GCPHN – Wound Workshop

Untangling Leg Ulcer Aetiology and Complex Wound Management

Gold Coast University Hospital & Griffith University

Declaration…

HOW DO WE HEAL LEG ULCERS ?

DELIVER NUTRIENTS
SUPPLY O2
CLEAR TOXINS

HOW DO WE HEAL LEG ULCERS ?

DELIVER NUTRIENTS
SUPPLY O2
CLEAR TOXINS
REMOVE EXCESS FLUID

BLOOD FLOW

HOW DO WE HEAL LEG ULCERS ?

DELIVER NUTRIENTS
SUPPLY O2
CLEAR TOXINS
REMOVE EXCESS FLUID

BLOOD FLOW

So, All Ulcers are VASCULAR

Why else? – cost imperatives

5 months – insidious onset.

Why else? – cost imperatives

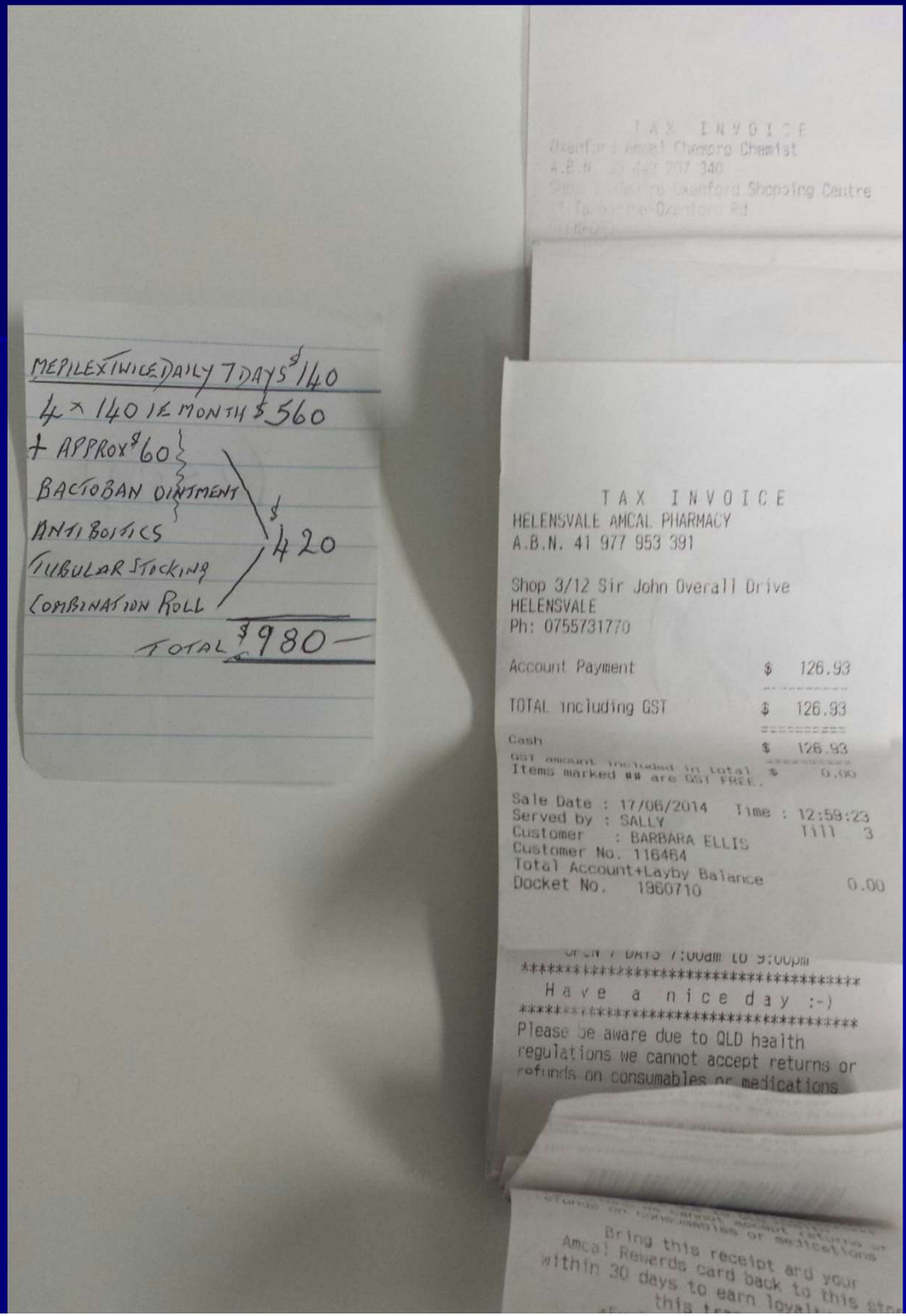
Venous ulcer

Receipts


TAX INVOICE
Oxenford Amcal Chempro Chemist
A.B.N. 98 442 207 340
Shop 9, Centro Oxenford
11 Tamborine-Oxenford Rd
OXENFORD
Ph: 07 5519 9200
HELENSVALE AMCAL PHARMACY
A.B.N. 41 977 953 391
Shop 3/12 Sir John Overall Drive
HELENSVALE
Ph: 0755731770
Account Payment
TOTAL including GST
Cash
GST amount included in total
Items marked ## are GST FREE.
Sale Date : 17/06/2014 Time : 12:59:23
Served by : SALLY Till 3
Customer : BARBARA ELLIS
Customer No. 116464
Total Account+Layby Balance
Docket No. 1960710
Bring this receipt and your
Amcal Rewards card back to this store
within 30 days to earn loyalty points for
this transaction.#
Sale Date : 01/05/2014
Served by : Michelle R
Customer : DAVID ELLIS
Docket No. 610415
OPEN 7 DAYS 7:00am to 9:00pm
Have a nice day :-)
Please be aware due to QLD health
regulations we cannot accept returns or
refunds on consumables or medications
Amcal Rewards No
Card #: 9970019000023
Name: Brian Ellis
CHEMIST WAREHOUSE
Tax Invoice
TOTAL
You have saved
Is this Australia's Cheapest Chemist?
Please retain your receipt as proof of purchase. No
refunds outside Consumer Guarantee

Monthly costs A$980

Estimated by carer



Ineffective wound care - 2

- 34yo
- Ulceration: 3 months
- Unable to work.

Poor management - 2

- 34yo
- 3months ulceration. Unable to work.
- Dressings – erratic protocol
- 6 courses of antibiotics
- "Regular appointment on Friday afternoon for more antibiotics"
- Currently on Cipro & Septrin Forte

It gets worse…

- Plastics admission
  - Antibiotics of course!!
- Plan…
  - Plastic surgical Outpatients
  - Consider excision & skin grafting …

…advised to avoid stockings

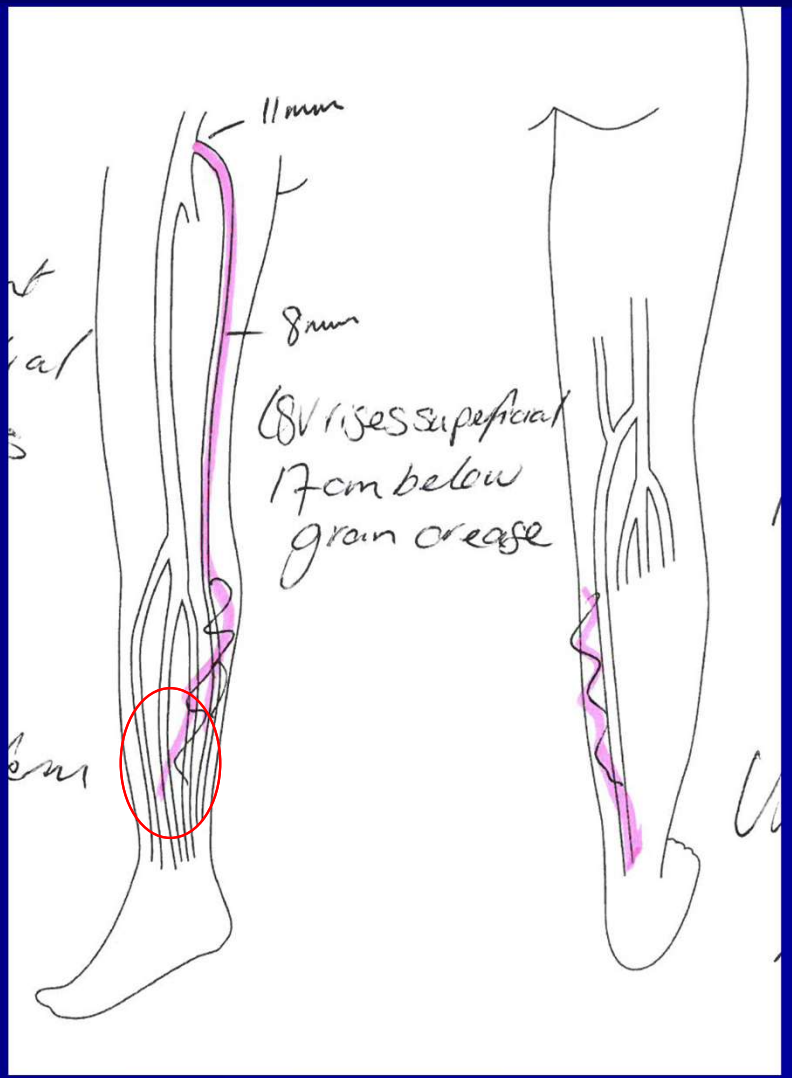
Vascular assessment

- Before plastics !!!

- Clinically evident VV's

Vascular assessment

- Duplex assessment
- Large incompetent Great Saphenous vein
  - Leading all the way to the area of ulceration



Why else?
– Patient imperatives

Iatrogenic injury (Health-care associated)

Saphenous vein harvest

Diagnosis helps prevention… Pressure Ulceration

Why else?
– Patient imperatives

Iatrogenic injury
Health-care associated

Pressure injury

Compression

ULCER AETIOLOGY

Venous

Arterial

Neuropathic

Lymphoedema

Others

ULCER AETIOLOGY

Venous

Arterial

Neuropathic

Lymphoedema

Others

Vasculitic

Trauma

Malignancy

Drug eruption

Congenital disorders

ULCER AETIOLOGY

Venous

Arterial

Neuropathic

ULCER AETIOLOGY

Venous

Arterial

Neuropathic

Lymphoedema

Others Vasculitic

Trauma

Malignancy

Drug eruption

Congenital disorders

Mixed Aetiology

Increasingly aged population

Prevalence of Diabetes, Obesity

& Renal failure / dialysis

ULCER AETIOLOGY

Venous

Arterial

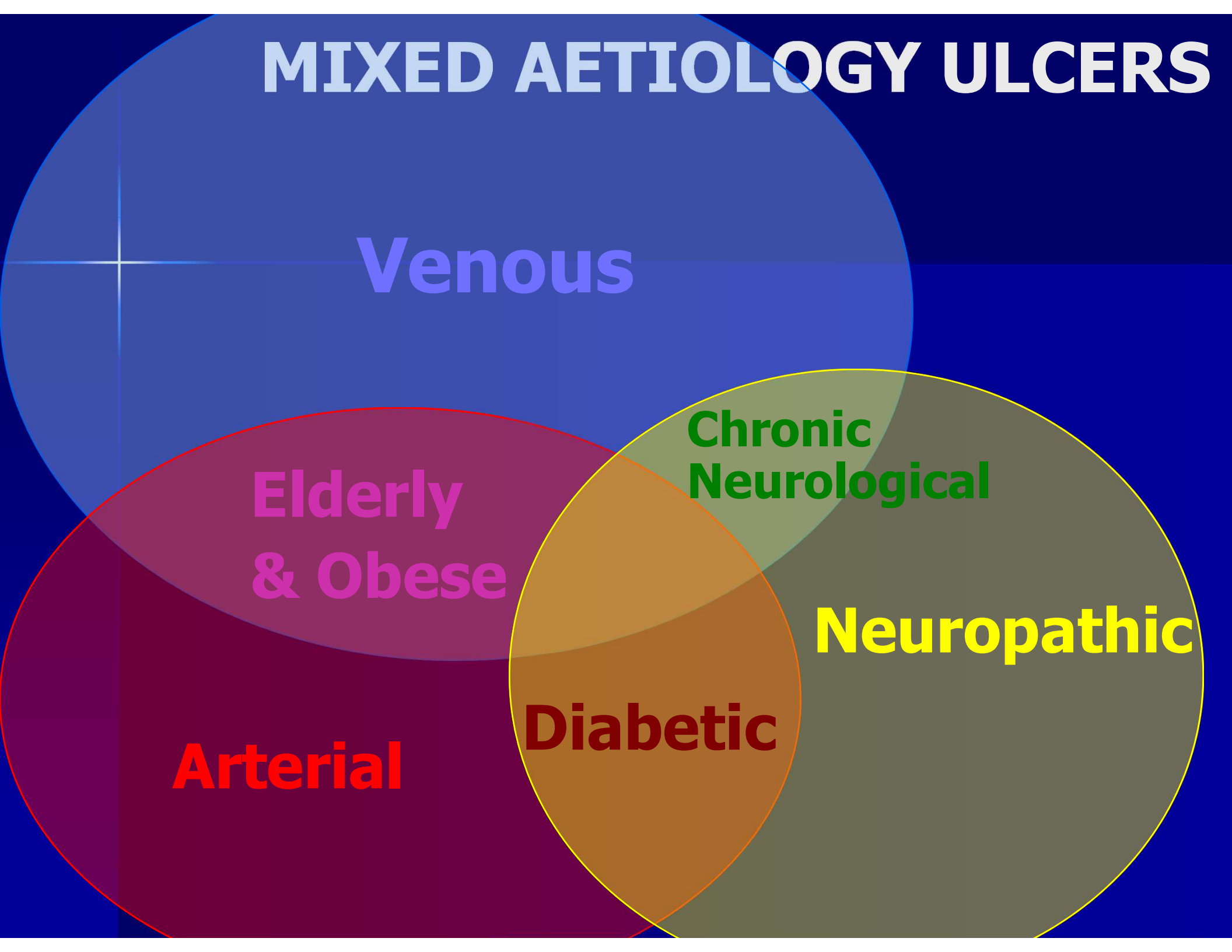
Neuropathic

MIXED AETIOLOGY ULCERS

Venous

Arterial

Neuropathic


MIXED AETIOLOGY ULCERS
Venous
Elderly
& Obese
Chronic
Neurological
Neuropathic
Diabetic
Arterial

.....ULCER MANAGEMENT

Compression

Off-loading

Revascularisation

Diabetes: Silent Epidemic

The natural history of Type 2 Diabetes is characterised by a slow progression from a low-risk to high-risk State.

1) onset of 'prediabetic' changes in glucose metabolism
2) the prevalence of undiagnosed diabetes
3) eventual diagnosis of diabetes.

But, macrovascular complications commence long before during the threshold for diagnosis of diabetes

- occurs with normal HbA1C
- OGTT more diagnostic

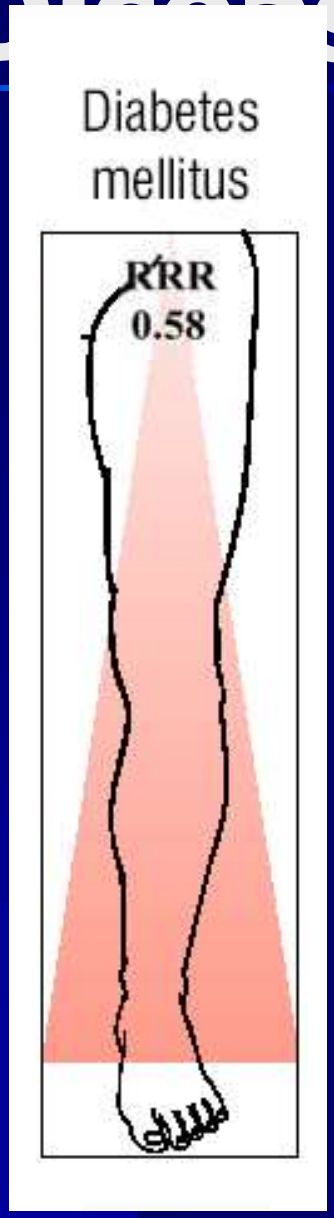
Neuropathy too.

How does Diabetic Vascular Disease differ from atherosclerosis?

