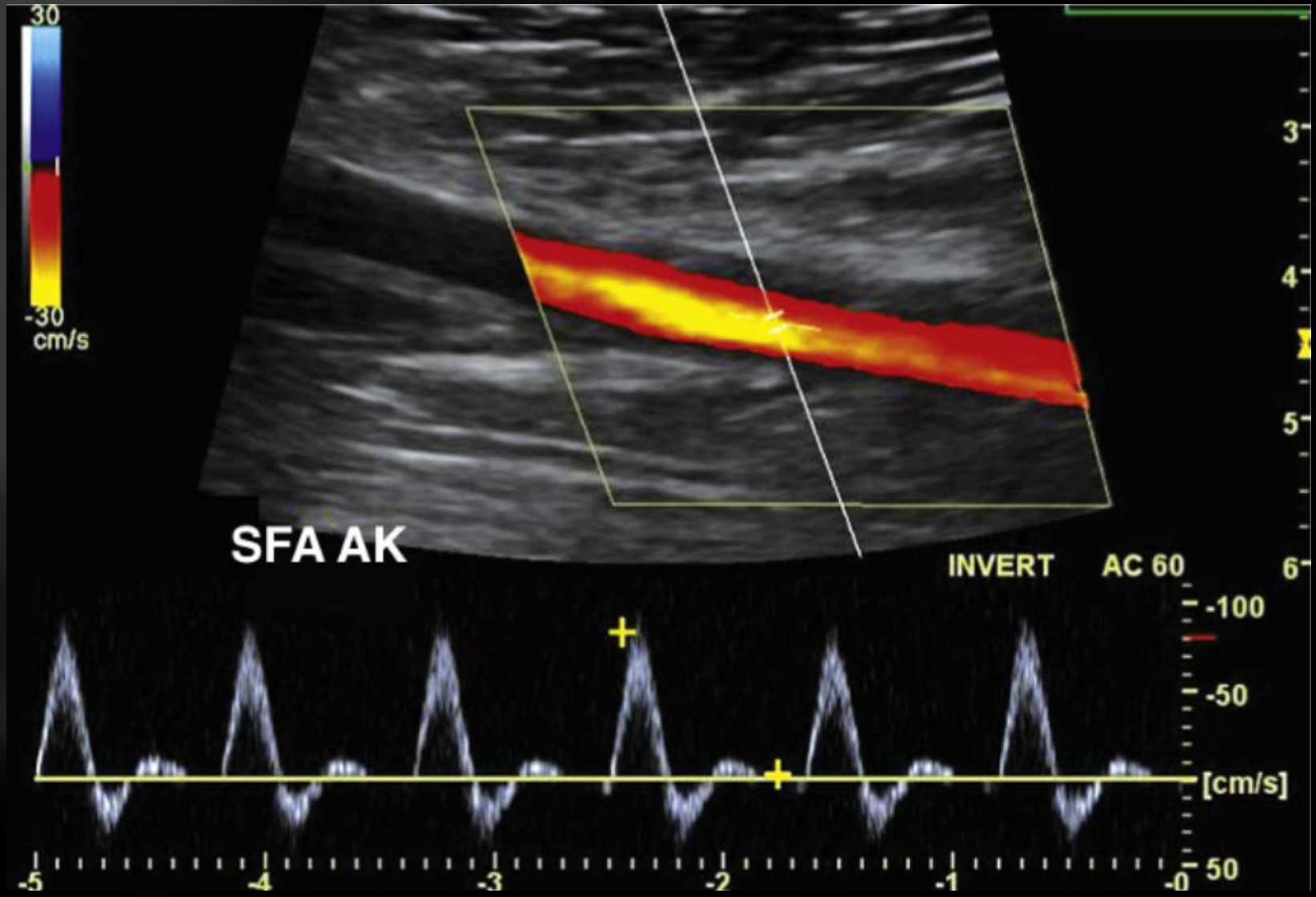




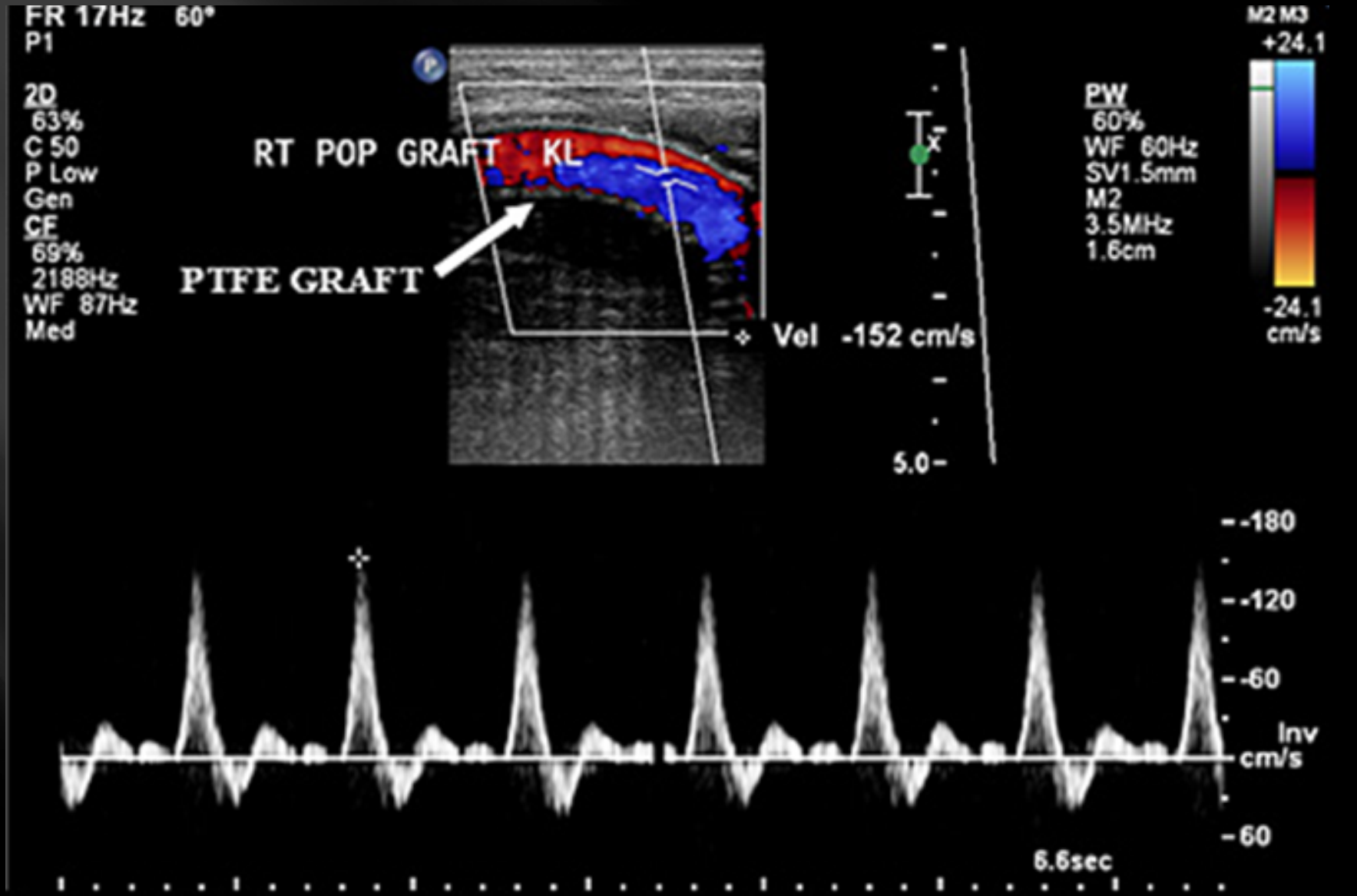
DUPLEX ULTRASOUND



DUPLEX ULTRASOUND



DUPLEX ULTRASOUND



