The Diabetic Foot

Dr.Edwin Stephen

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

US 2/3rd of non traumatic amputations

Facts

Indian figures not known

2004 Surgery Dept Stats

14% admissions – diabetic foot infections (S2)

Surgery amputations

DM			87%
	major	40	
	minor	63	
Others			13%
	major	09	
	minor	14	

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

Hallett et al: Comprehensive Vascular and Endovascular Surgery © 2004

Neuropathic Foot Changes

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

Charcot Arthropathy

High Index of suspicion

Diabetic

Hot / red / swelling

Trauma - minor / major

Pain + / -

Architectural Disruption

Ulcer + / -

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

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

Pathogens detected in microbiologic specimens from patients with moderate/severe (limb-threatening) diabetic foot infections.

Pathogens	*Patients (%) with pathogens isolated*
Monomicrobial	16
Polymicrobial	80
Staphylococcus aureus	56
Coagulase-negative staphylococci	13
Streptococci	36
Enterococci	29
Klebsiella sp.	5
Proteus sp.	7
Other gram-negatives	6–44
Pseudomonas aeruginosa	7
Anaerobes	42
Fungi	3

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

Diabetic Foot Sepsis

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

If ischemia present it must be corrected

OR

measures to treat infection/neuropathy

will fail

Aetiology of the Diabetic Foot

Neuropathy

Reduced response to infection

Ischaemia

The concept of small vessel disease is erroneous and has no place in management of diabetic foot

Distribution similar to atherosclerosis

Foot arteries almost always spared

Diabetic Vascular Disease

Large vessel disease

- common
- early age of onset
- rapid progression

Microvascular disease

- presence in limbs controversial
- 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

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

NB:ABI unreliable in diabetes/ renal failure/ rheumatoid arthritis/ leg swelling


PAPER LOADING INSTRUCTION
USE ONLY THERMAL RECORDING PAPER
C.M.C HOSPITAL VELLORE

Doppler Studies

Low readings (ABI <0.5)

confirm severe ischaemia

High readings (ABI >0.5)

difficult to interpret if no pulses palpable

Toe Pressures


PAPER LOADING UNIT(PLU)
USE ONLY THERMAL
RECORDING PAPER
MADRAS ENGINEERING SERVICES
MES
SIZE
RUN
SPEED
VOLUME
REMOTE
DOPPLER
ECG