Affects younger patients (if poorly controlled)
No sex differences
Rapidly progressive
Increased calcification
Impaired Endothelial function
More distal vessels affected

Smaller vessels have poor outcomes in vascular surgery

Anatomical Patterns of Diabetic Vascular Disease



Small Vessel Disease – Calcification

Assessing the Diabetic Foot

- The "High-risk" diabetic foot
- Neuropathy (greatest contributor)
  - Sensory (pain, temperature stimuli)
  - Motor (intrinsic muscles –deformity)
  - Sympathetic (impaired autoregulation)
- Impaired immunity – specific bacteriology
- Impaired Vascularity
- Impaired Vision - Accidents / poor hygeine / awareness

The Diabetic Foot

- **7% of the Australian population T2 DM (2.3M)**
- **15% develop a foot ulcer In lifetime (345,000)**
- **500,000 hospital admissions and 12,000 deaths attributed to the condition in 2004 alone**

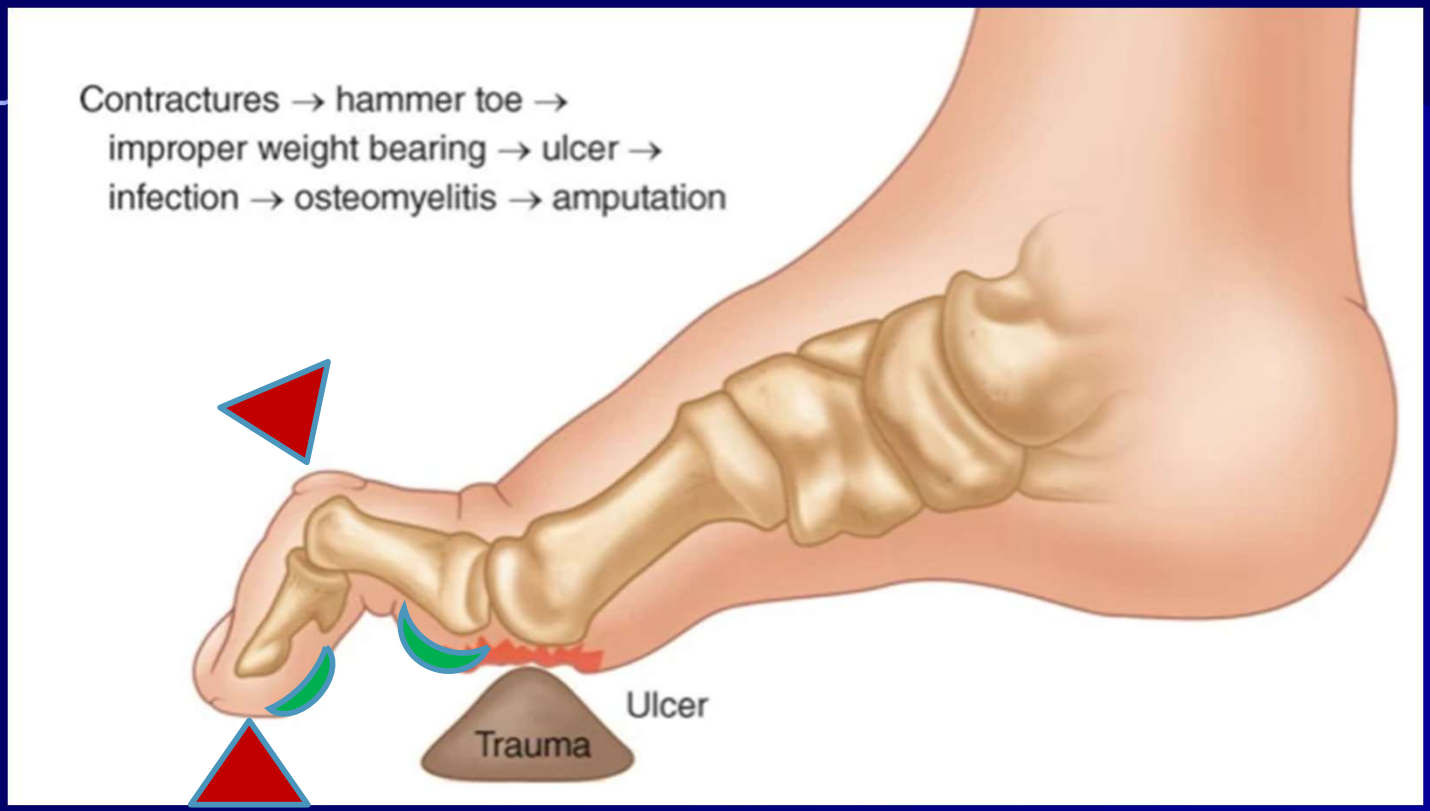
(Lazarrini 2012)

Those admitted with foot ulcer have:

Significant rates of limb amputation

Mortality risk

Neuropathy - deformities



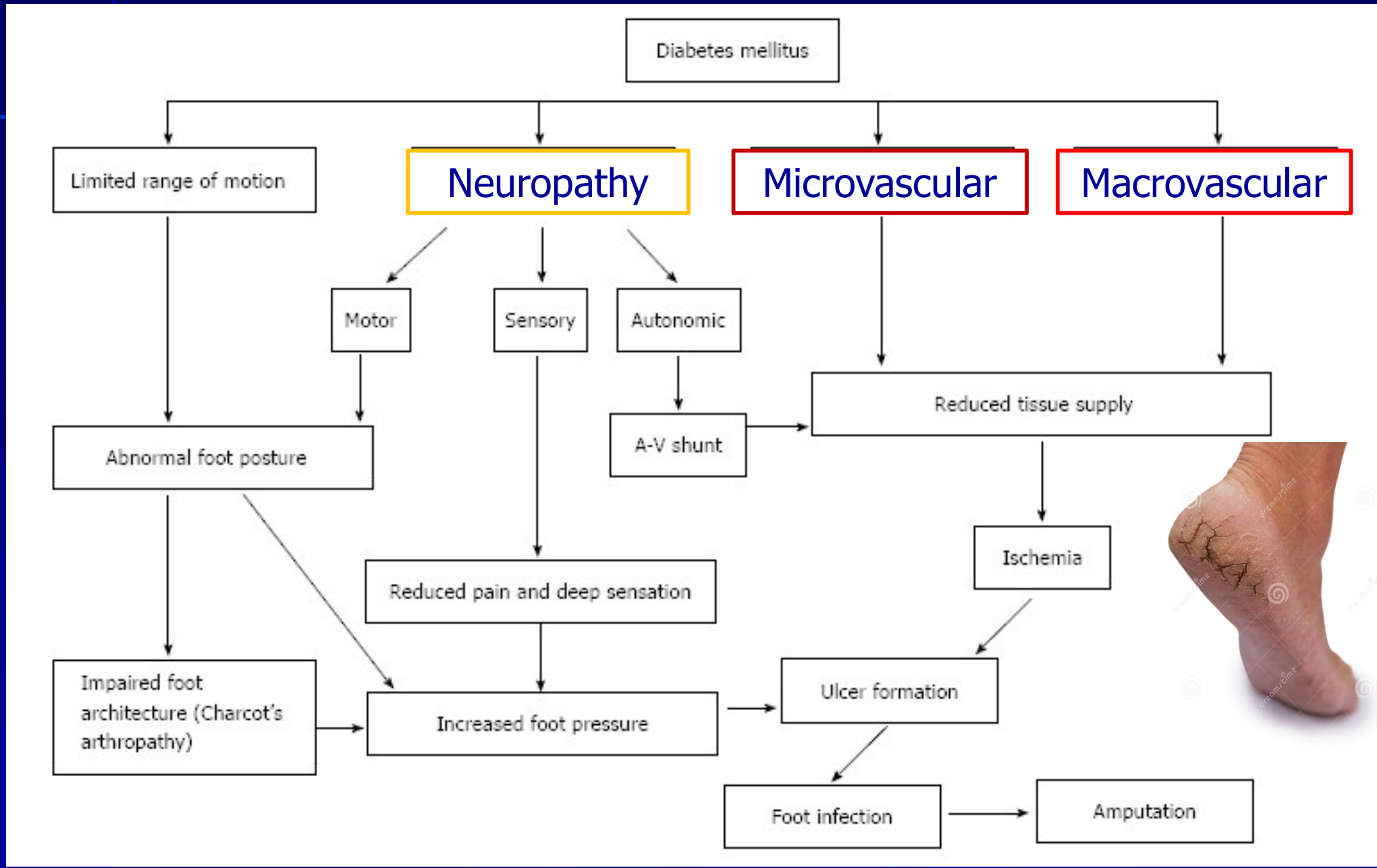
The Gold Coast Diabetic Foot

The Diabetic Foot

- 7% of the Australian population T2 DM (2.3M)
- 15% develop a foot ulcer In lifetime (345,000)
- 500,000 hospital admissions and 12,000 deaths attributed to the condition in 2004 alone

(Lazarrini 2012)

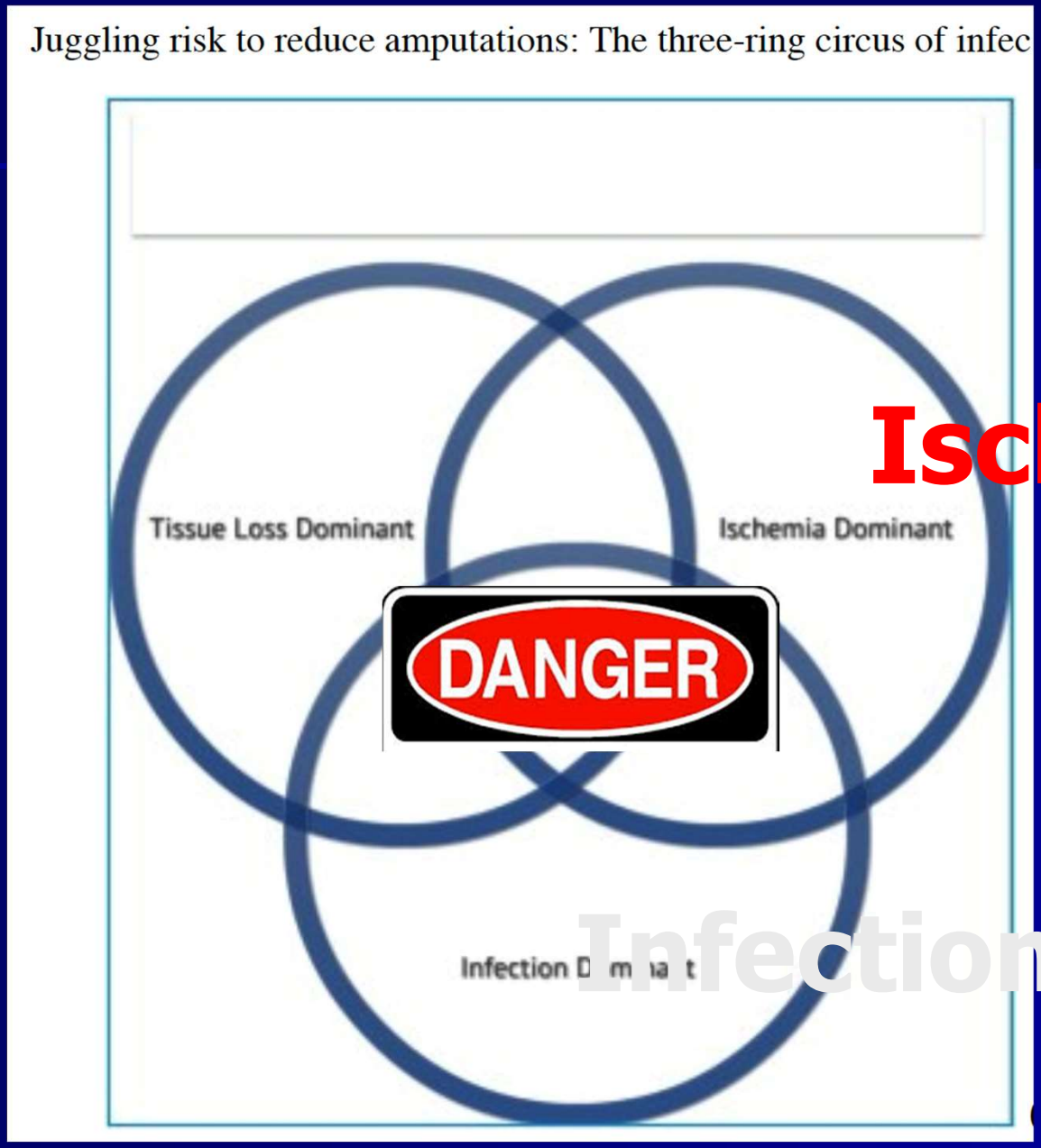
Diabetic Foot -Pathophysiology



3 Factors in Diabetic foot salvage

Wound

Ischaemia



Infection

"The stairway to amputation"

Major amputation

Sepsis

Acute Diabetic Foot

+ Vascular disease

Foot Ulceration

High-risk Diabetic Foot

Neuropathy

At Risk Diabetic Foot

Diabetes / Metabolic Syndrome

Guidelines

DIABETES/METABOLISM RESEARCH AND REVIEWS
Diabetes Metab Res Rev 2016; **32**(Suppl. 1): 45–74
Published online in Wiley Online Library (wileyonlinelibrary.com) **DOI:** 10.1002/dmrr.2699

SUPPLEMENT ARTICLE

IWGDF guidance on the diagnosis and management of foot infections in persons with diabetes

Benjamin A. Lipsky[1,2*]
Javier Aragón-Sánchez[3]
Mathew Diggle[4]
John Embil[5]
Shigeo Kono[6]
Lawrence Lavery[7]
Éric Senneville[8]
Vilma Urbančič-Rovan[9]
Suzanne Van Asten[7,10]
Edgar J. G. Peters[10]

Recommendations

Classification/diagnosis

1. Diabetic foot infection must be diagnosed clinically, based on the presence of local or systemic signs or symptoms of inflammation (strong; low).
2. Assess the severity of any diabetic foot infection using the Infectious Diseases Society of America/International Working Group on the Diabetic Foot classification scheme (strong; moderate).

Osteomyelitis

Guidelines

The Management of the Diabetic Foot

A Clinical Practice Guideline by the Society for Vascular Surgery in Collaboration with the American Podiatric Medical Association and the Society for Vascular Medicine

Journal of Vascular Surgery
February 2016 Supplement
Volume 63, Issue 2, Pages 3S–21S

SVS | Society for Vascular Surgery

High-risk foot referral portal

https://www.goldcoast.health.qld.gov.au/referrals/conditions/high-risk-foot-vascular

High-risk foot (Vascular)

Adult

Vascular Surgery

On this page

Useful Management Information

- Diabetic foot ulcer: High-risk foot clinic (referral via podiatry and access via telehealth available -- Statewide Diabetes Clinical Network will provide details)
- For adults with diabetes, assess their risk of developing a diabetic foot problem at the following times:
  - when diabetes is diagnosed, and at least annually thereafter
  - if any foot problems arise
  - on any admission to hospital, and if there is any change in their status while they are in hospital.
- For low risk of developing a diabetic foot problem, continue to carry out annual foot assessments, emphasise the importance of foot care, and advise they could progress to moderate or high risk
- Basic foot care advice and the importance of foot care
- Aboriginal and Torres Strait Islander people with diabetes are considered to be at high risk of developing foot complications until adequately assessed otherwise
- Commence antibiotics as per therapeutic guidelines
  Off-loading
- Renal impairment increases the risk of amputation for people with diabetes who experience amputation rates 11 times that of the general diabetic population, which in turn is 15 times the rate in people without diabetes

Examine both feet for evidence of the following risk factors:

- Neuropathy (use a 10g monofilament as part of a foot sensory examination)
- Limb ischaemia (see CPC on peripheral arterial disease)
- Ulceration
- Callus
- Infection and/or inflammation
- Deformity
- Gangrene
- Charcot arthropathy

Minimum Referral Criteria

Send Referrals To

Smart Referrals
Preferred Method
About Smart Referrals

Secure Web Transfer
Send to: Gold Coast Health Service District

Internal Referrals
Vascular Surgery (E-Blueslips)

Fax
(07) 5687 4497

Post
Booking and Referral Centre
Gold Coast University Hospital
1 Hospital Boulevard
Southport QLD 4215

Enquiries
1300 559 083

Service Availability

Dr Venu Bhamidi

Facilities
Gold Coast University Hospital
Robina Hospital

If you would like to send a named referral, please address it to the specialist listed above, who will allocate a suitably qualified specialist to see the patient. Alternatively, you can view a full list of our specialists.

12:19 PM
30/08/2021

High-risk foot

Minimum Referral Criteria

Does your patient meet the minimum referral criteria?

Category 1 (appointment within 30 calendar days)	▪ Foot ulcer or pressure injury with mild to moderate infection <2cm around wound ▪ Necrosis/dry gangrene (with or without ulceration) ▪ Non-infected foot ulcer

Category 2 (appointment within 90 calendar days)	▪ Diabetic with high-risk foot*
	
	*High-risk foot has 2 or more of the following:
	▪ Peripheral neuropathy (PN),
	▪ Peripheral arterial disease (PAD),
	▪ Foot deformity
	▪ Or a history of:
	  ▪ previous amputation or
	  ▪ previous foot ulceration

Category 3 (appointment within 365 calendar days)	▪ Peripheral arterial disease, peripheral neuropathy or foot deformity in the absence of adequate community resources

- If the patient does not meet the criteria for referral but the referring practitioner believes the patient requires specialist review, a clinical override may be requested:
  - Please explain why (e.g. warning signs or symptoms, clinical modifiers, uncertain about diagnosis, etc.)
- Please note that your referral may not be accepted or may be redirected to another service.

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High-risk foot

Essential Referral Information

- Details of all treatments offered and efficacy
- Peripheral pulses, femoral/popliteal/foot
- Is the ulcer neuropathic or ischaemic (or both) in origin?

If a specific test result cannot be obtained due to access, financial, religious, cultural or consent reasons a clinical override may be requested. This reason must be clearly articulated in the body of the referral.

Additional Referral Information

- Is there active infection? Consider deep wound swab/pathology for culture, ESR CRP FBC
- Is there invasive infection with spreading cellulitis around the wound?
- Is there bony infection? XR if required.
- If suspected arterial disease –Doppler Ankle Brachial Pressure Index (ABPI), toe pressures, duplex scan etc
- Appropriate medical history including claudication distance, rest pain, ischaemic changes and risk factors
- Results of depression screening (PHQ-2)
  - over the last 2 weeks, how often have you been bothered by any of the following problems?
    - little interest or pleasure in doing things?
    - feeling down, depressed, or hopeless?

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Diabetic foot infection

QHEPS Home Page | Queenslan | ANZSVS AVA - Admission Details | Topic | Therapeutic Guidelines | ANZSVS AVA - Admission Details | Home

https://tgldcdp.tg.org.au/viewTopic?topicfile=diabetic-foot-infection

Guidelines Drugs Quick links Updates Contact us

eTG complete > Antibiotic > Diabetic foot infection

Diabetic foot infection

Antibiotic

- Bartonella infections
  - Bartonella infections
- Bone and joint infections
- Brucellosis
- Cardiovascular system infections
- Central nervous system infections
- Cytomegalovirus (CMV) infection
- Acute infectious diarrhoea
- Ear, nose and throat infections
- Eye infections
- Febrile neutropenia
- Genital and sexually transmitted infections
- Human immunodeficiency virus
- Intra-abdominal infections
- Leptospirosis
- Lyme disease
- Mediastinitis
- Melioidosis
- Nocardiosis
- Nontuberculous mycobacterial

Aetiology of diabetic foot infection

Assessing diabetic foot ulcers for infection

Approach to managing diabetic foot infection

Empirical therapy for mild diabetic foot infection

Empirical therapy for moderate diabetic foot infection

Empirical therapy for severe diabetic foot infection

Key references

Diabetic foot infection

Assessing diabetic foot ulcers for infection

The International Working Group on the Diabetic Foot [Note 1] and the Infectious Diseases Society of America [Note 2] advise t
ulcer to be considered infected, **at least two** of the following features should be present:

- local swelling or induration
- erythema extending more than 0.5 cm in any direction from the wound
- local tenderness or pain
- local warmth
- purulent discharge.

Other causes of inflammation (eg trauma, gout, thrombosis) should be considered.