- Sensitive: ✓✓✓
- Operator dependent: ✓✓✓
- Toxic: ✗
- Therapeutic: ✗

CT ANGIOGRAM

CT ANGIOGRAM

CT ANGIOGRAM

CT ANGIOGRAM

CT ANGIOGRAM

CT ANGIOGRAM

- Sensitive: ✓✓✓✓✓
- Operator dependent: ✗
- Toxic: ✓✓✓
- Therapeutic: ✗

MR ANGIOGRAM

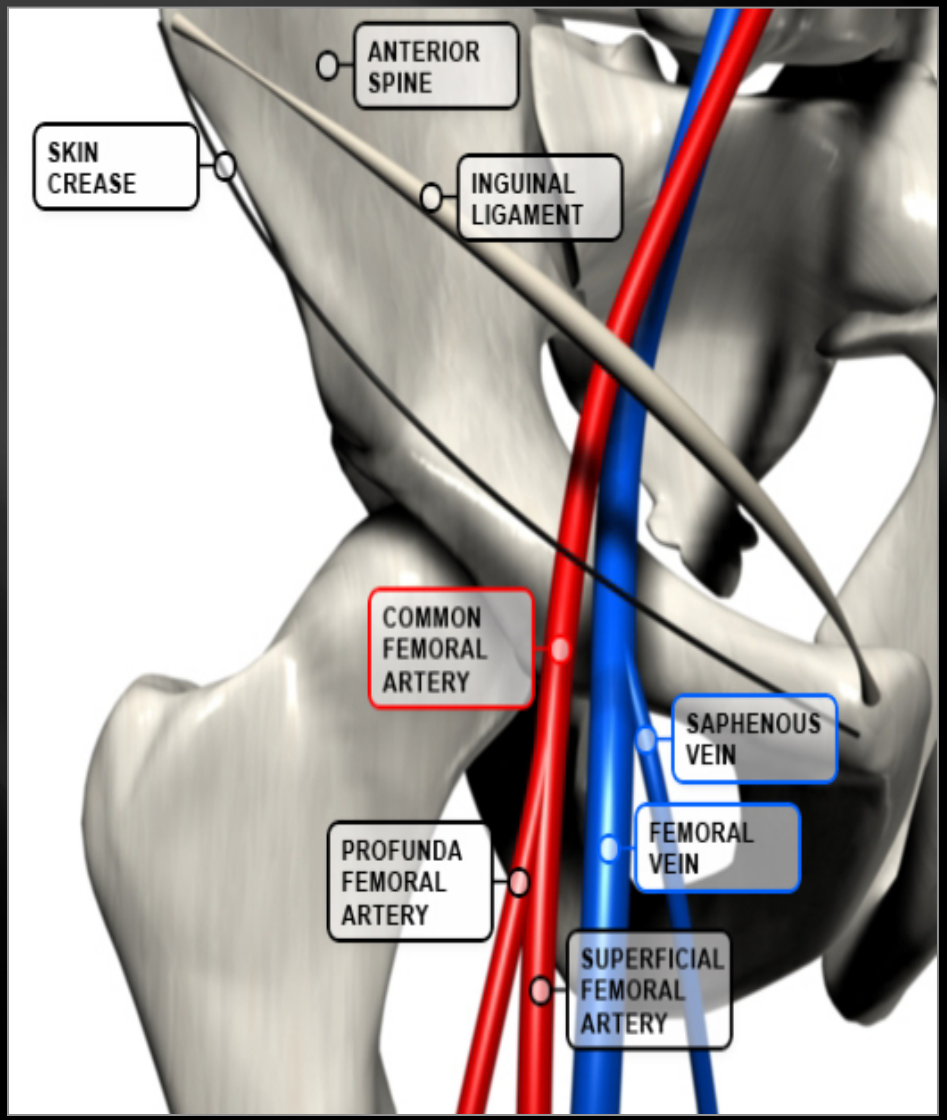
PPT Note: gadolinium