Toe Pressures

Better predictors of wound healing

Diabetics

- toe pressure
- skin perfusion pressure

<40mmHg → healing very unlikely

40 to 60mmHg → healing likely

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**

Case

52 yrs male

Smoking ++

DM X 5 yrs

Rest pain & blackening of right foot x 3 months

B\L lower limb pulses absent

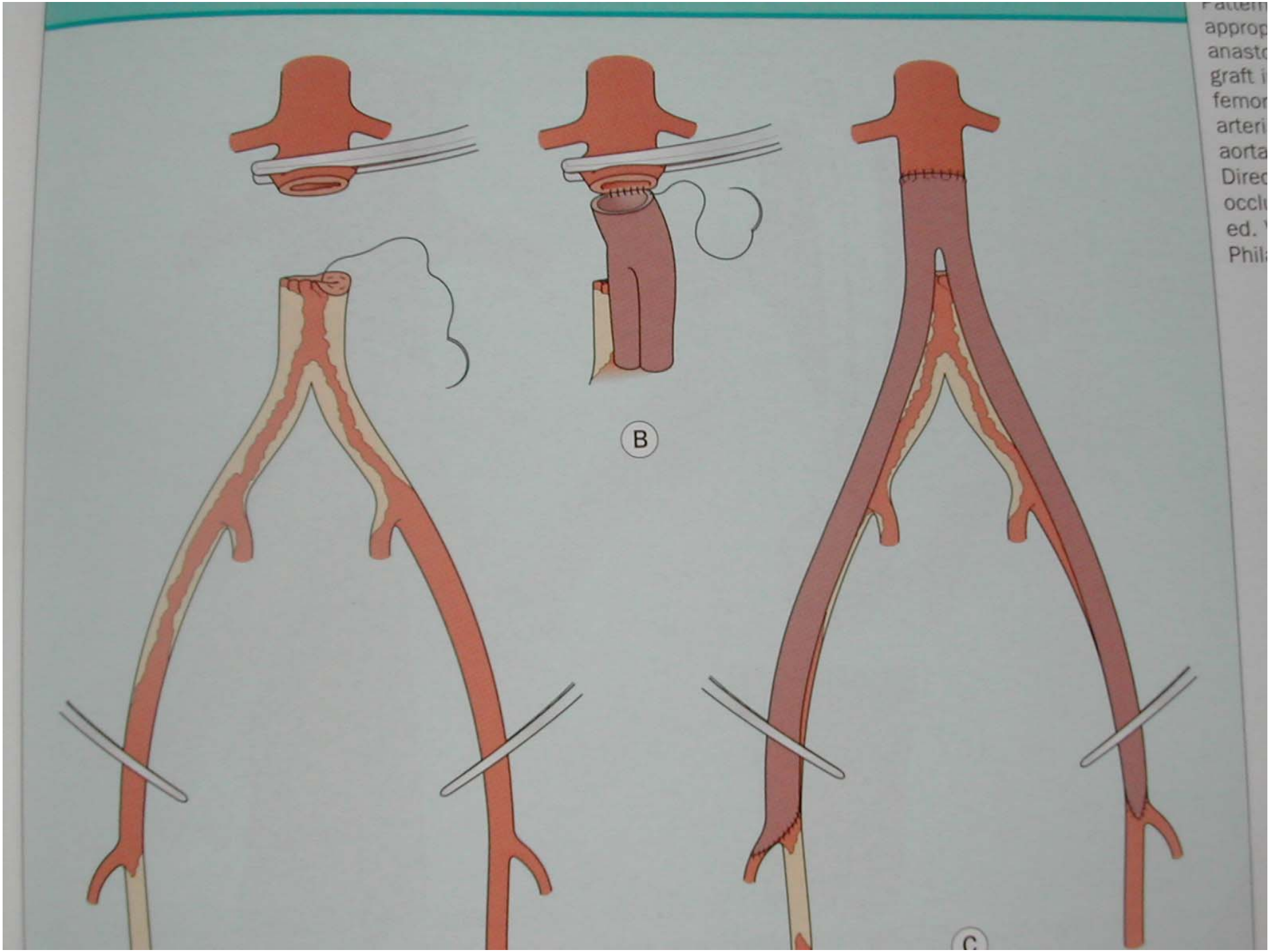
ABI R - 0 , L – 0.2


R


R

Management

Underwent emergency Aorto-bifem bypass and right trans-tarsal amputation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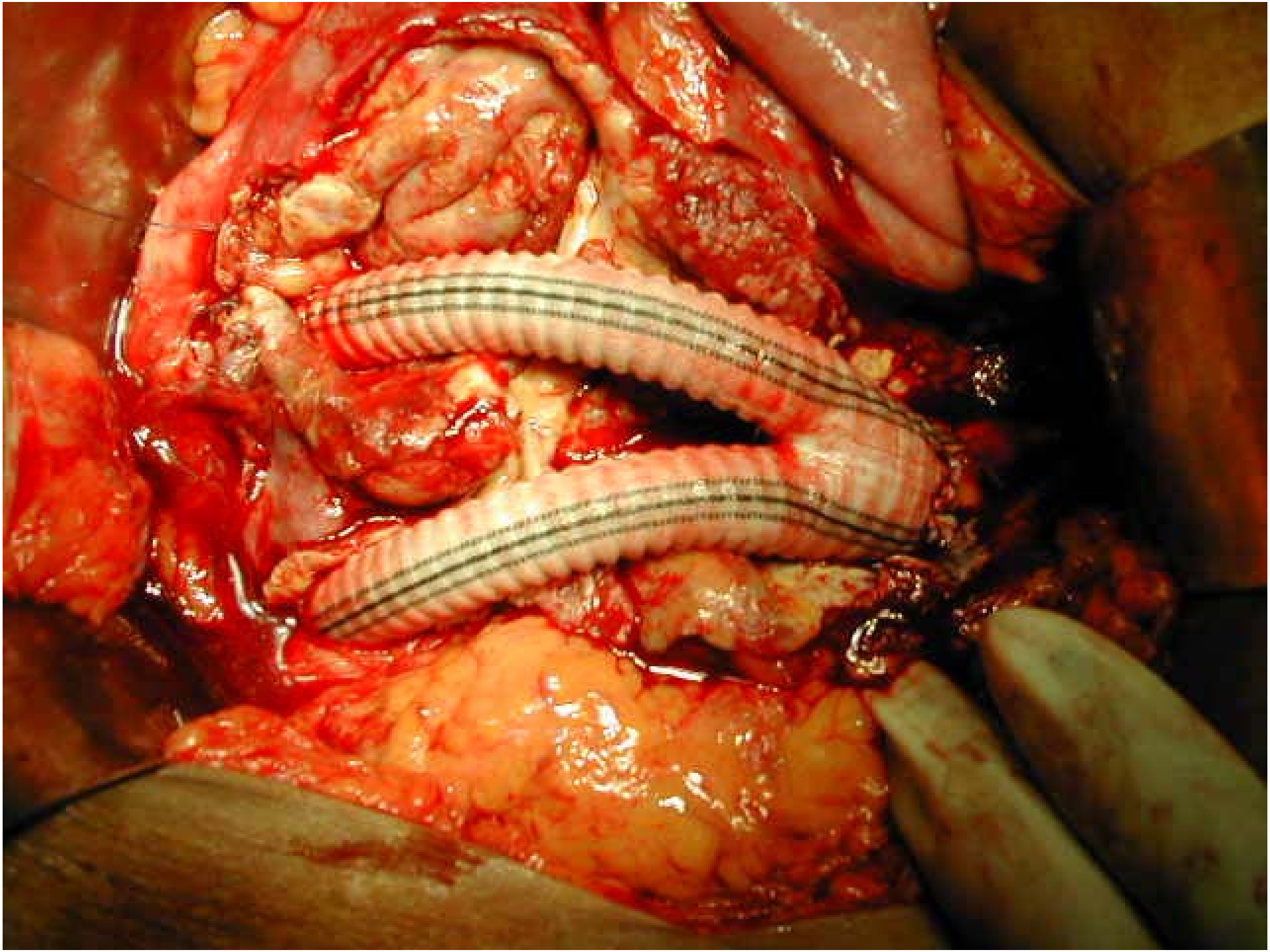


