Radiological study

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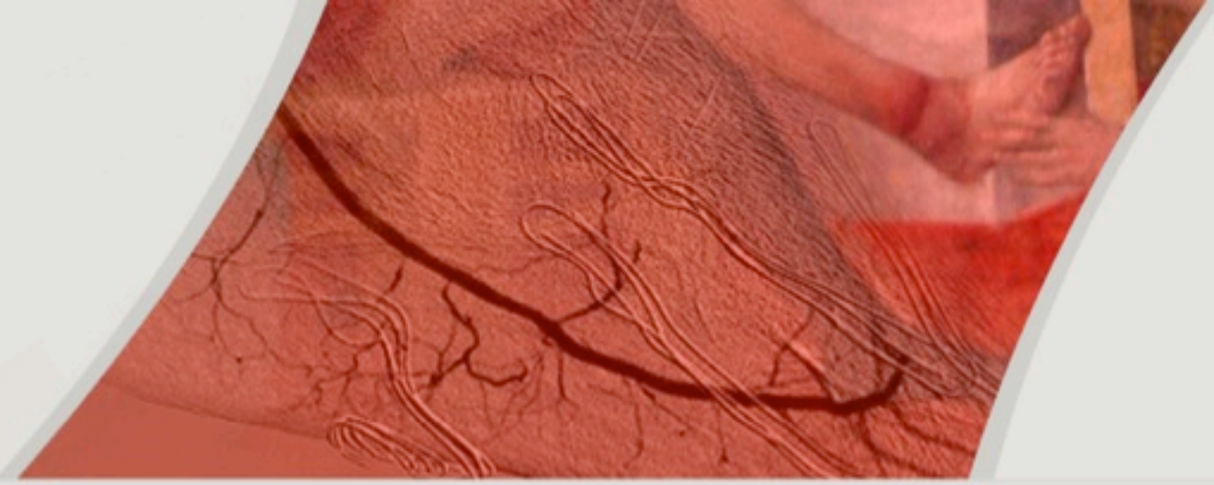
Radiological study



Measure Contrast dye

Digital Subtraction Analysys (DSA)

Coronary-like study

- Case 1
- Case 2

Popliteal artery Study

- Case 1
- Case 2
- Case 3

Look for hidden arteries

- Case 1

Radiological study

- Measure contrast dye
- Calibrate your DSA
- Coronary-like study
- Popliteal artery study
- Look for hidden arteries

Radiological study

Puncture study:
4-8 mL, diluted

Bolus chase:
8-10 mL, pure

Details study:
2-4 mL x 2-6

Selective angiographic study
20-40 mL

Contrast dye

total dose
35-100 mL

PTA performed immediately after angiography: 15-60 mL

Radiological study

- Measure contrast dye
- Calibrate your DSA
- Coronary-like study
- Popliteal artery study
- Look for hidden arteries

Note:

The majority of patients with CLI have some degree of renal disfunction:

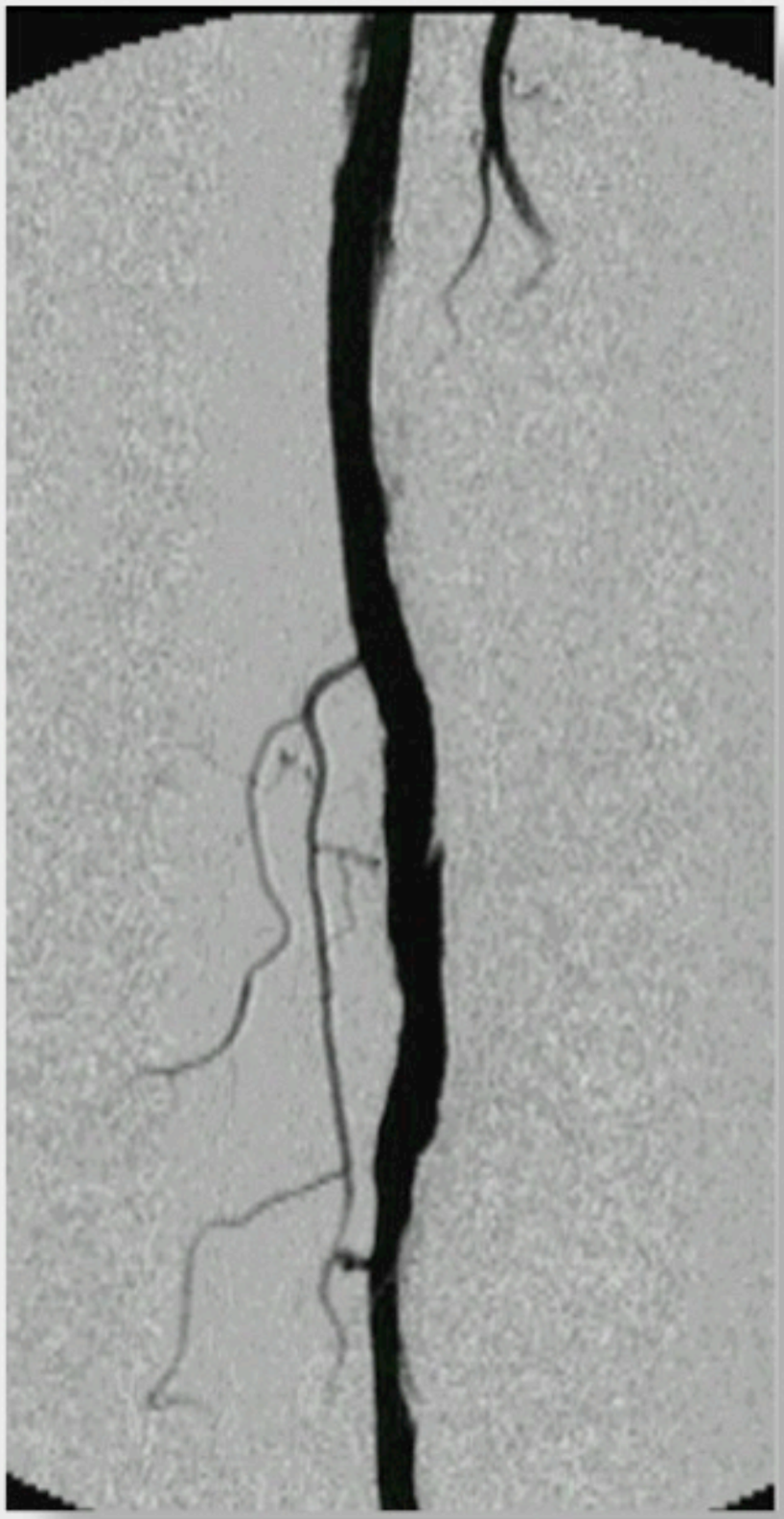
do not kill their kidneys using too much contrast dye!

Radiological study

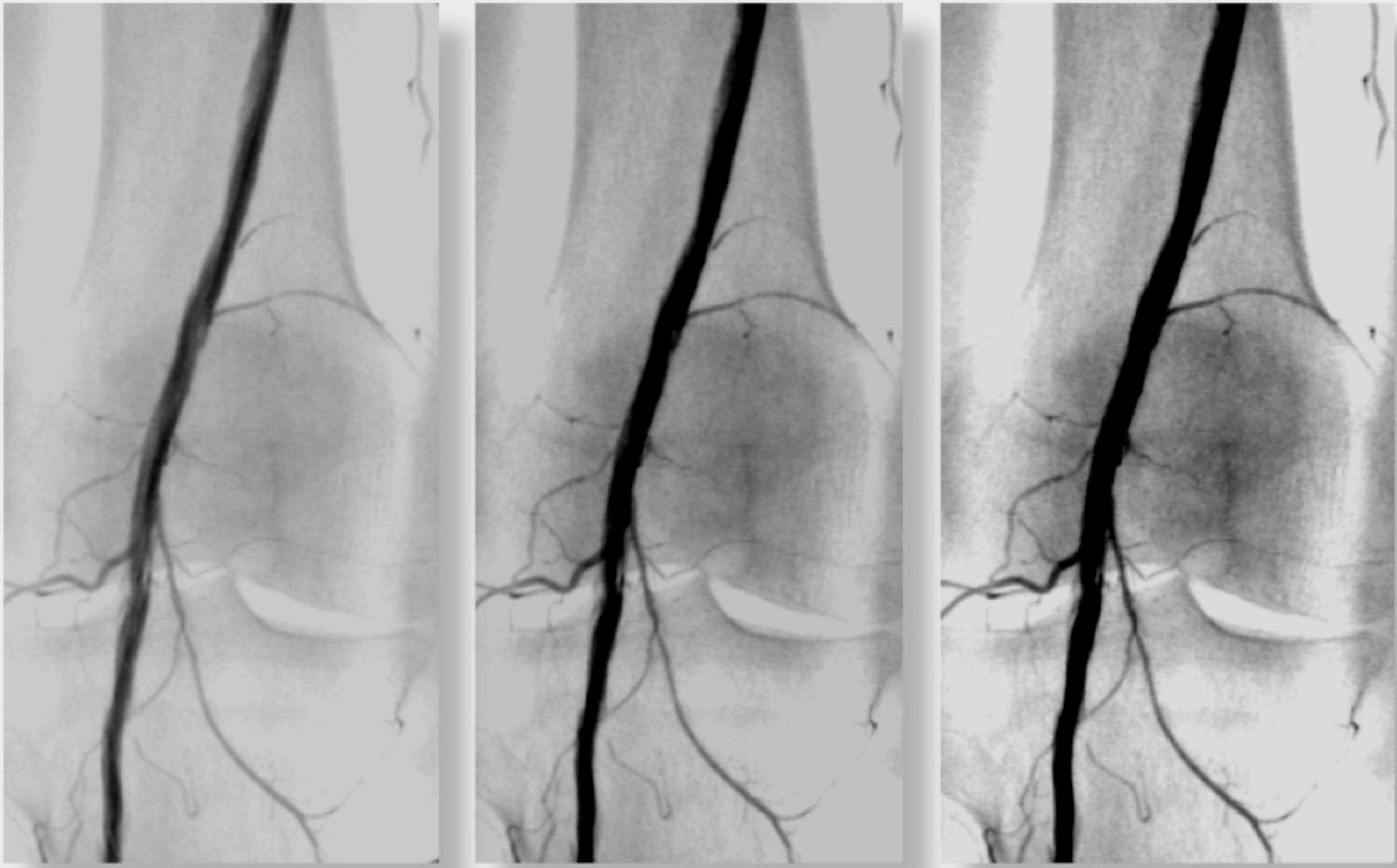
- Measure contrast dye
- Calibrate your DSA
- Coronary-like study
- Popliteal artery study
- Look for hidden arteries

BASAL

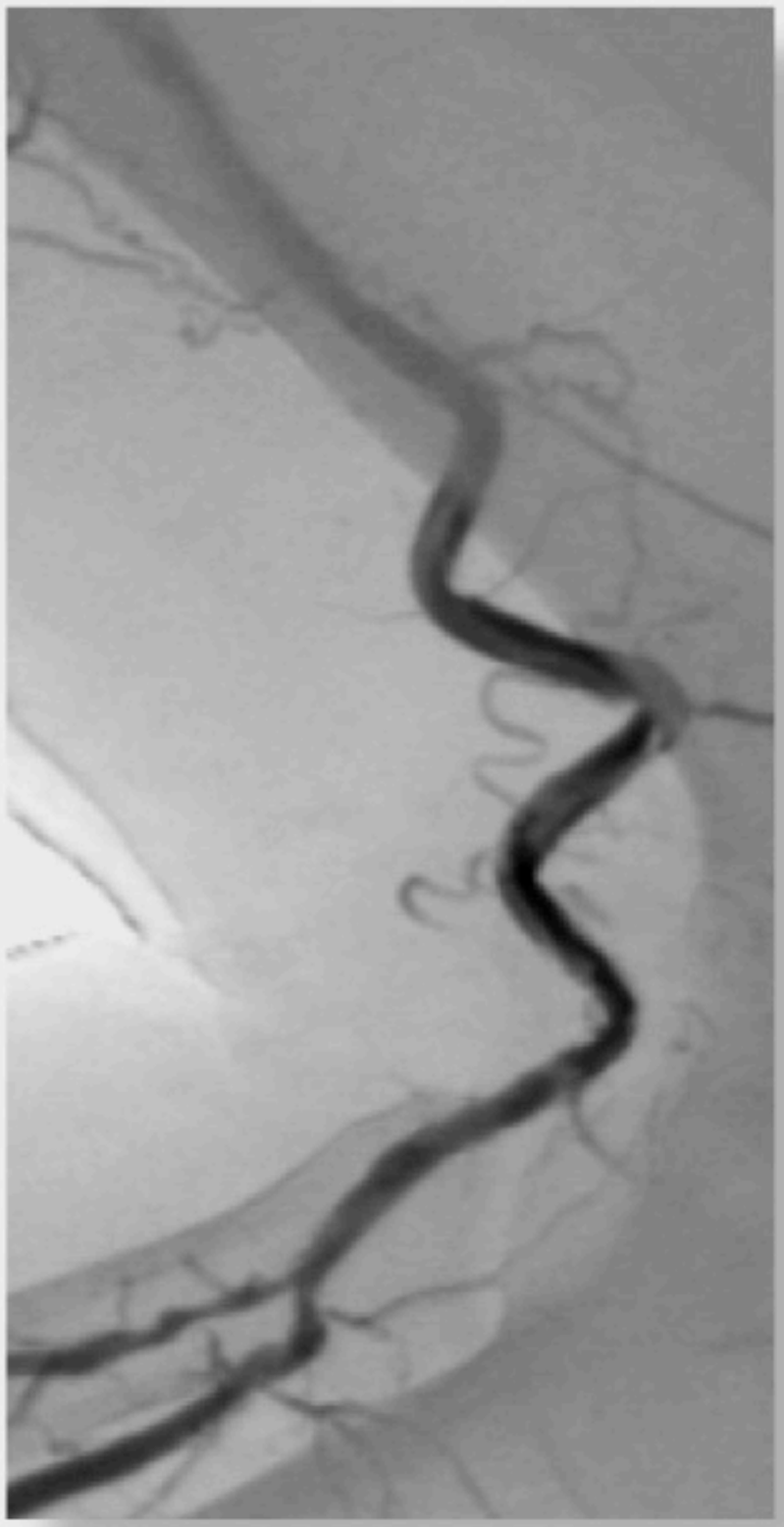
POST PTA: typical “spiral” subintimal lumen



SUBTRACTED IMAGE: no evidence of spiral shape



Different digital subtraction filters can erase dissection details



Different digital subtraction filters can erase dissection details

Different digital subtraction filters can erase dissection details

Radiological study

- Measure contrast dye
- Calibrate your DSA
- Coronary-like study
- Popliteal artery study
- Look for hidden arteries

Note:

What is the problem? The angiographer or the technique?