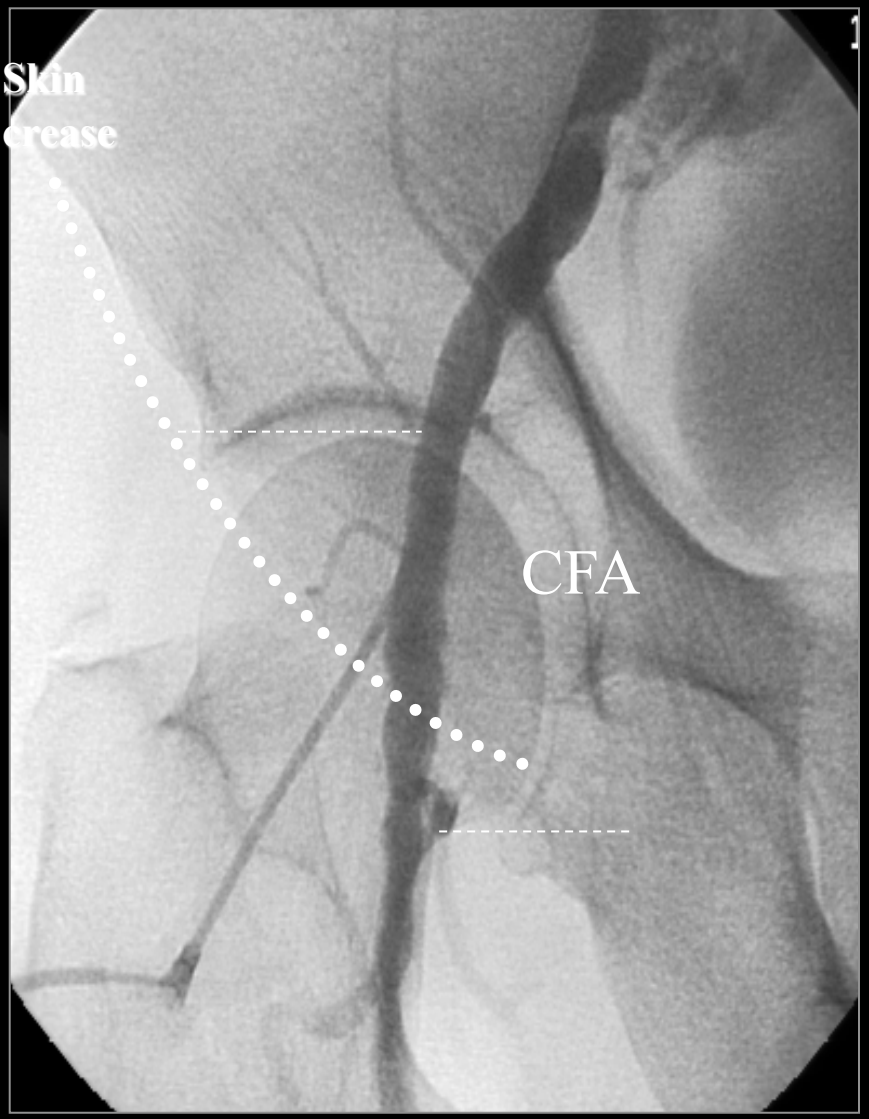
MR ANGIOGRAM

- Sensitive: ✓✓✓✓
- Operator dependent: ✗
- Toxic: ✓✓✓
- Therapeutic: ✗

ANGIOGRAPHY

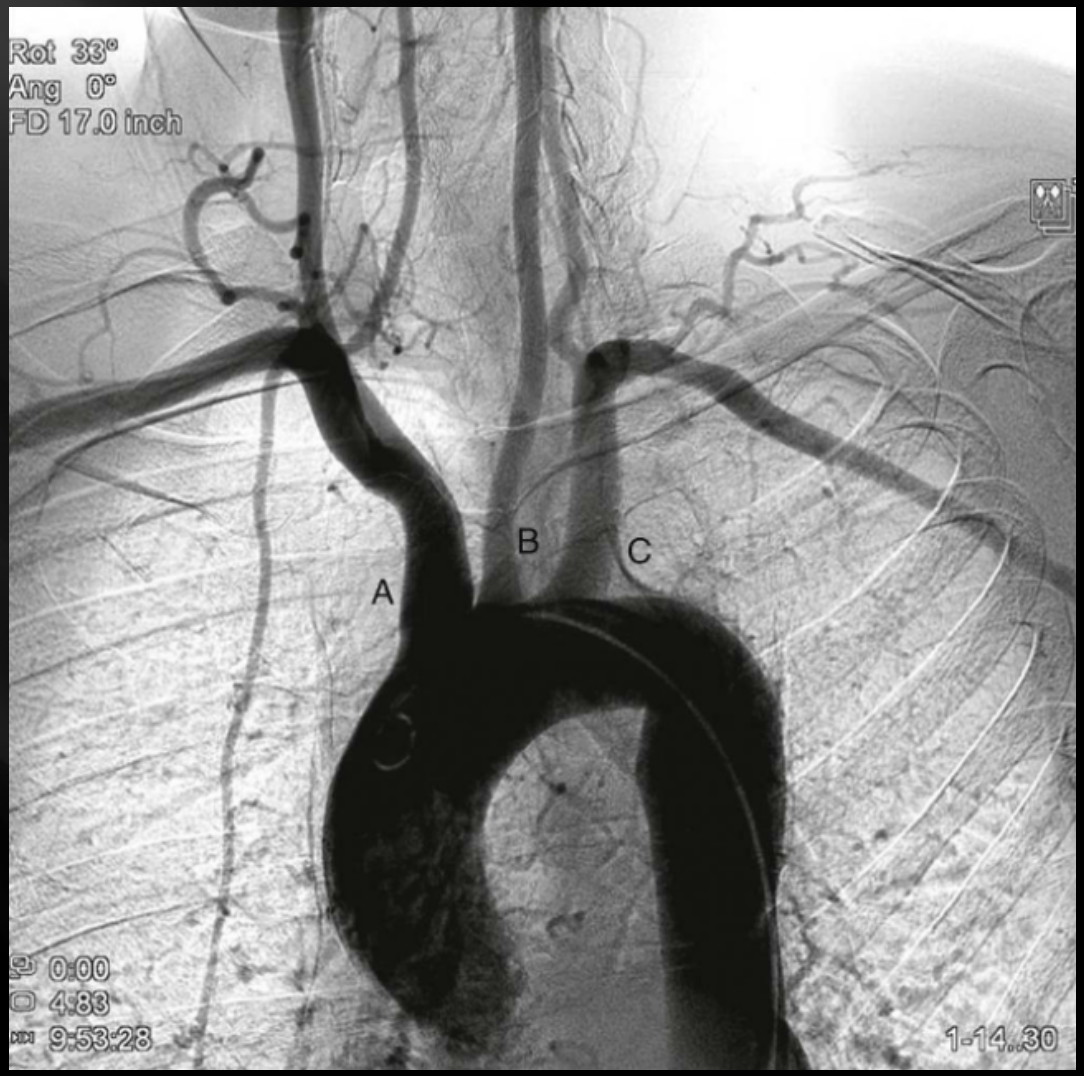
