DIABETIC FOOT

The Diabetic Foot

Collection of foot problems which are not unique to, but occur more commonly in diabetic patients

FACTS

- **Commonest cause of hospitalization in DM**
- **Egypt 2/3rd of non traumatic amputations**

Aetiology of the Diabetic Foot

Neuropathy

Reduced response to infection

Ischaemia

Neuropathy

Up to 50% of type 2 diabetic patients have significant neuropathy and at-risk feet

International Consensus on the Management and the Prevention of the Diabetic Foot (2003)

ASSESSMENT OF NEUROPATHY

Neuropathic Foot Changes

- Clawing/Retraction of minor digits
- Atrophy of plantar fatty pad
- Restricted movements of joints
- Muscle wasting
- Warm feet
- Changes to joint alignment
- Skin anhydrosis

Hallett et al: Comprehensive Vascular and Endovascular Surgery © 2004 Elsevier L

Charcot Arthropathy

High Index of suspicion

Diabetic

Hot / red / swelling

Trauma - minor / major

Pain + / -

Architectural Disruption

Ulcer + / -

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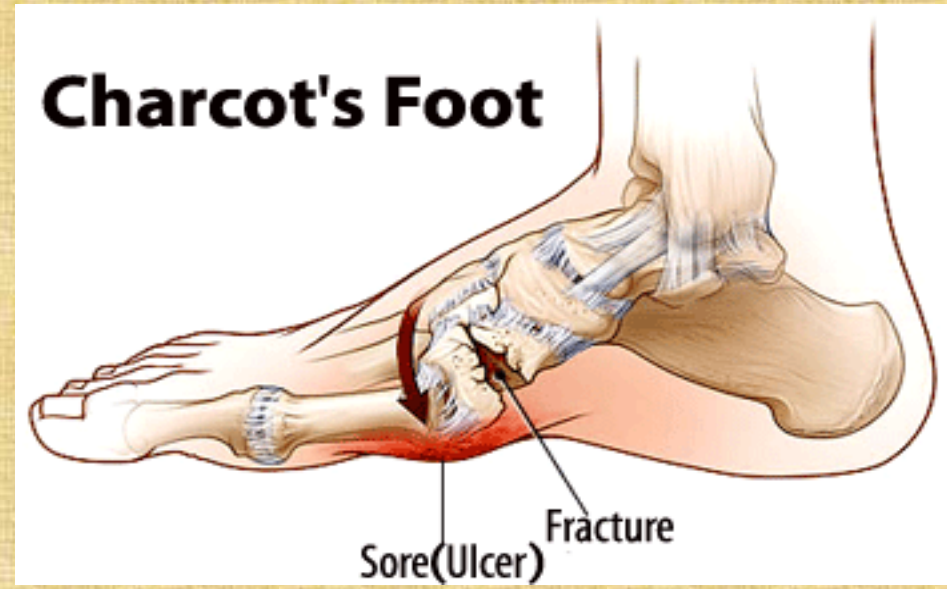


Management of Diabetic Neuropathy

- Look for it!
- Tight glycaemic control
- Painful
  - medication
  - referral to neurologist
- Intensive podiatry/orthotic input
- Pressure Off-Loading

Pressure Off-Loading

Total Contact Cast

Diabetic Air Walker

Aetiology of the Diabetic Foot

Neuropathy

Reduced response to infection

Ischaemia

Diabetic Foot Infection

Polymicrobial - gram (+) cocci, gram (-) bacilli and anaerobes

Redness and swelling may not be present

Suspect if deterioration in glycaemic control

Unusual foot pain with no fracture etc

Diabetic Foot Sepsis

Surgical principles

Drain pus urgently / immediately

Xray foot

Assess perfusion

Debride necrotic tissue

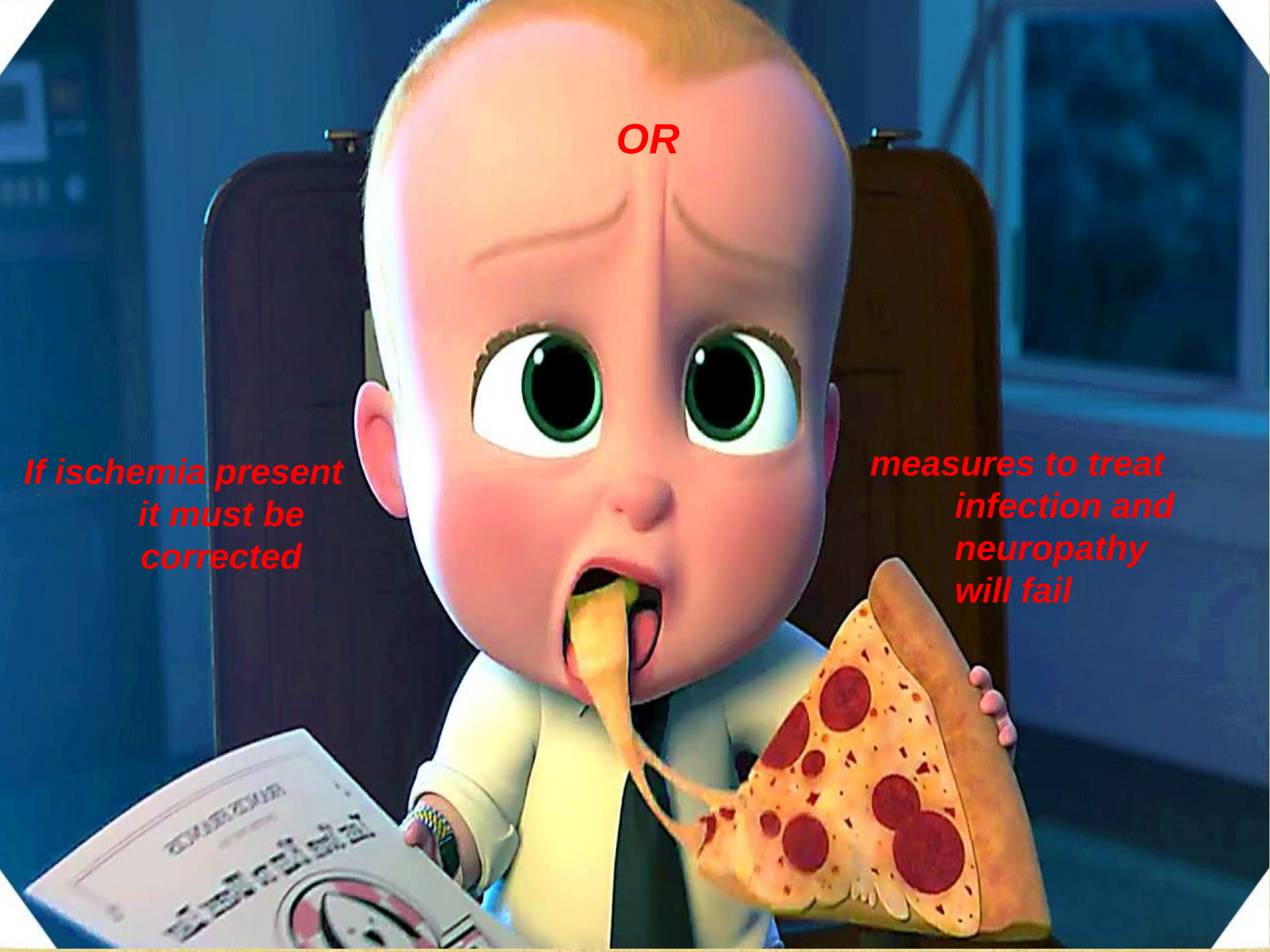
Revascularise early if required

MRI useful to assess soft tissues


R
L
R

Diabetic Foot Sepsis

Severe ischaemia is present in 5 to 15% of admitted cases of foot sepsis


OR
If ischemia present it must be corrected
measures to treat infection and neuropathy will fail

Aetiology of the Diabetic Foot

Neuropathy

Reduced response to infection

Ischaemia

Diabetic Vascular Disease

Distribution similar to atherosclerosis

Large vessel disease

- **common**
- **early age of onset**
- **rapid progression**

Microvascular disease

- **retinal and renal lesions common**

Assessment of Foot Perfusion

Subjective

palpation of pulses

Objective

Doppler pressures (ankle/brachial index)

toe pressures

Correlation between ankle–brachial index and severity of arterial ischemia.	
ABI	*Clinical status*
1.1 ± 0.1	Normal
0.6 ± 0.2	Intermittent claudication
0.3 ± 0.1	Ischemic rest pain
0.1 ± 0.1	Impending tissue necrosis