Culture of tissu
may identify org
from noninfecte

Do not collect

Infection severi
Diabetic Foot [I

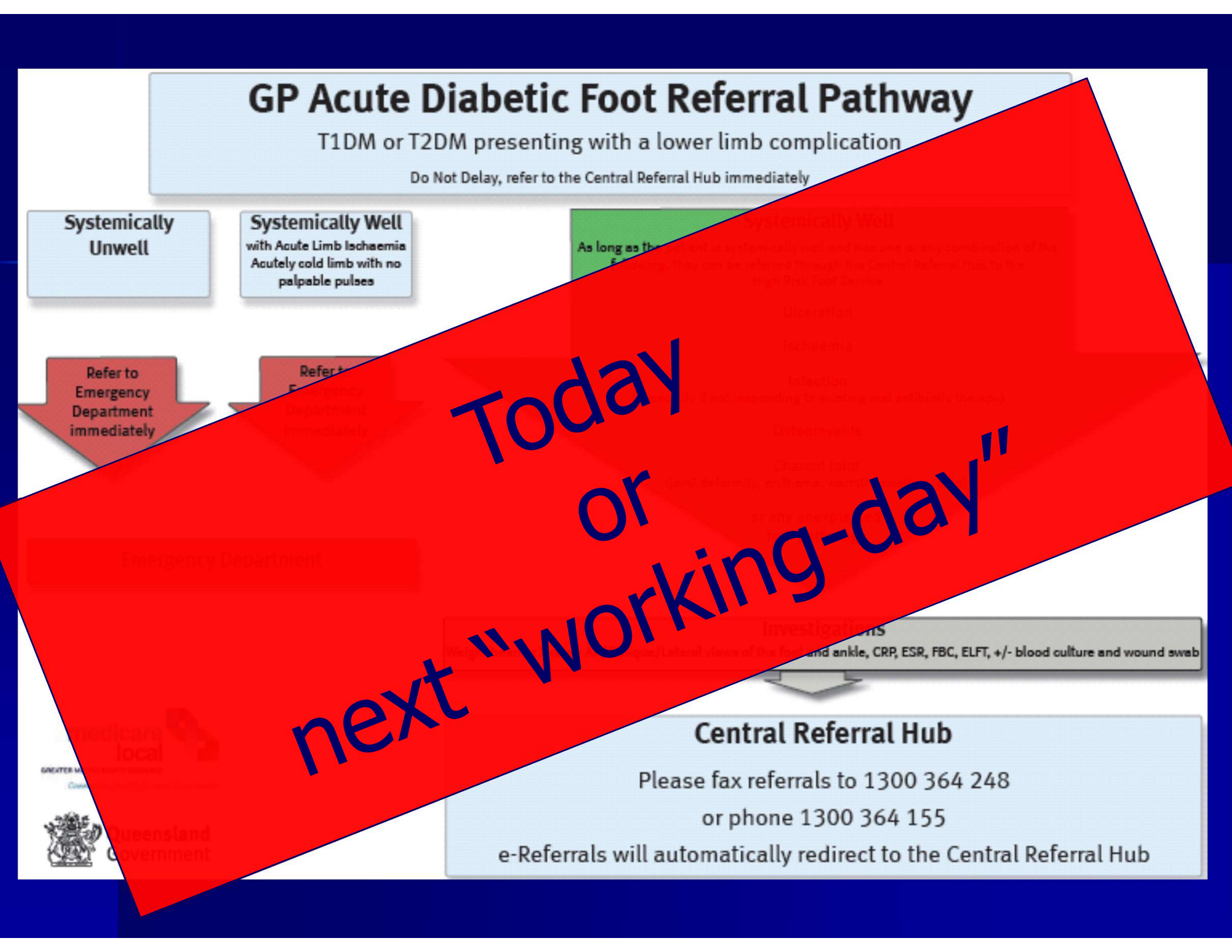
- mild diab
  margin a
- moderat
  erythema
  syndrom
- severe d
  abnorma
  breaths/

Infection severity determines antibiotic choice. The following severity scoring system is supported by the International Working Group on the Diabetic Foot [Note 1] and the Infectious Diseases Society of America [Note 2]:

- mild diabetic foot infection involves only the skin and subcutaneous tissue. Erythema extends no more than 2 cm from the wound margin and there are no systemic features of infection
- moderate diabetic foot infection involves structures deeper than the skin or subcutaneous tissues (eg muscle, bone, joint, tendon) or erythema that extends more than 2 cm from the wound margin. Infection is not associated with systemic inflammatory response syndrome (SIRS) (as described below)
- severe diabetic foot infection is an infection associated with systemic inflammatory response syndrome (SIRS) (ie 2 or more of: abnormal temperature [more than 38°C or less than 36°C]; heart rate more than 90 beats/minute; respiratory rate more than 20 breaths/minute; white cell count more than 12×10^9/L or less than 4×10^9/L, or more than 10% immature [band] forms).

Note 1: Lipsky B
with diabetes. Di

Note 2: Lipsky BA, Berendt AR, Cornia PB, Pile JC, Peters EJ, Armstrong DG, et al. 2012 Infectious Diseases Society of America clinical practice guideline for the diagnosis and treatment of diabetic foot infections. Clin Infect Dis 2012;54(12):e132-73. [URL]


GP Acute Diabetic Foot Referral Pathway
T1DM or T2DM presenting with a lower limb complication
Do Not Delay, refer to the Central Referral Hub immediately
Systemically Unwell
Systemically Well
with Acute Limb Ischaemia
Acutely cold limb with no palpable pulses
Refer to Emergency Department immediately
Today
or
next "working-day"
and ankle, CRP, ESR, FBC, ELFT, +/- blood culture and wound swab
Central Referral Hub
Please fax referrals to 1300 364 248
or phone 1300 364 155
e-Referrals will automatically redirect to the Central Referral Hub

WOUND MANAGEMENT PRIORITIES

- Determine Viability
- Drain Sepsis
- Ensure Vascular Supply
- Treat Infection
- Determine Aetiology
- Debridement
- Granulation / Wound Contracture
- Epithelisation
- Prevention

Drain sepsis (steel therapy).

Look for tracking of sepsis

Needs drainage

Temporising measures

Drain pus / open tracts / joint cavities

HIERARCHY of PRIORITIES- A Vascular Surgeon's Perspective

- Determine Viability
- Drain Sepsis
- Treat Infection
- Determine Aetiology
- Ensure Optimal Vascular Supply
- Debridement
- Granulation / Wound Contracture
- Epithelisation
- Prevention

DETERMINE AETIOLOGY

- History.
  - Pain:

severe	Arterial
moderate	Vasculitic
mild	Venous
None	Neuopathic

- Examination — Co-existent signs
  Peripheral pulses.
- Pathology.
  - Biopsy. (Unusual & chronic wounds)
- Radiology.

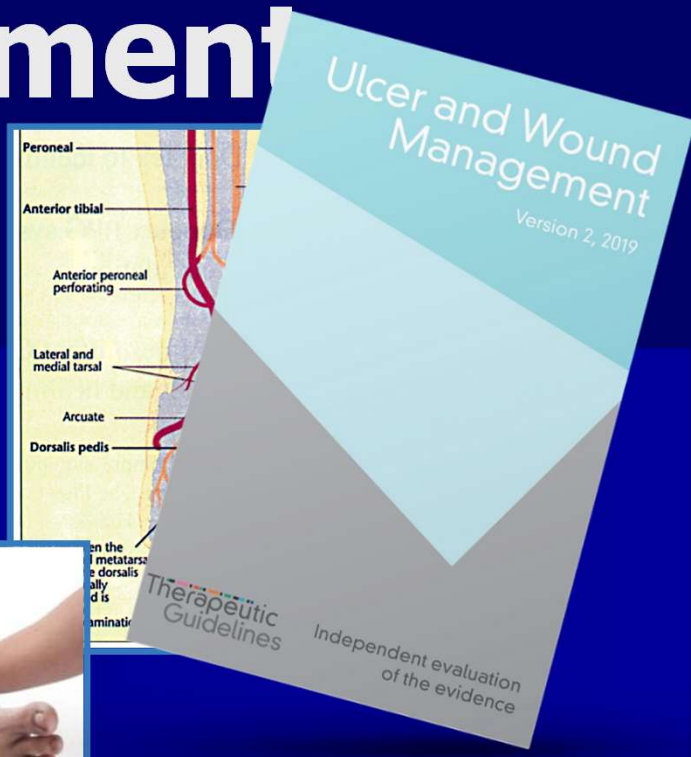
Arterial assessment

- Determine aetiology
- Plan revascularisation (deliver 02)
- Avoid injury
- Apply compression when revascularization required.

Assessment of Peripheral Vascular System

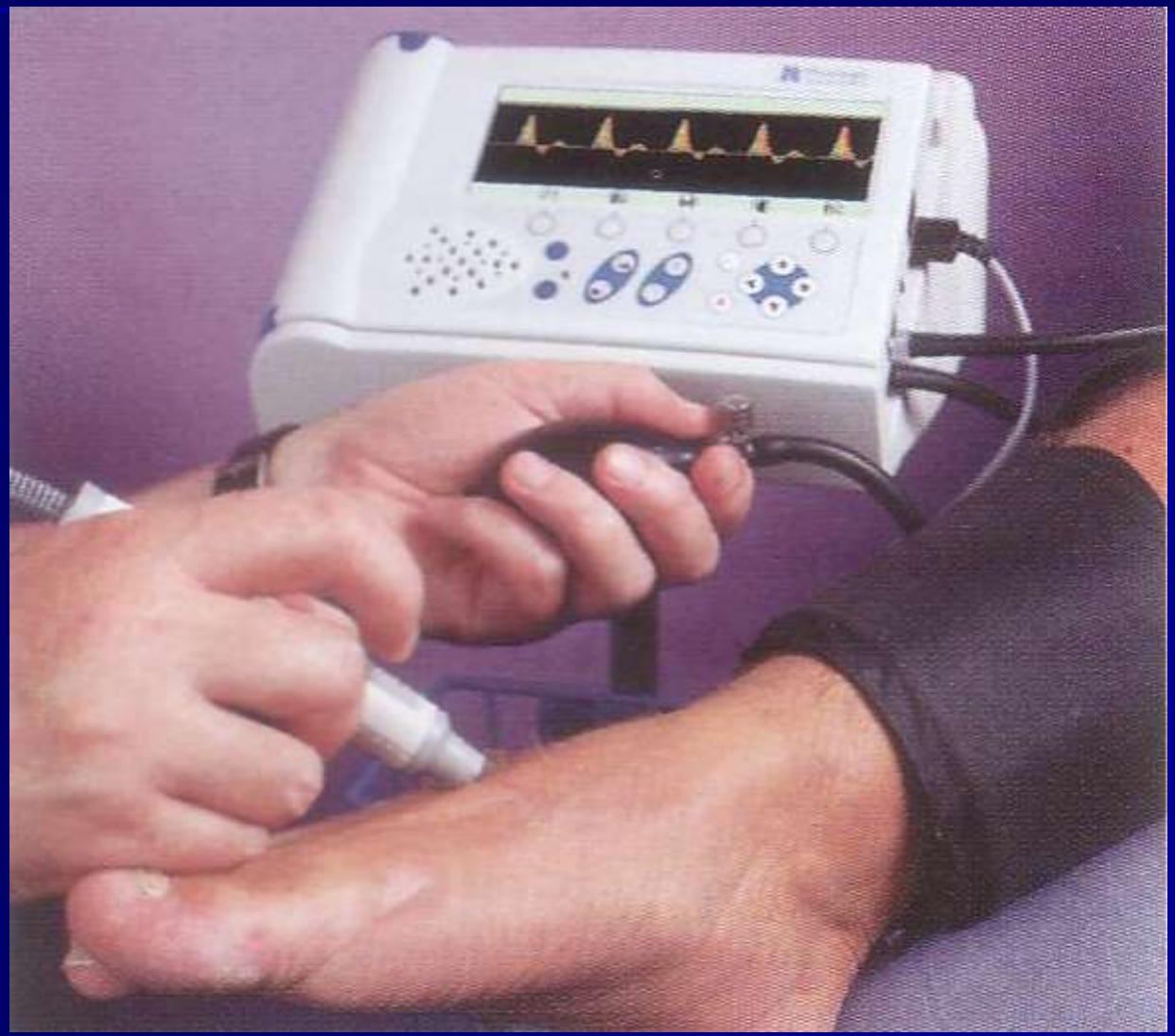
Non-invasive assessment techniques

- Peripheral pulses and bruits
- Ankle brachial index (Doppler)
- Doppler velocity waveform
- Duplex ultrasound scanning
- Magnetic resonance angiography

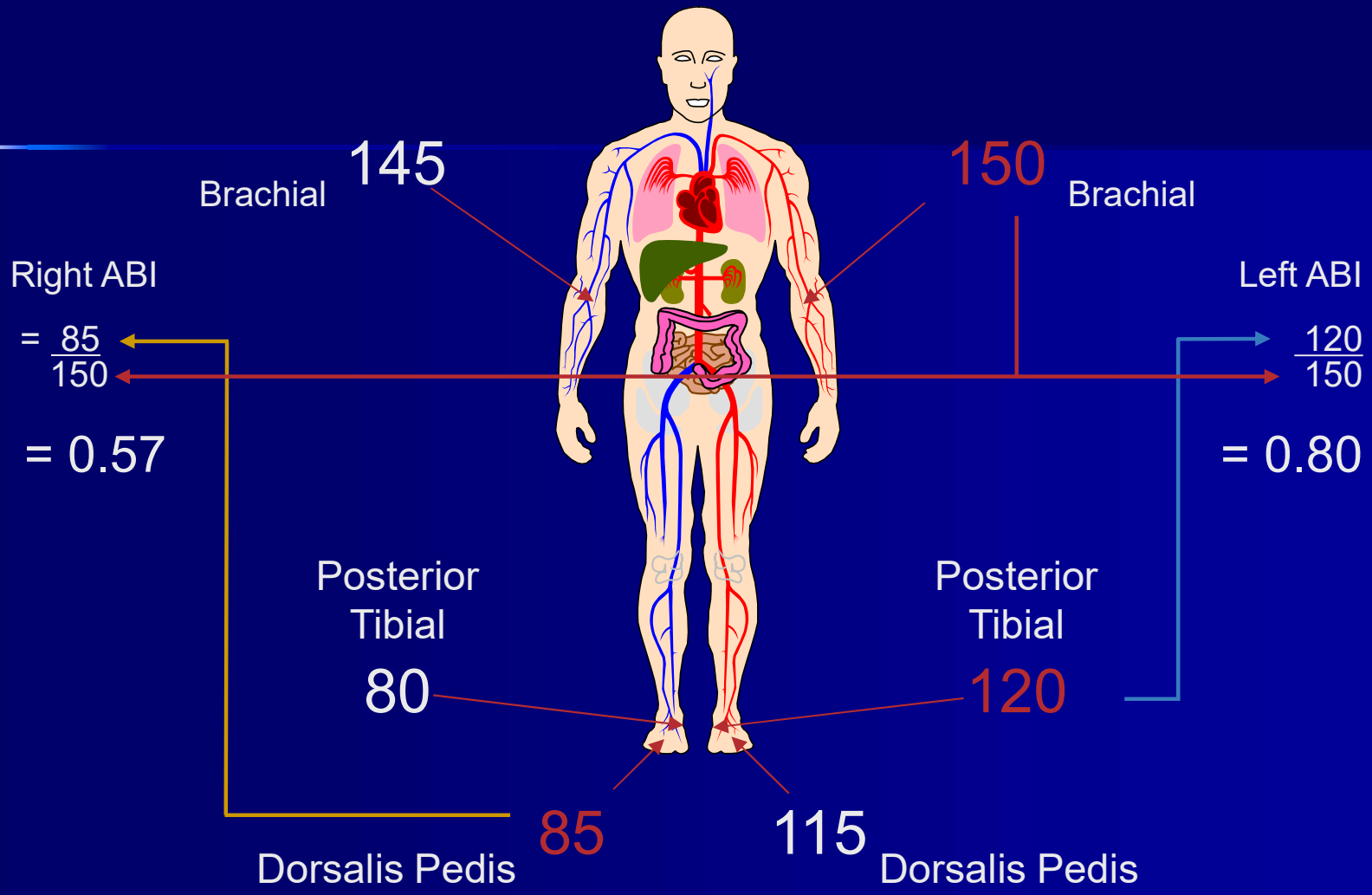


Belch JJF *et al. Arch Intern Med* 2003; 163: 884-92.; TASC Working Group. *J Vasc Surg* 2000; 31: S1-S296.

Ankle-Brachial Pressure Indices (ABPI's)



How to calculate the ABI



Belch JJF *et al. Arch Int Med* 2003; 163: 884-92; Hiatt WR. *N Engl J Med* 2001; 344: 1608-21.

ABI values and clinical severity

Ankle-Brachial Index	Interpretation
>1.30	Non compressible
>0.90-1.30	Normal
0.41-0.90	Mild-to-moderate PAD
0.00-0.40	Severe PAD

Belch JJF *et al*. *Arch Intern Med* 2003; 163: 884-92; Hiatt WR. *N Engl J Med* 2001; 344: 1608-21.