Femoral Artery





ANGIOGRAPHY

ANGIOGRAPHY

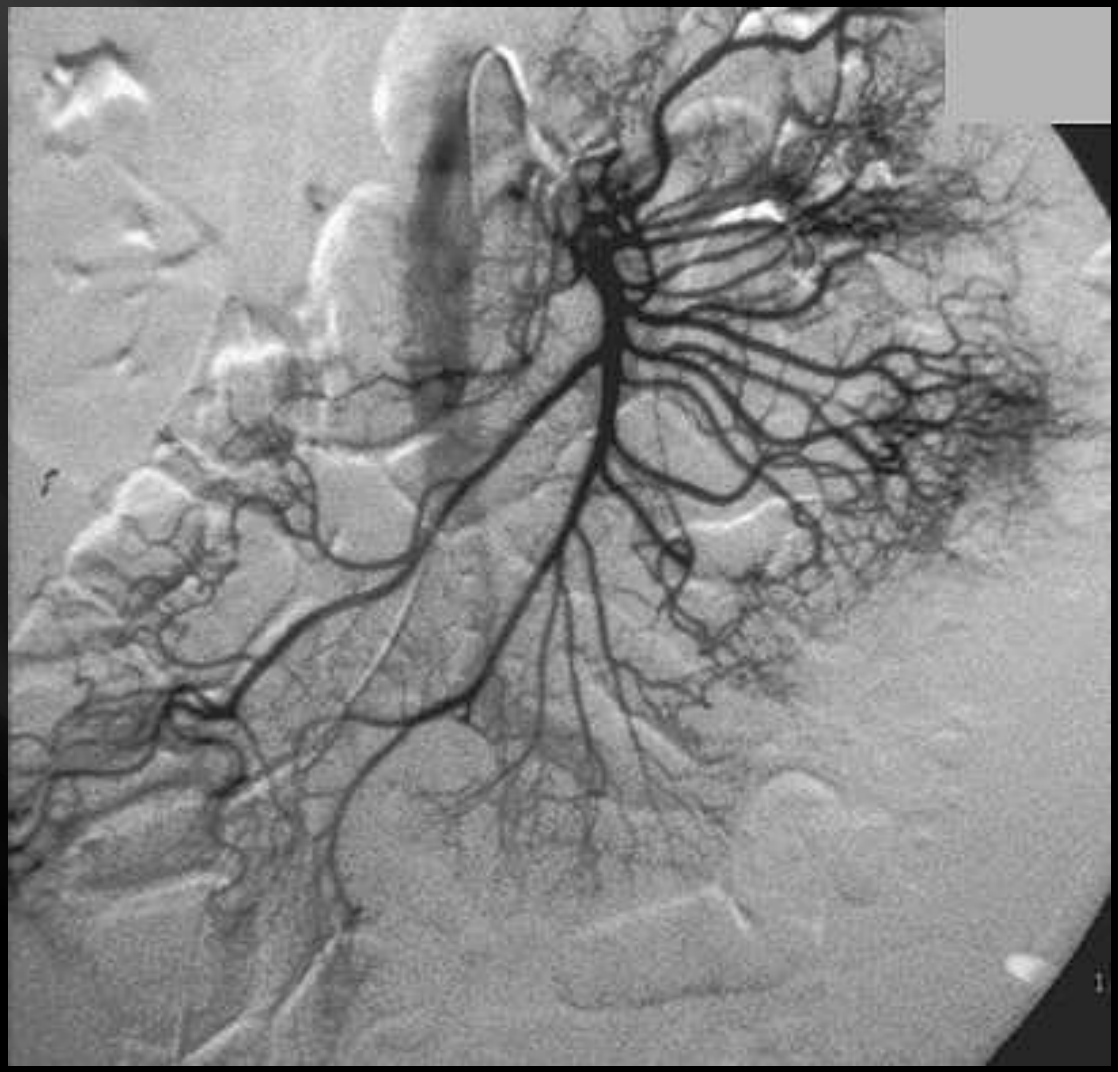


ANGIOGRAPHY

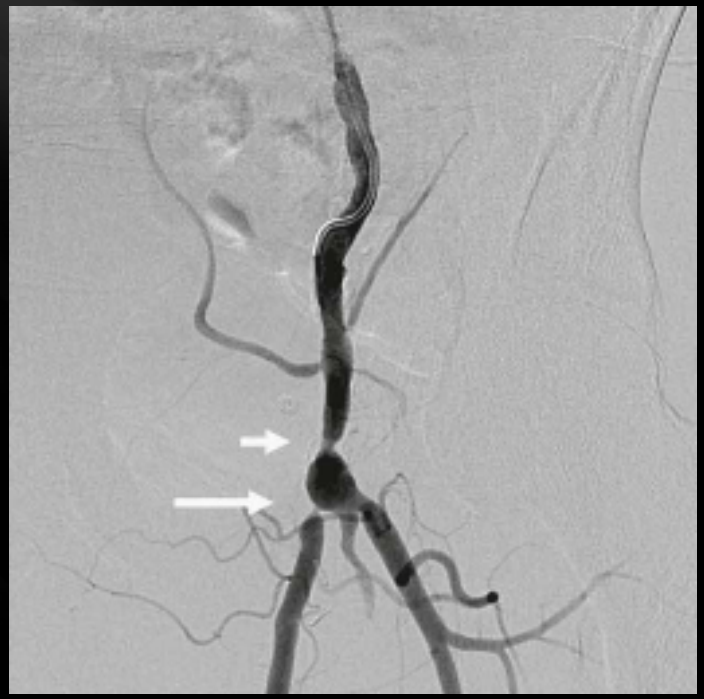