NB:ABI UNRELIABLE IN DIABETES/RENAL FAILURE/ RHEUMATOID ARTHRITIS/LEG SWELLING


C.M.C HOSPITAL VELLOR

Doppler Studies

Low readings (ABI <0.8)

confirm ischaemia

High readings (ABI >1.1)

difficult to interpret if no pulses palpable


PAPER LOADING UNIT(PLU)
USE ONLY THERMAL RECORDING PAPER
MADRAS ENGINEERING SERVICES
REMOTE
DOPPLER
PPG

Toe Pressures

Better predictors of wound healing

Diabetics

- toe pressure
- skin perfusion pressure

<40mmHg → healing very unlikely

40 to 60mmHg → healing likely


MANAGMENT

Management - Medical

↓ Progression of disease

Stop smoking

Rx predisposing factors

Foot care

Management - Medical

↓ progression of disease

↑ blood flow

Exercises

Drugs

-Antiplatelet :Aspirin / ticlopidine / clopidogrel

-Dipyridamole (Persantin)

-Pentoxiphylline (Trental)

-Cilostazol (Pletoz)

Management - medical

↓ progression of disease

↑ blood flow

Relief of pain

-NSAIDS: check renal functions

-Opiates: cause constipation

-Epidural analgesia

-Antibiotic

-Drainage abscess

Management - intervention

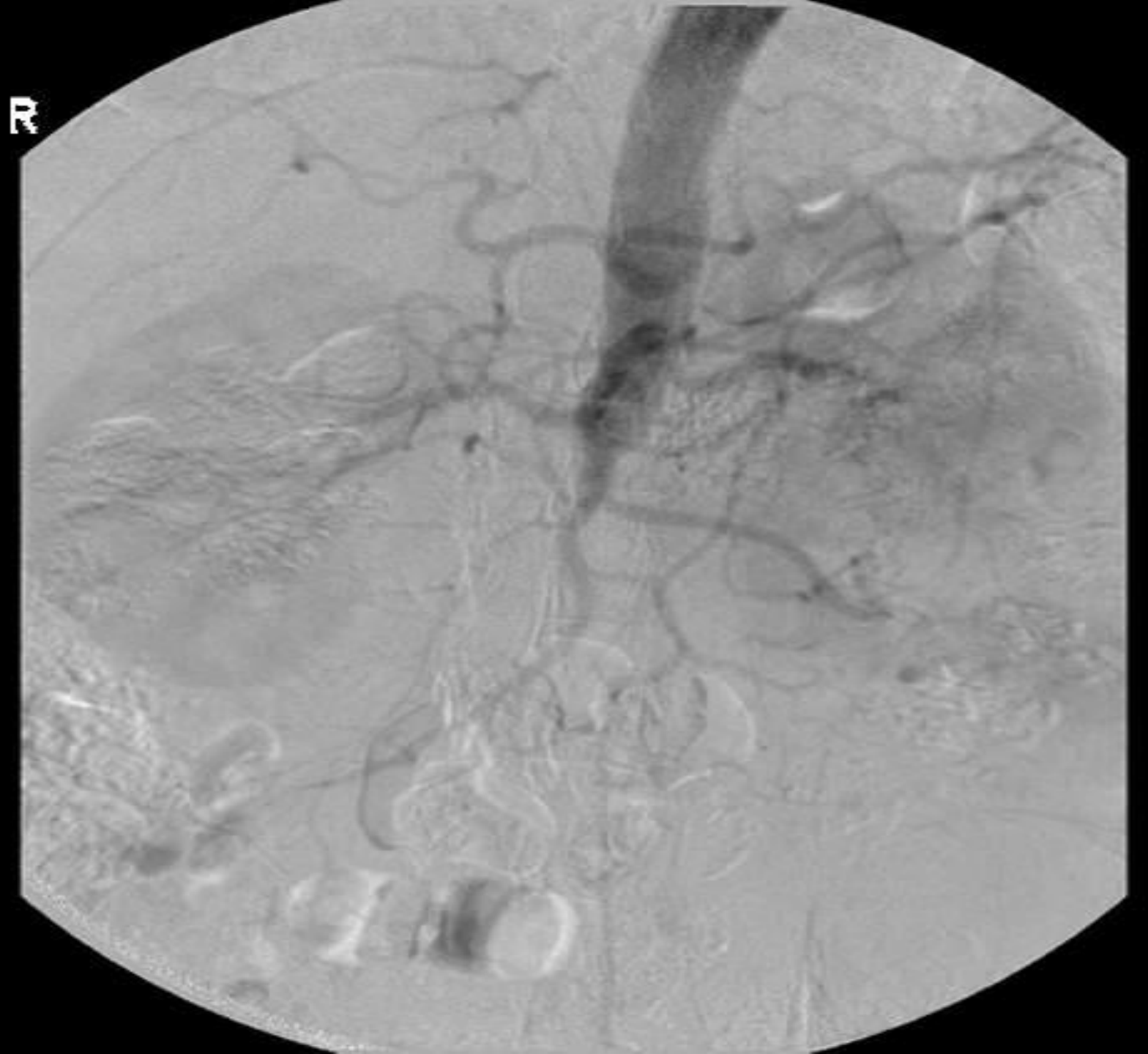
Endovascular

- Balloon angioplasty +/- Stent

Surgery

- Bypass
  - Anatomical
    - Aorto-bifemoral
    - Ileo-femoral
    - Femoro-popliteal
  - Extra-anatomical
    - Axillo-bifemoral
    - Femoro-femoral