Images obtained by digital subtraction analysis are very sensitive to filtering algorithm

- ***Study your device programs, select proper X-ray algorithms to improve definition and to reduce exposure***
- ***Adapt contrast dye concentration to the type of radiological target***

Radiological study

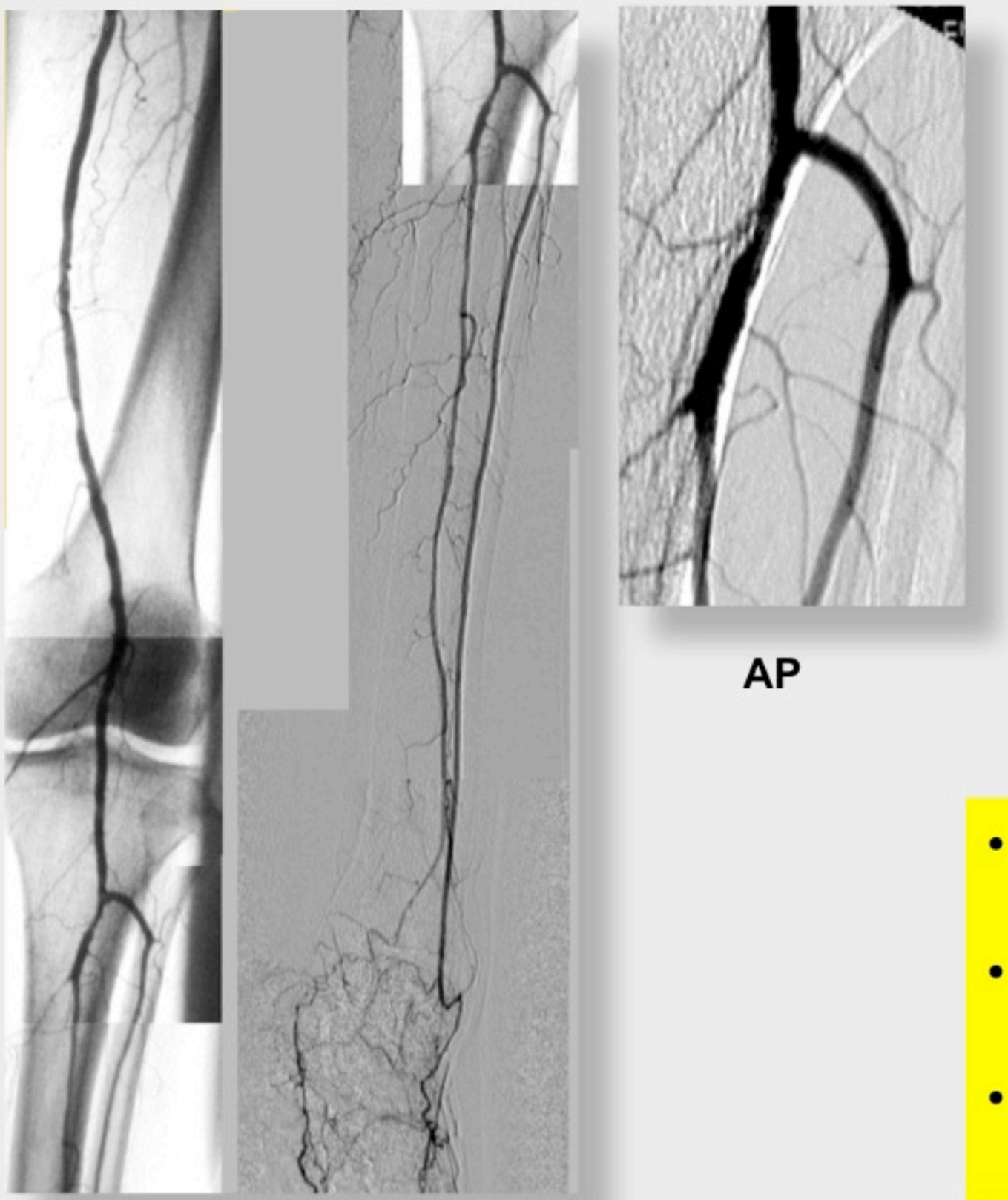
- Measure contrast dye
- Calibrate your DSA
- Coronary-like study
- Popliteal artery study
- Look for hidden arteries

CASE 1

PATIENT DATA

- 70-year-old male
- Type 2 DM
- Toe ulcers

CASE 1

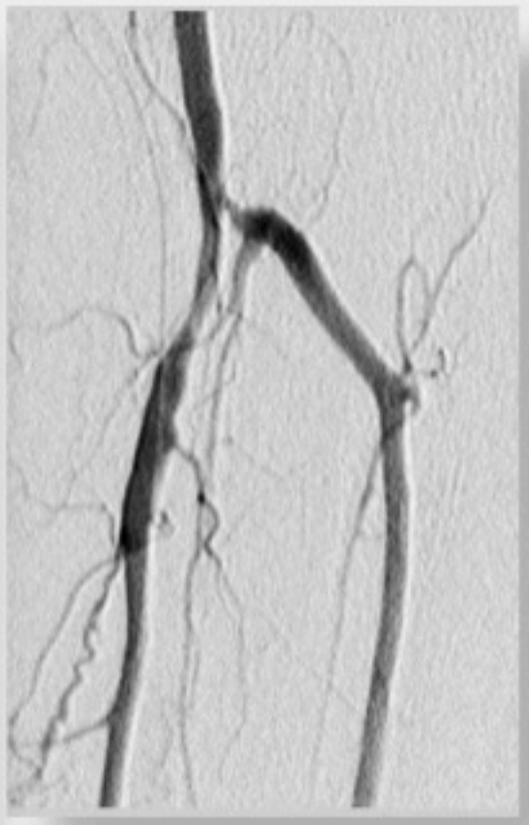


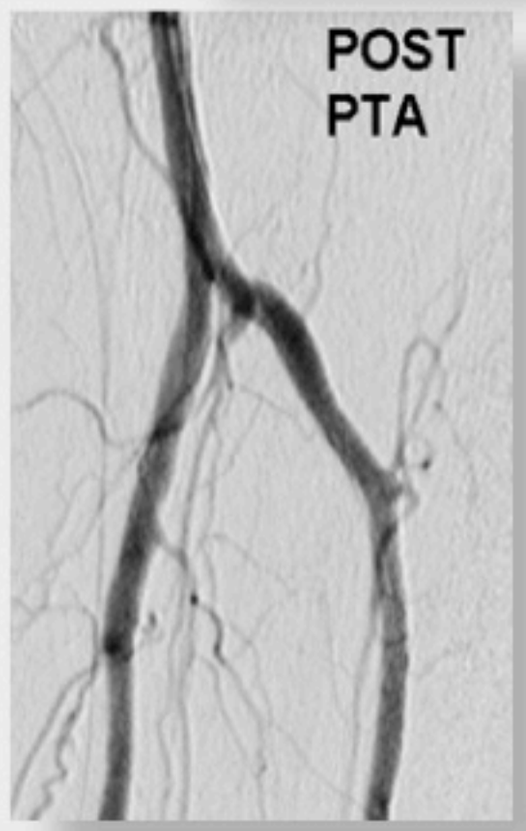
AP

DIAGNOSIS

- Good FEM-POP patency
- Good PER & ATA patency
- Posterior tibial & foot vessel disease

CASE 1





AP **Left oblique 40°**

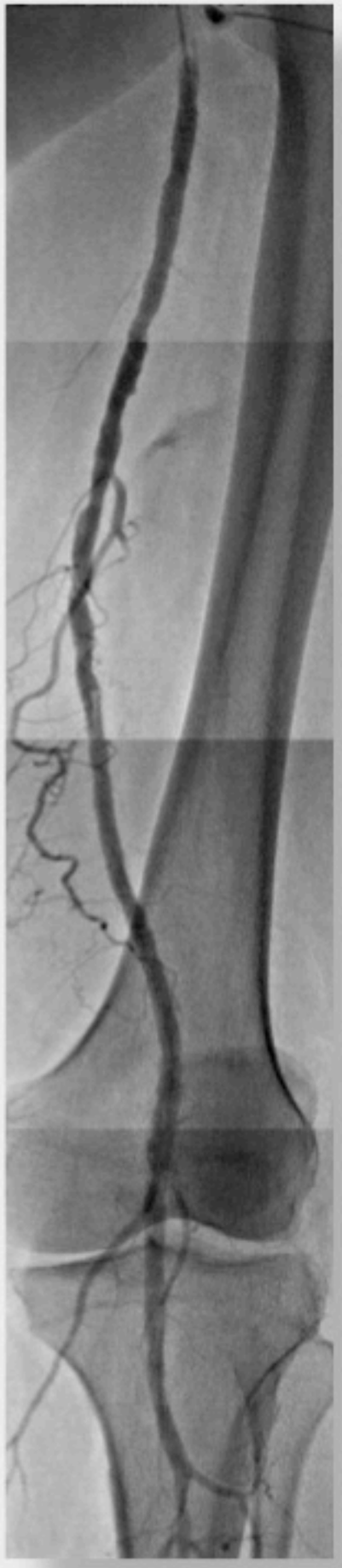
DIAGNOSIS

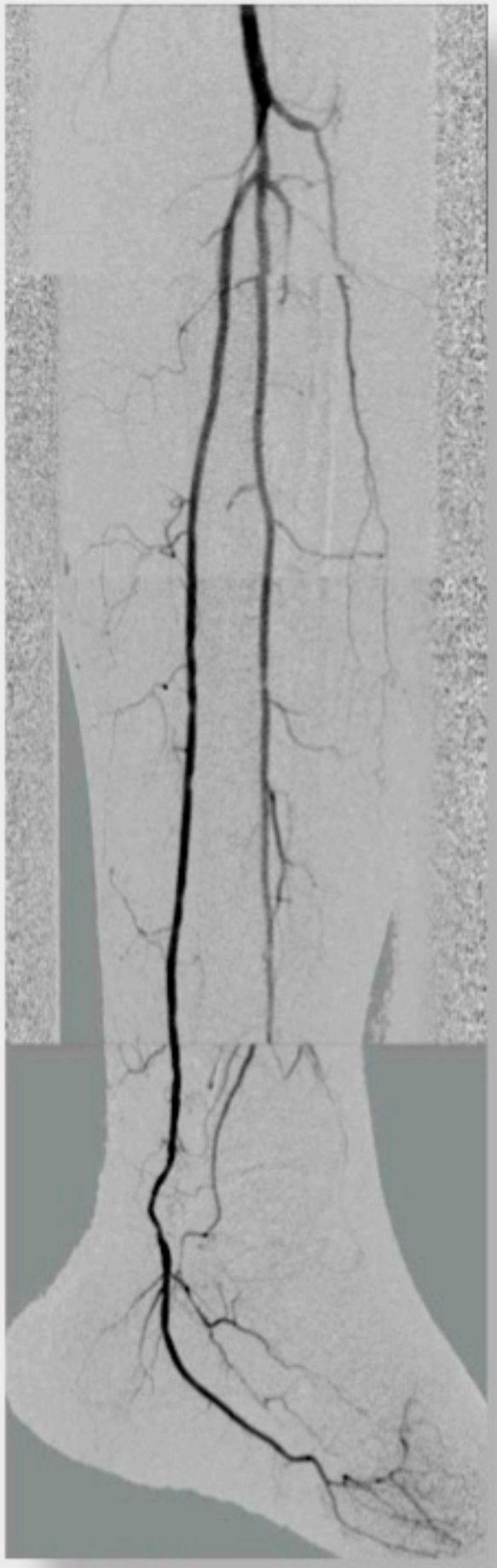
Only in left oblique view an ostial stenosis of ATA and TPT is clearly visible