ANGIOGRAPHY

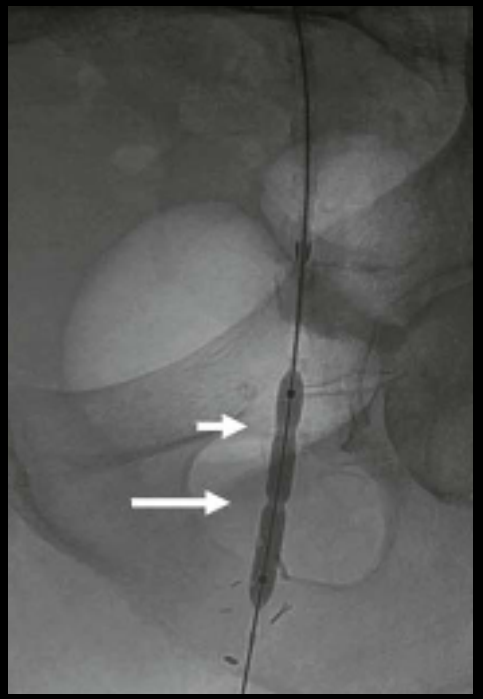
ANGIOGRAPHY

ANGIOGRAPHY

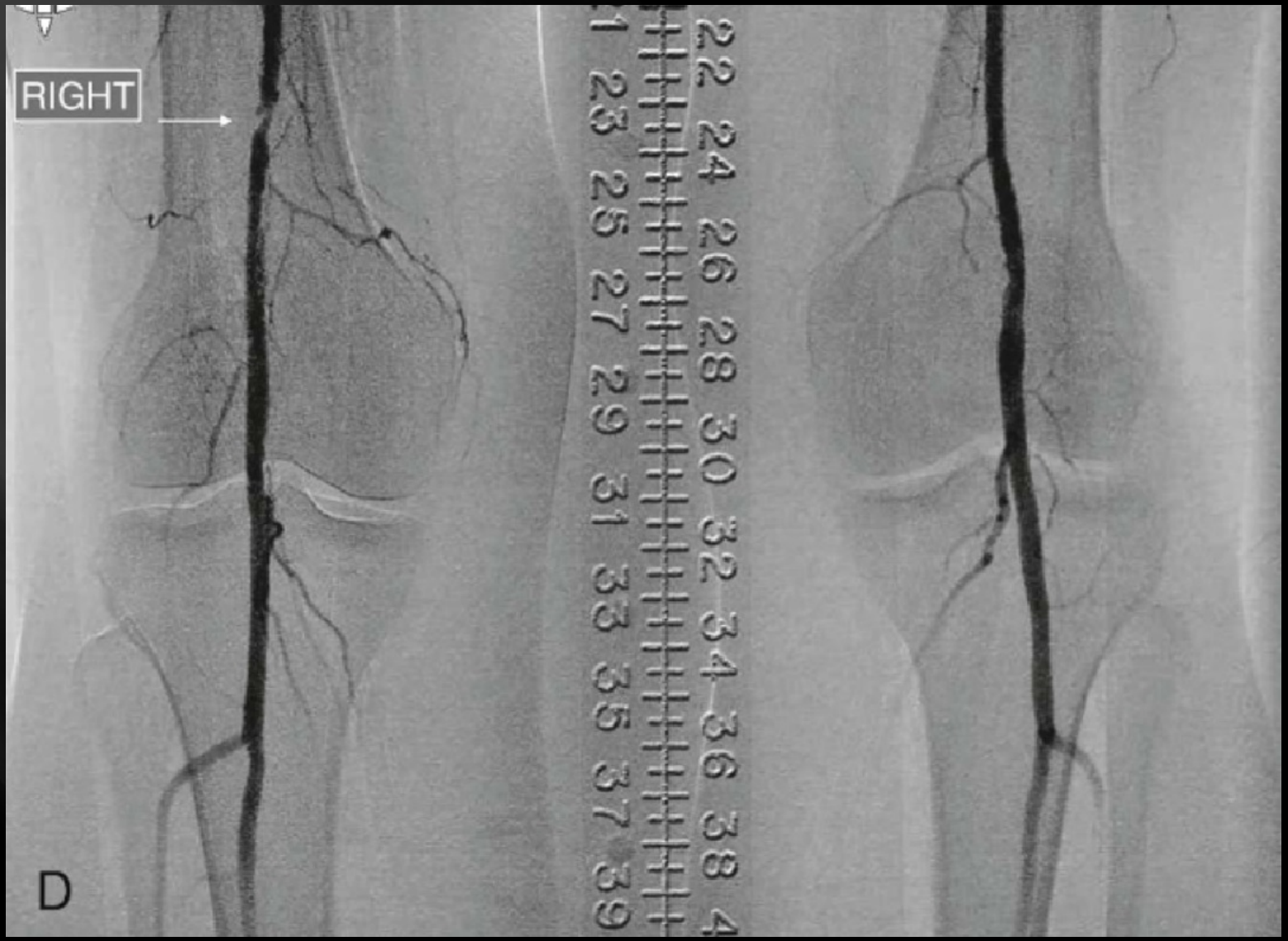


ANGIOGRAPHY