Arterial Assessment – Caveat

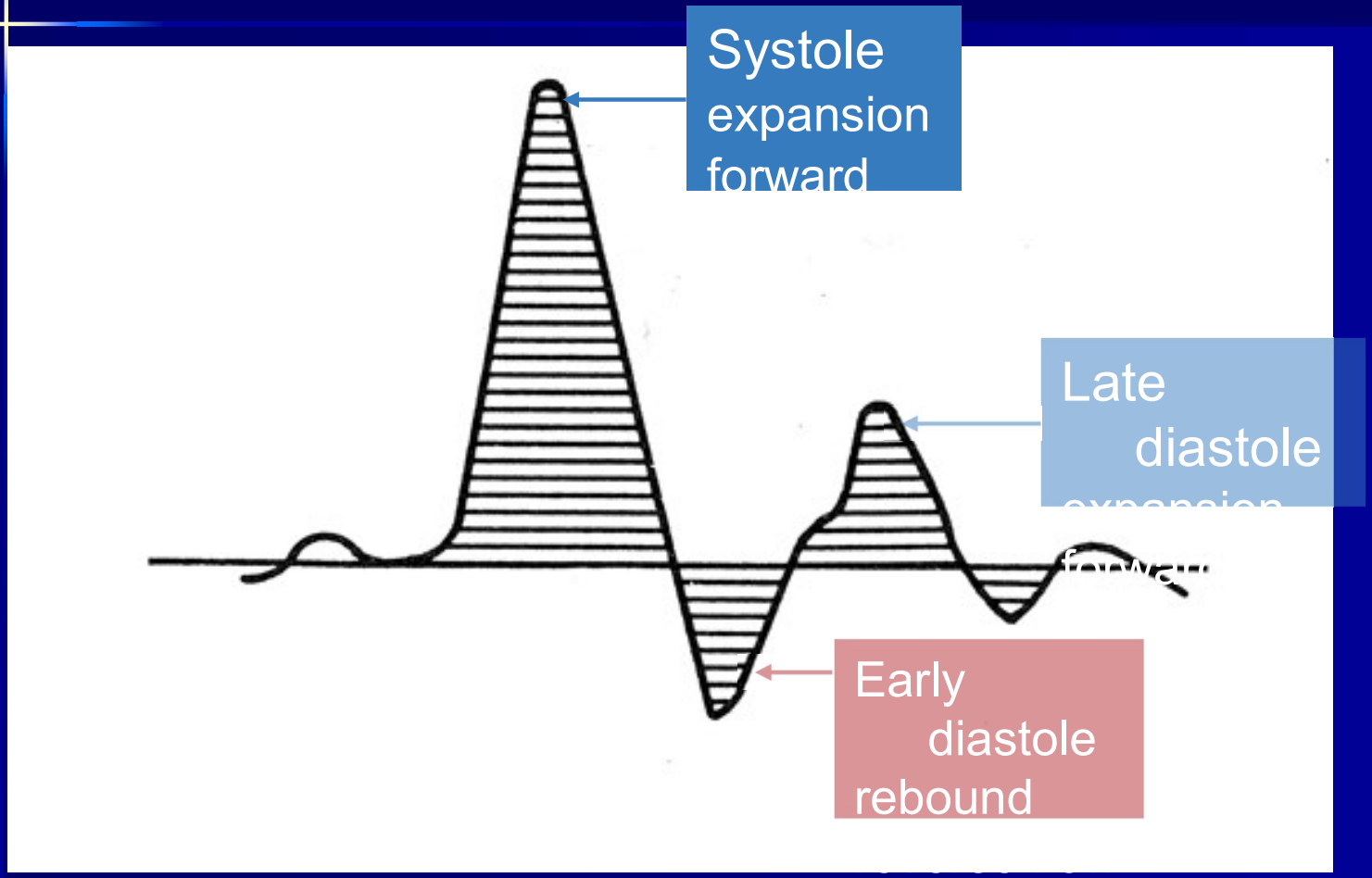
Ankle-Brachial Index Interpretation

>1.30 Non compressible

Nb. Calcified or non-compressible arteries may lead to falsely elevated ABI readings →

attempt toe-brachial index instead .

Haemodynamics

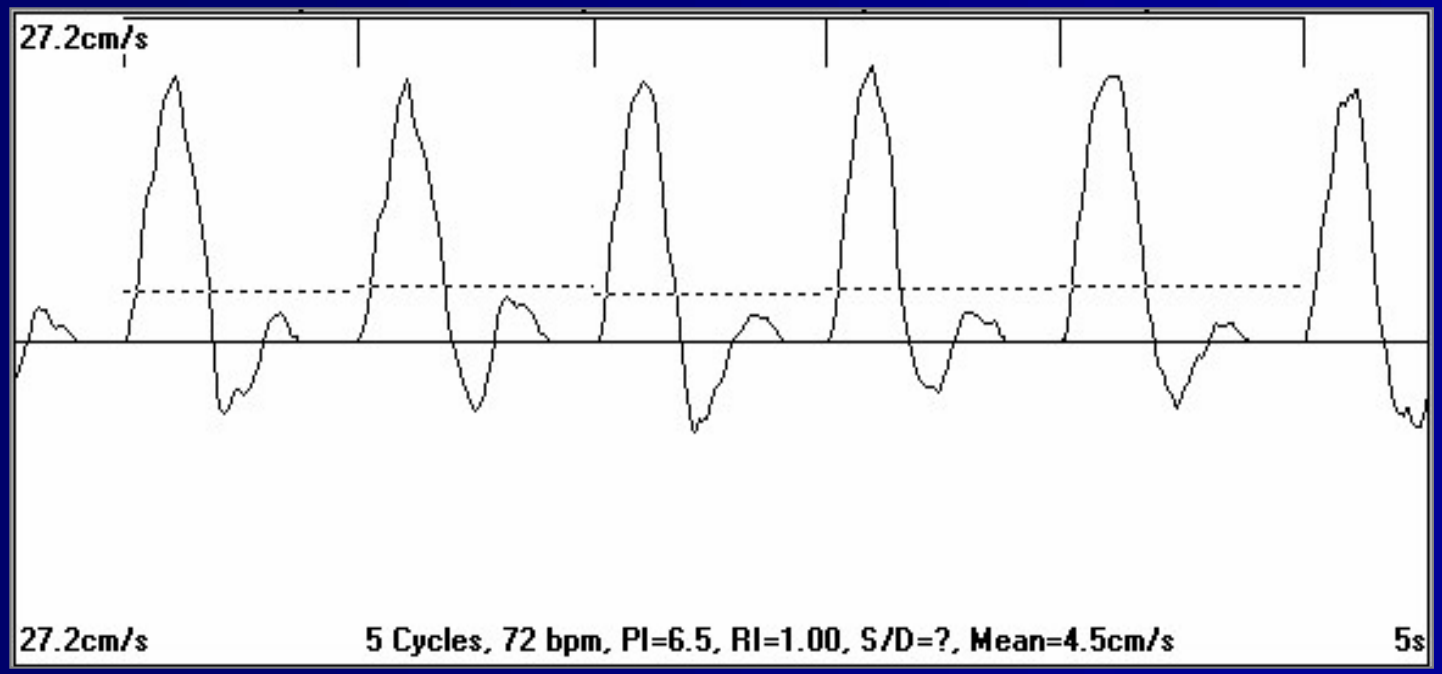


Zwiebel WJ, 1982; Aburahma AF, Diethrich ED, 1988.

Interpreting Doppler waveforms

Triphasic waveform

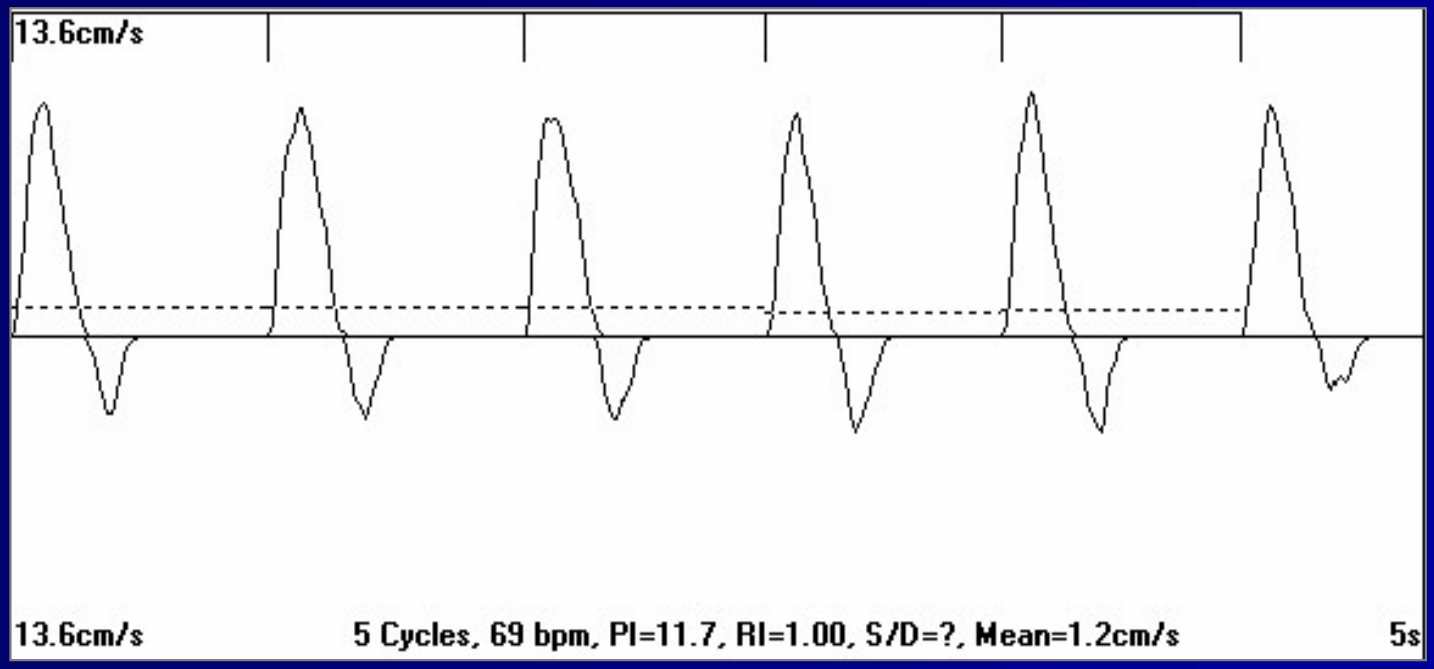
- Indicates normal blood flow



Interpreting Doppler waveforms

Biphasic waveform

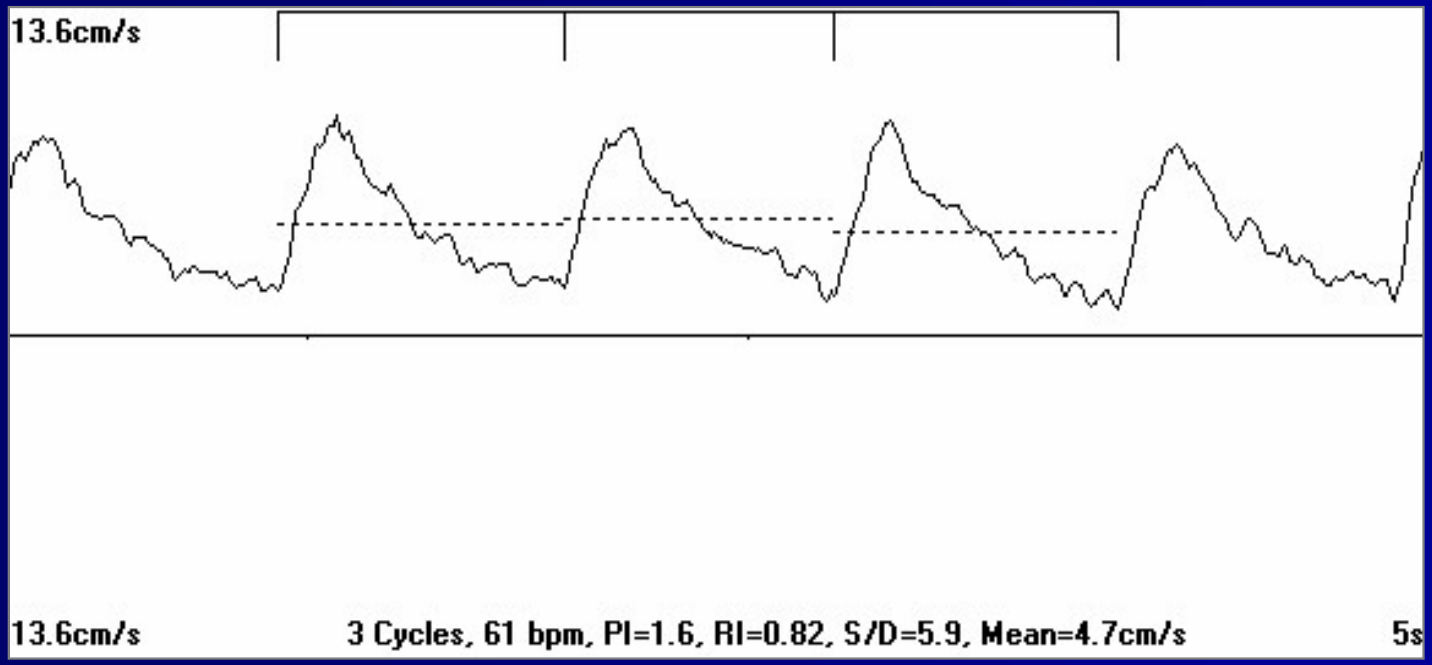
- Indicates mild-to-moderate flow impairment



Interpreting Doppler waveforms

Monophasic waveform

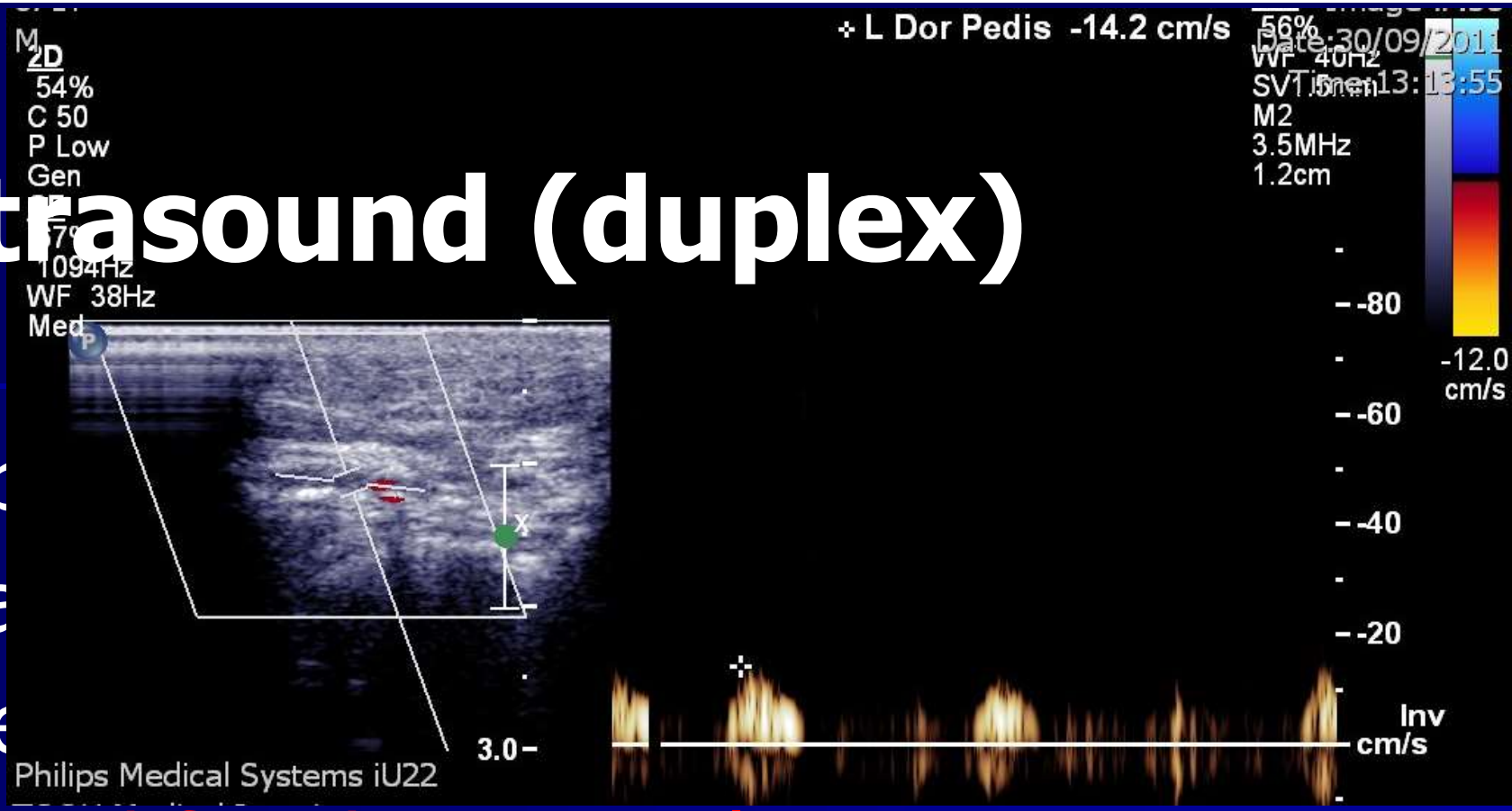
- Indicates severe flow impairment



Ultrasound (duplex)

- Non-invasive
- Cheap but time consuming
- Operator dependent- experience, enthusiasm
- Requester dependent
- Not good for fat people
- Calcified vessels difficult to insonate
- Calcific walls contribute to reverberation artefacts

Ultrasound (duplex)



- Cheap
- Opera
- Reque
- Not good for obese people
- Calcified vessels difficult to insonate
- Calcific walls contribute to reverberation artefacts

* Somewhat limited in advanced diabetic disease

CTA

- Expensive
- Iodinated contrast
- Radiation
- Scanner and operator dependent
- Very demanding to interpret
- Good for obese people
- Good for big vessels
- No good with calcium

CTA can be great

- normals
- no calcium
- good kidneys
- big vessels

…but CTA is no good when…

- calcified vessels
- small diameter vessels
- Renal issues
  (Iodinated contrast & frail kidneys)

* Very limited in advanced diabetic disease

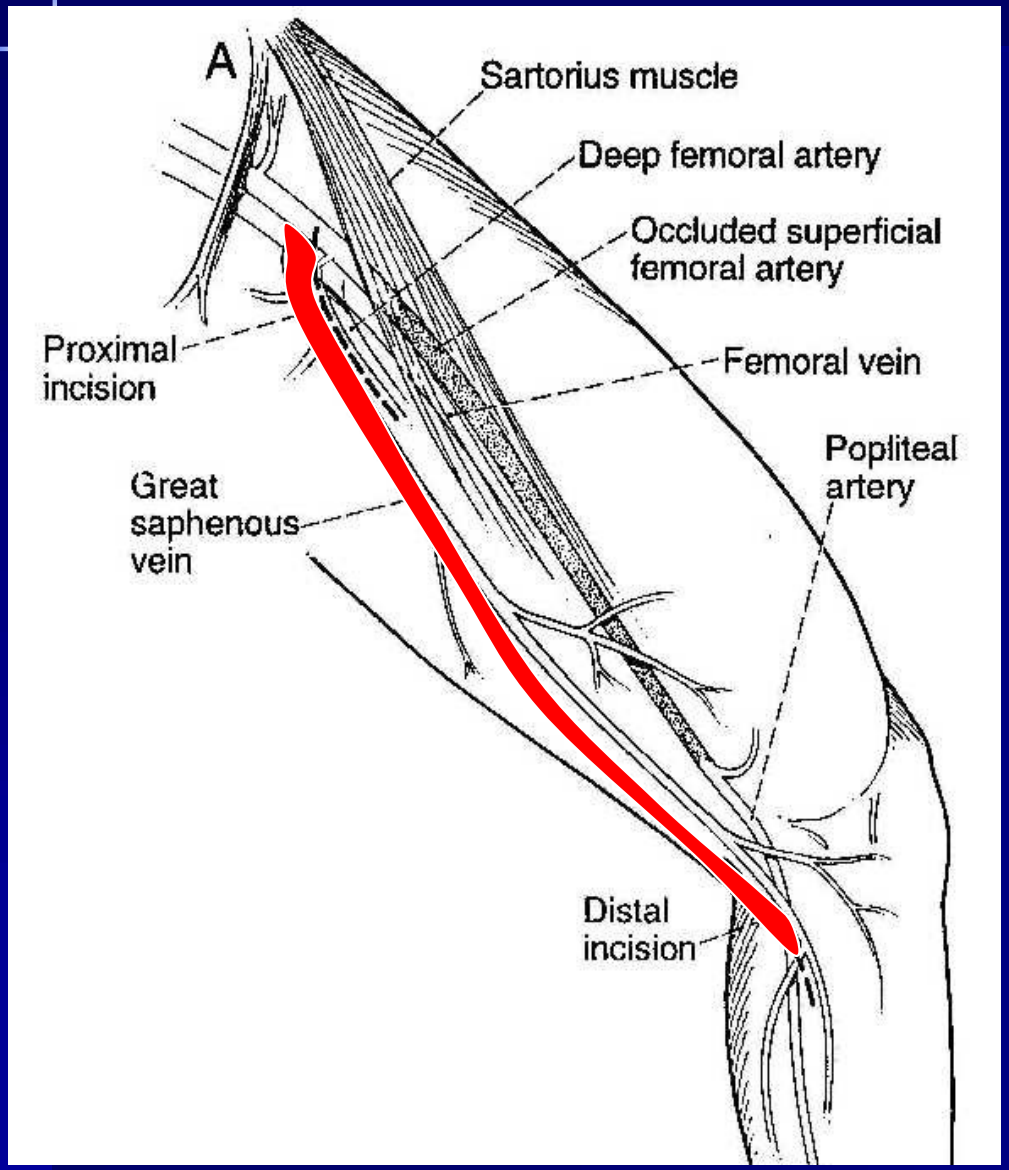
Revascularisation. What options do we have?