PATIENT DATA

- 76-year-old male
- 50 m claudication

CASE 2

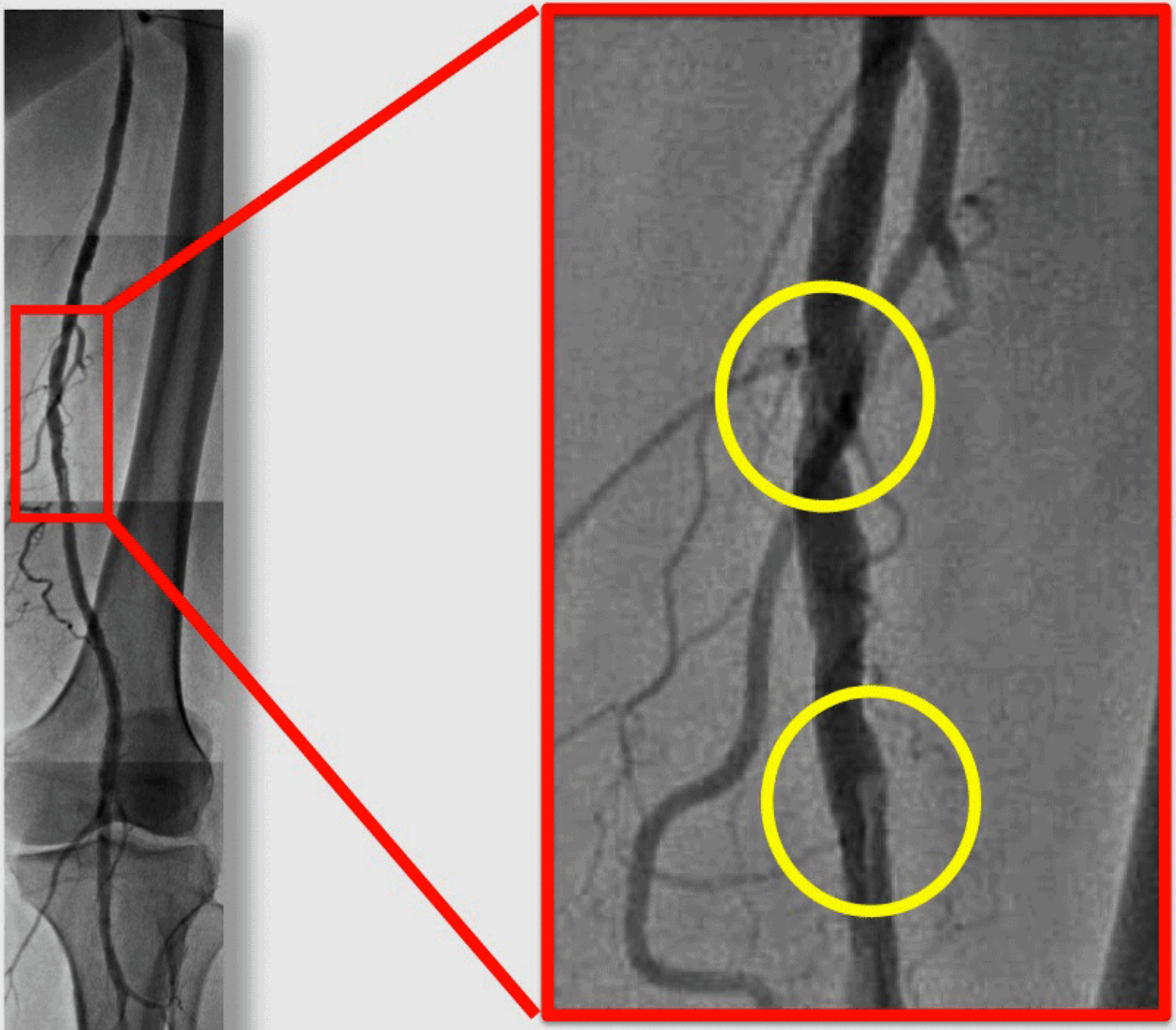




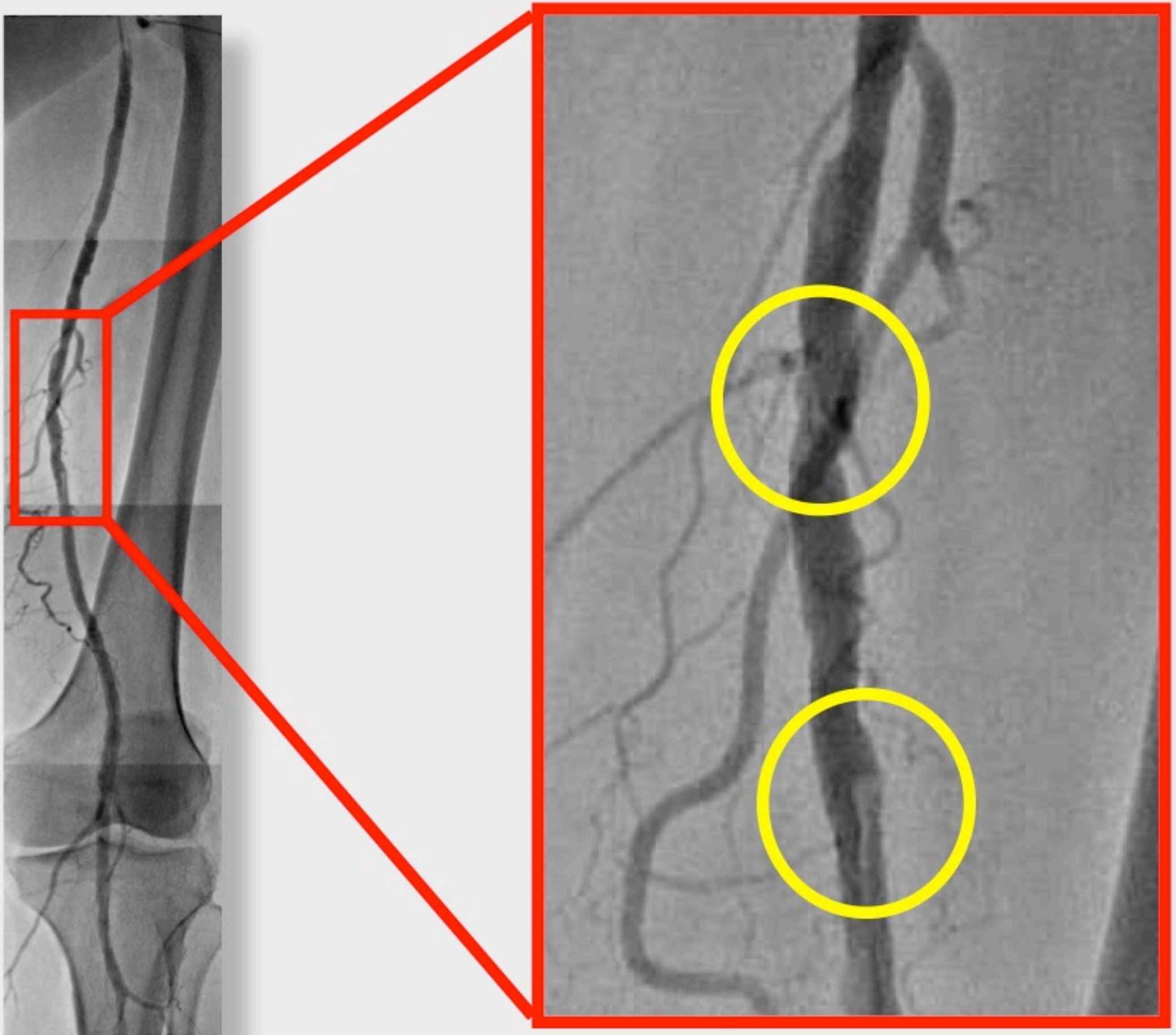
DIAGNOSIS

- Apparently good FEM-POP patency
- Occlusion of ATA

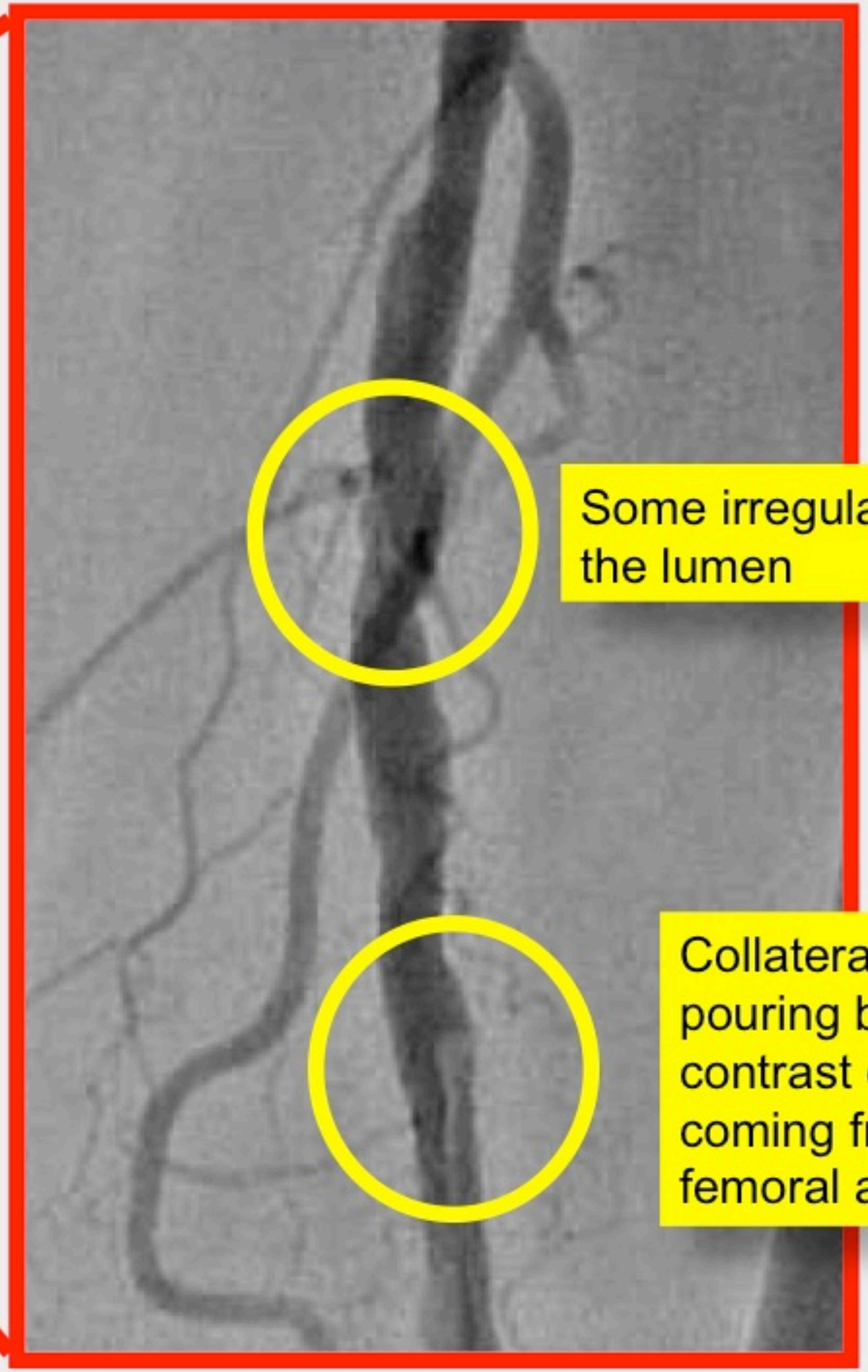
CASE 2



CASE 2



CASE 2

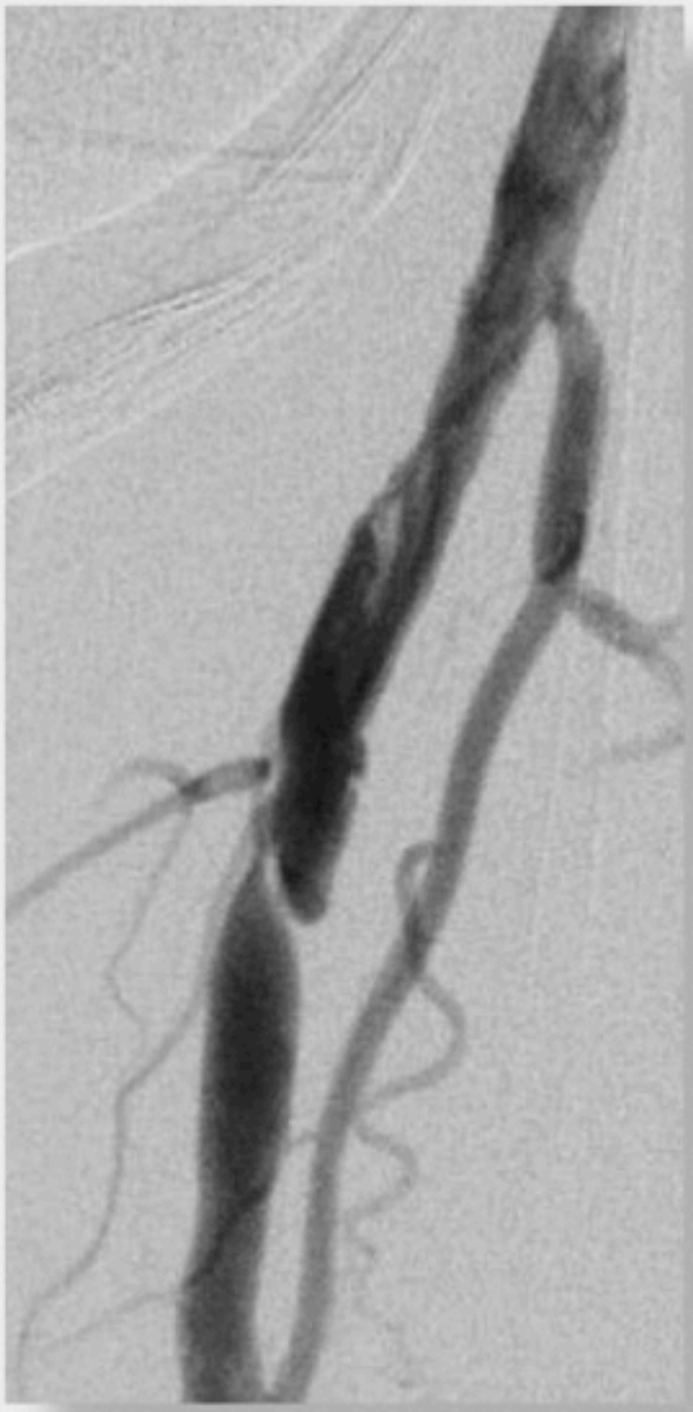

Some irregularities in the lumen
Collateral vessel pouring blood without contrast dye because coming from deep femoral artery

DSA using oblique projections

CASE 2

AP

RAO 30°



RAO 30°CRA 15°

CASE 2

Final result after stenting

CASE 2

Radiological study

- Measure contrast dye
- Calibrate your DSA
- Coronary-like study
- Popliteal artery study
- Look for hidden arteries

Note:

Angiographic study of the arteries of the limb requires the same approach as for coronary arteries: antero-posterior, oblique, cranial, caudal views etc.

Stop thinking in a 2D space!
The real world is a 3D space!