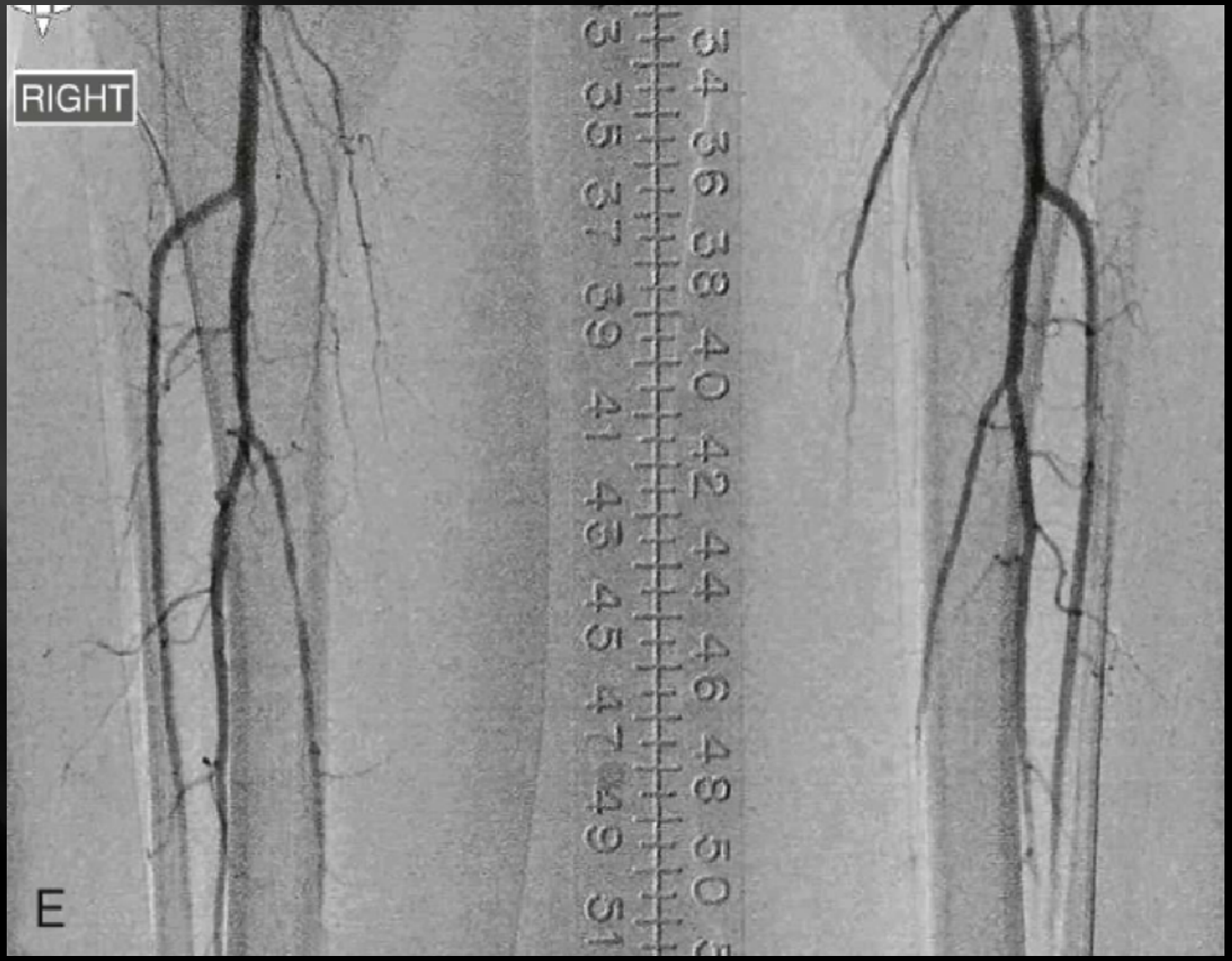




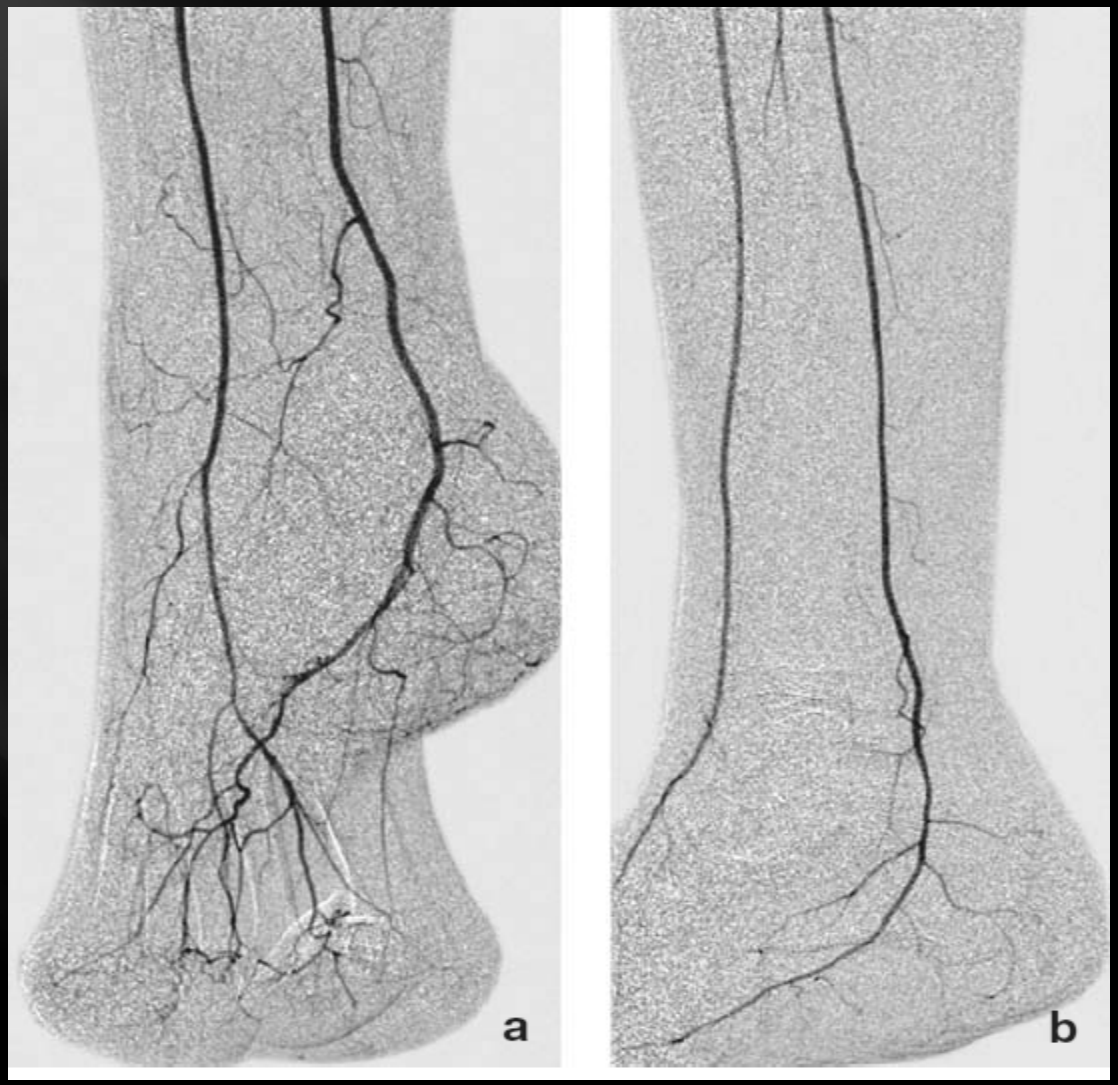
ANGIOGRAPHY



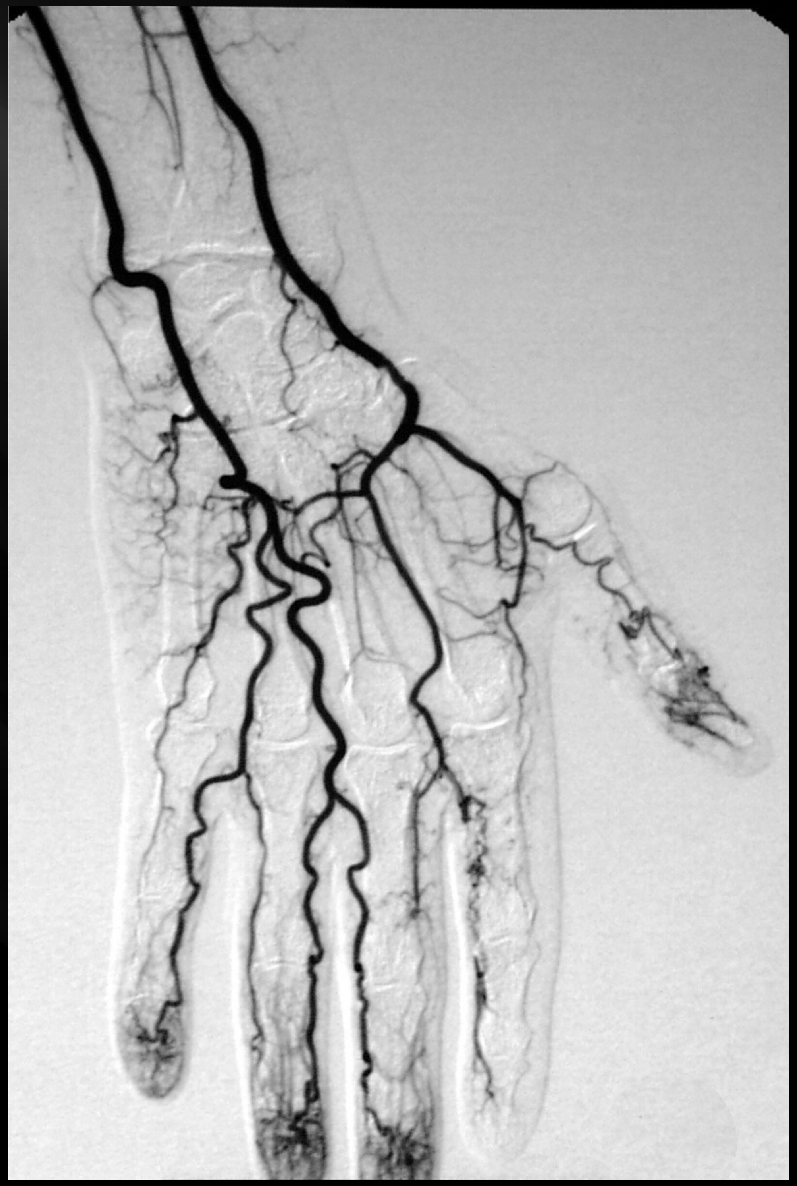
ANGIOGRAPHY