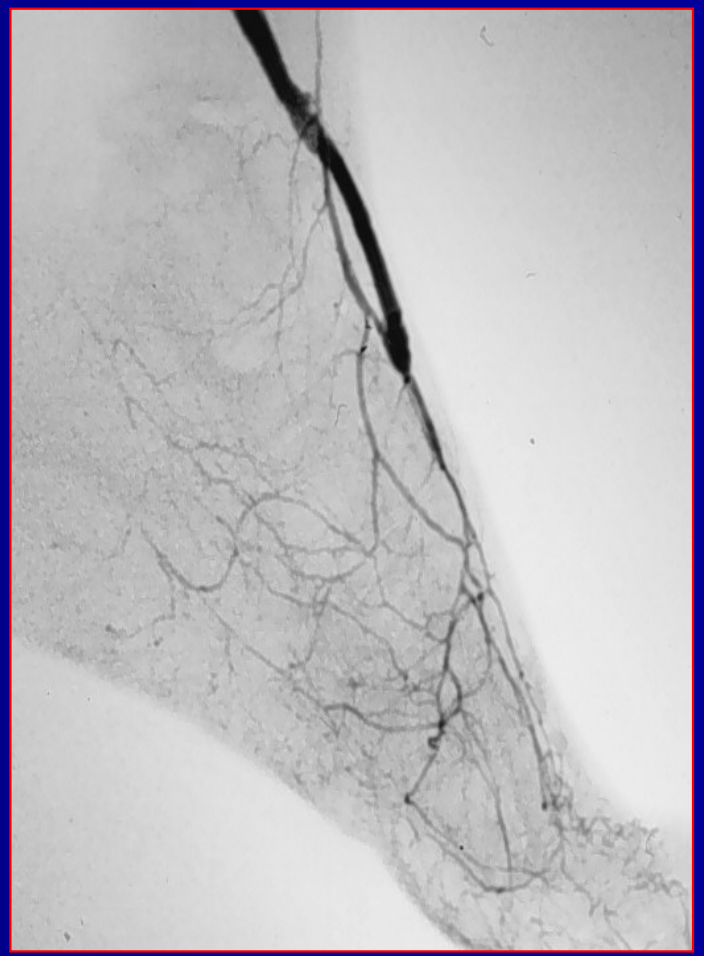
Leg ulceration or tissue loss

?

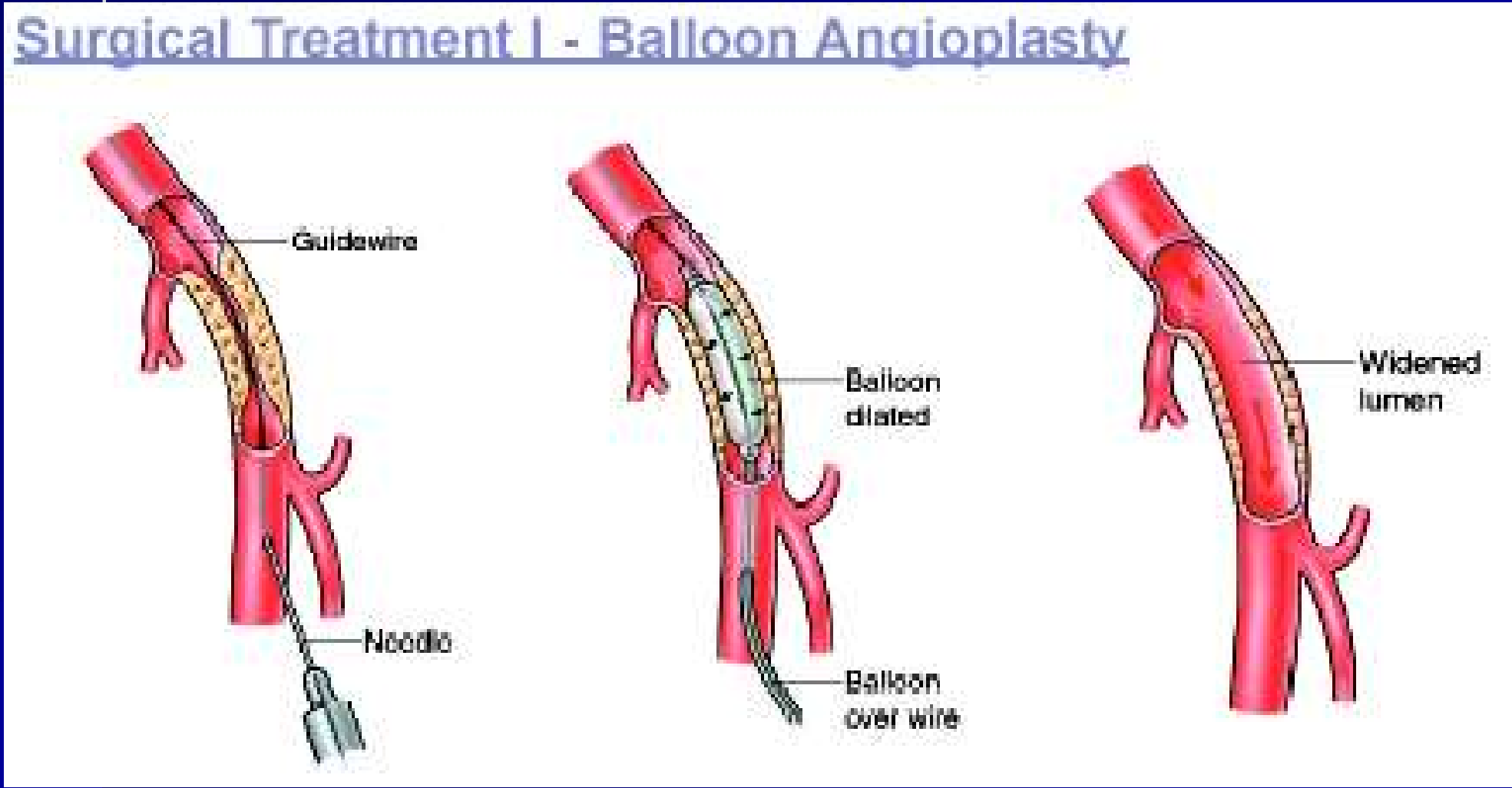
- Conservative
- Angioplasty / Stent
- Bypass
- Primary Amputation
- Palliation

Bypass for Lower Limb Revascularisation





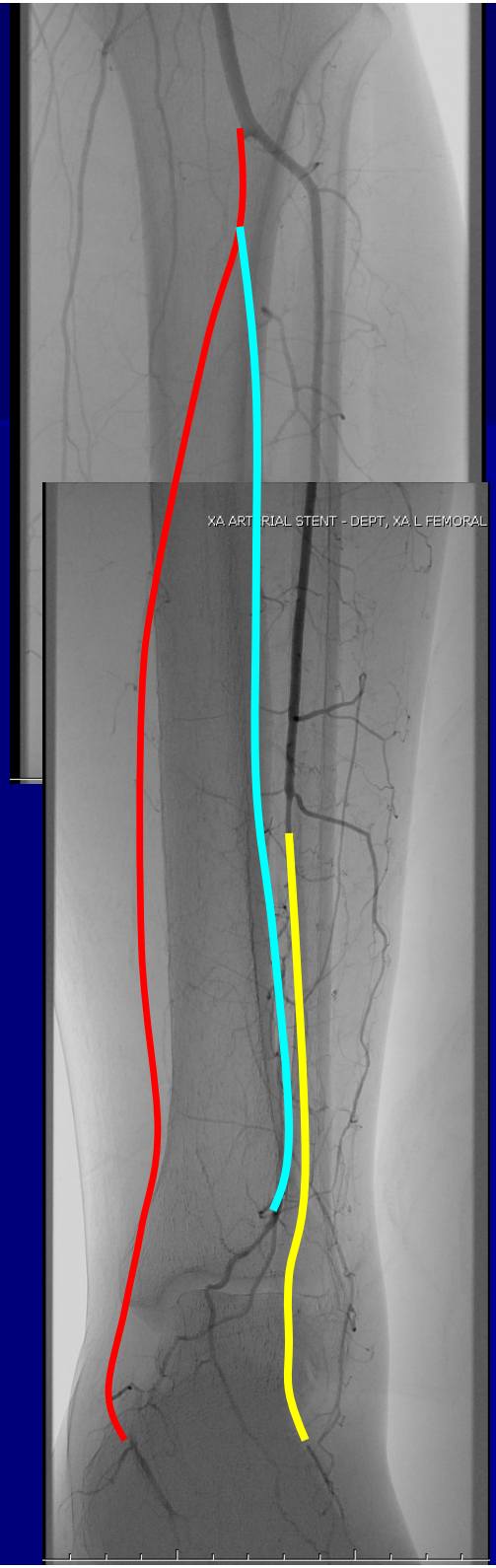
MANAGEMENT- Endovascular

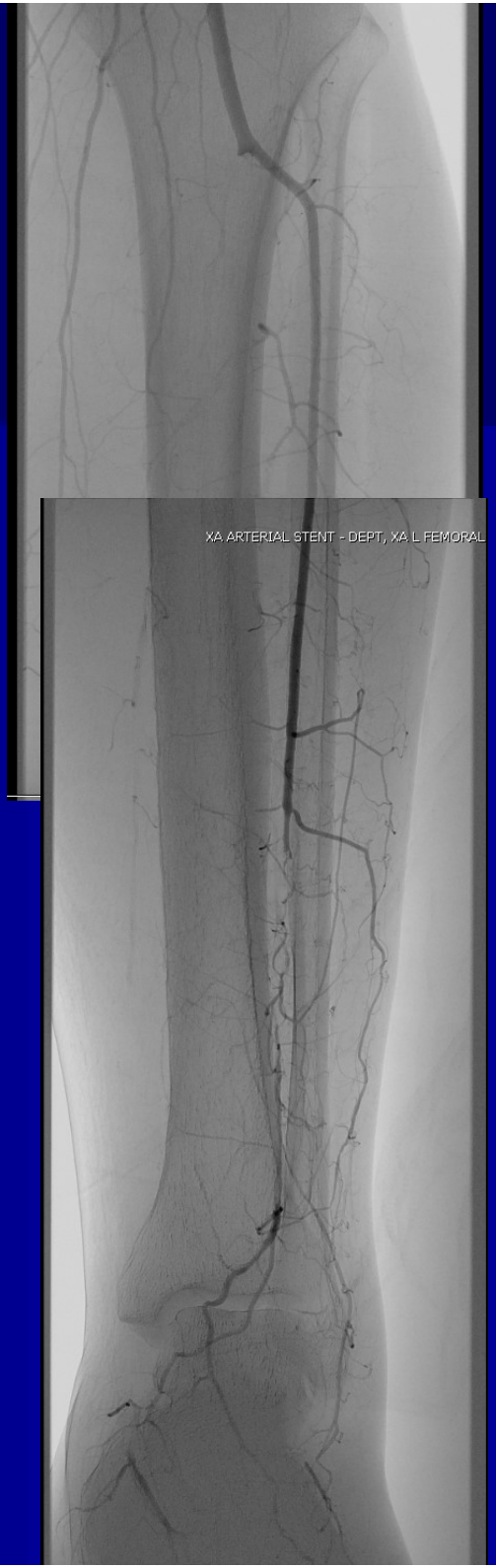


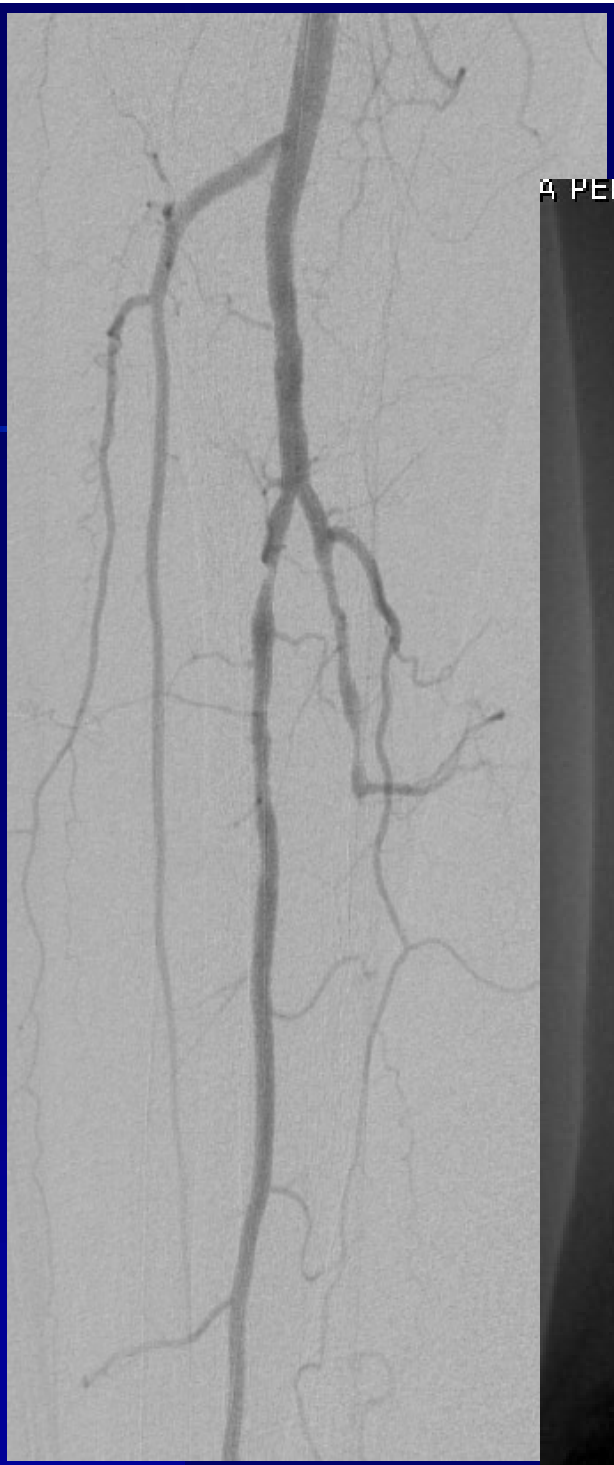
Diabetic Macrovascular Disease (DSA)

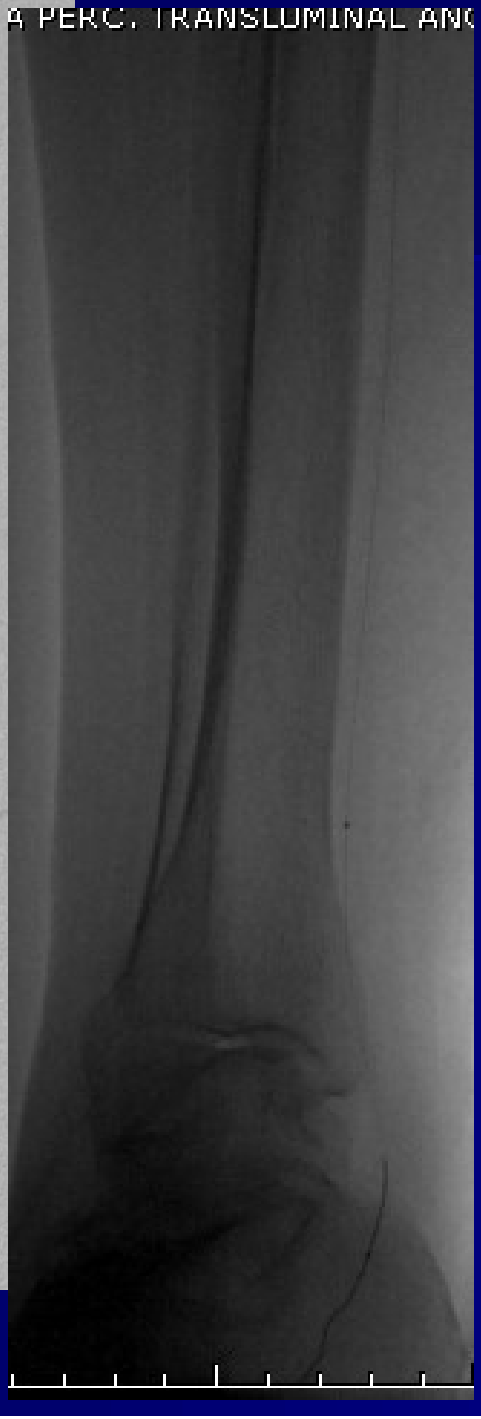
Diabetic Macrovascular Disease (DSA)