Radiological study

- Measure contrast dye
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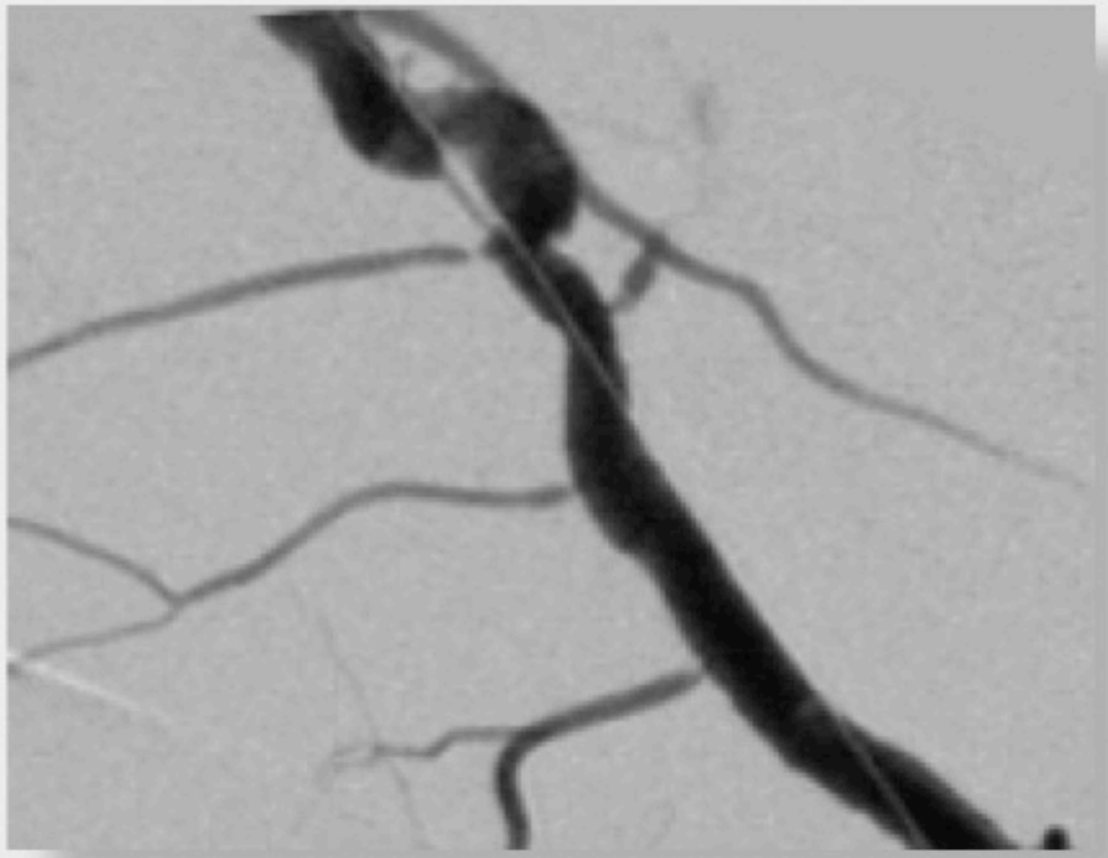
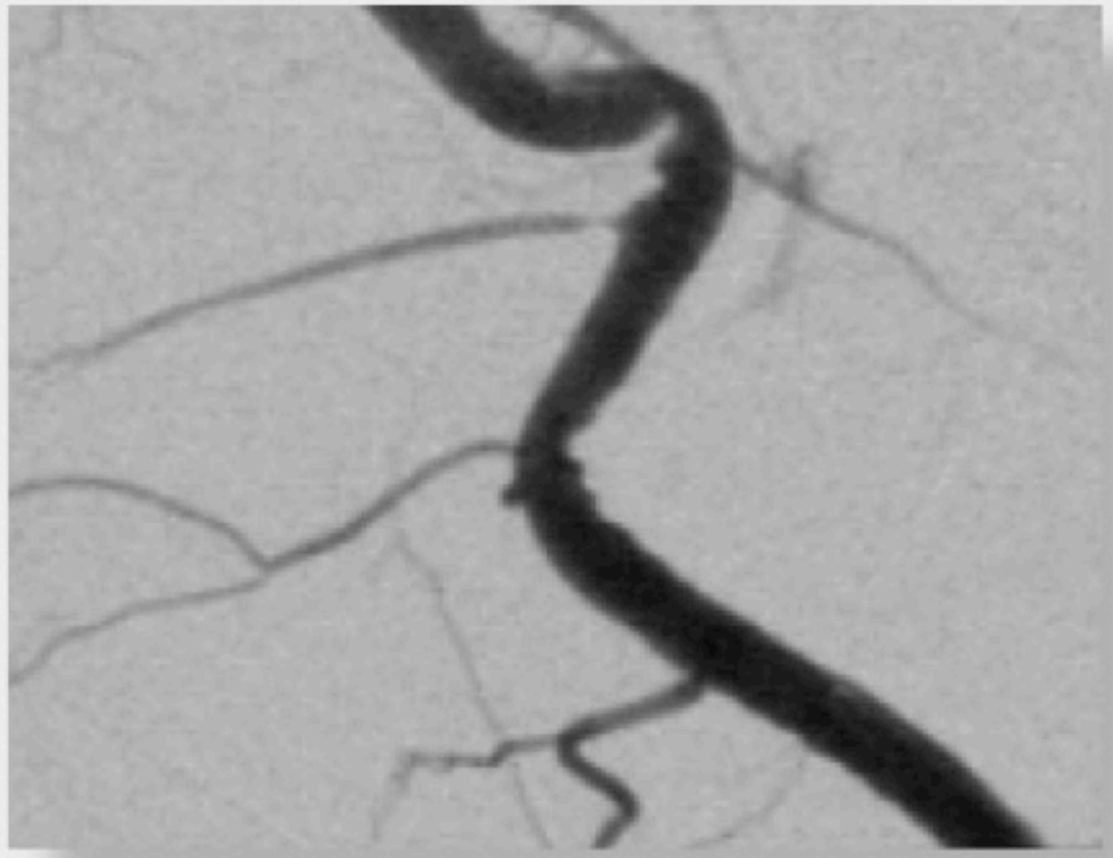
Question

Should flexed knee study modify our popliteal treatment strategy ?

Popliteal artery study



A stiff 0.018” wire is inside the lumen during flexed knee study: the vessel is abnormally straightened

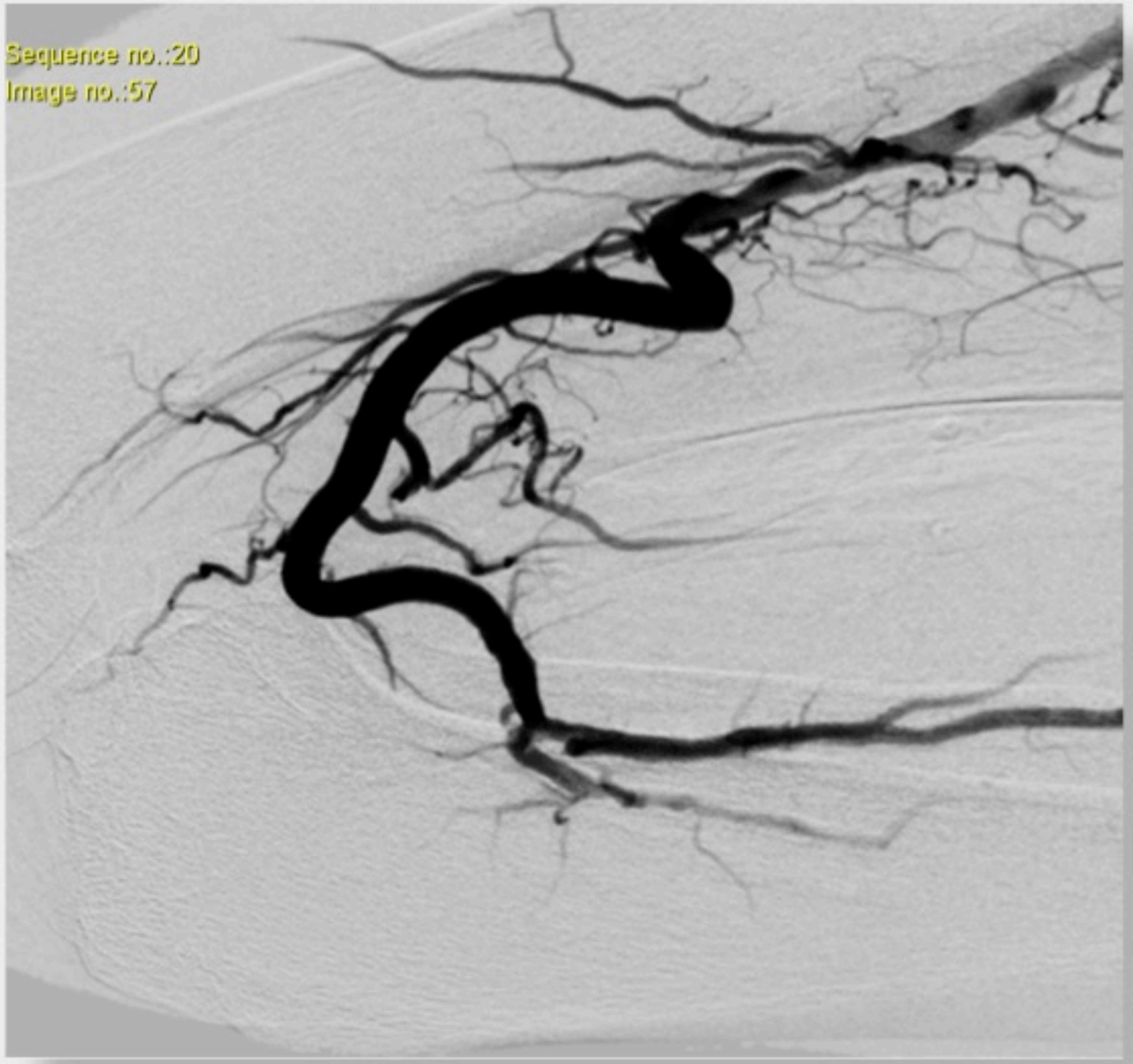


No wire: “natural” atherosclerotic proximal popliteal kinking

Technique

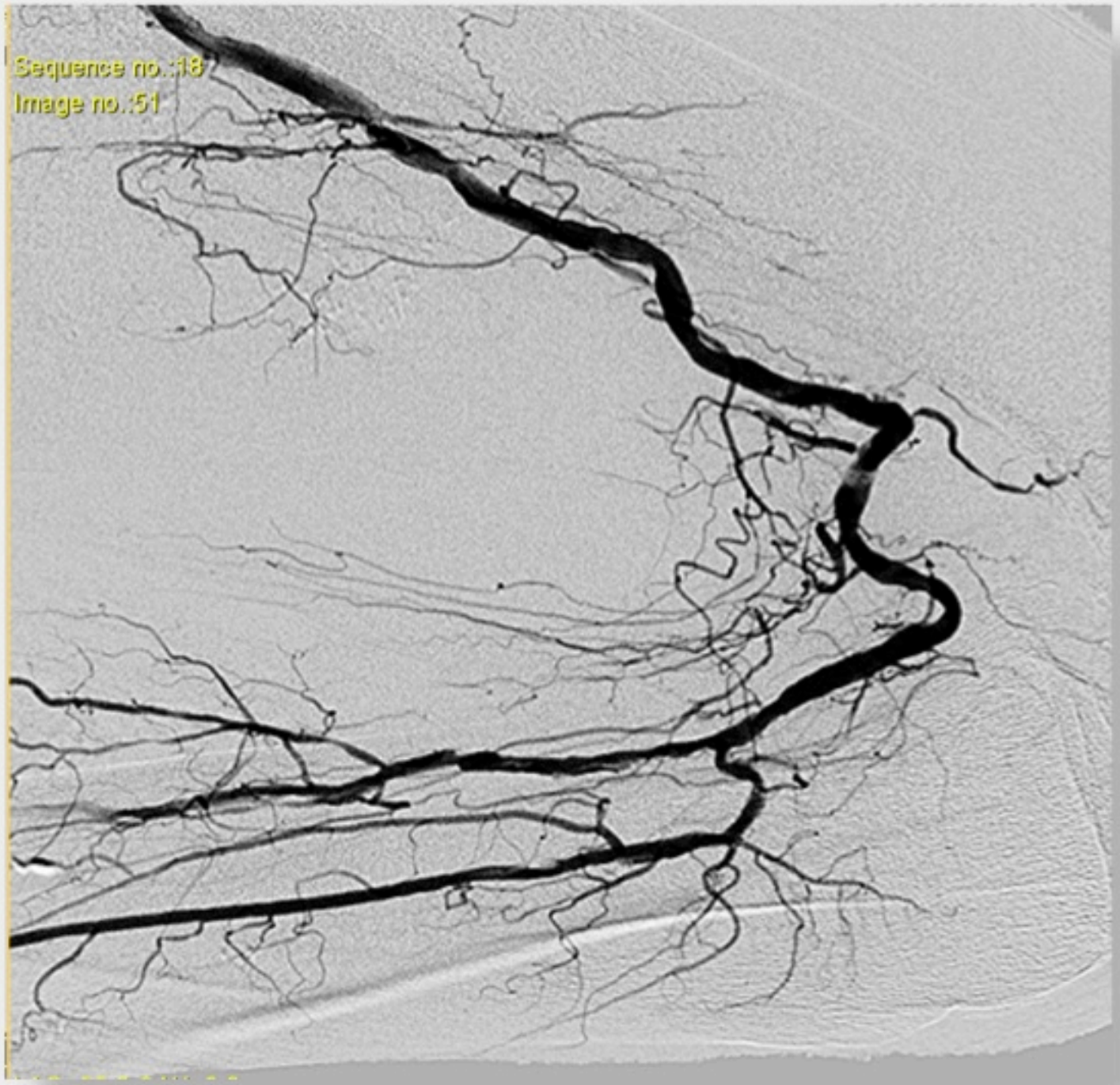
Always remove the wire when studying flexed popliteal artery !!!