Outcome

Post Op ABI left 1.1

Right stump healed well

Case

55 yrs male

DM x 6 yrs

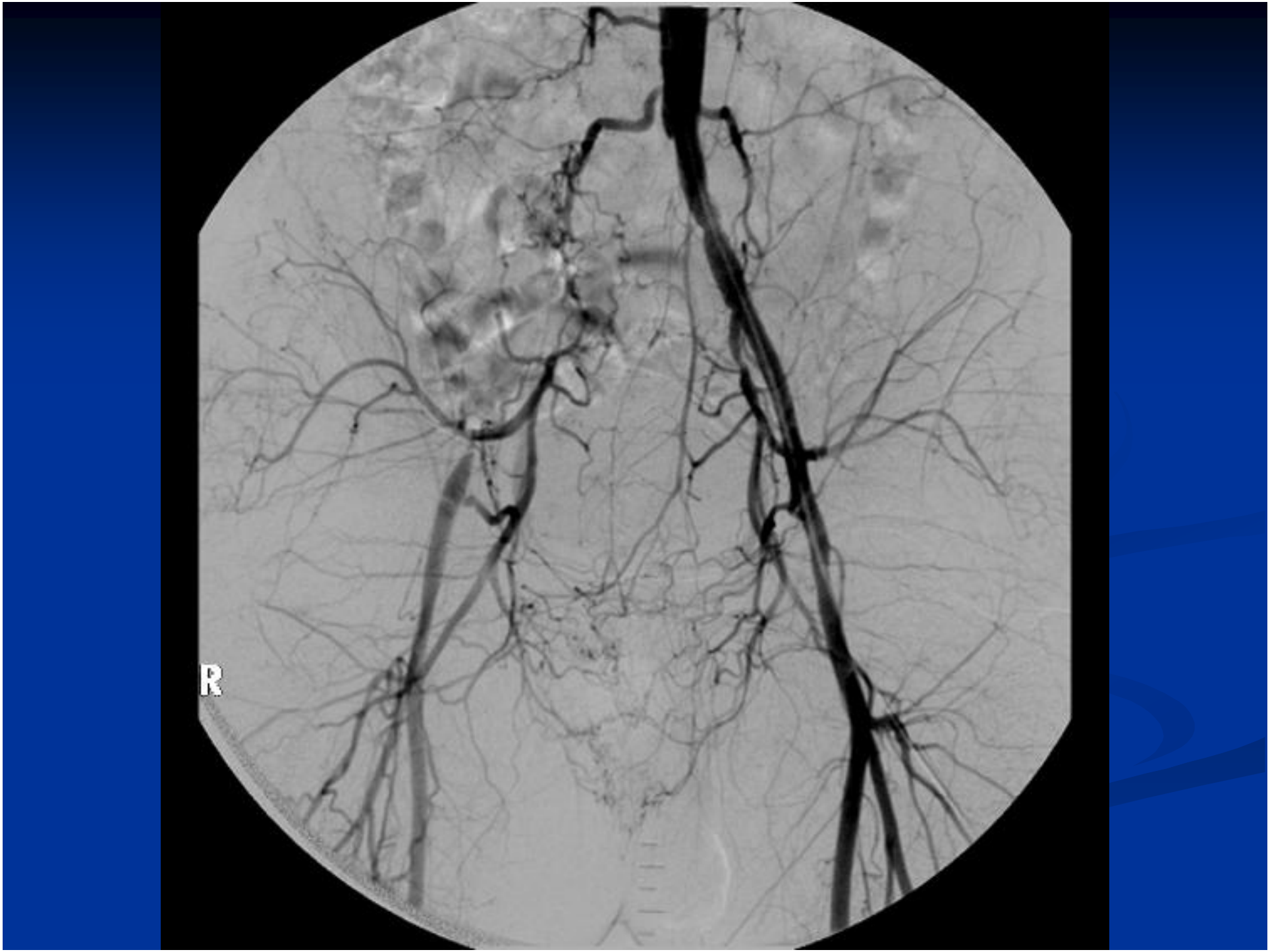
Smoking many years

Rest pain / nonhealing wound R foot x 4 m

Right lower limb pulses absent

ABI R – 0.24 L – 1.03


R

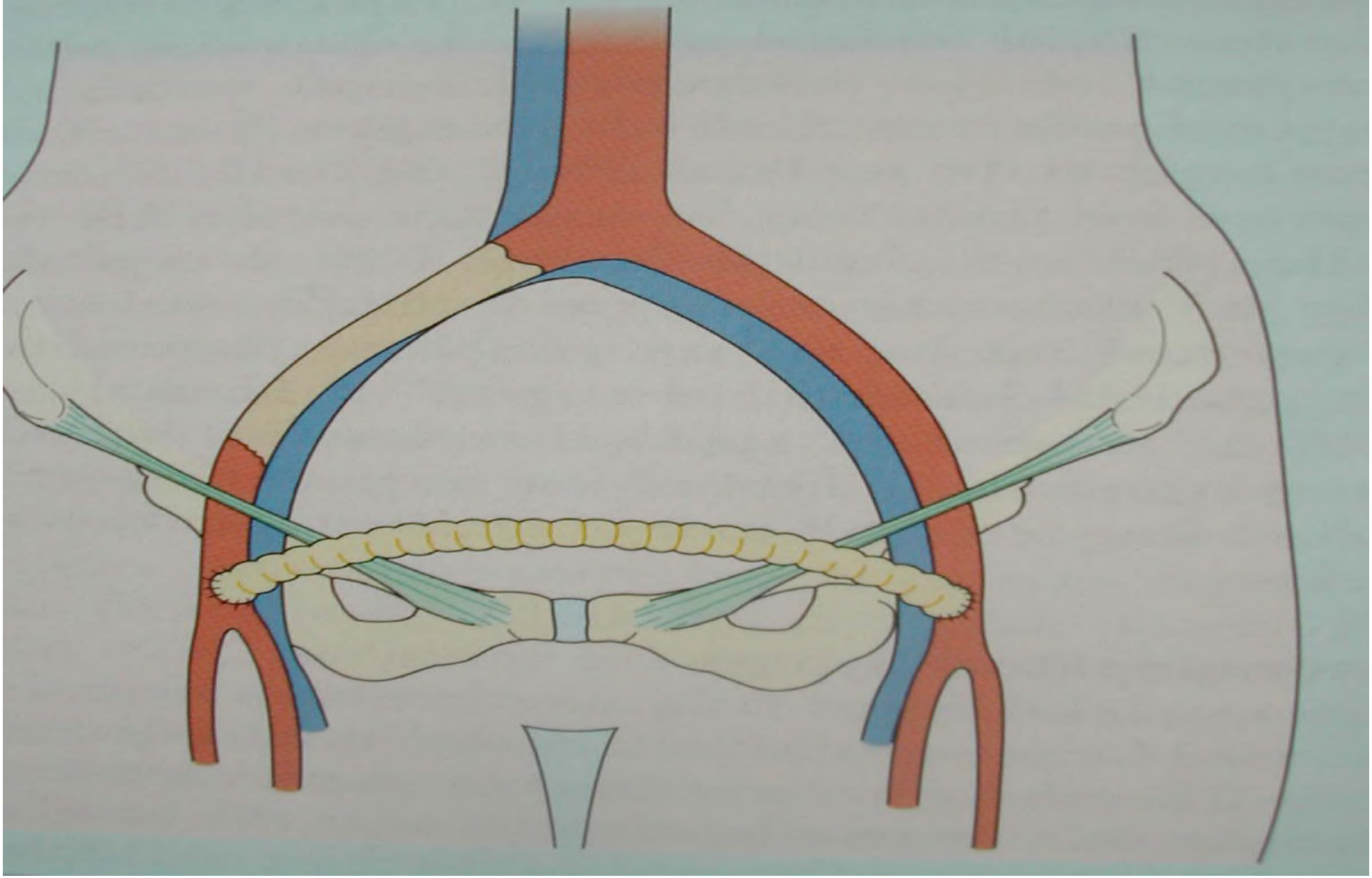

R

Management

Underwent left fem to right bypass using

8mm ringed PTFE graft

Femorofemoral bypass graft



Outcome

Post-operative recovery uneventful