Diabetic Macrovascular Disease (DSA)

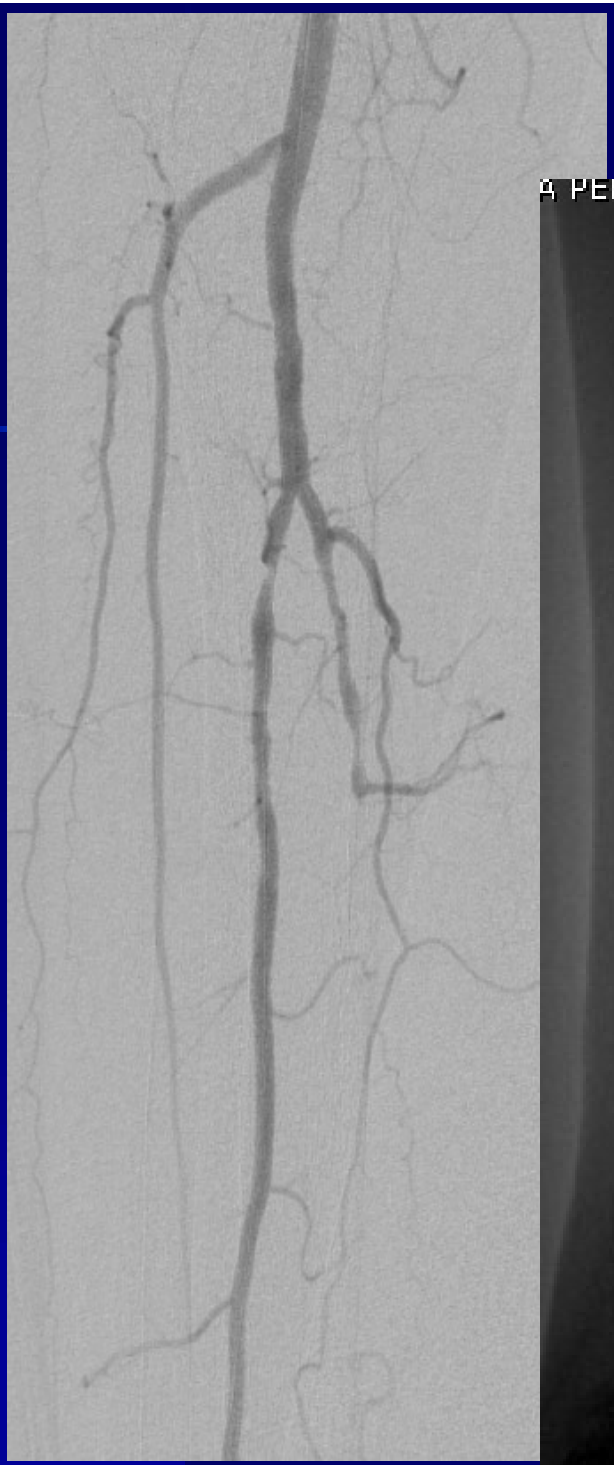







A PERC. TRANSLUMINAL ANG


A PERC. TRANSLUMINAL ANG

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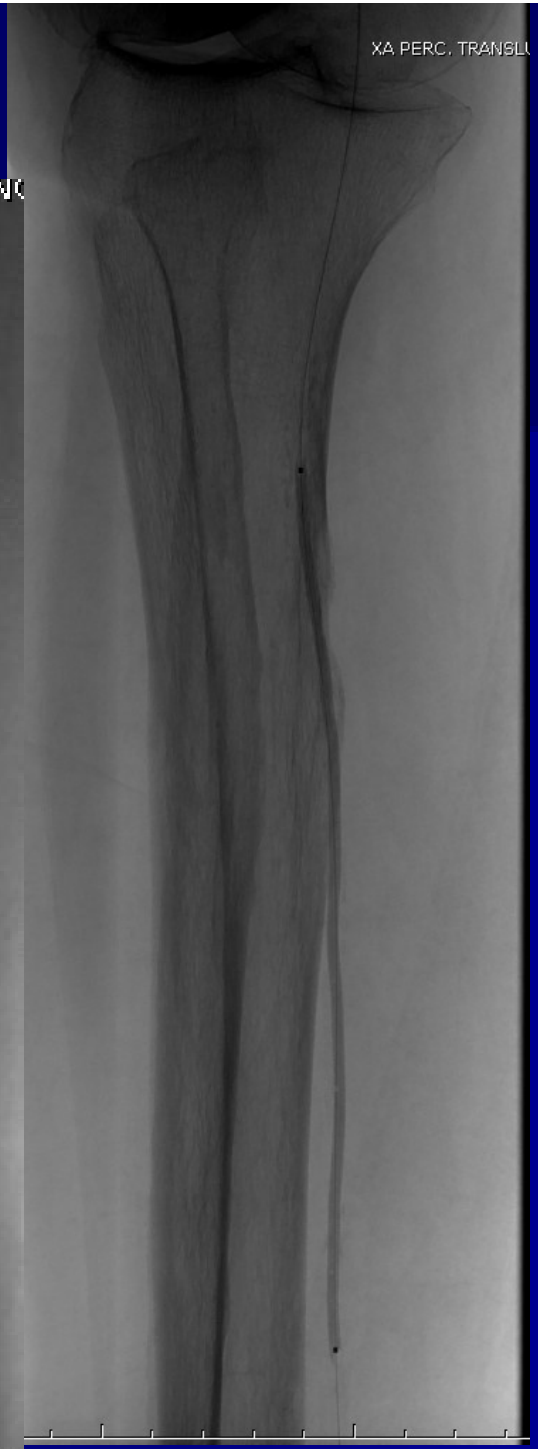
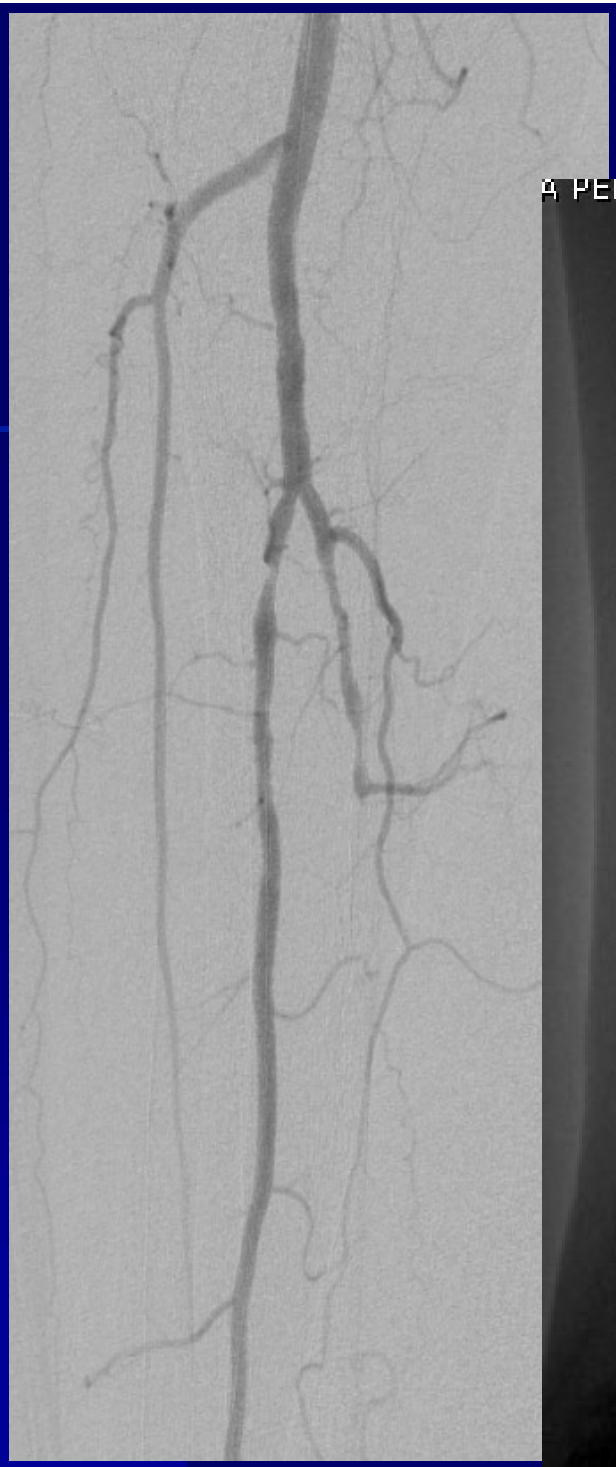

XA PERC. TRANSLU

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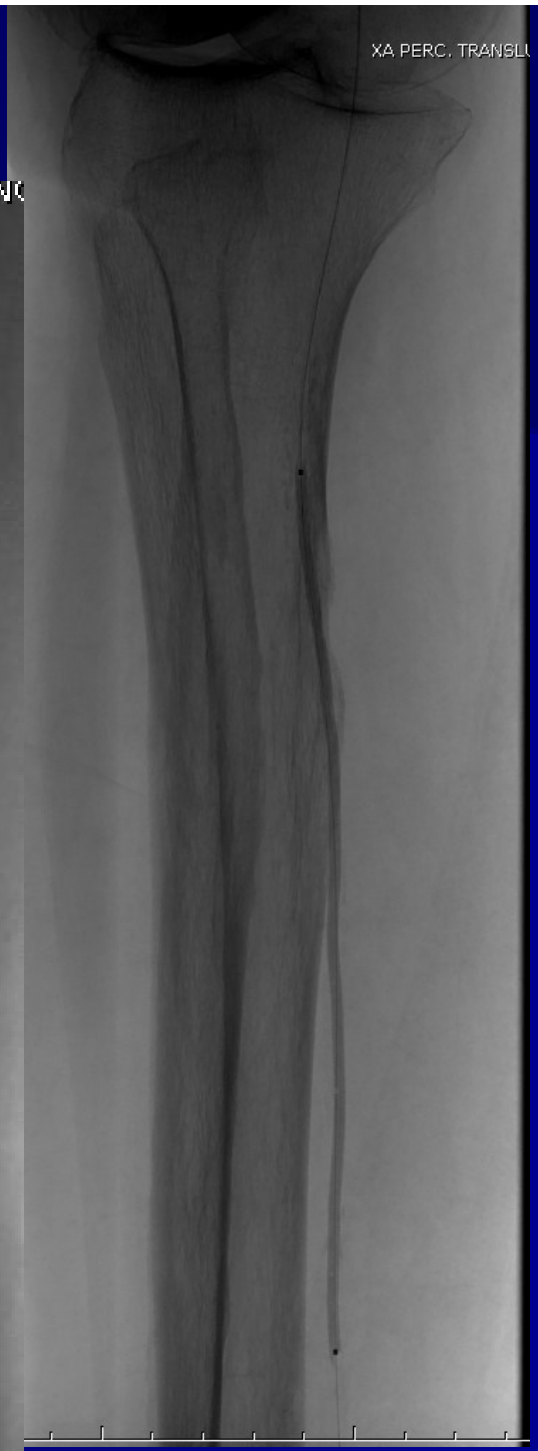
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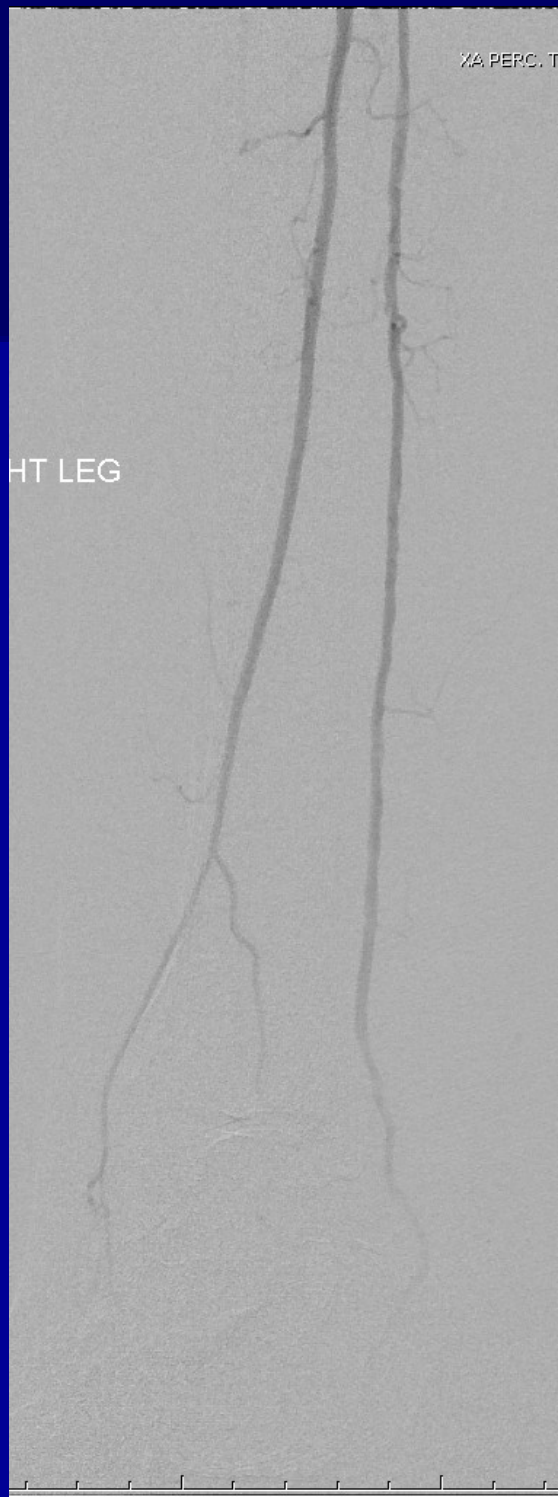
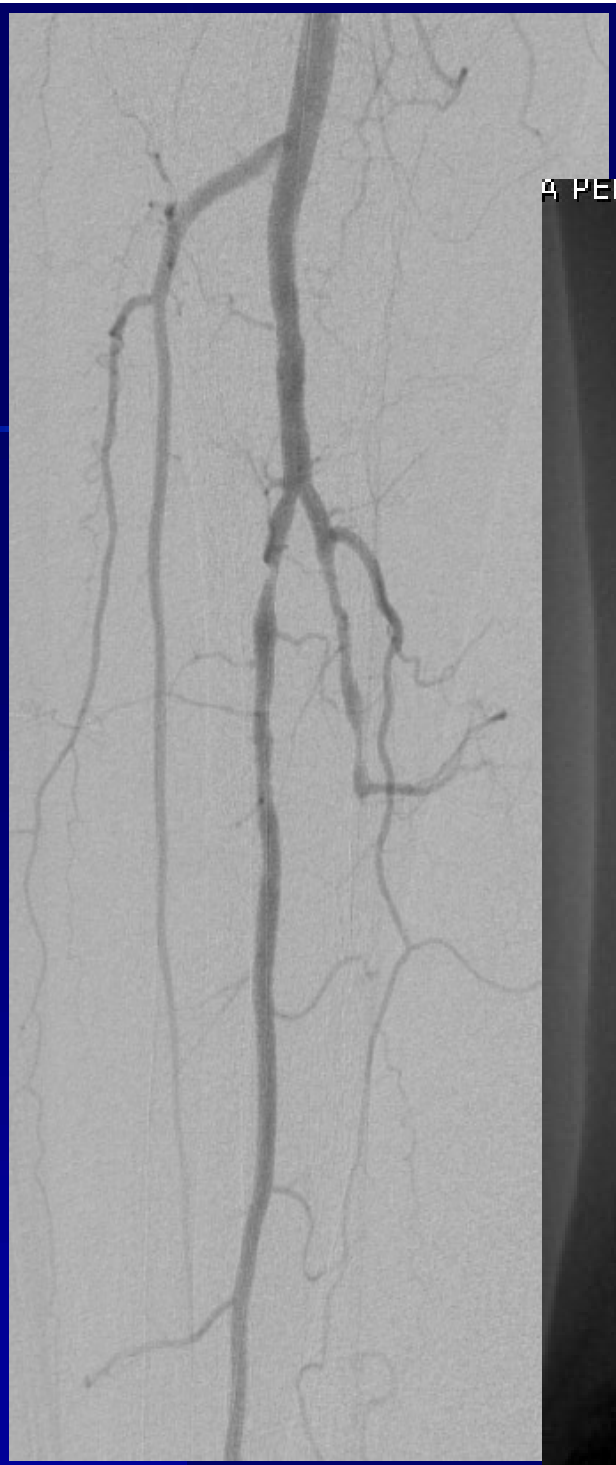