Popliteal artery study

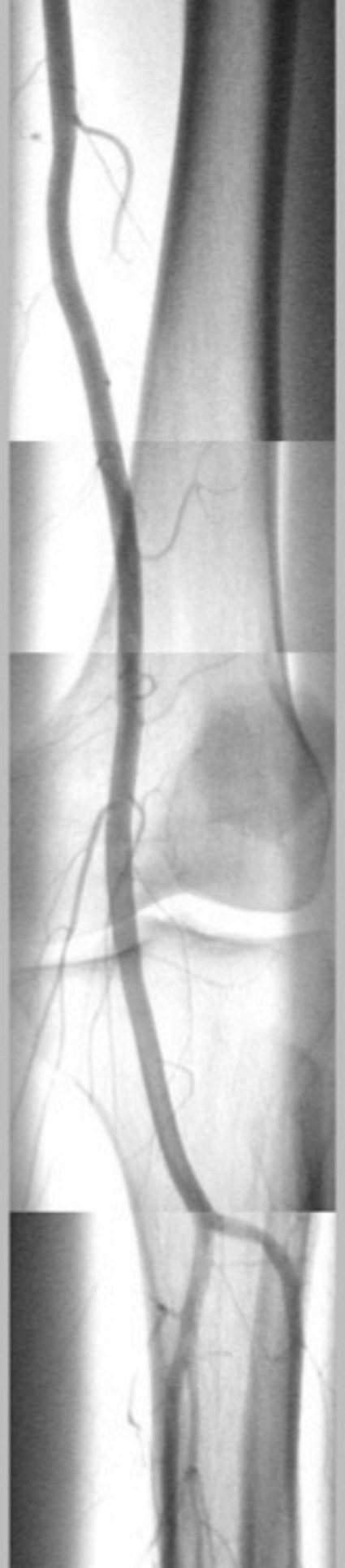


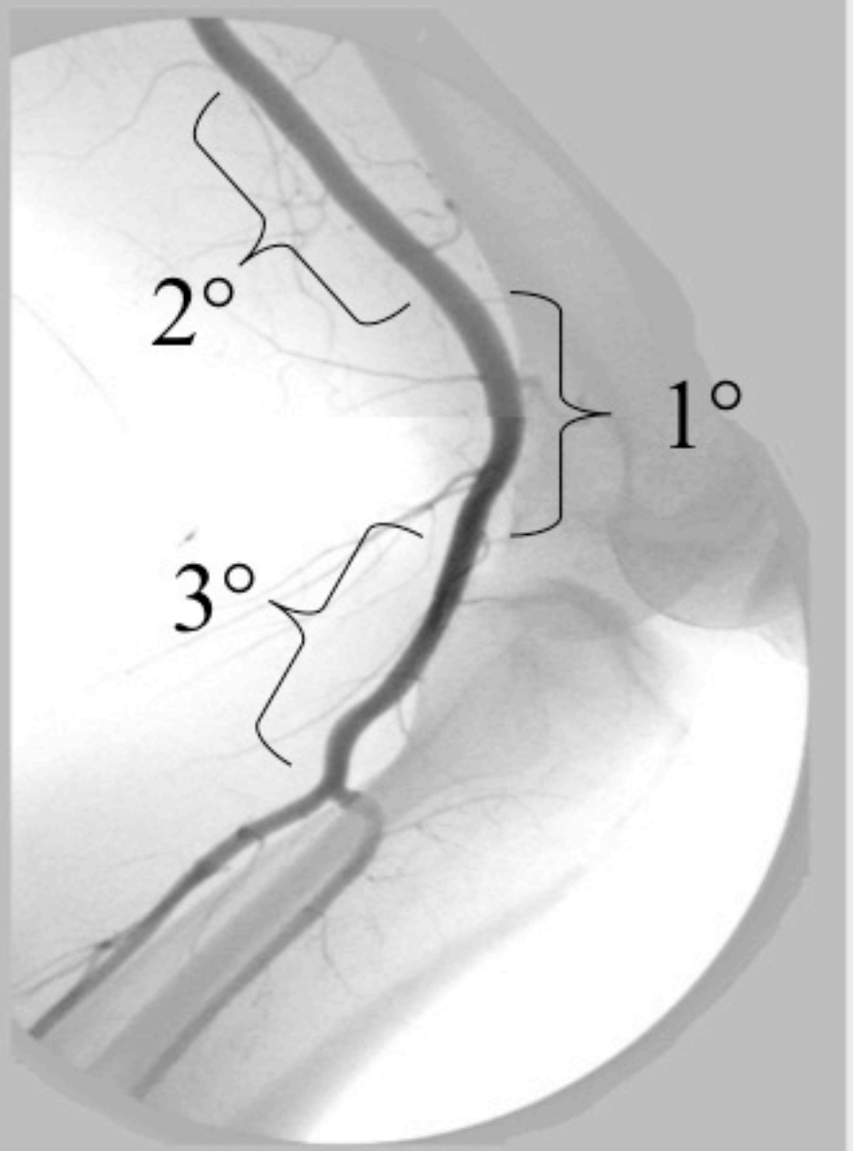
Non-atherosclerotic popliteal artery is flexible