ABI R 1.07 L – 0.96

Wounds healed well

Case

60 yrs male

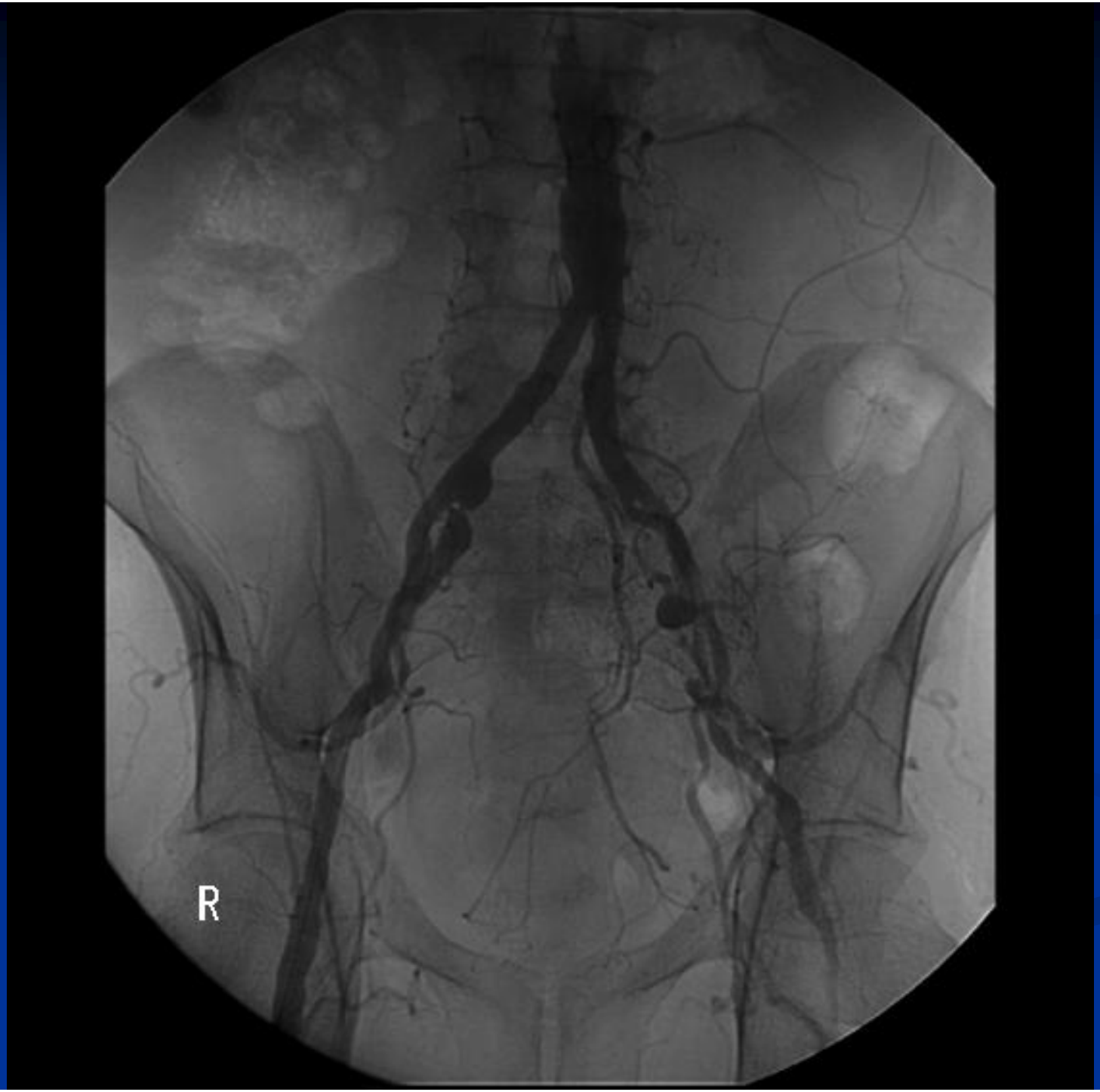
DM x 12yrs

HT x 9 yrs

Heavy smoker

3 months H/O ulceration toes L foot & rest pain

ABI **R** 0.5 **L** 0.32


R

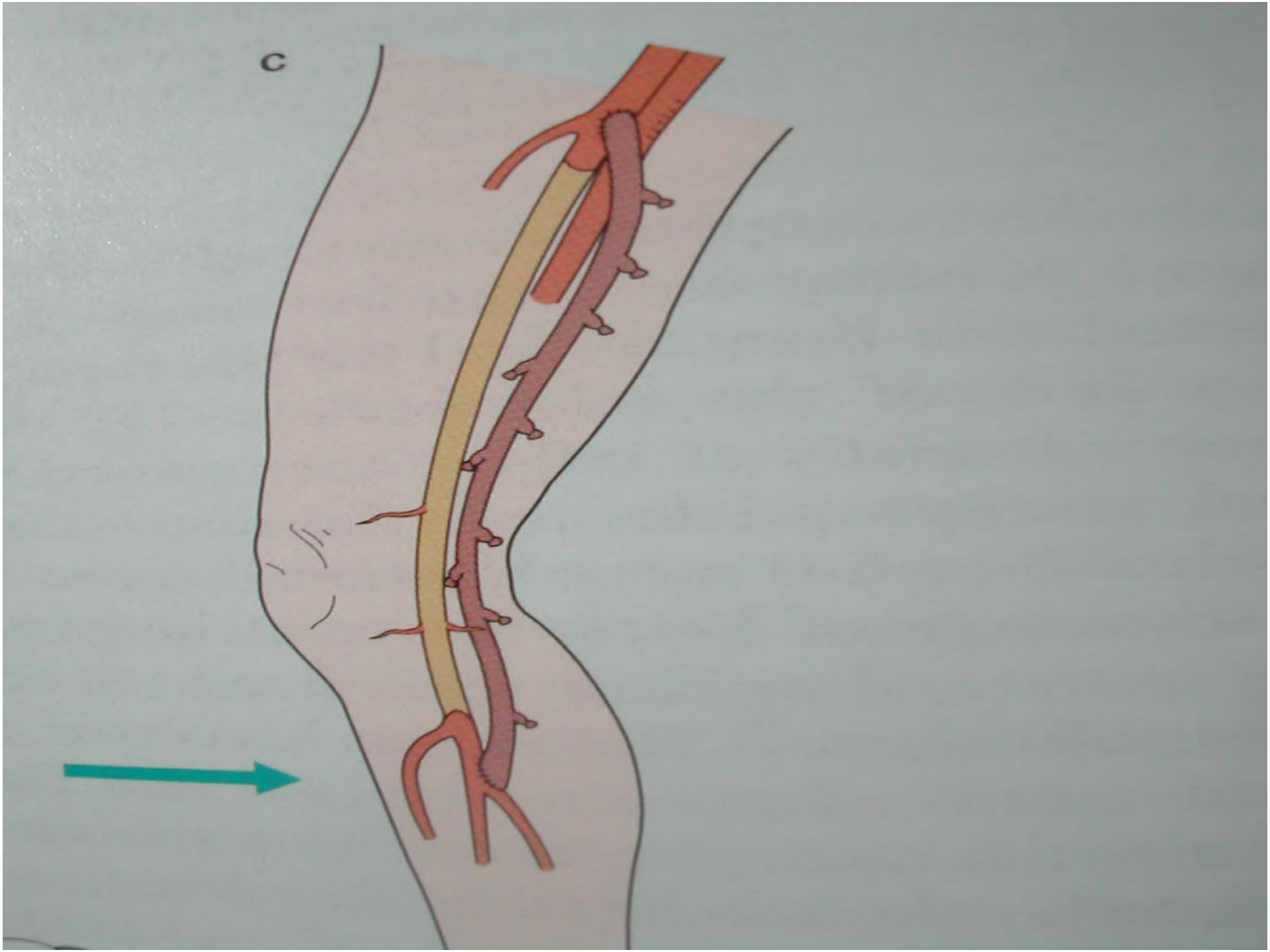

R


R


R

Management

Underwent left Femoro-popliteal bypass using reversed LSV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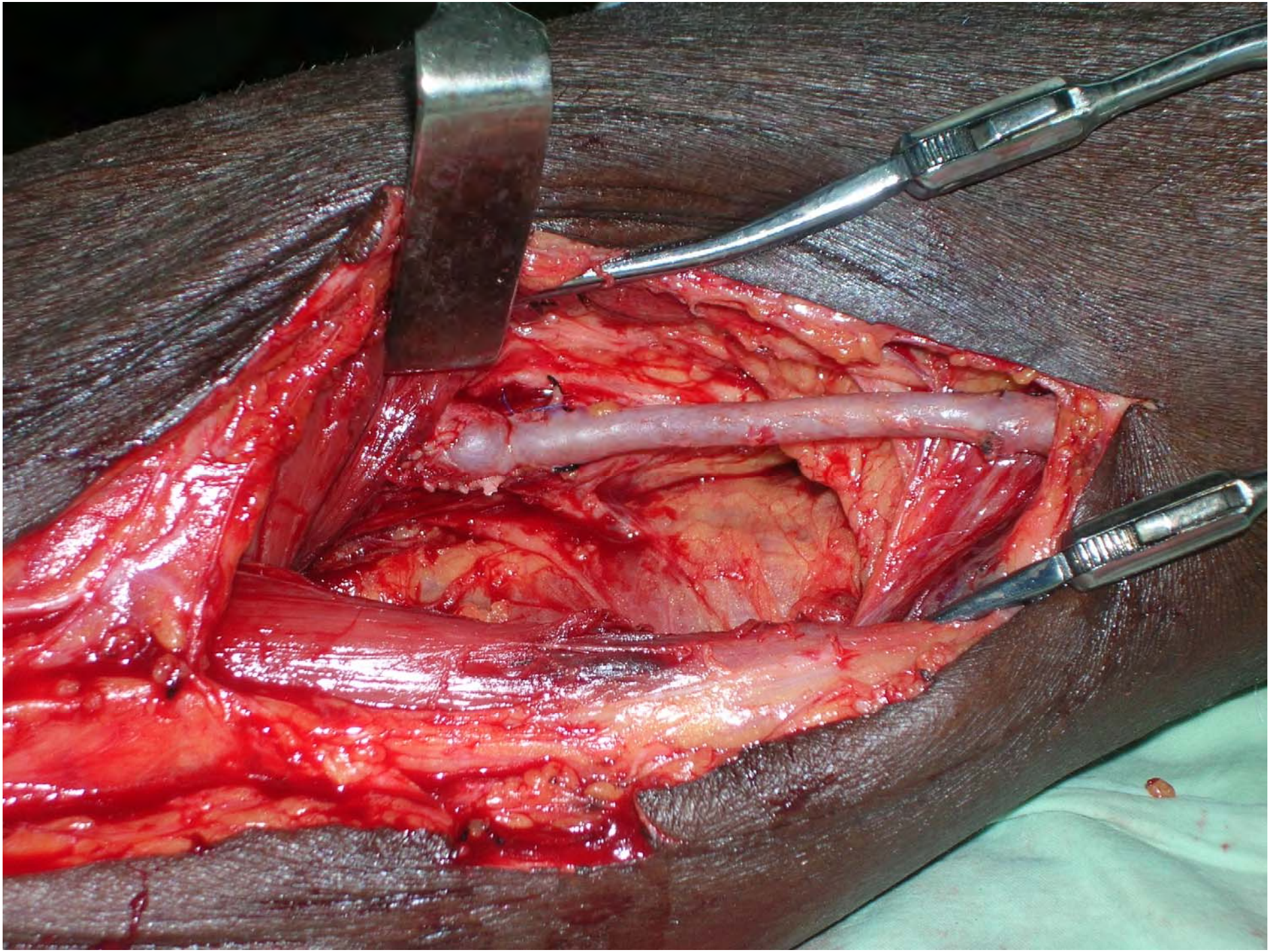