52 yrs male
Smoking ++
DM X 5 yrs
Rest pain & blackening of right foot x 3
B\L lower limb pulses absent
ABI R - 0 , L – 0.2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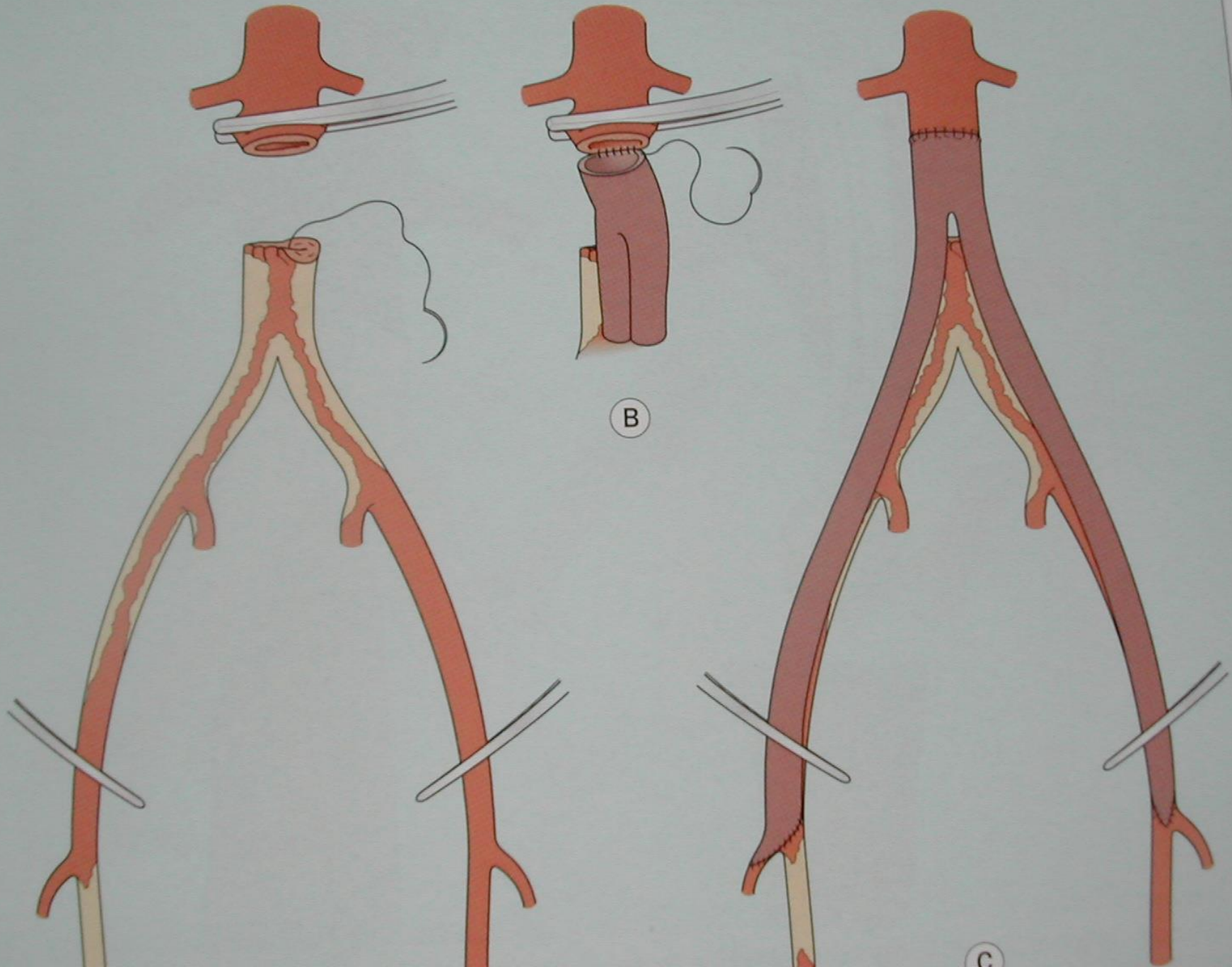
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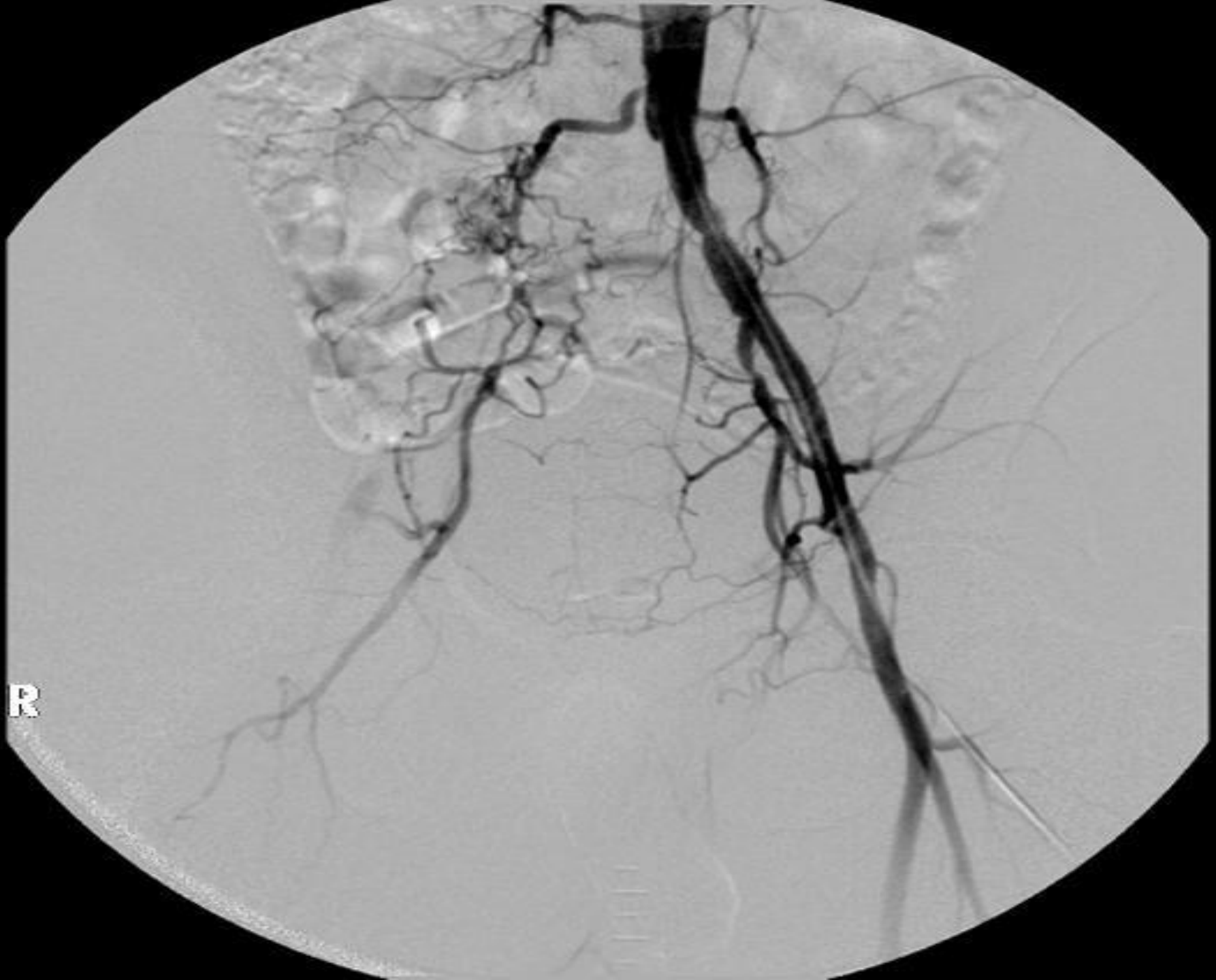
C


Post Op ABI left 1.1
Right stump healed well