Popliteal artery study

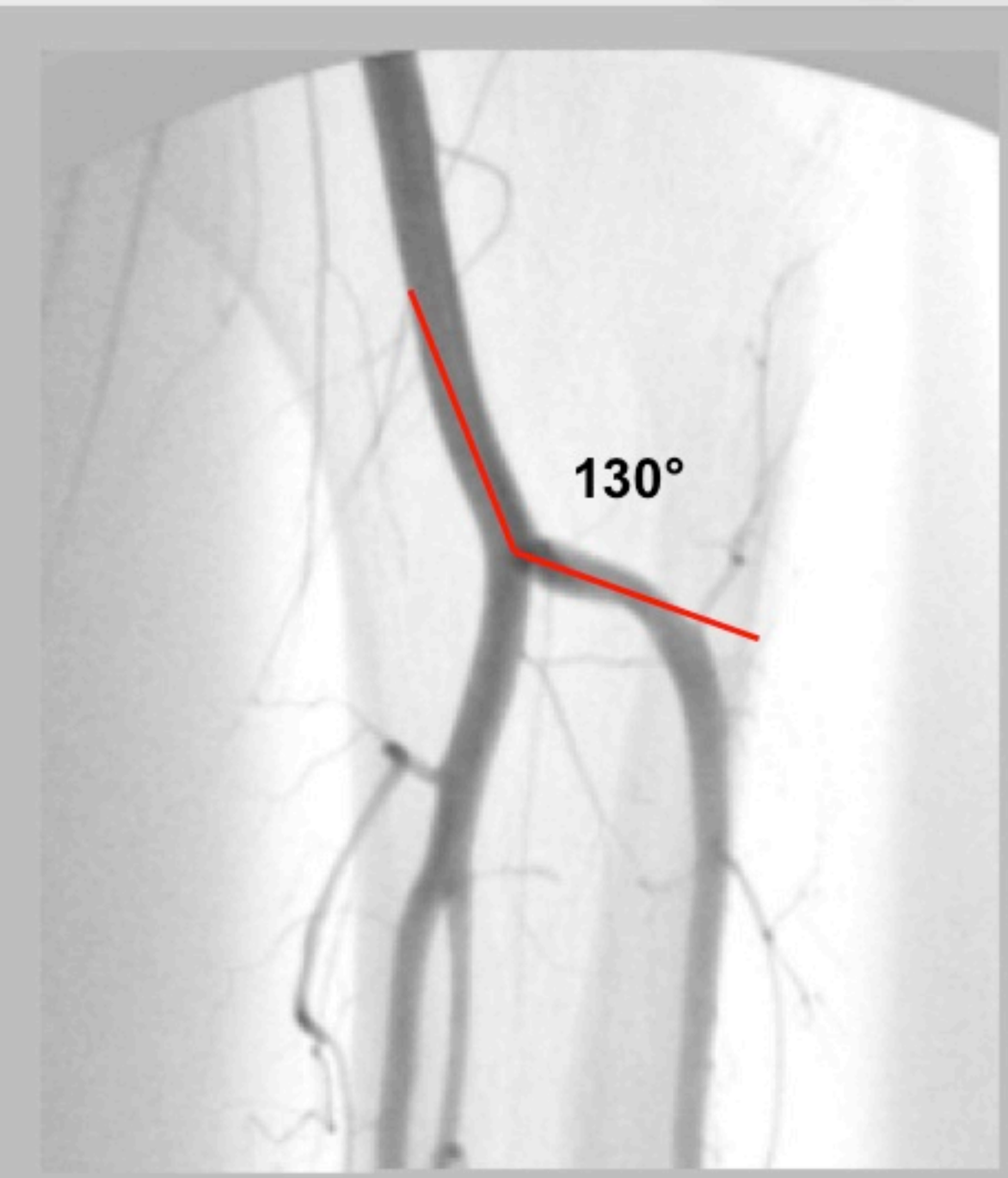


Atherosclerotic popliteal artery is stiff and the only way to bend is kinking

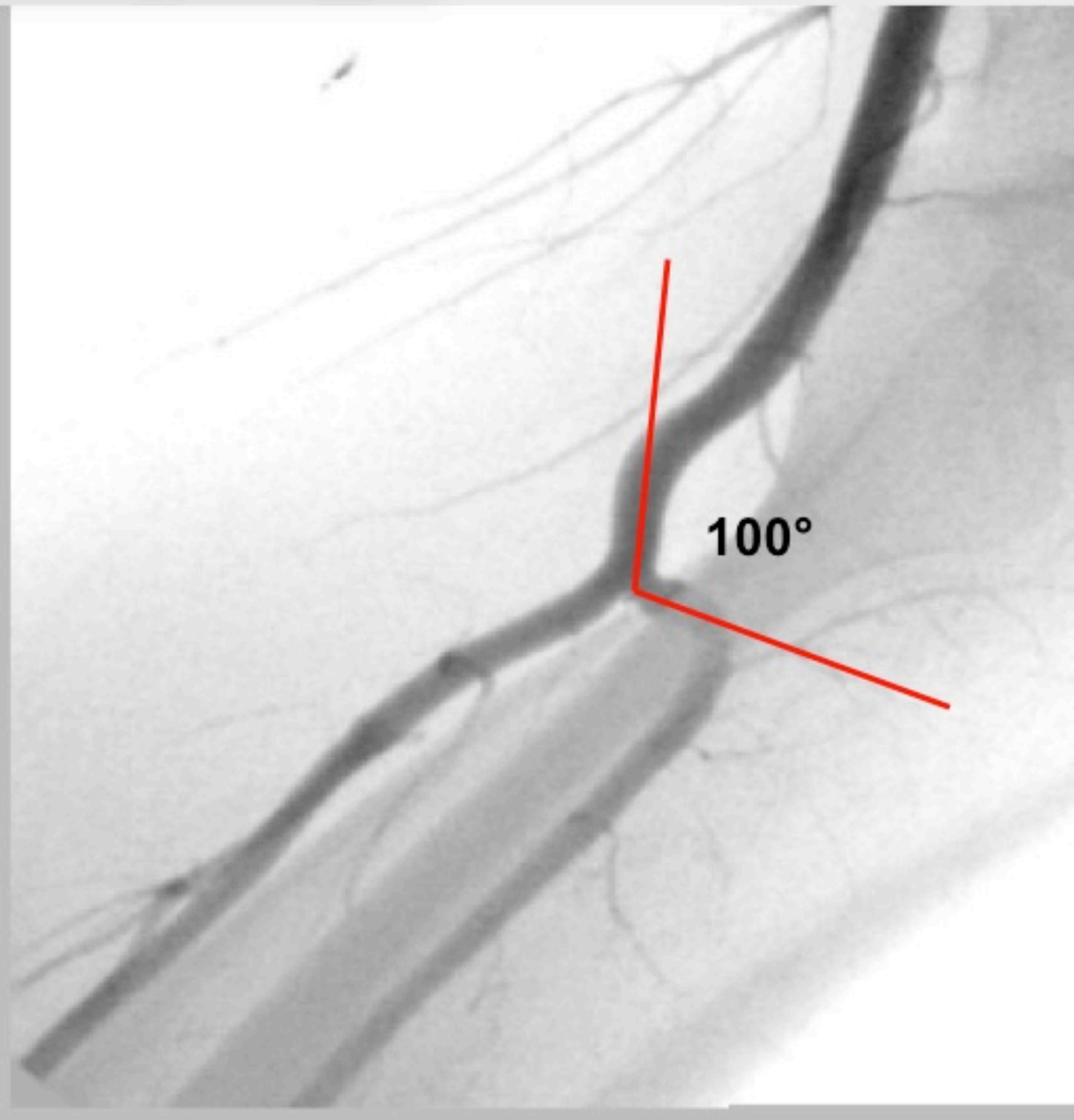



2°
1°
3°

Popliteal artery study



Standard AP projection:
extended knee



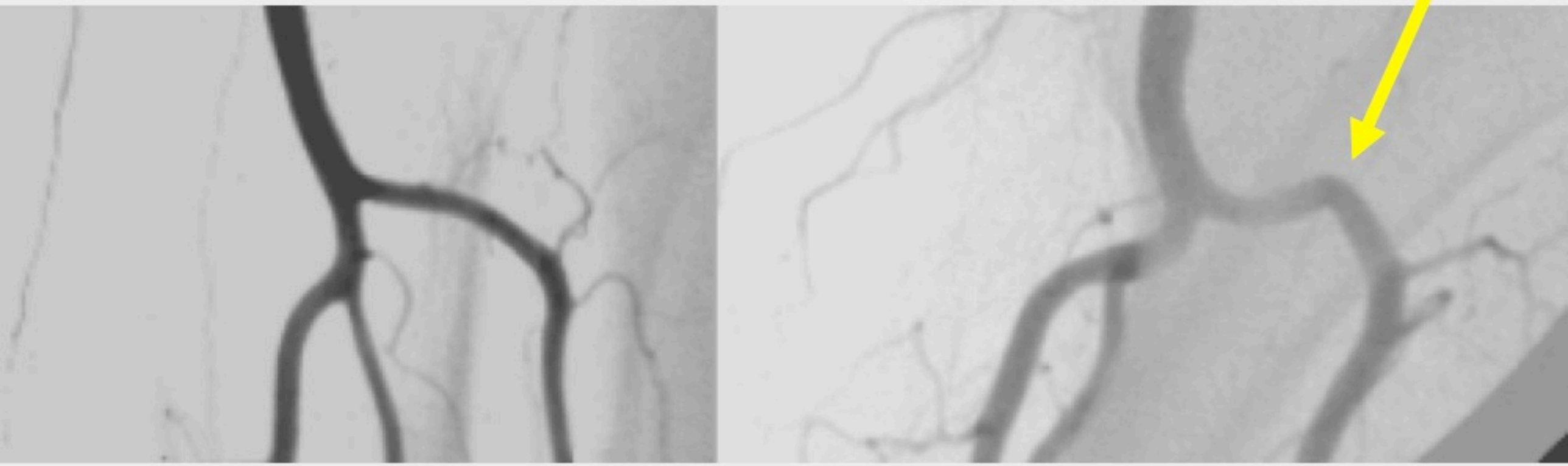
Latero-lateral projection:
Flexed knee

Popliteal artery study

Standard AP projection:
extended knee

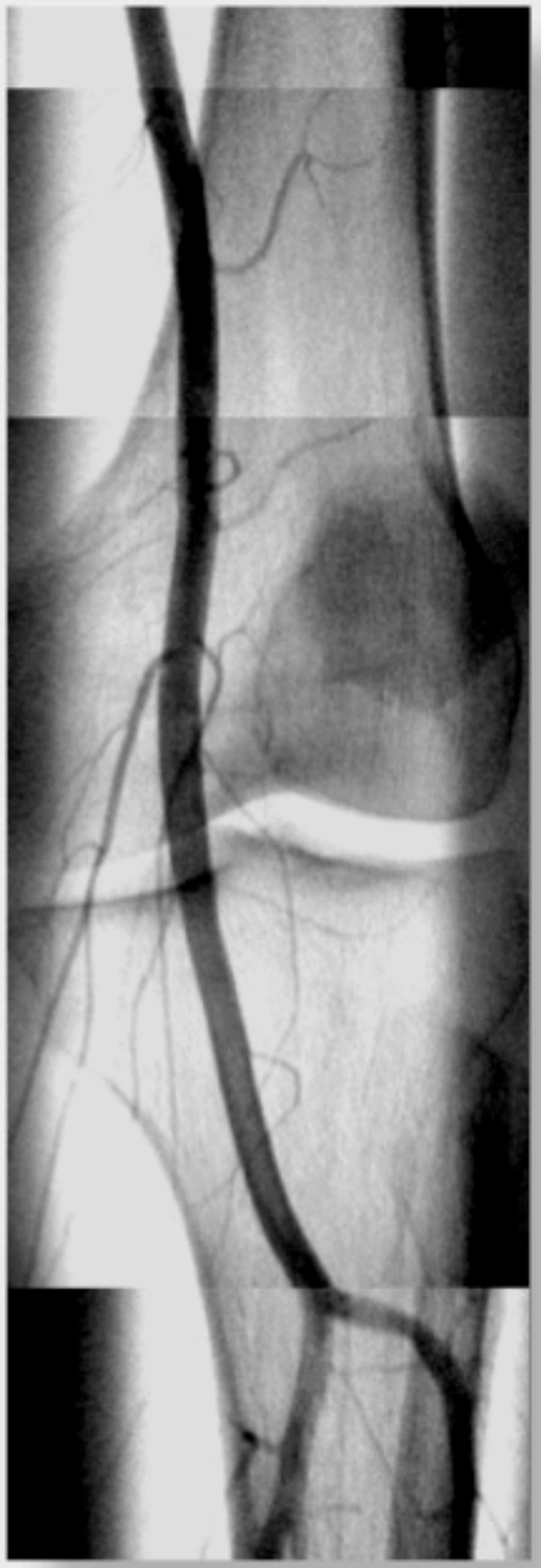
Latero-lateral projection:
Flexed knee

Popliteal artery study



The anterior tibial artery passage through membrana interossea: a fixed point

36 yrs



62 yrs

75 yrs

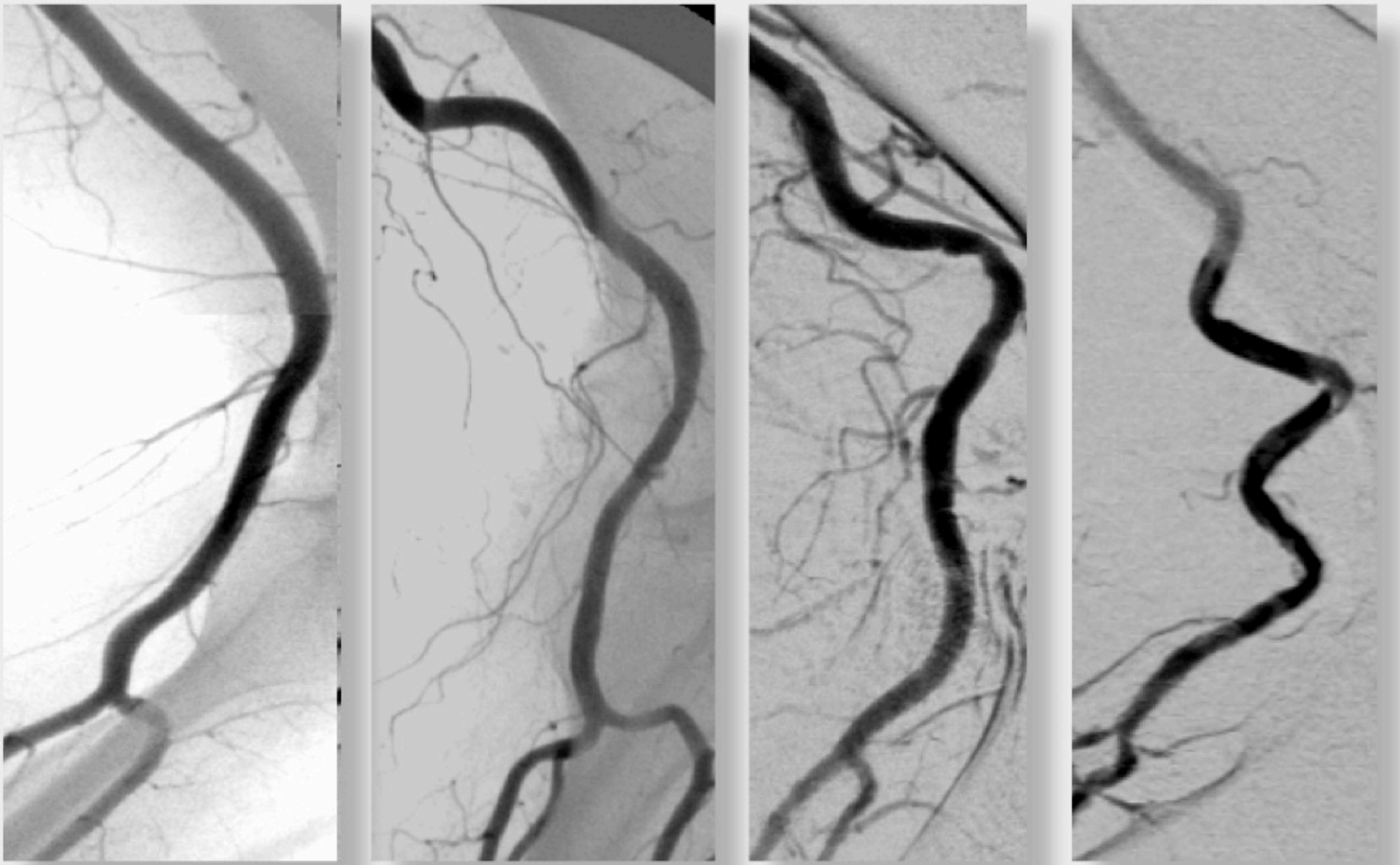
84 yrs

36 yrs

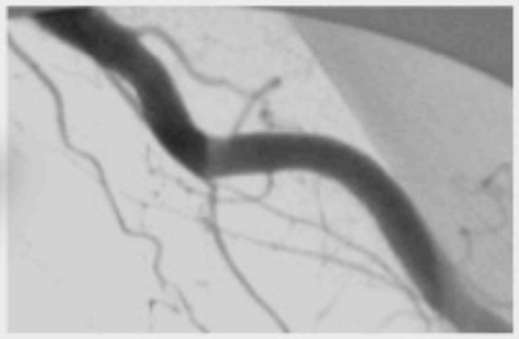
62 yrs

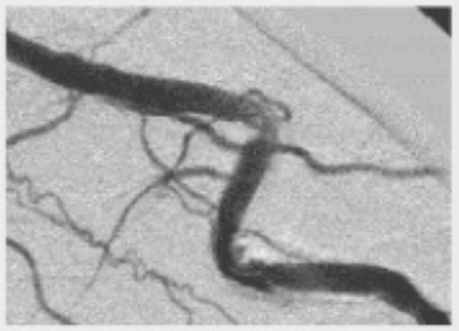
75 yrs

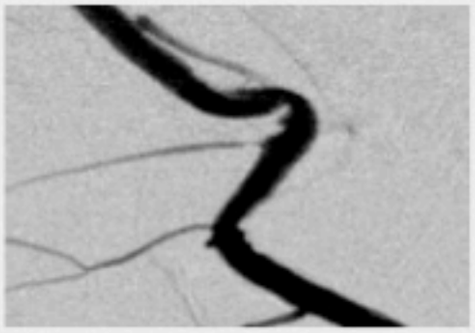
84 yrs



Popliteal artery study



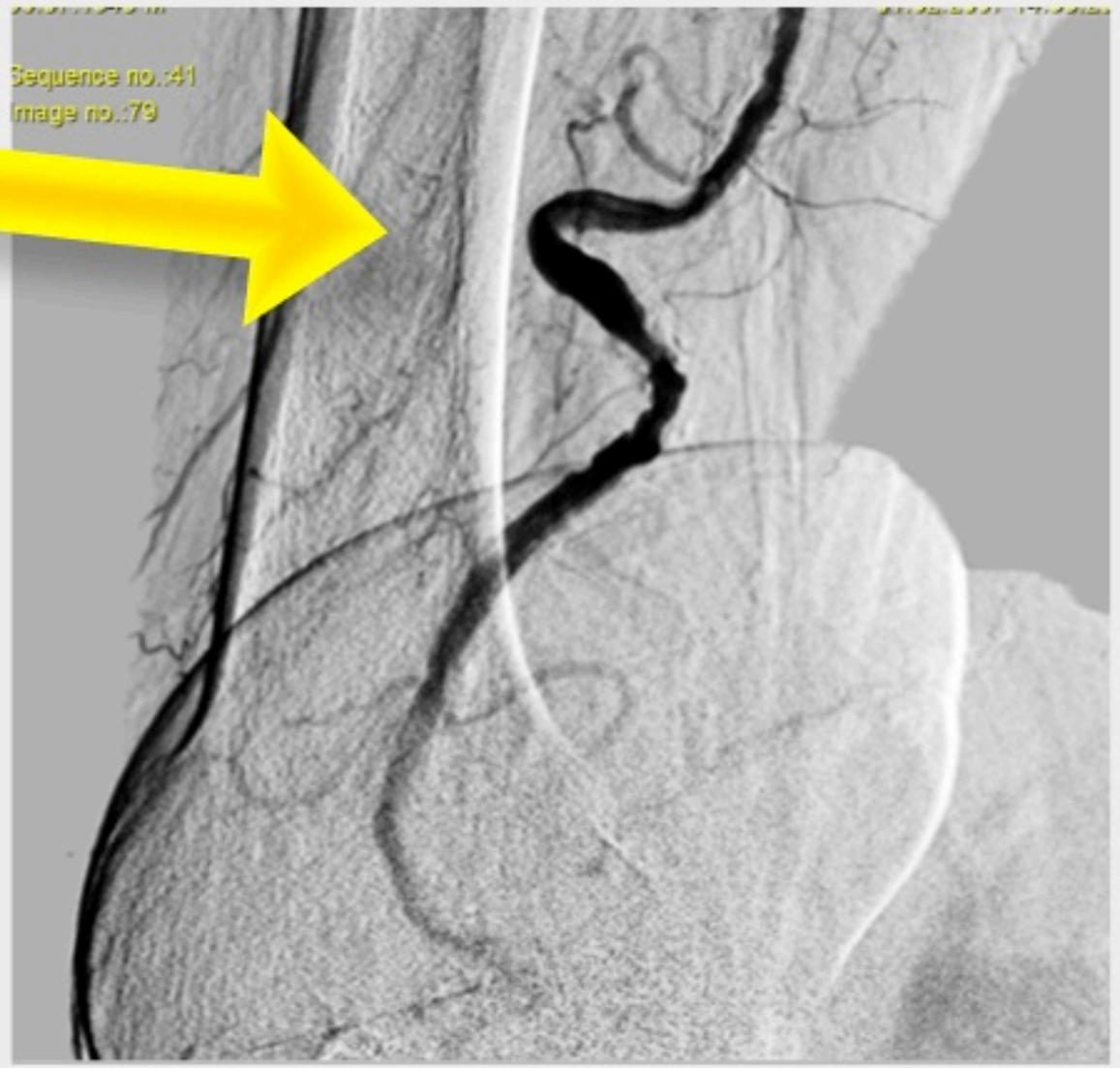




Proximal popliteal kinking

Popliteal artery study

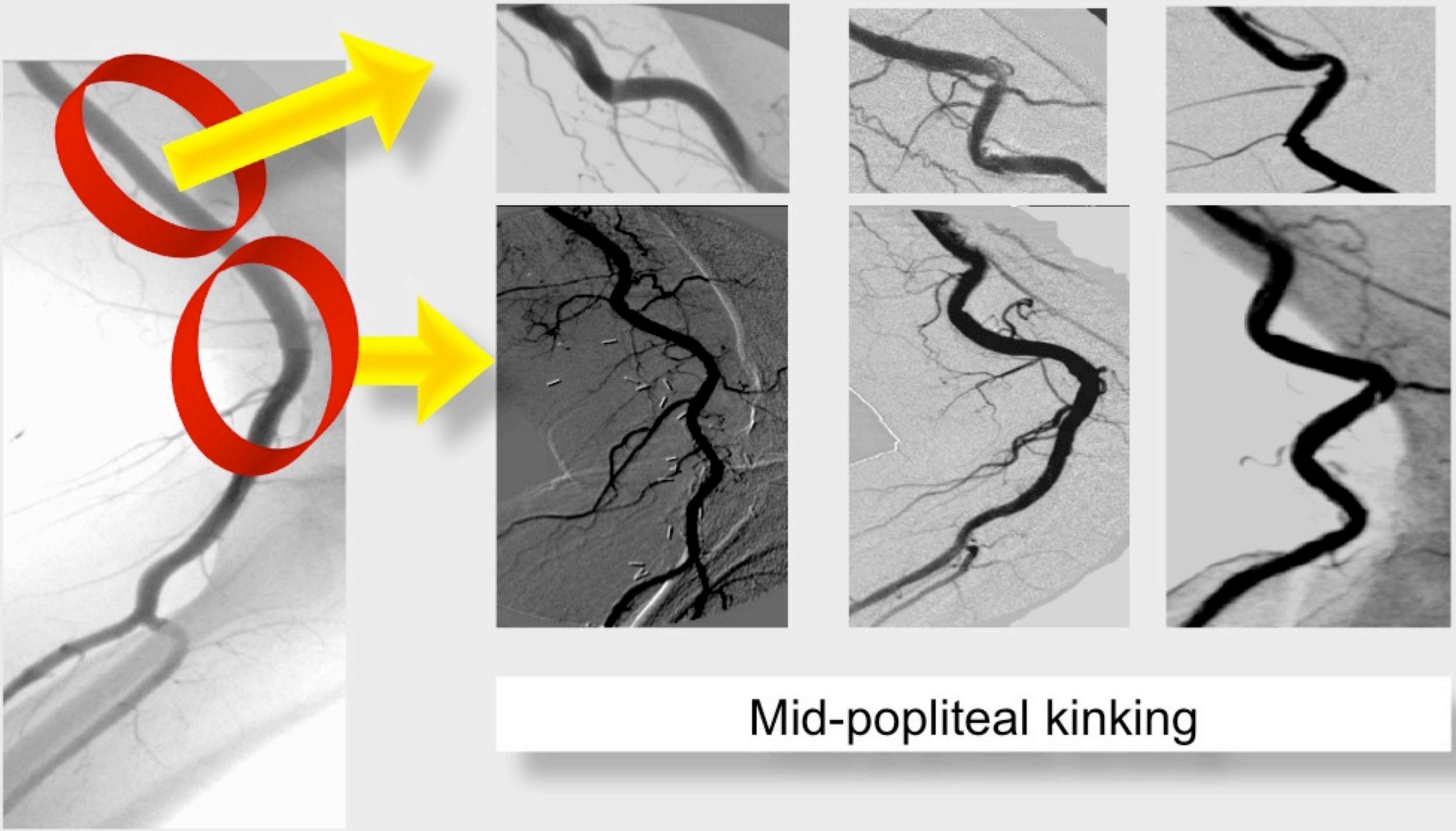
Flexed knee, latero-lateral projection



Flexed knee, cranial AP projection

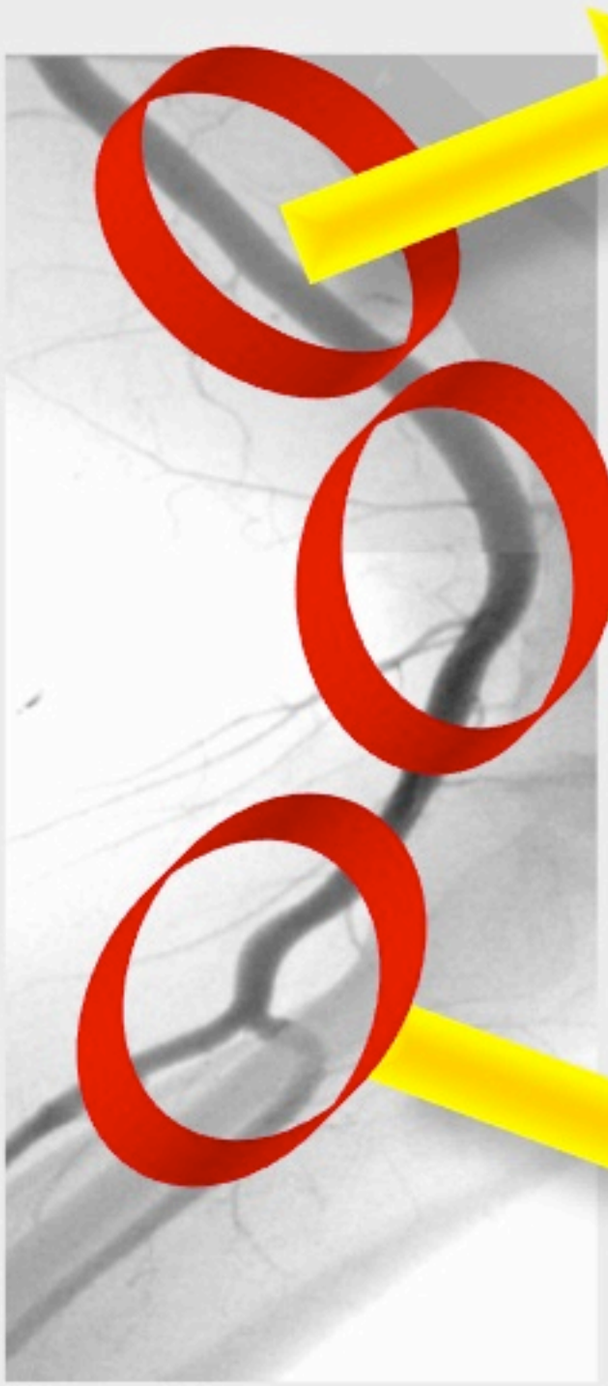
Sometimes the “proximal popliteal kinking “ is in a very high position