Outcome

Post op course uneventful

Post-op ABI R – 0.54 L – 0.73

Wound healed within a month

Case

64 yrs male

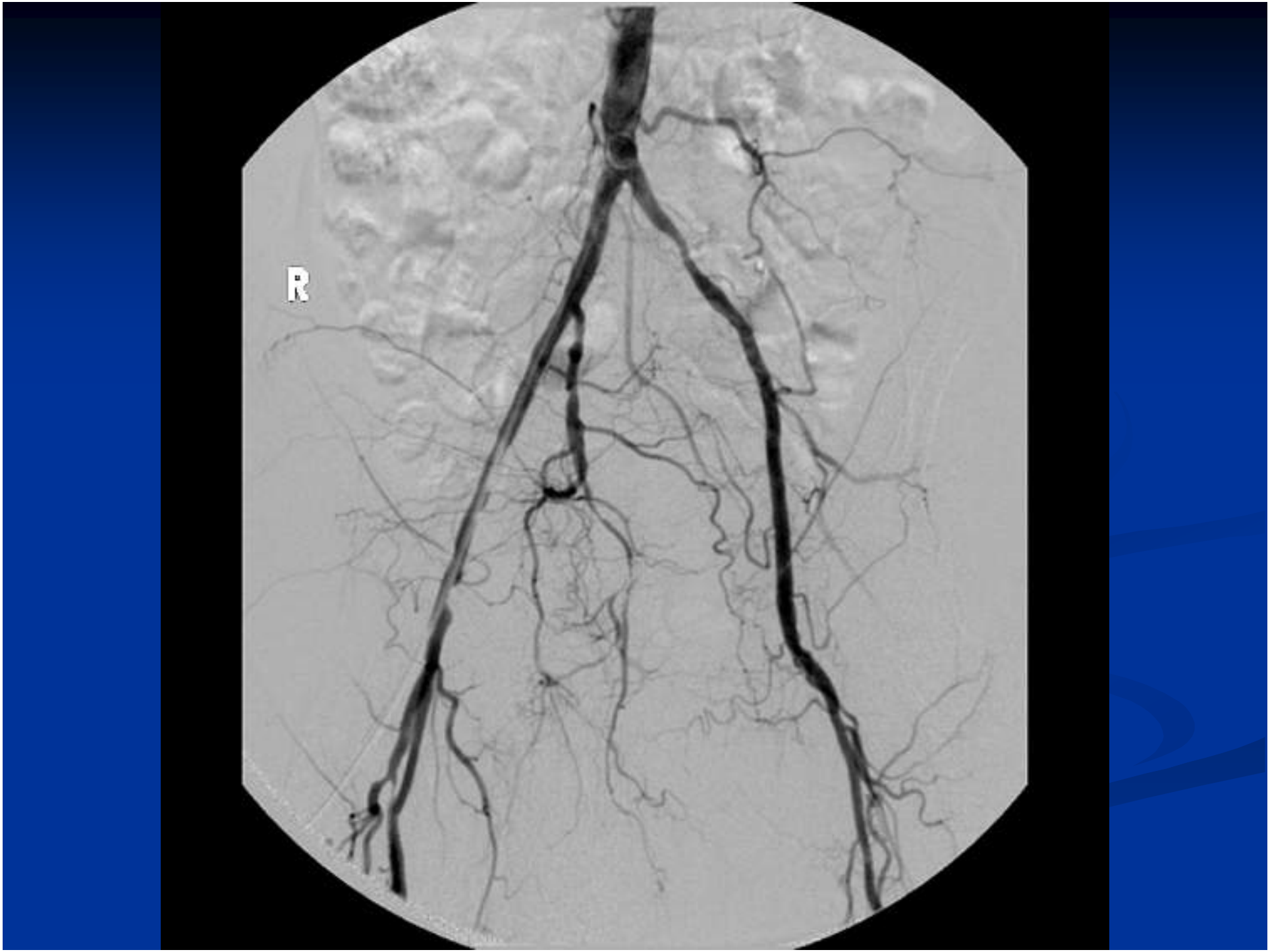
DM x 16 yrs

HT x 2yrs

Heavy smoker

Painful nonhealing ulcer left foot

ABI **R** 0.7 **L** 0.43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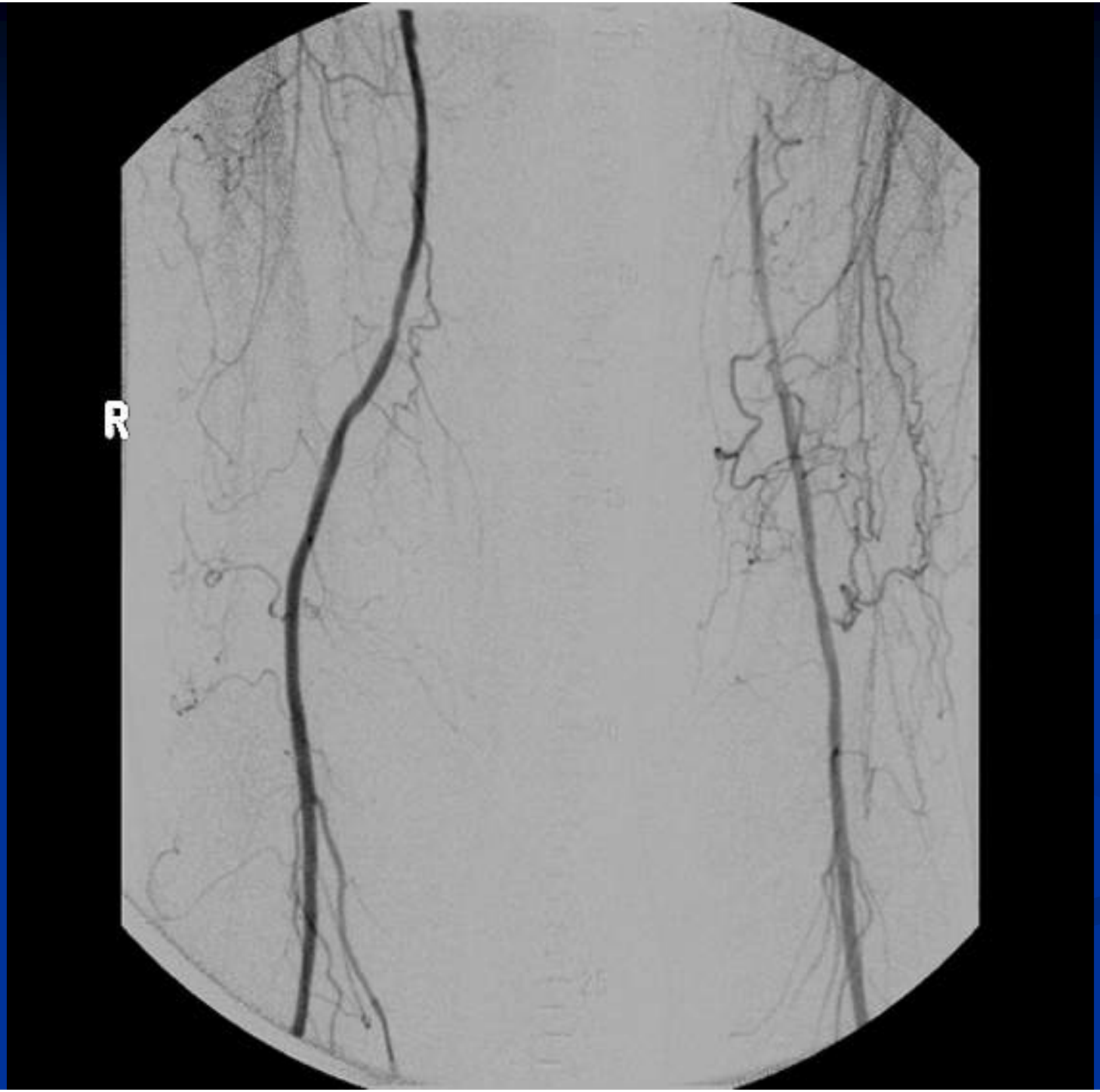
R