55 yrs male
DM x 6 yrs
Smoking many years
Rest pain / nonhealing wound R foot x 4 m
Right lower limb pulses absent
ABI R – 0.24 L – 1.03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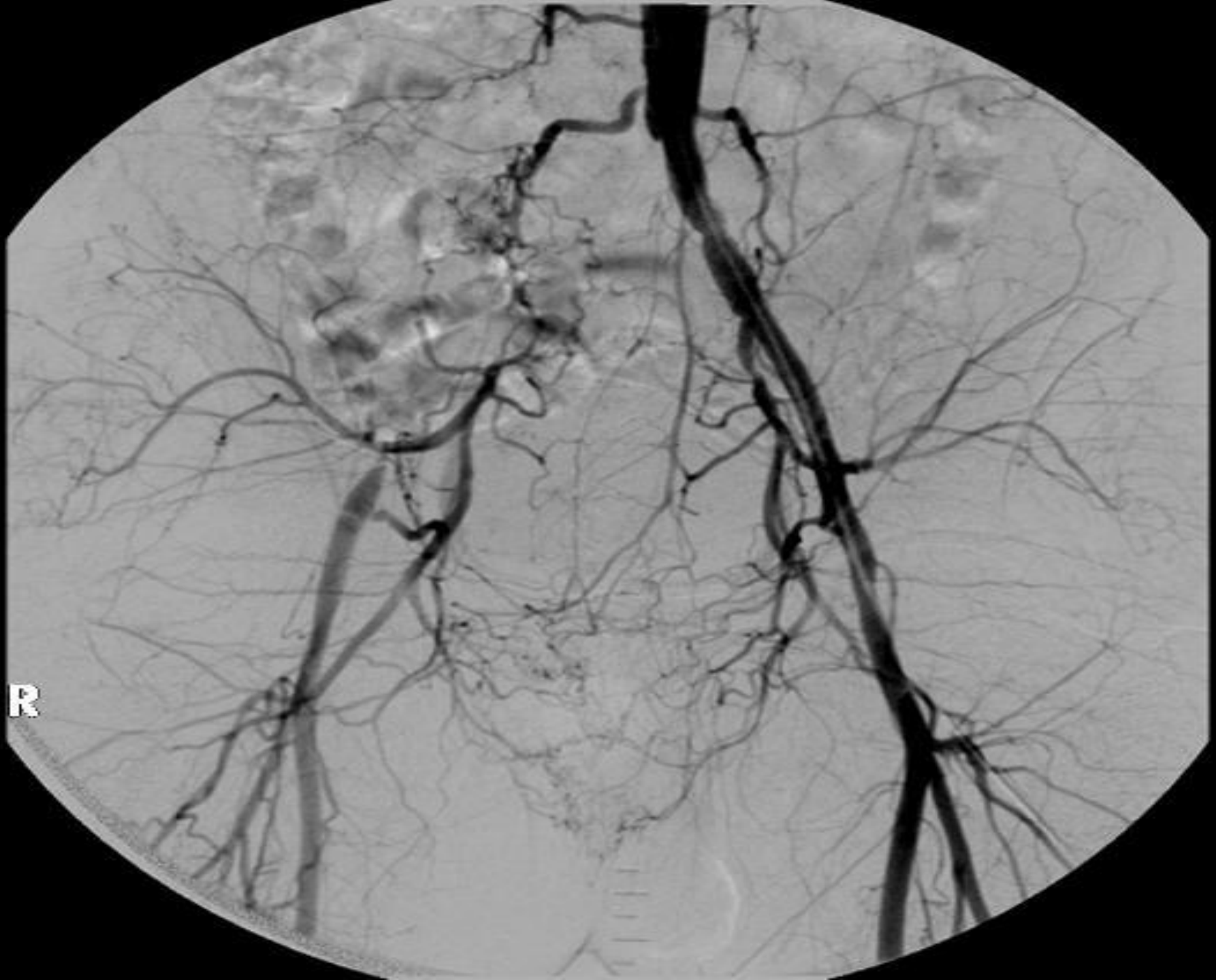
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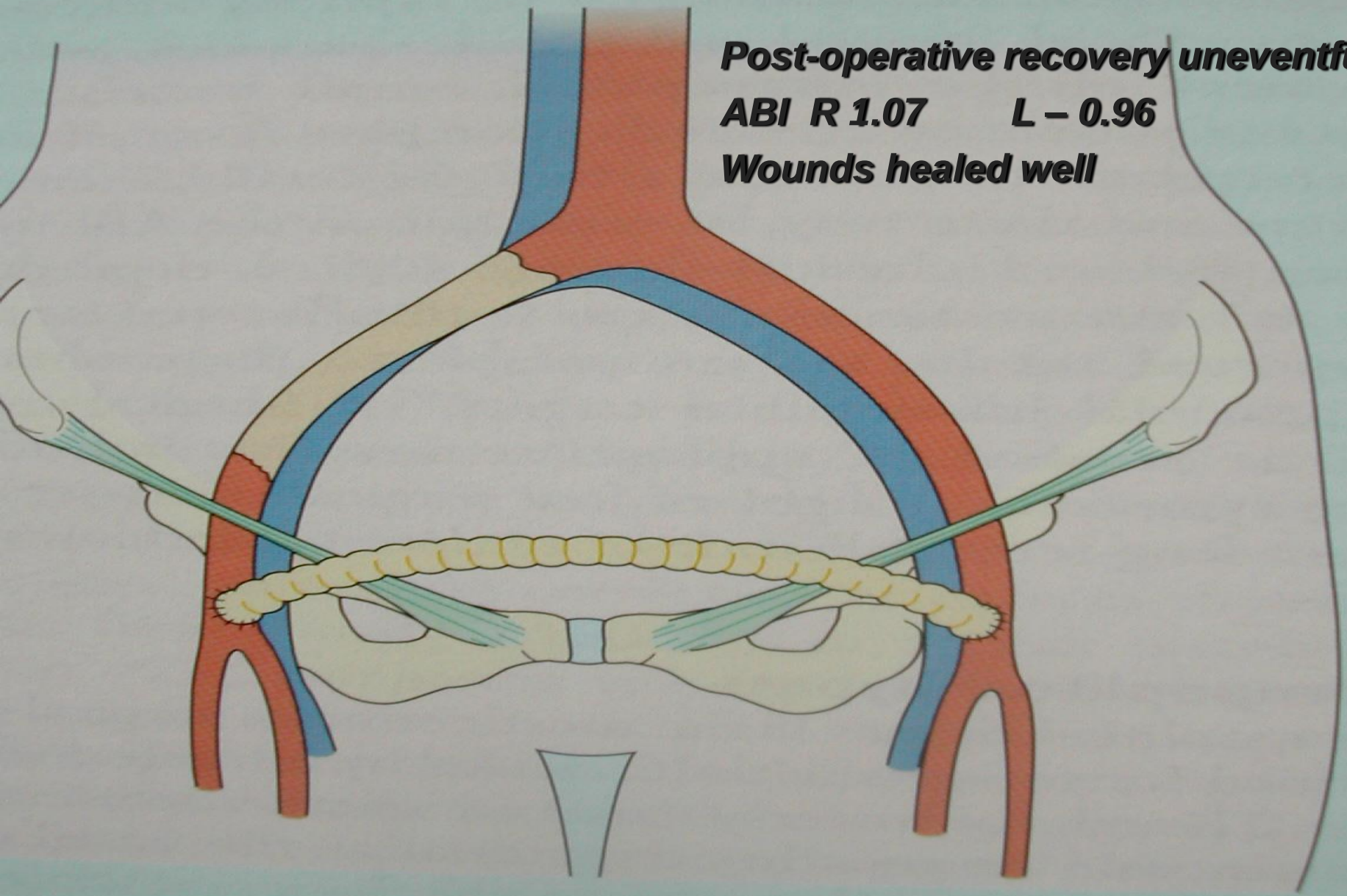
Femorofemoral bypass graft