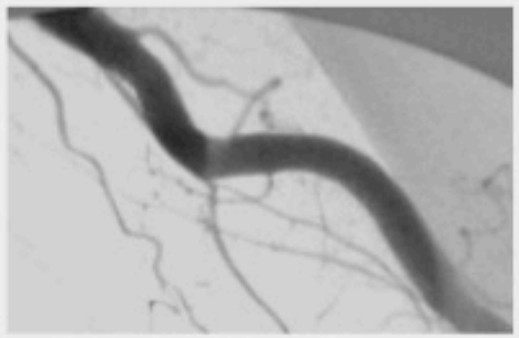
Popliteal artery study

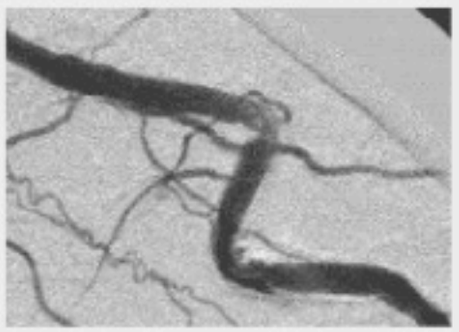


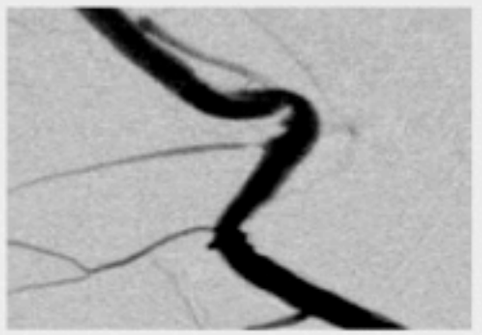
Mid-popliteal kinking

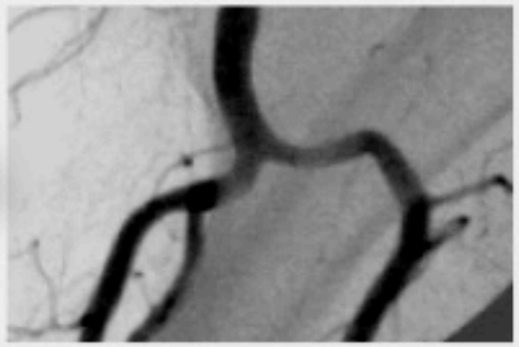
Popliteal artery study

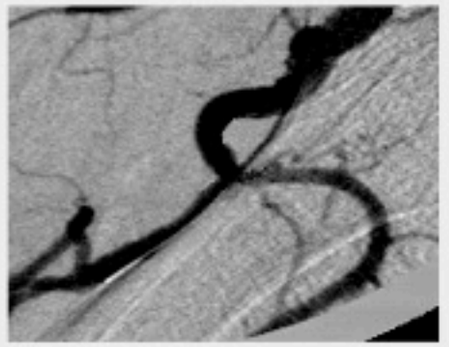


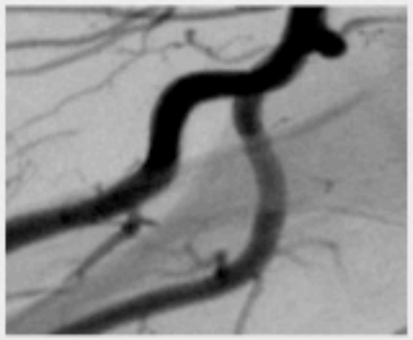












Distal popliteal kinking

POP-CASE 1

PATIENT DATA

- 82-year-old female
- Type 2 DM
- Gangrene of forefoot → Chopart amputation → Not healing

Basal angio

POP-CASE 1

After ballooning

POP-CASE 1

Open questions:

- **To stent or not to stent ?**
- **If stenting, where ?**

Flexed knee study

POP-CASE 1

Stenting

- **Self-expandable nitinol stent 5 x 40 mm**
- **Self-expandable nitinol stent 5 x 60 mm**

Final result

POP-CASE 1

POP-CASE 2

PATIENT DATA

- 73-year-old male
- Type 2 DM
- Toe gangrene

Basal angio

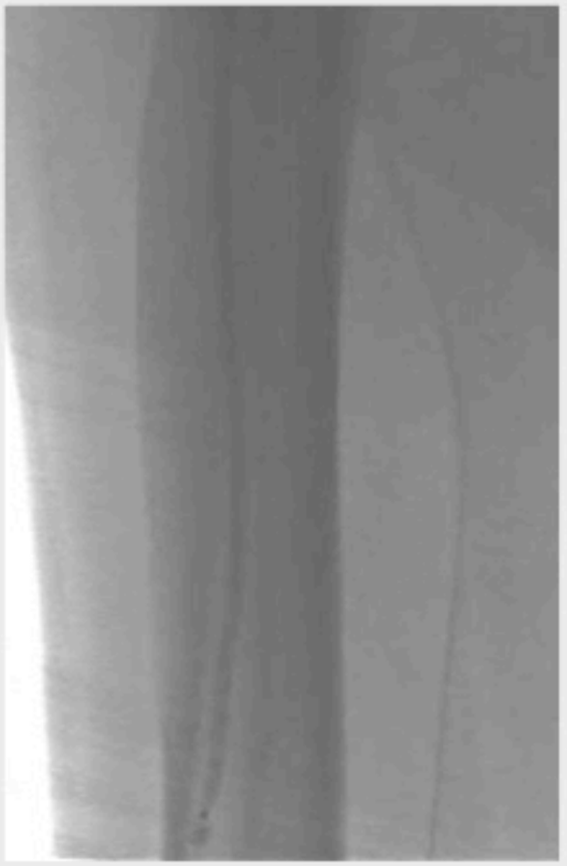
POP-CASE 2

POP-CASE 2

DIAGNOSIS

Focal POP stenosis

POP-CASE 2



Materials & Technique:

- Balloon 4.0 x 30 mm

After ballooning

POP-CASE 2

POP-CASE 2

Technique

- Flexed knee study after ballooning

POP-CASE 2

Extended knee: good result

Flexed knee: obstruction!

POP-CASE 2

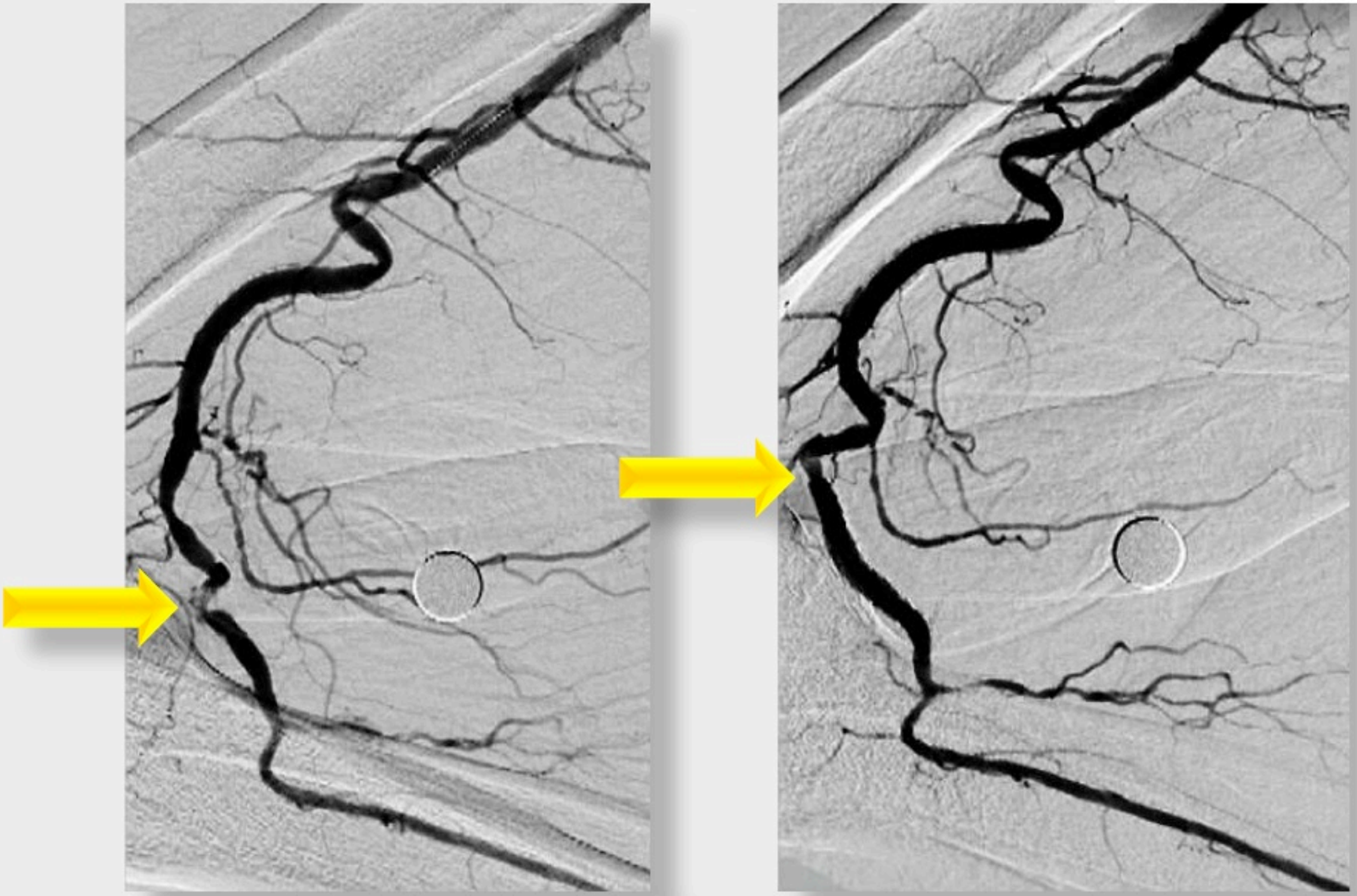
Stenting:

- Self-expandable nitinol stent 5 x 30 mm

Final result

POP-CASE 2

POP-CASE 2



Stenting modified the geometry of POP artery in flexion

POP-CASE 3

PATIENT DATA

- 78-year-old male
- Ex-smoker
- 12-yr-old saphenous vein FEM-POP bypass

The squatting position is not recommended for people with bypass….

Radiological study

- Measure contrast dye
- Calibrate your DSA
- Coronary-like study
- Popliteal artery study
- Look for hidden arteries

Note:

Should flexed knee study modify our popliteal treatment strategy?