R

Management

Underwent balloon angioplasty and stenting of left common iliac artery


R

Management

Followed by

Left Femoro-popliteal bypass using reversed GSV

Patient did well

Case

69 yrs male

DM + 12 yrs

HT+ / Smoking +

Rest pain left forefoot

Left popleteal and pedal pulses absent

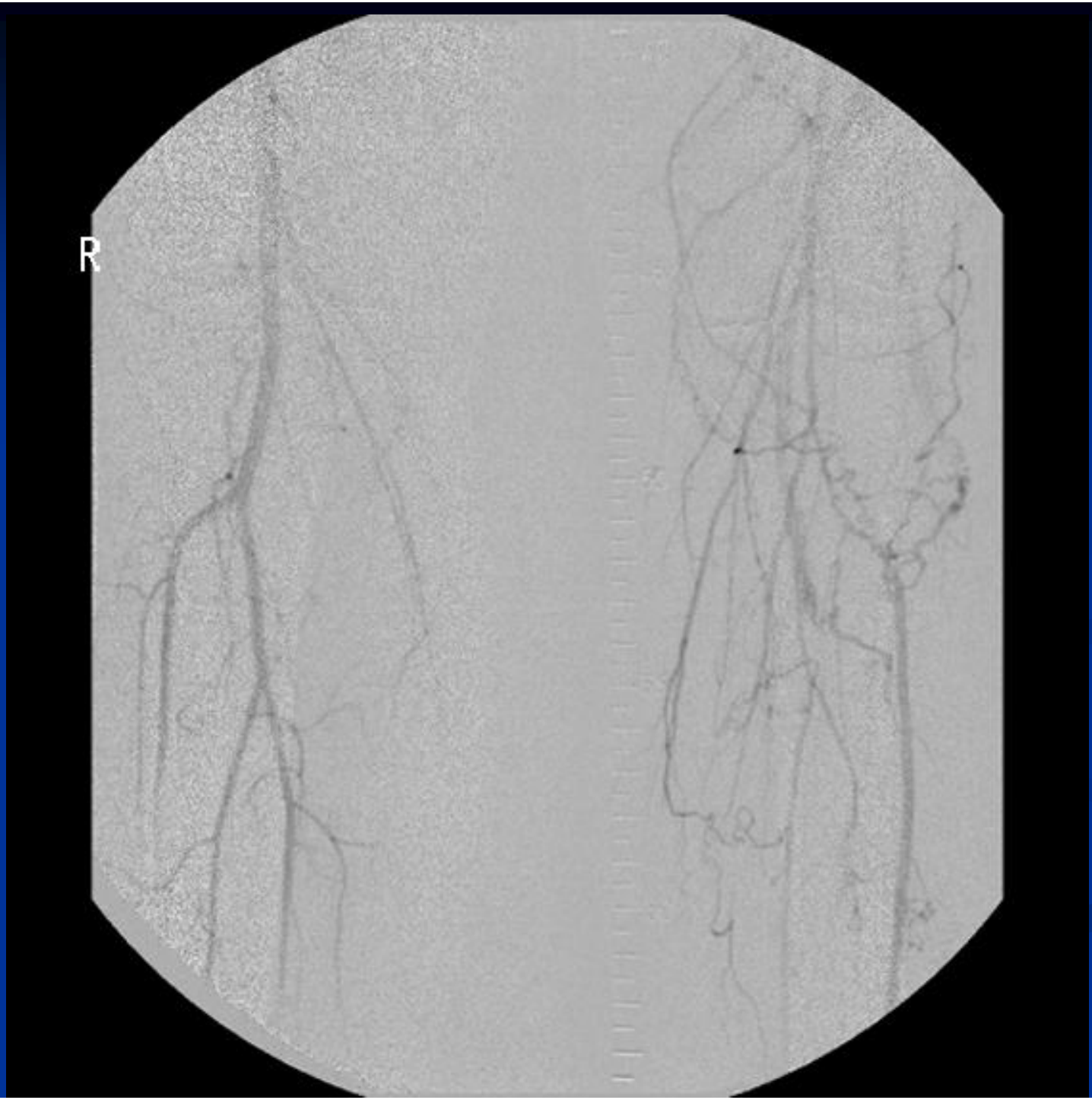
ABI

R – 0.93

L – 0.21


R


R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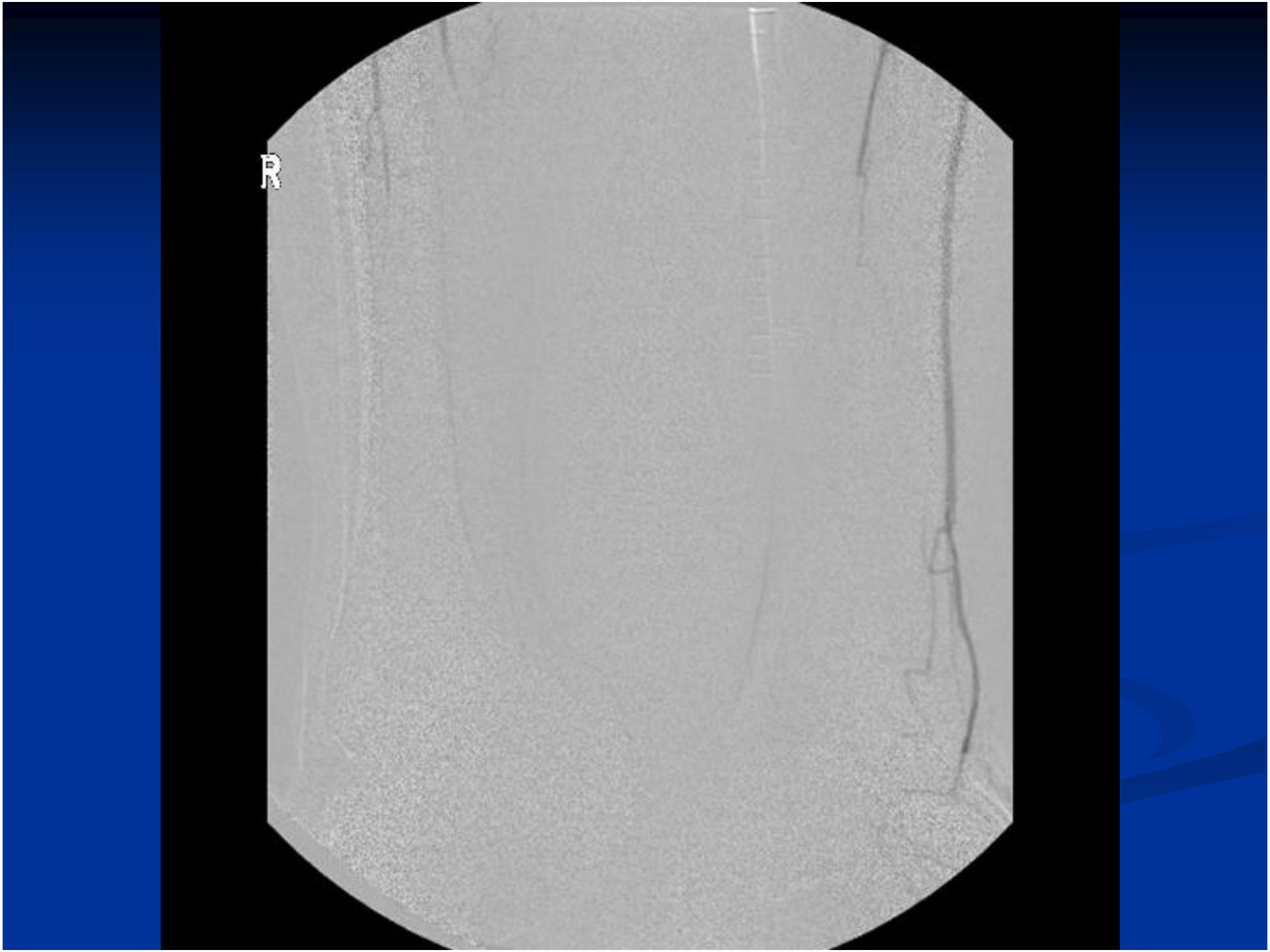
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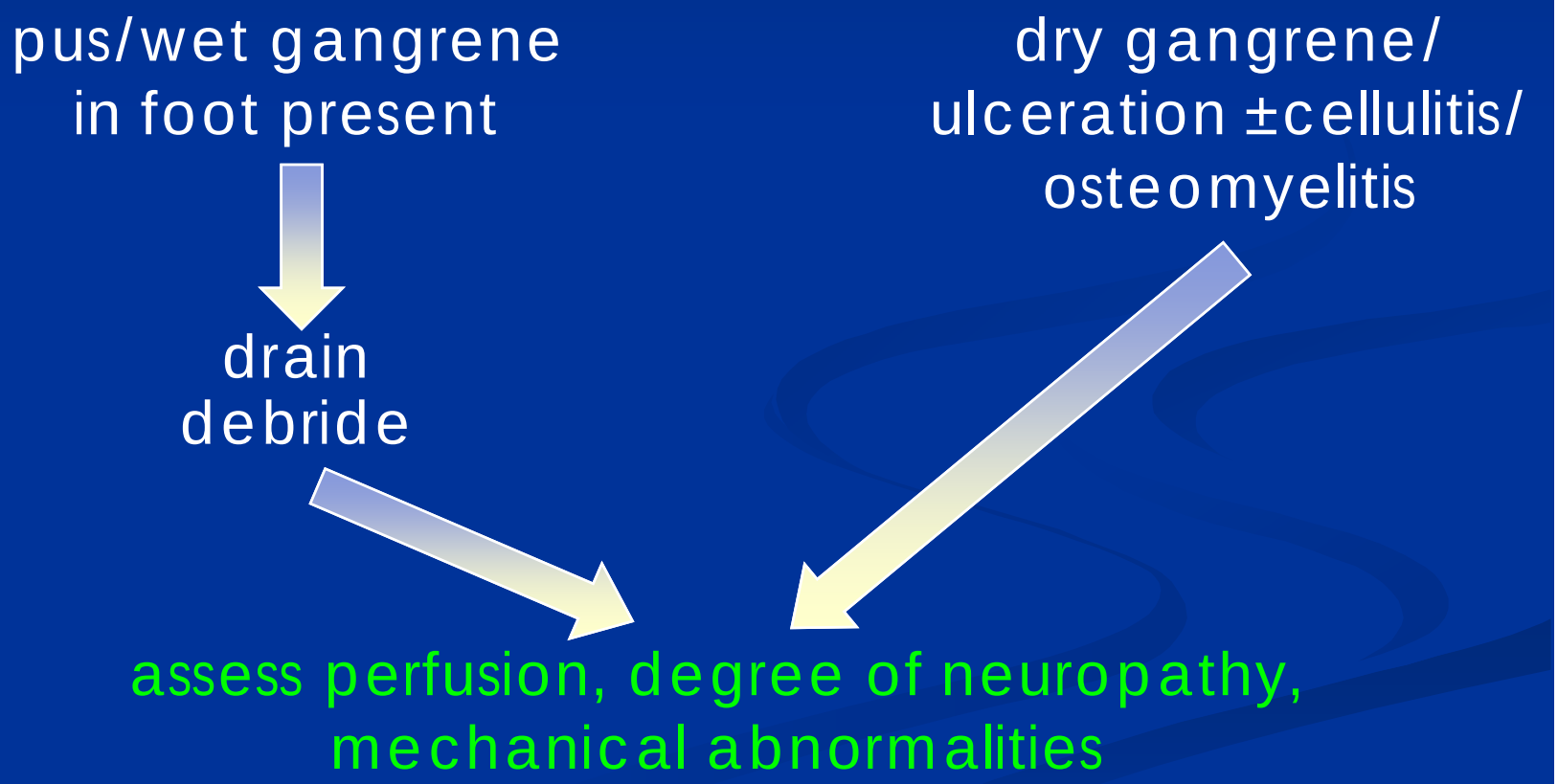
Management