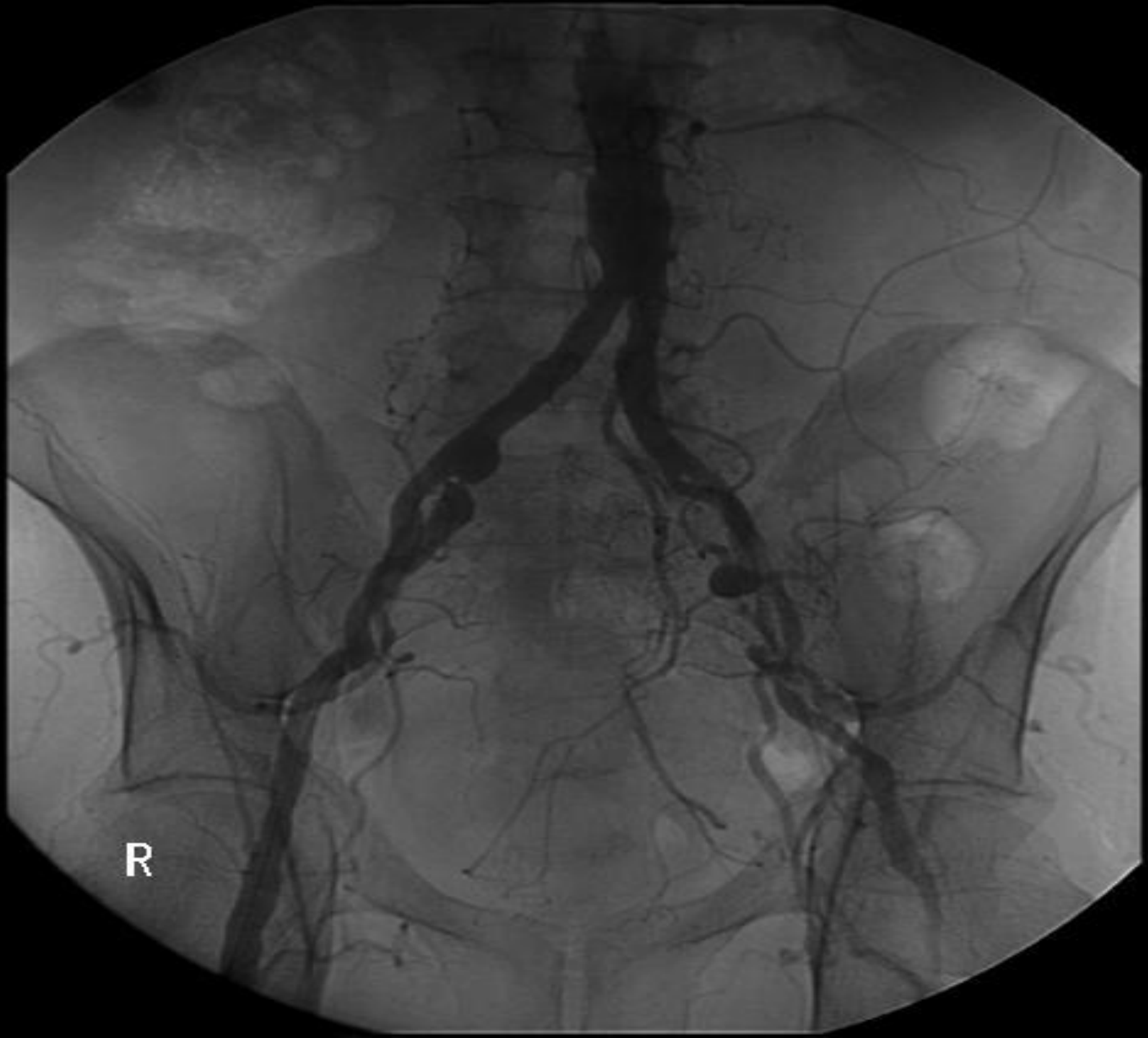


Post-operative recovery uneventful

ABI R 1.07 L – 0.96

Wounds healed well


60 yrs male
DM x 12yrs
HT x 9 yrs
Heavy smoker
3 months H/O ulceration toes L foot & rest pain
ABI R 0.5 L 0.32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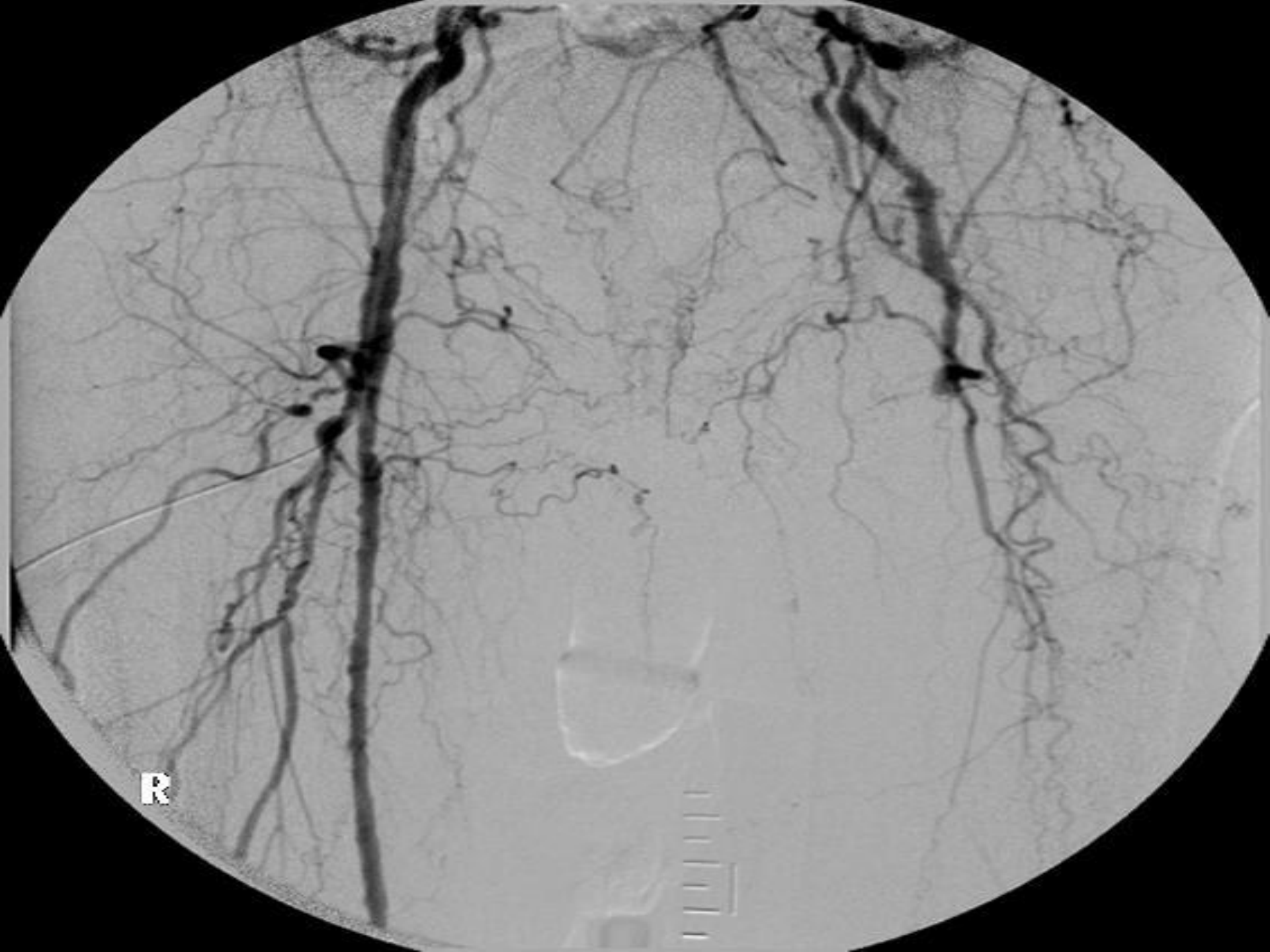