XA PERC. T
HT LEG

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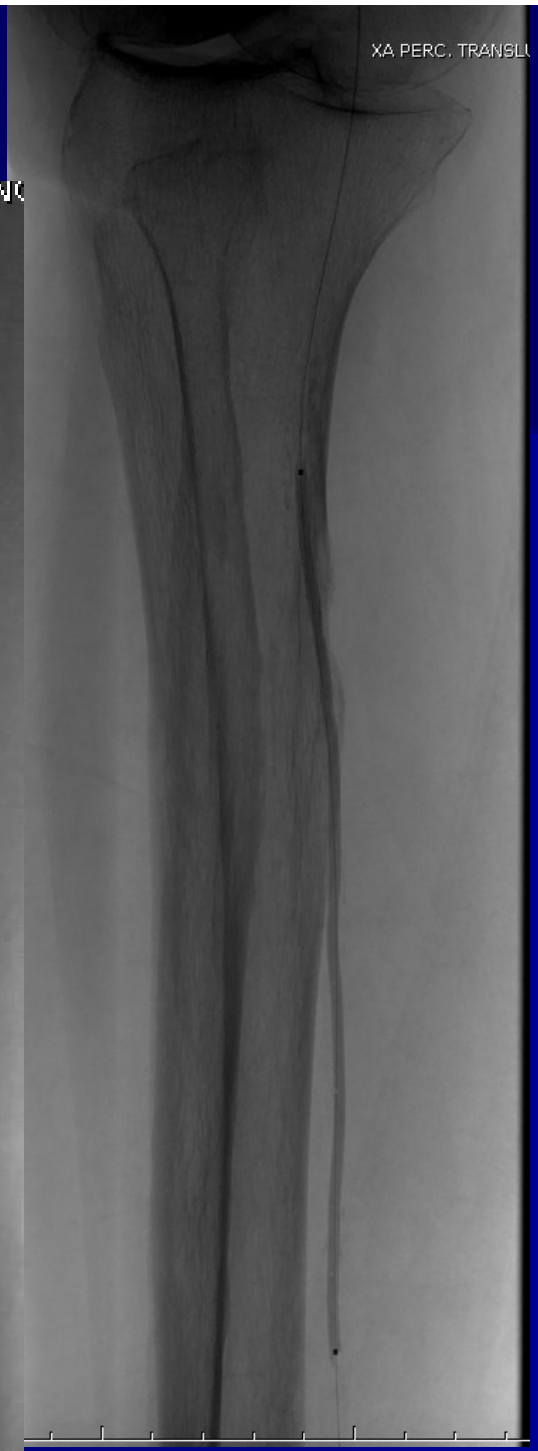
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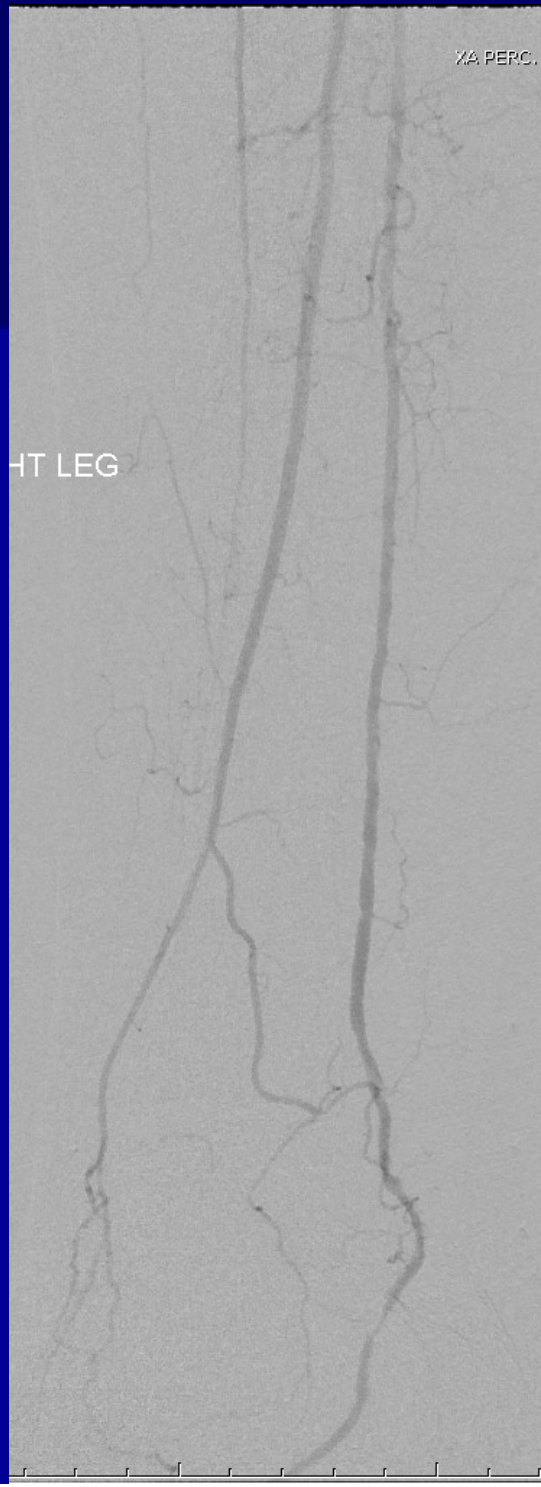

XA PERC.
HT LEG

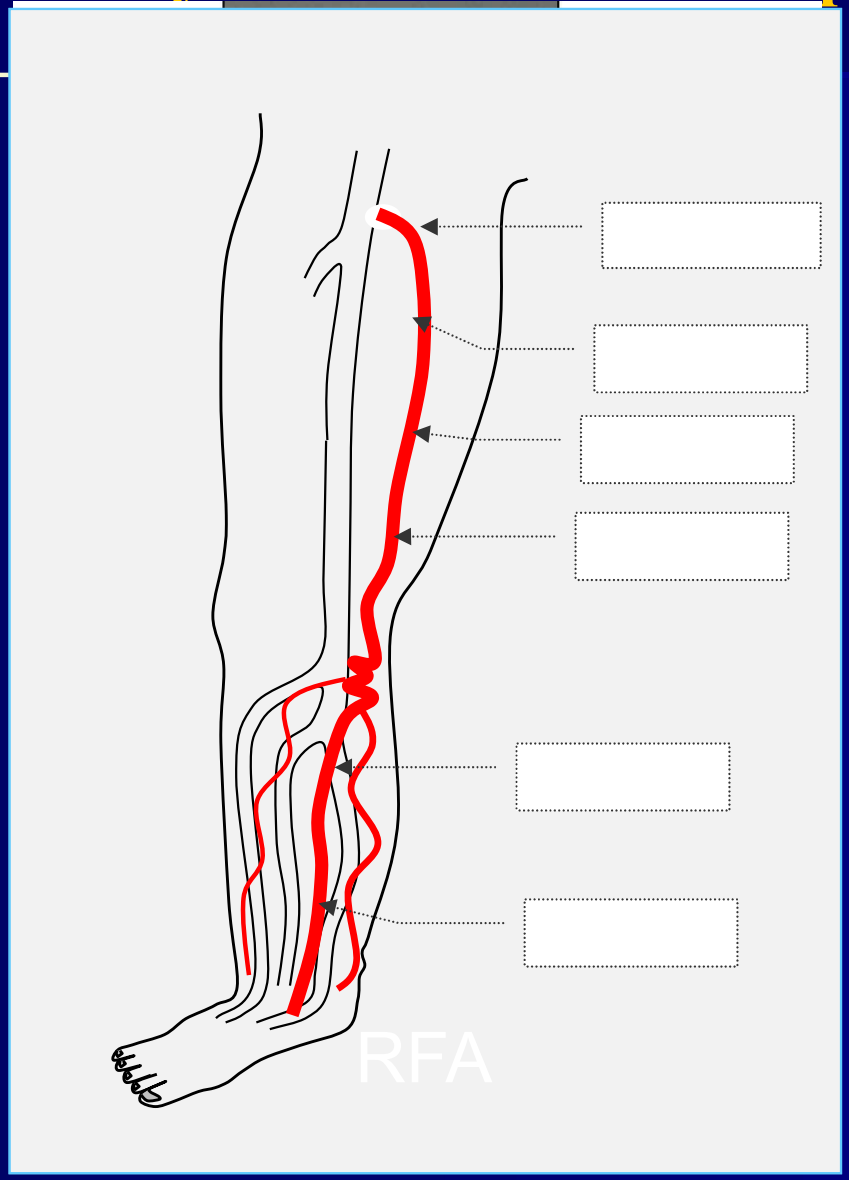
Endovascular Facilities.

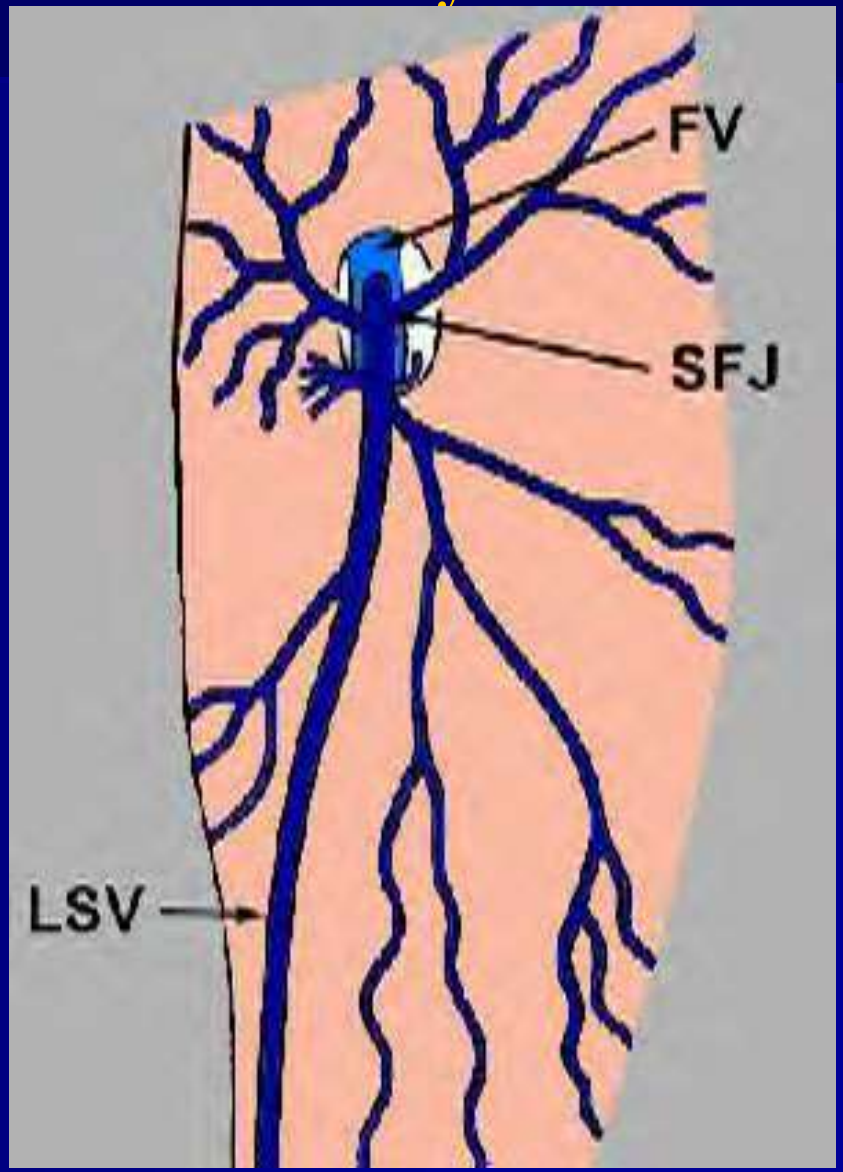
Expensive Resource - intensive

Shorter adm.
Recovery of function.
Healing
Less pain

VENOUS INSUFFICIENCY

Anatomy of the lower limb superficial venous system





VENOUS ULCER

- SITE- near medial or lateral malleolus.
- APPEARANCE- flat shallow margins, variable size,heavily exuding.
- PERIWOUND- stasis dermatitis, scale,maceration.

VENOUS LEG

- Staining of lower leg.
- Induration of ankle.
- Ankle flare - distended small venules on the medial aspect of foot.
- Oedema.
- Friable skin.
- Stasis dermatitis.

SIGNS OF VENOUS INSUFFICIENCY

Stasis changes

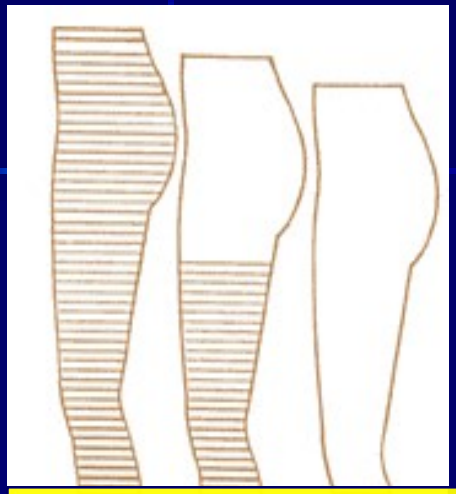
Precursor to Ulceration

- Haemosiderin
- LipoSclerosis (soft tissues)
- Dermatosclerosis
- Venous Flares / spiders
- Oedema

Massive Varicose Veins

Venous stasis oedema

Compression Therapy



Compression Bandaging	Compression stockings	
Tubular (retention dressing)	TEDS	Bed-bound
Multi-layer Tubular 3-layered bandage	Grade 1 (15-20mmHg) elderly / intolerant	

Compliance

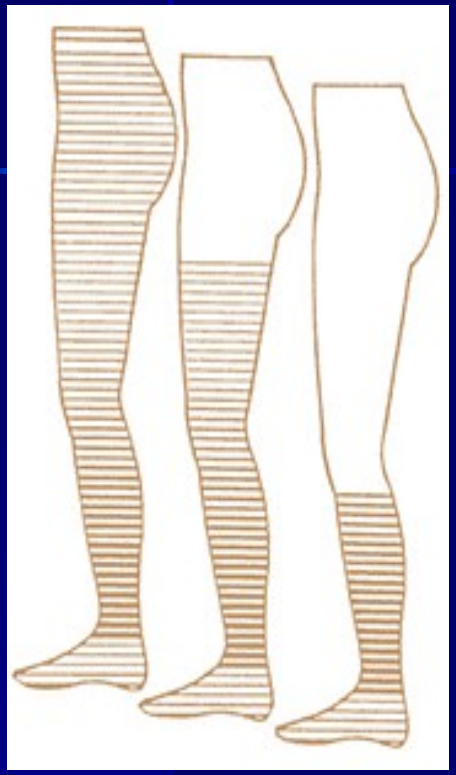
?Reason – Fitting

Wearing

Removing

Venous stasis eczema / ulceration & cellulitis

Compression Therapy



Compression Bandaging

Tubular (retention dressing)

Multi-layer Tubular
3-layered bandage
Variable stretch bandage

4-

Compression stockings

TEDS Bed-bound

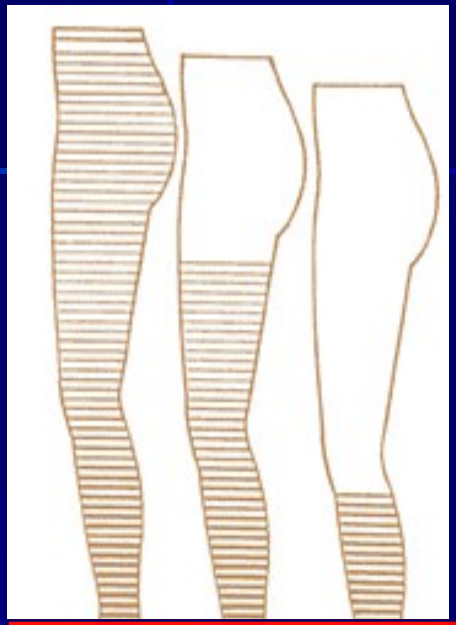
Grade 1 (15-20mmHg)
elderly / intolerant

Grade 2 (20-30mmHg)
preferred
aids can be employed

Grade 3 (25-35mmHg)
compliance is difficult

Forced compliance!

Compression Therapy



Compression Bandaging	Compression stockings
Tubular (retention dressing)	TEDS Bed-bound
Multi-layer Tubular 3-layered bandage Variable stretch bandage	Grade 1 (15-20mmHg) elderly / intolerant
4-layered bandage	Grade 2 (20-30mmHg)
Short stretch bandaging	Grade 3 (25-35mmHg) Compliance is difficult

Need to check pulses and ABPI's

ABI values and grade of compression.

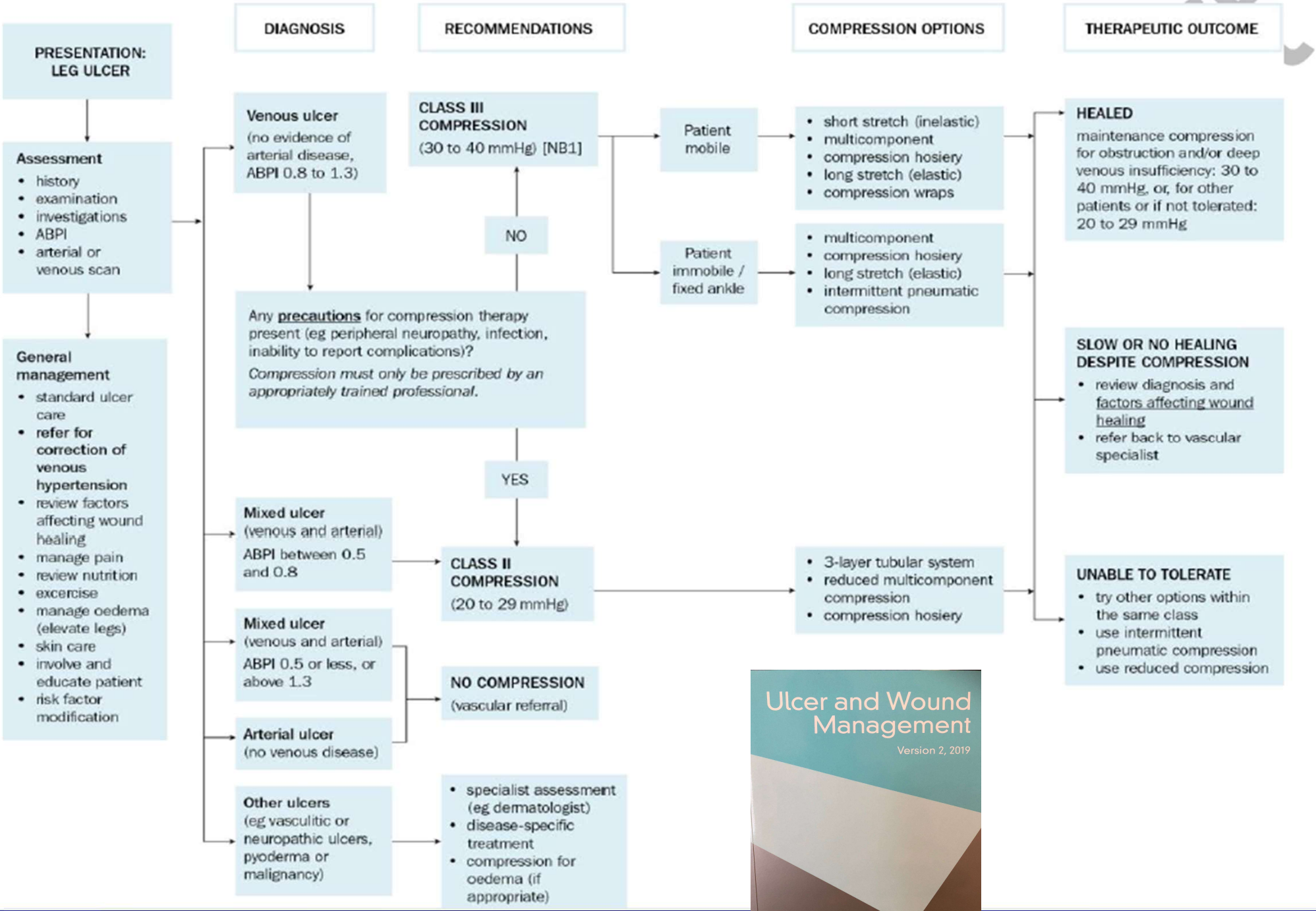
Ankle-Brachial Index			Interpretation
>1.30			Non compressible
>0.90-1.30			Normal
	ABPI 0.8 - 0.9	Compress	
0.41-0.90	ABPI 0.6 - 0.8	Light	Mild-to-moderate PAD
	ABPI 0.4 – 0.6	No compression	
0.00-0.40			Severe PAD

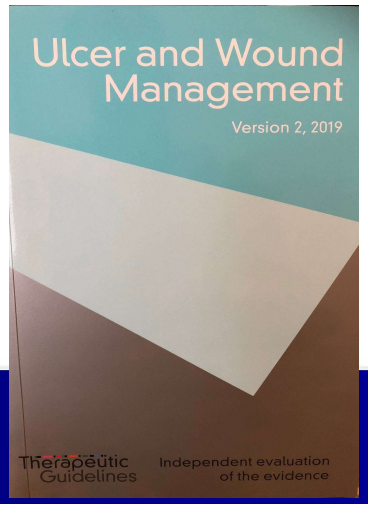
Belch JJF *et al*. *Arch Intern Med* 2003; 163: 884-92; Hiatt WR. *N Engl J Med* 2001; 344: 1608-21.