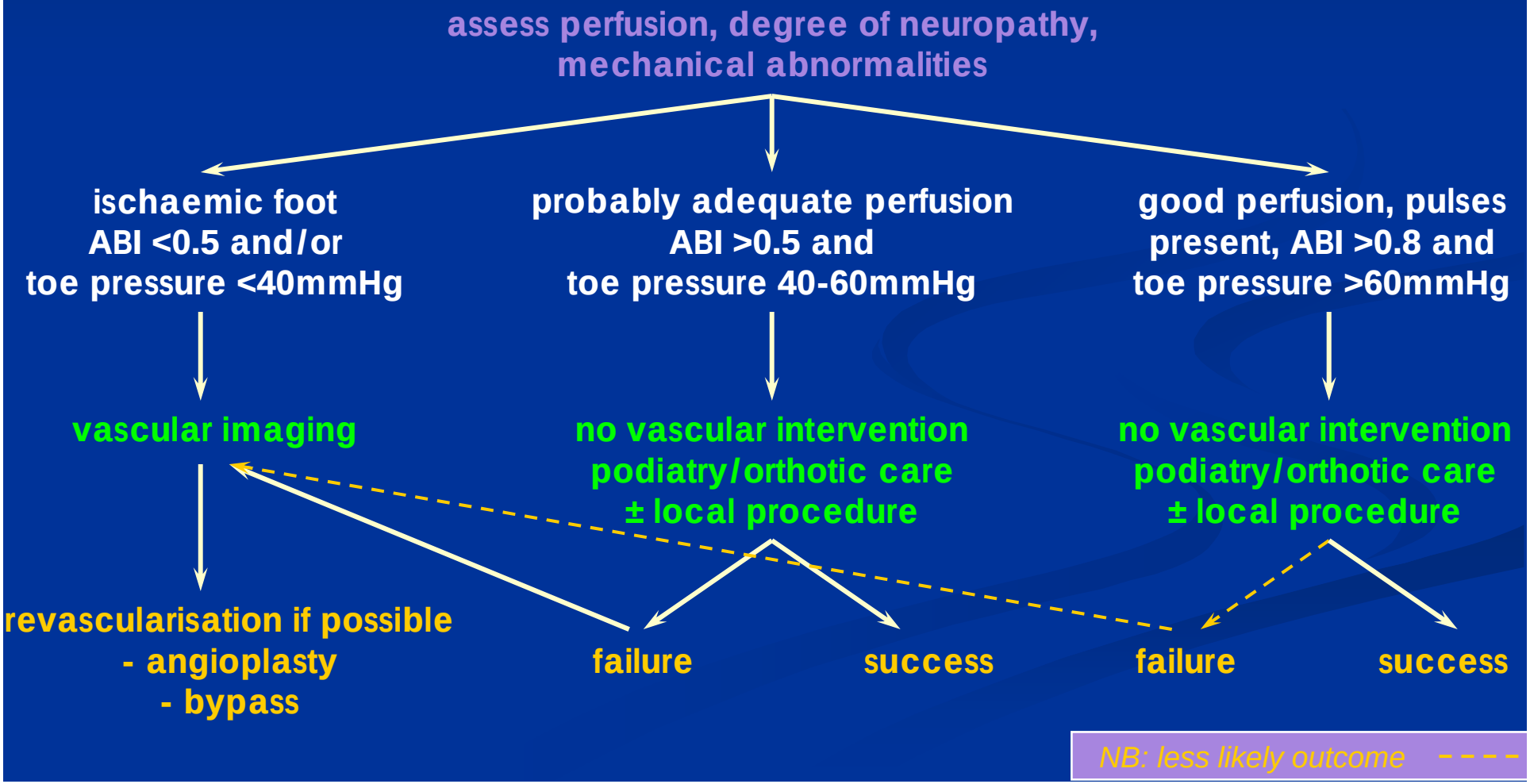
Underwent fem-anterior tibial bypass using reversed GSV