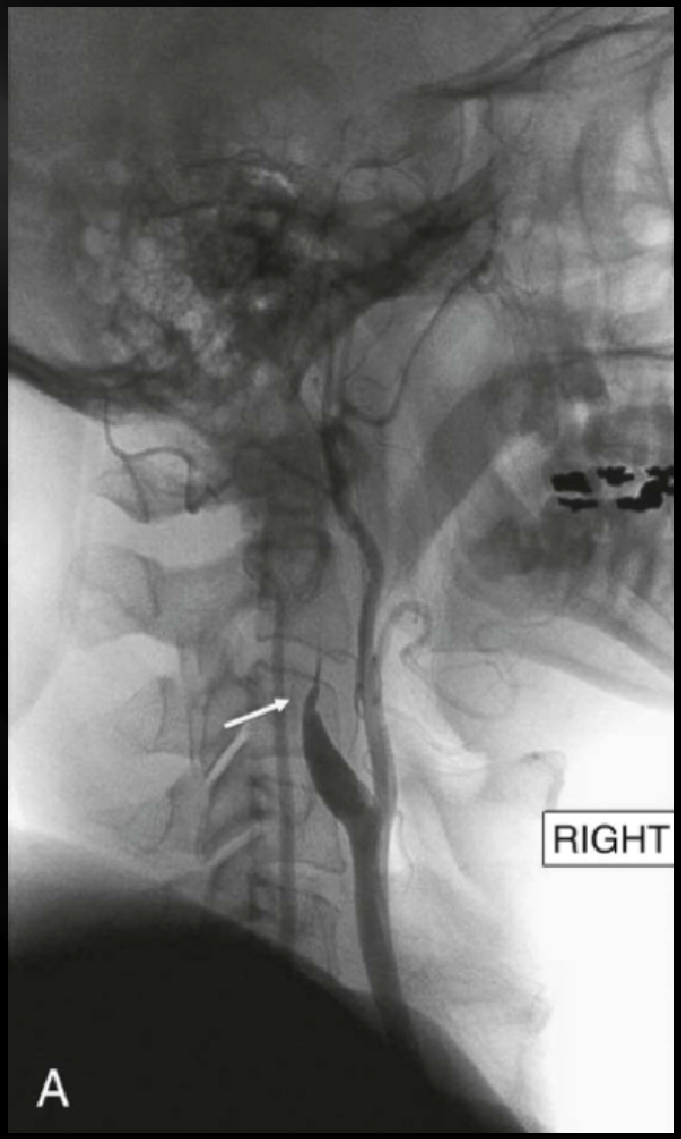
ANGIOGRAPHY



ANGIOGRAPHY



ANGIOGRAPHY



- Sensitive: ✓✓✓✓✓
- Operator dependent: x
- Toxic: ✓✓✓
- Therapeutic: ✓✓✓

THANK YOU