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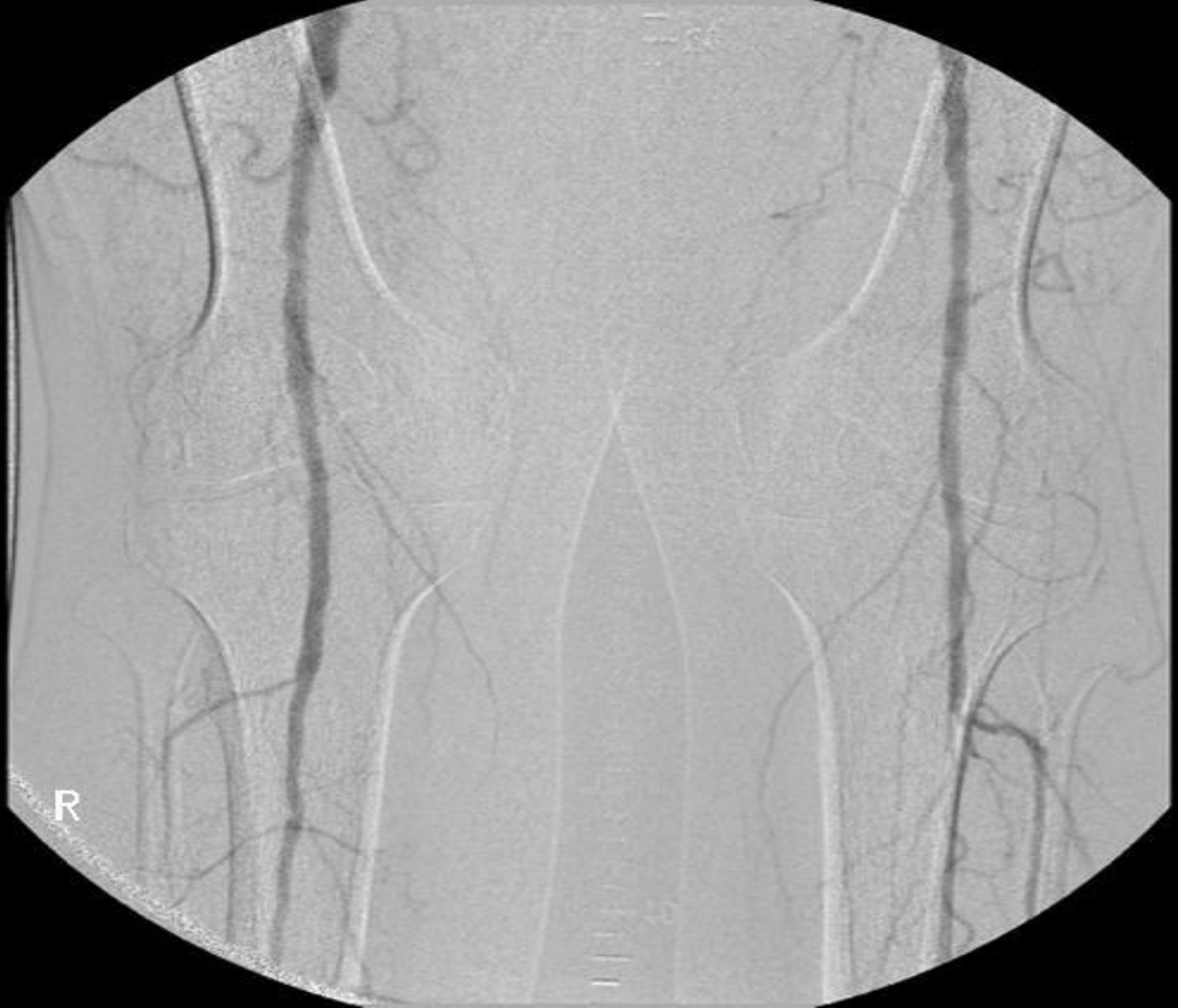
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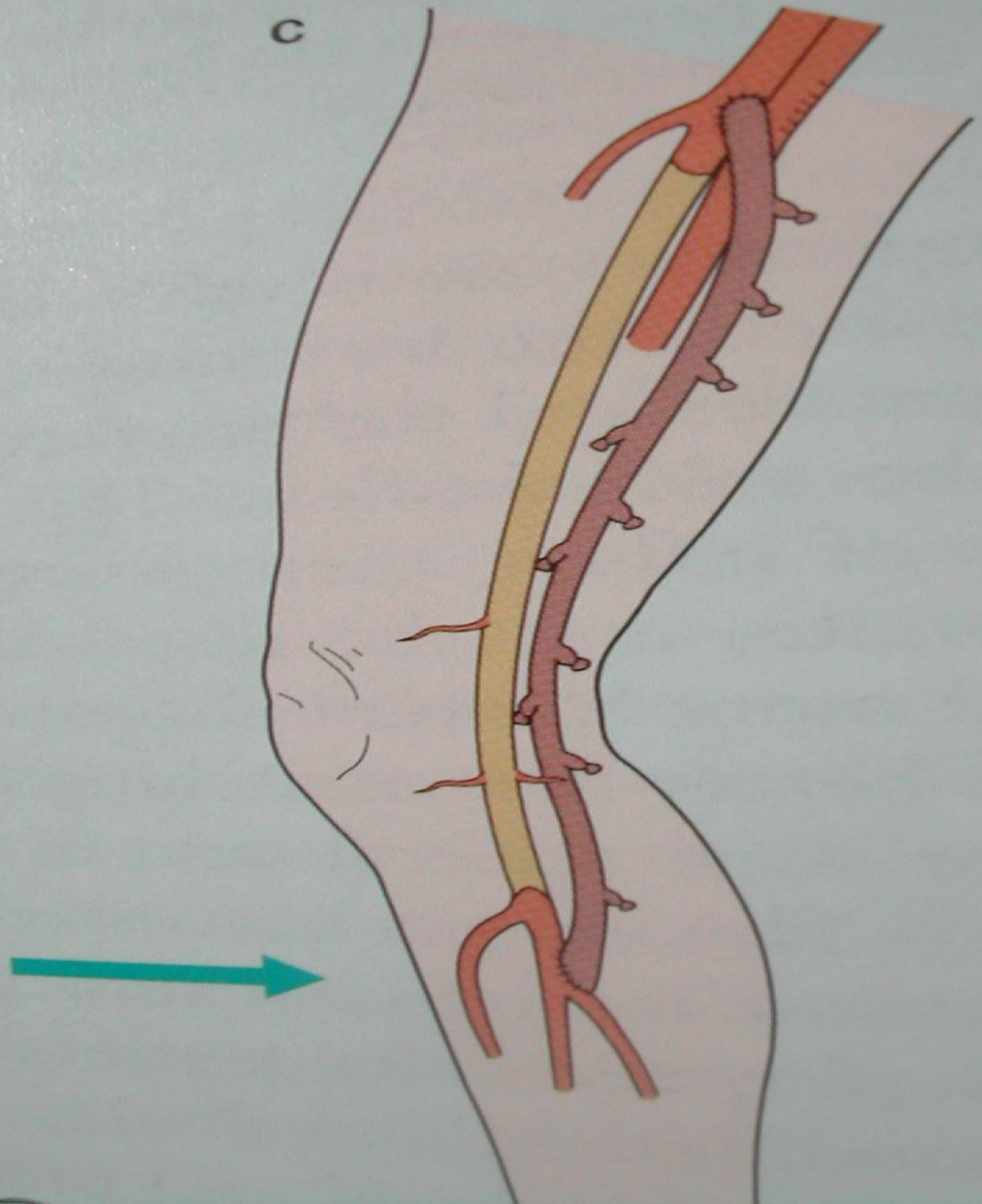
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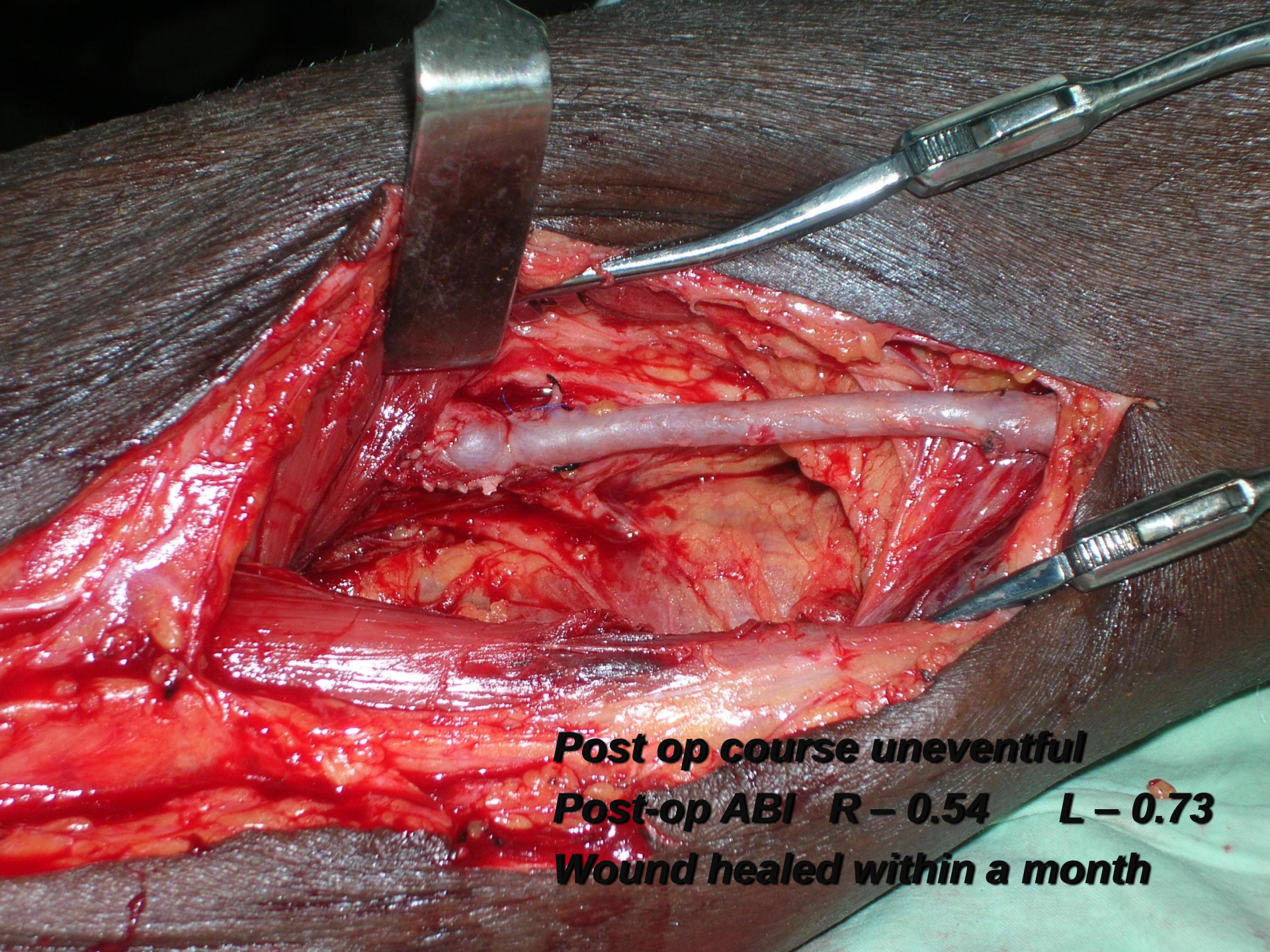
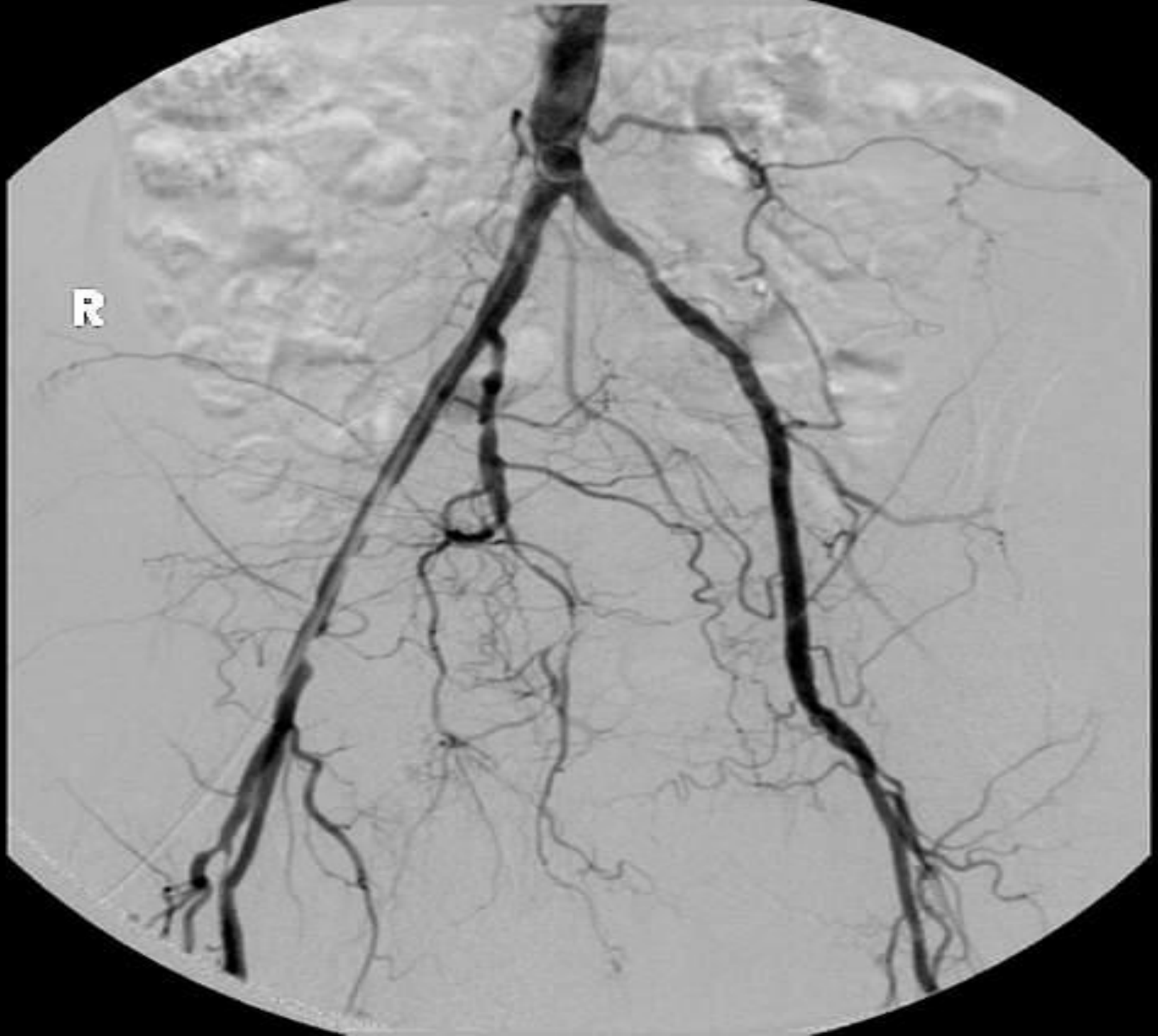