Required forefoot amputation

Management Algorithm for the Diabetic Foot Lesion



Management Algorithm for the Diabetic Foot Lesion



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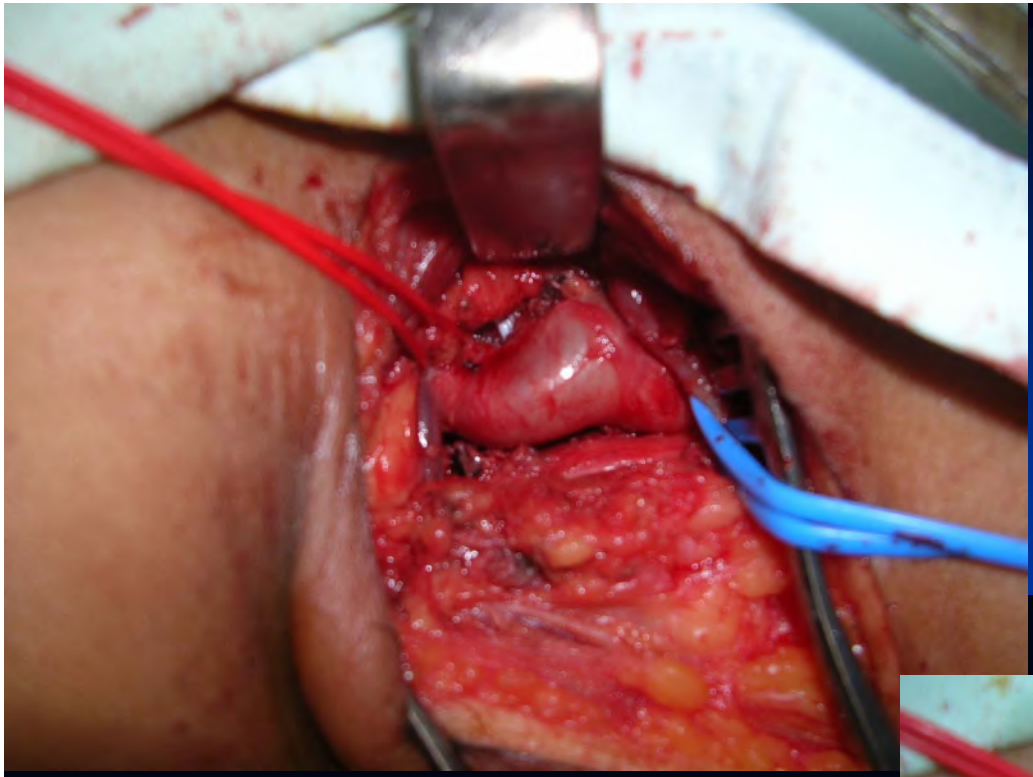

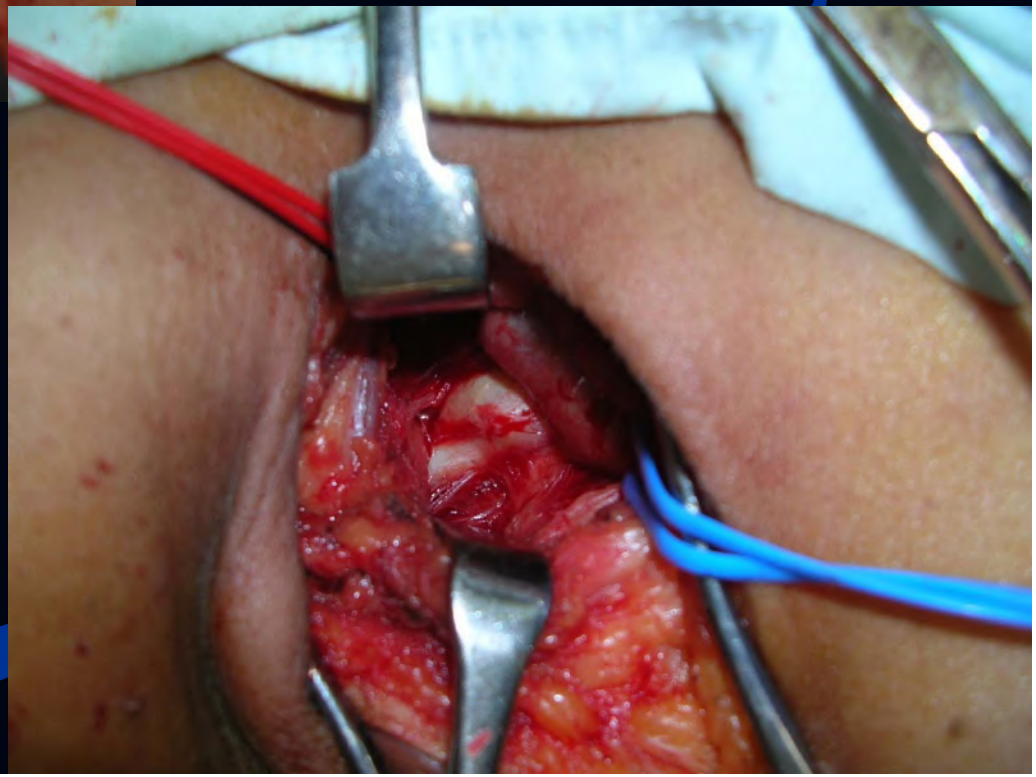

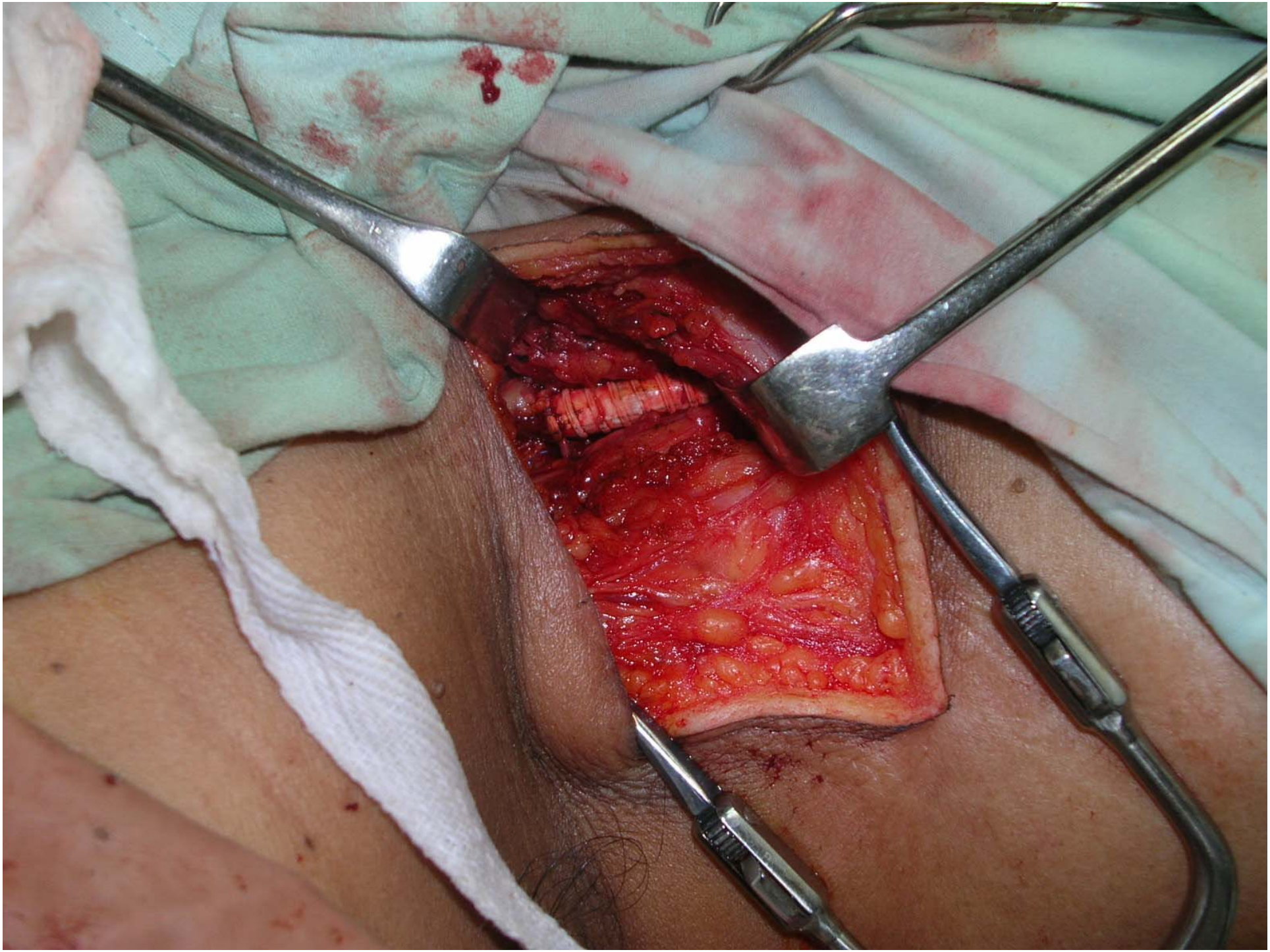


C.M.C.VELLORE

THANK YOU !!