In our experience flexed-knee popliteal artery study is essential in guiding complex popliteal treatment and stenting

Radiological study

- Measure contrast dye
- Calibrate your DSA
- Coronary like study
- Popliteal artery study
- Look for hidden arteries

Hidden-CASE 1

PATIENT DATA

- 79-year-old male
- Type 2 DM
- Third degree toe gangrene

Hidden-CASE 1

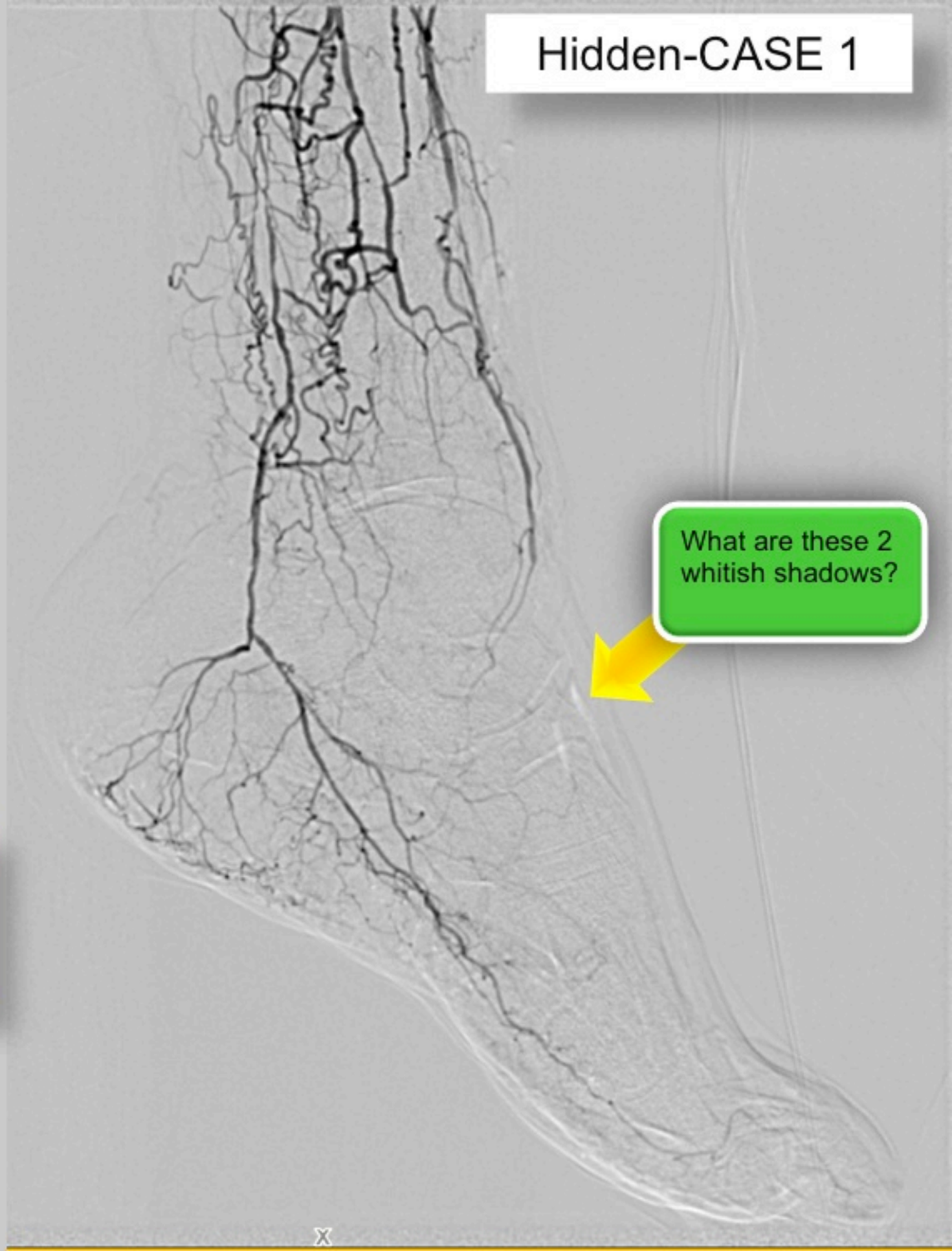
DIAGNOSIS

- Long in-stent occlusion of SFA & POP
- ATA & PTA occlusion
- Good PER patency

Foot angio

15 FPS 182 frames = 12”

Hidden-CASE 1



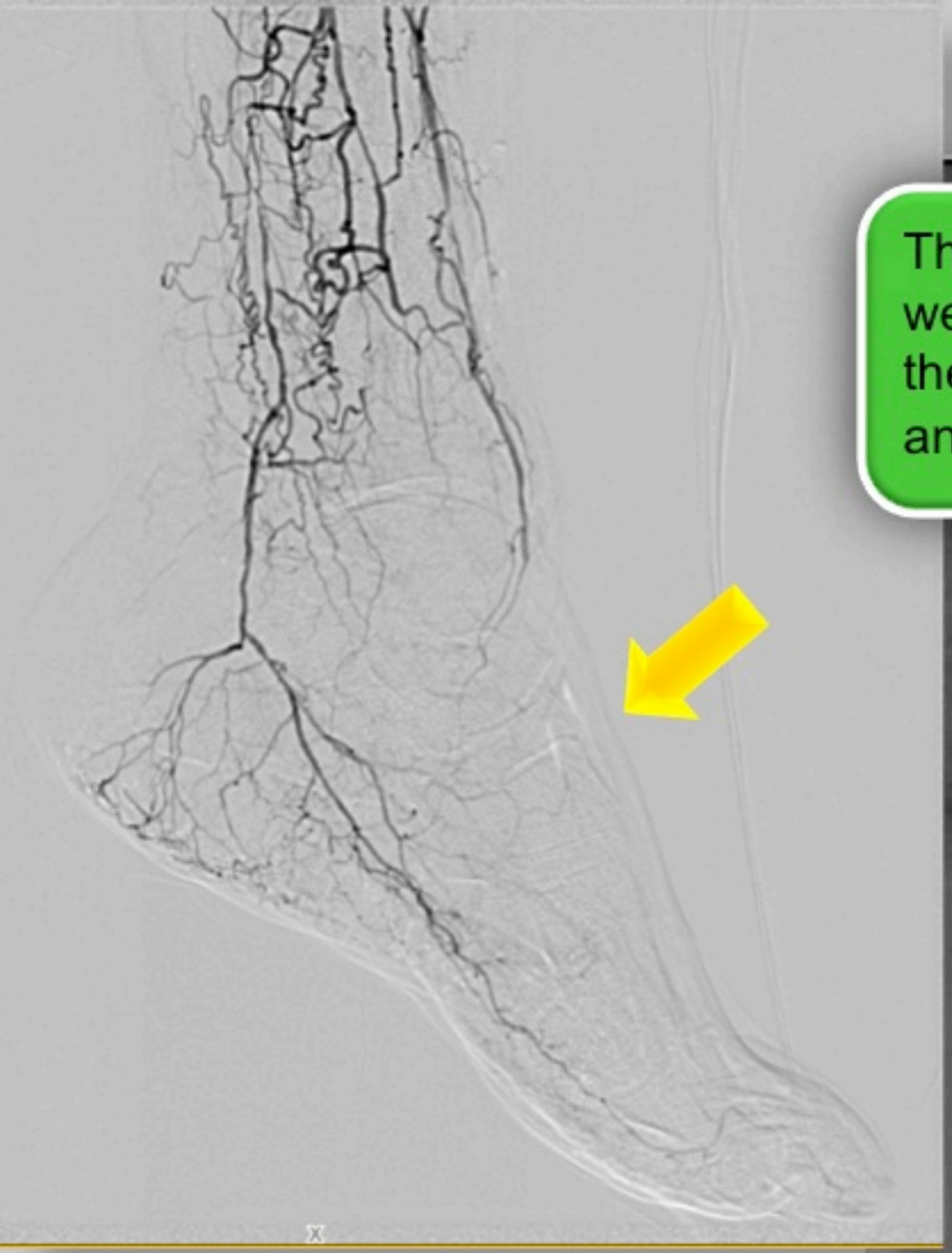
DIAGNOSIS

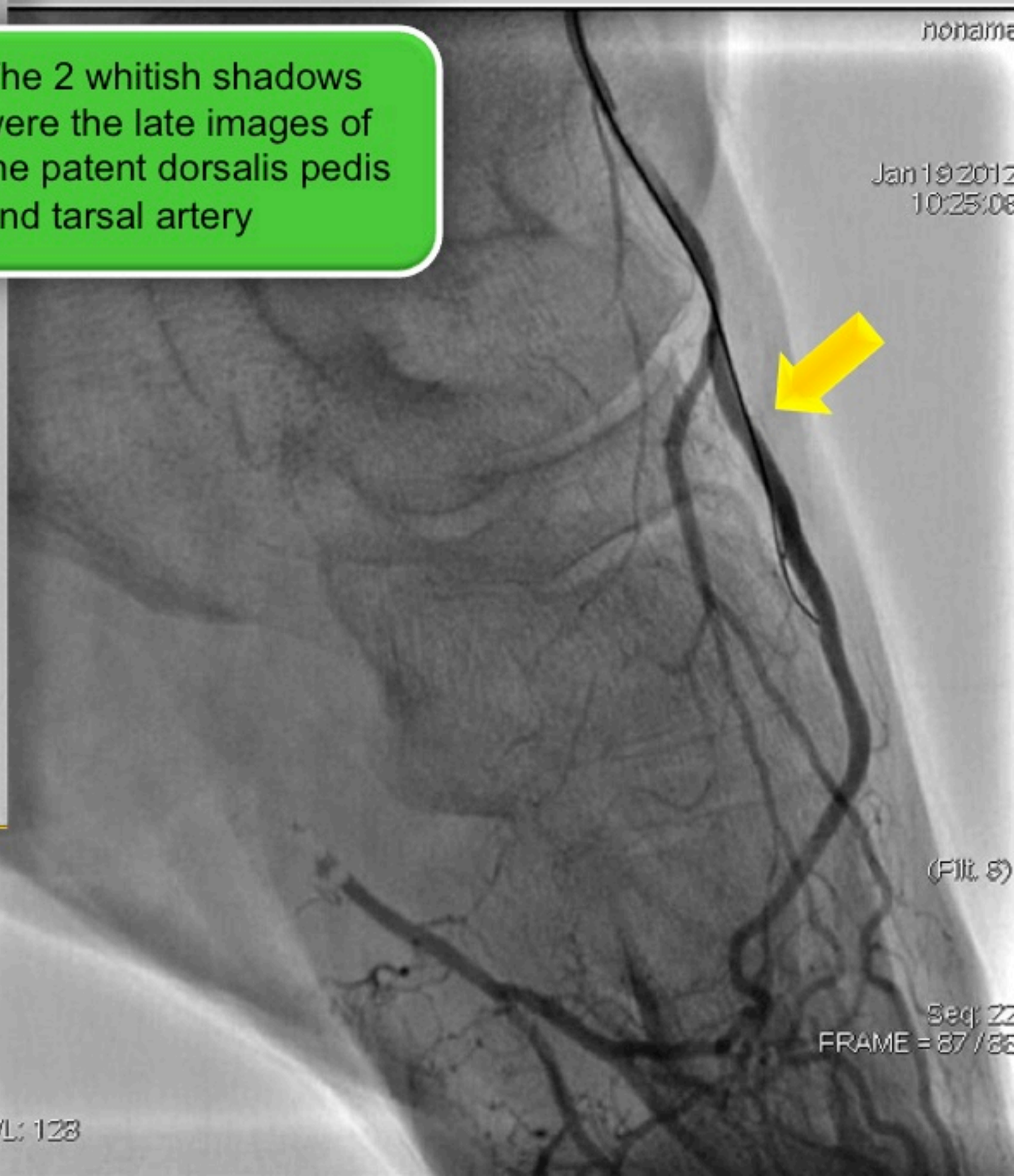
- No signs of dorsalis pedis, tarsal, plantar arch, lateral plantar arteries

Subintimal approach of ATA

Delicate and slow injection of dye from the catheter tip

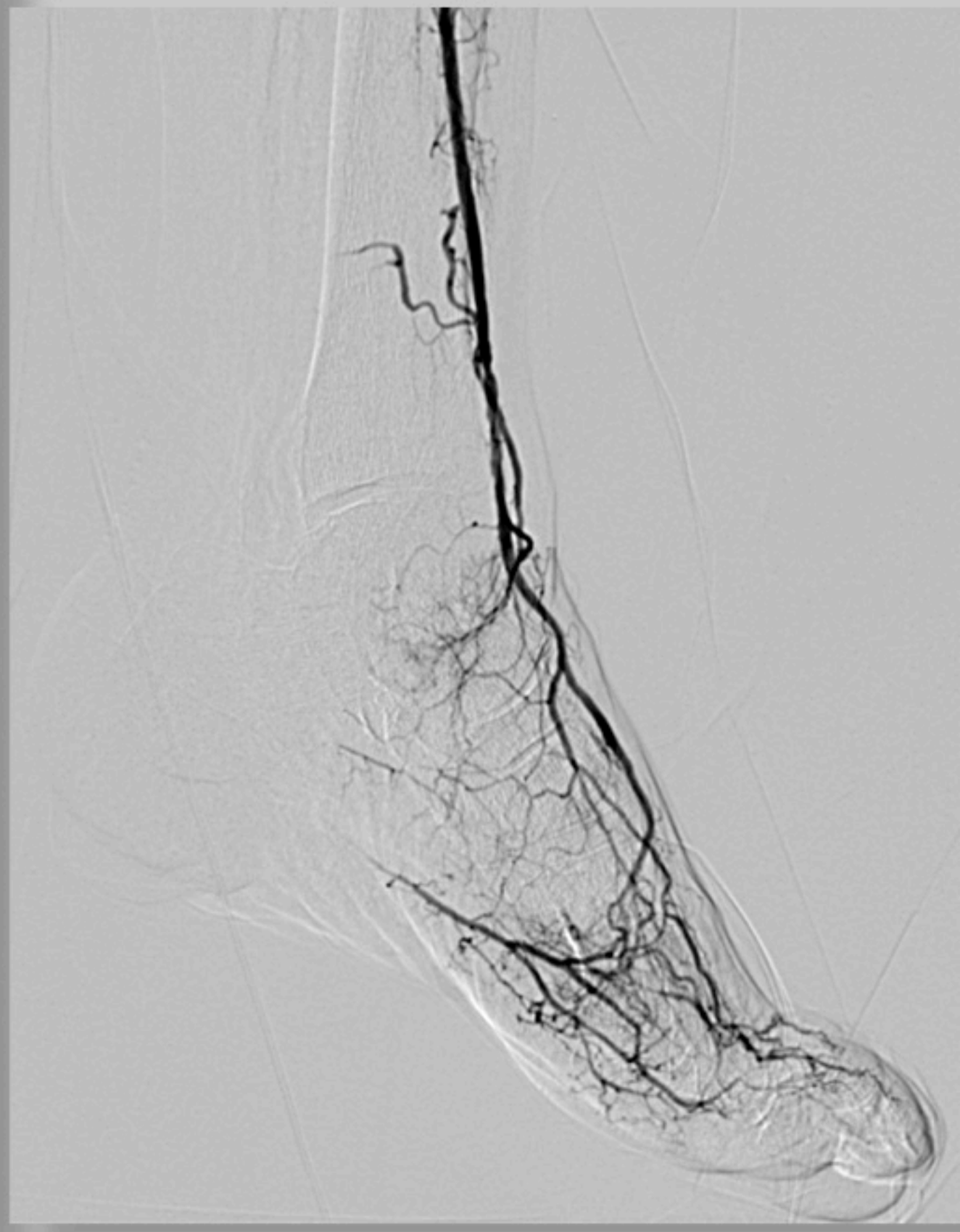
The 2 whitish shadows were the late images of the patent dorsalis pedis and tarsal artery





Final result





Are these feet the same?

J CARDIOVASC SURG 2004;45:203-12

Dorsalis pedis, tarsal and plantar artery bypass

B. AULIVOLA, F.B. POMPOSELLI

Blind operative exploration may be performed in the case of non-visible foot arteries on DSA in cases where patency is suspected on the basis of an audible Dopller signal, [14] altough this is rarely required due to the precise imaging capabilities of modern DSA.

Radiological study

- Measure contrast dye
- Calibrate your DSA
- Coronary-like study
- Popliteal artery study
- Look for hidden arteries

Note:

Adequate imaging of the distal vessels can be difficult to obtain, especially in patients with multilevel vessel disease.

In these cases very long X-ray movies, waiting for late opacification and very distal injection through the exploring catheter at the ankle level, can help in identifying a good distal target vessel.

Never give up on blind distal vessels!