Post op course uneventful
Post-op ABI R – 0.54 L – 0.73
Wound healed within a month


64 yrs male
DM x 16 yrs
HT x 2yrs
Heavy smoker
Painful nonhealing ulcer left foot
ABI R 0.7 L 0.43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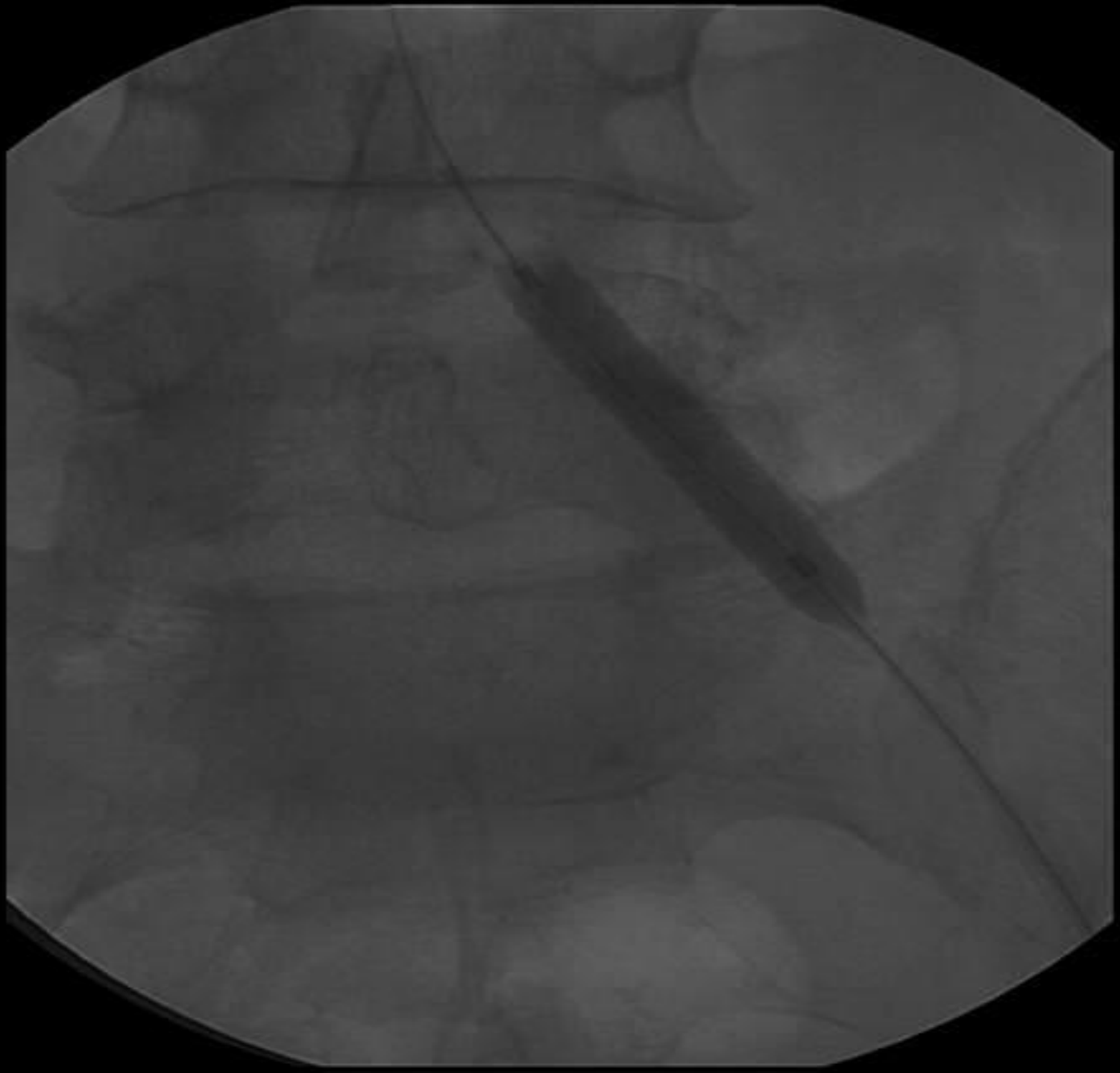

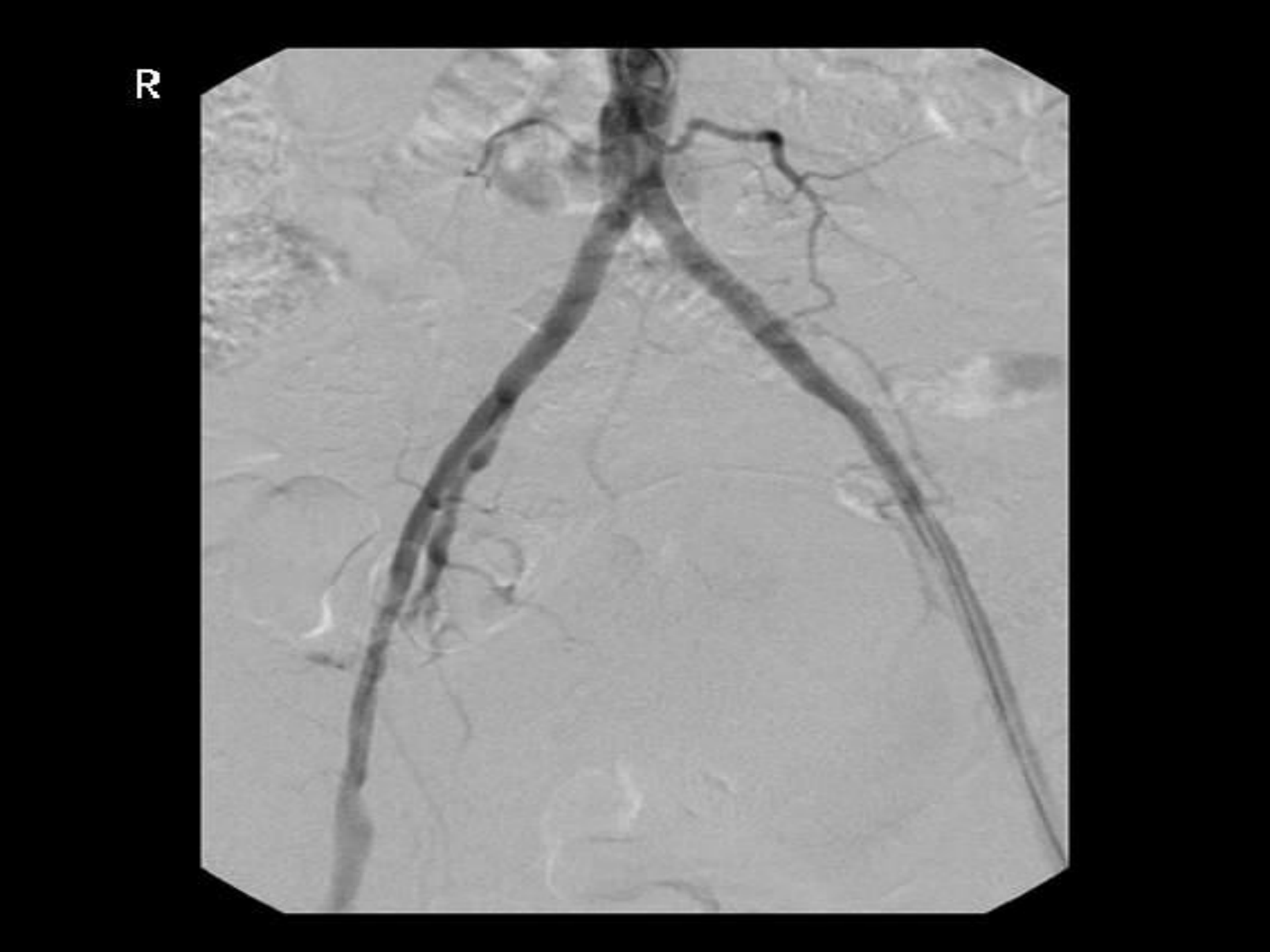
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Management Algorithm for the Diabetic Foot Lesion

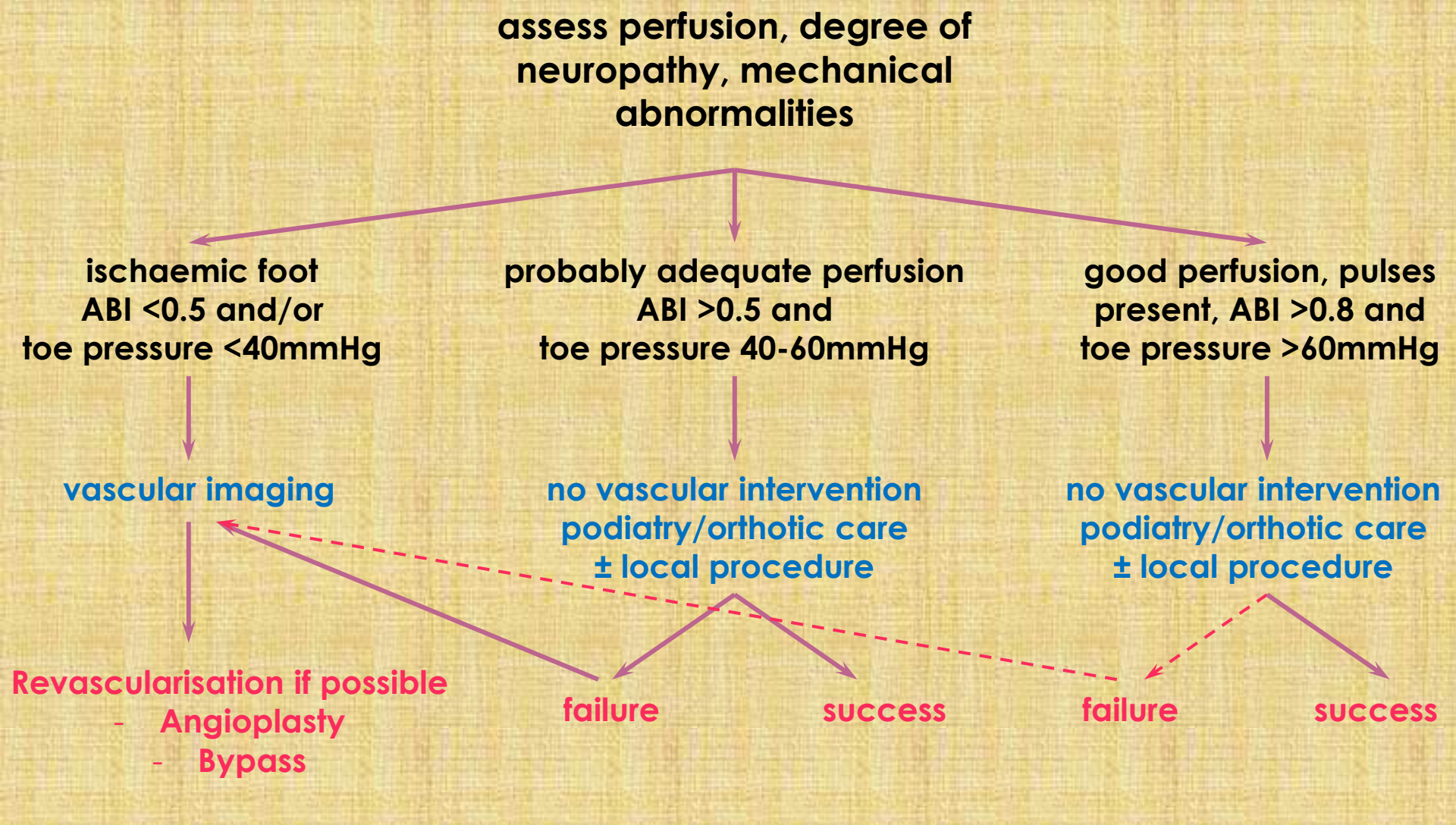
pus/wet gangrene in foot present

drain debride

dry gangrene/ ulceration ±cellulitis/ osteomyelitis

assess perfusion, degree of neuropathy, mechanical abnormalities

Management Algorithm for the Diabetic Foot Lesion




C.M.C.VELLORE



CLASSIFICATION - WAGNER

- Grade 0 - Skin intact, no foot deformity
- Grade 1 - Superficial ulcer
- Grade 2 - Deep ulcer
- Grade 3 - Deep ulcer with infection
- Grade 4 - Limited necrosis
- Grade 5 - Necrosis of the entire foot

Wagner grade 0

- Grade 0 - Skin intact
- Grade 1 - Superficial ulcer
- Grade 2 - Deep ulcer
- Grade 3 - Deep ulcer with infection
- Grade 4 - Limited necrosis
- Grade 5 - Necrosis of the entire foot

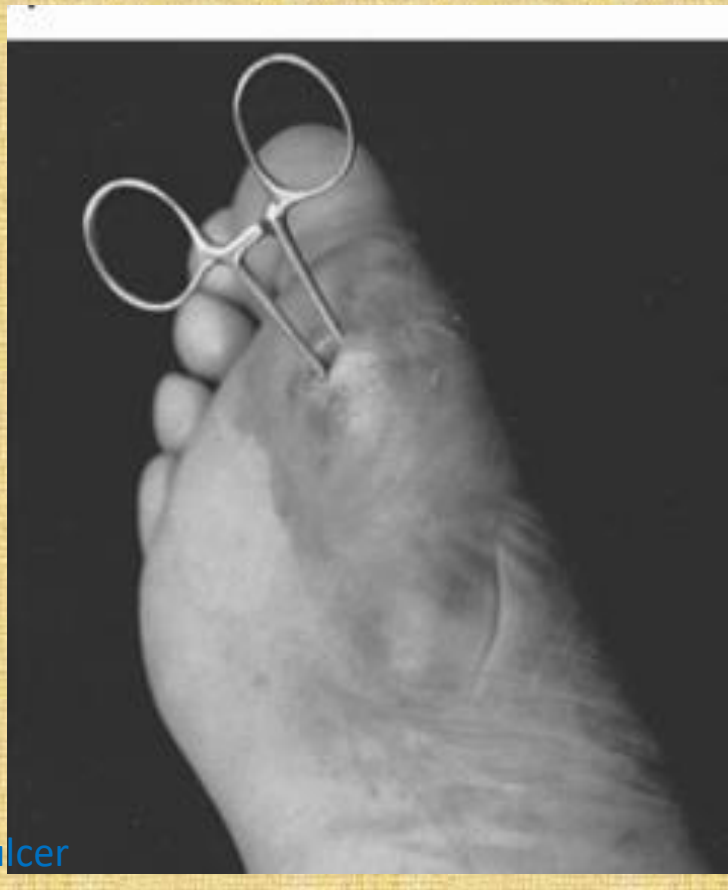
Wagner grade 1

- Grade 0 - Skin intact
- Grade 1 - Superficial ulcer
- Grade 2 - Deep ulcer
- Grade 3 - Deep ulcer with infection
- Grade 4 - Limited necrosis
- Grade 5 - Necrosis of the entire foot

Wagner grade 2

- Grade 0 - Skin intact
- Grade 1 - Superficial ulcer
- Grade 2 - Deep ulcer
- Grade 3 - Deep ulcer with infection
- Grade 4 - Limited necrosis
- Grade 5 - Necrosis of the entire foot

Wagner grade 3



- Grade 0 - Skin intact
- Grade 1 - Superficial ulcer
- Grade 2 - Deep ulcer
- Grade 3 - Deep ulcer with infection
- Grade 4 - Limited necrosis
- Grade 5 - Necrosis of the entire foot

Wagner grade 4

- Grade 0 - Skin intact
- Grade 1 - Superficial ulcer
- Grade 2 - Deep ulcer
- Grade 3 - Deep ulcer with infection
- Grade 4 - Limited necrosis
- Grade 5 - Necrosis of the entire foot

Wagner grade 5

- Grade 0 - Skin intact
- Grade 1 - Superficial ulcer
- Grade 2 - Deep ulcer
- Grade 3 - Deep ulcer with infection
- Grade 4 - Limited necrosis
- Grade 5 - Necrosis of the entire foot


THANK
YOU