Need to check pulses and ABPI's

Never compress an Arterially Compromised Limb

Overview of leg ulcer assessment and compression therapy (Figure 15.6) [NB1]





Evidence for Venous intervention

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

A Randomized Trial of Early Endovenou Ablation in Venous Ulceration

Manjit S. Gohel, M.D., Francine Heatley, B.Sc., Xinxue Liu, Ph.D., Andrew Bradbury, M.D., Richard Bulbulia, M.D., Nicky Cullum, Ph.D. David M. Epstein, Ph.D., Isaac Nyamekye, M.D., Keith R. Poskitt, M.D Sophie Renton, M.S., Jane Warwick, Ph.D., and Alun H. Davies, D.Sc. for the EVRA Trial Investigators*

ABSTRACT

BACKGROUND

Venous disease is the most common cause of leg ulceration. Although comp therapy improves venous ulcer healing, it does not treat the underlying cause nous hypertension. Treatment of superficial venous reflux has been shown to the rate of ulcer recurrence, but the effect of early endovenous ablation of superficial venous reflux on ulcer healing remains unclear.

METHODS

In a trial conducted at 20 centers in the United Kingdom, we randomly assigned 450 patients with venous leg ulcers to receive compression therapy and undergo early endovenous ablation of superficial venous reflux within 2 weeks after randomization (early-intervention group) or to receive compression therapy alone, with consideration of

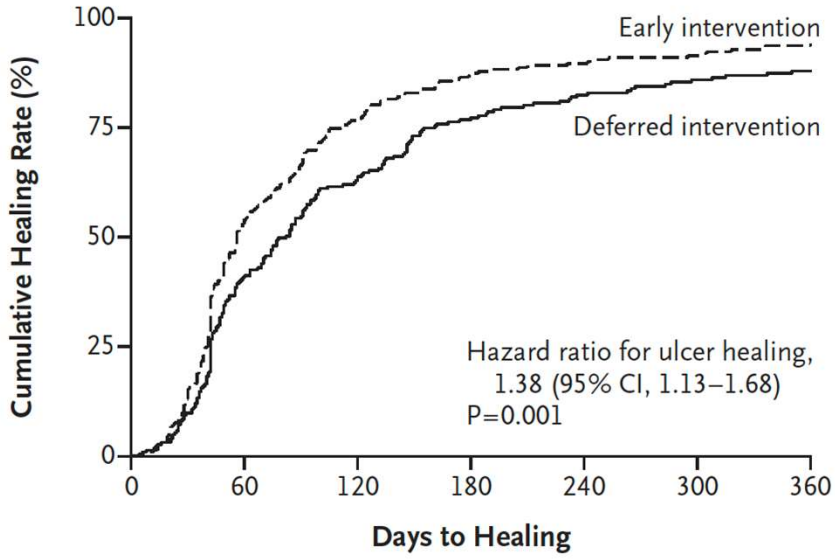


Figure 2. Kaplan–Meier Curves for Time to Ulcer Healing in the Two Treatment Groups.

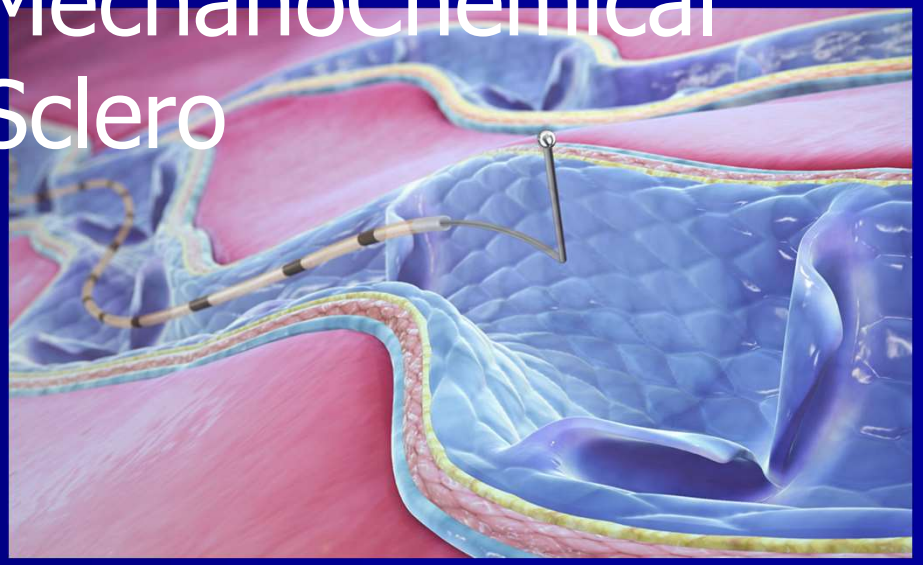
(M.S.G., F.H., A.H.D.) and Imperial Clinical Trials Unit (X.L., J.W.), Imperial College London, London, University of Birmingham, Birmingham (A.B.), Gloucestershire Hospitals NHS Foundation Trust, Gloucester (R.B., K.R.P.), the Medical Research Council Population Health Research Unit and the Clinical Trial Service Unit and Epidemiological Studies Unit, Nuffield Department of Population Health, University of Oxford, Oxford (R.B.), University

Surgery & Endovenous Therapies

Radiofrequency

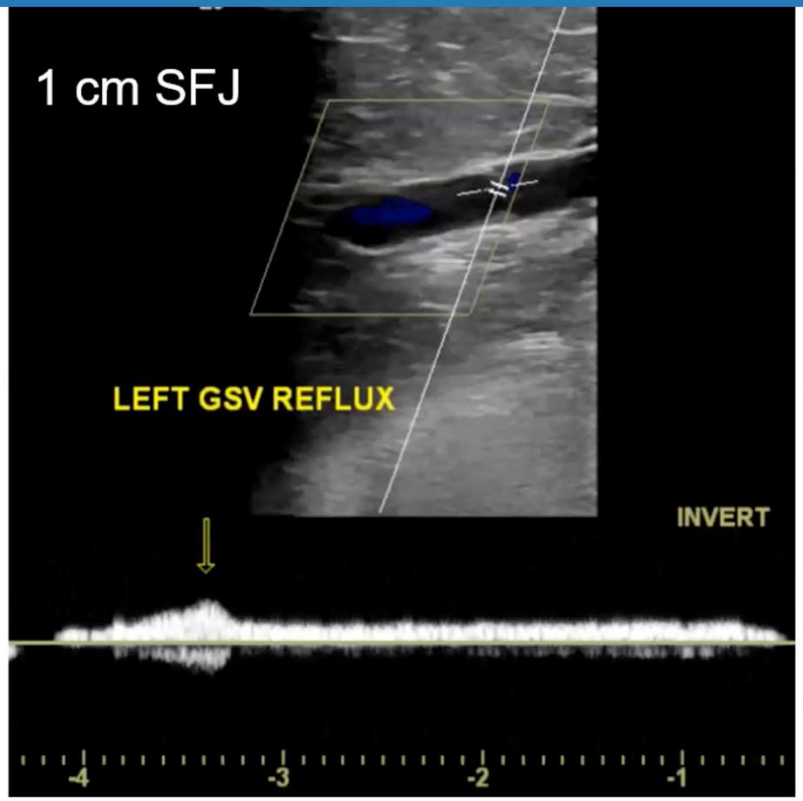
Laser

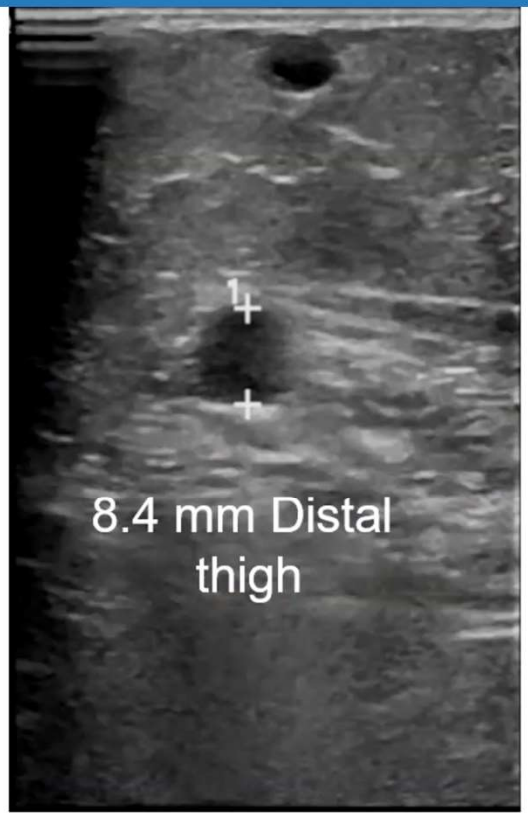
MechanoChemical Sclero



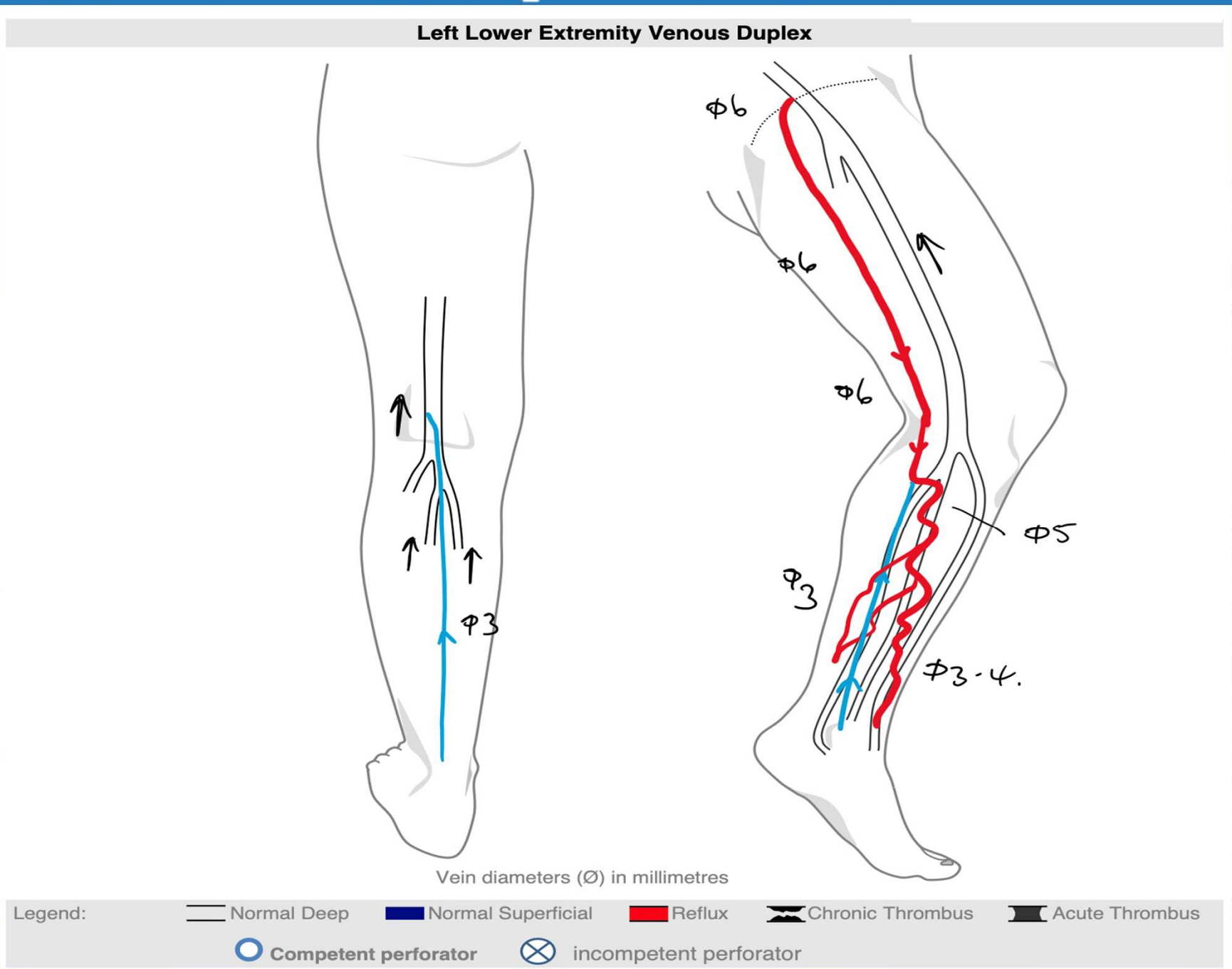
Vascular Assessment

Venous Duplex Ultrasound

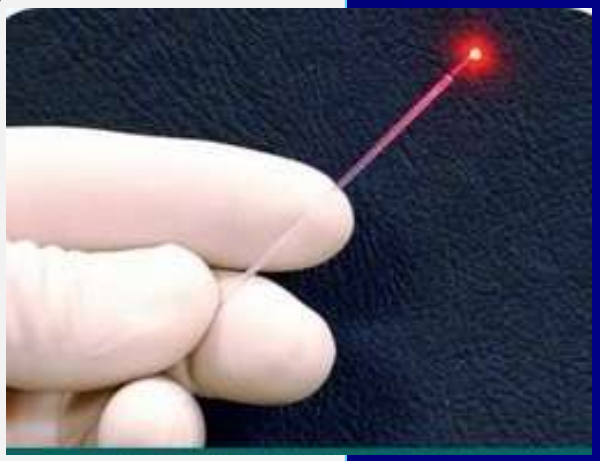




Venous Duplex Ultrasound



SUITABLE FOR ENDOVENOUS Rx (EVT)?

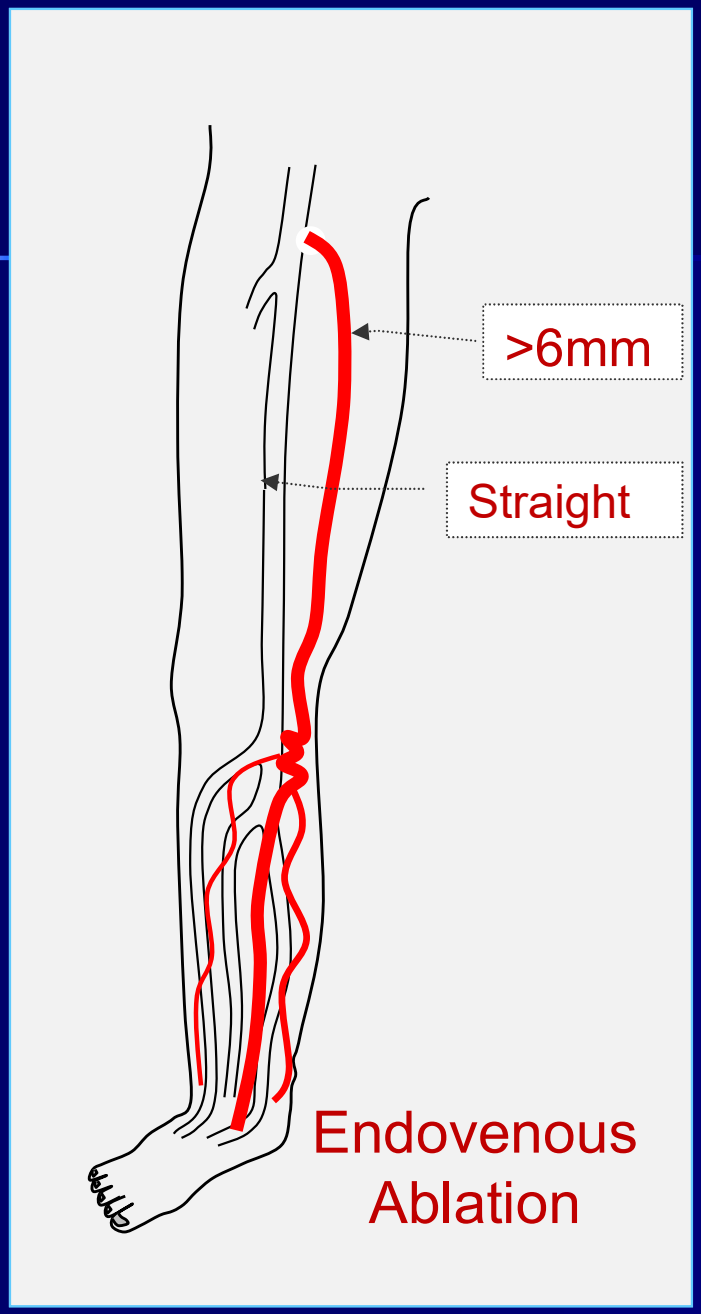


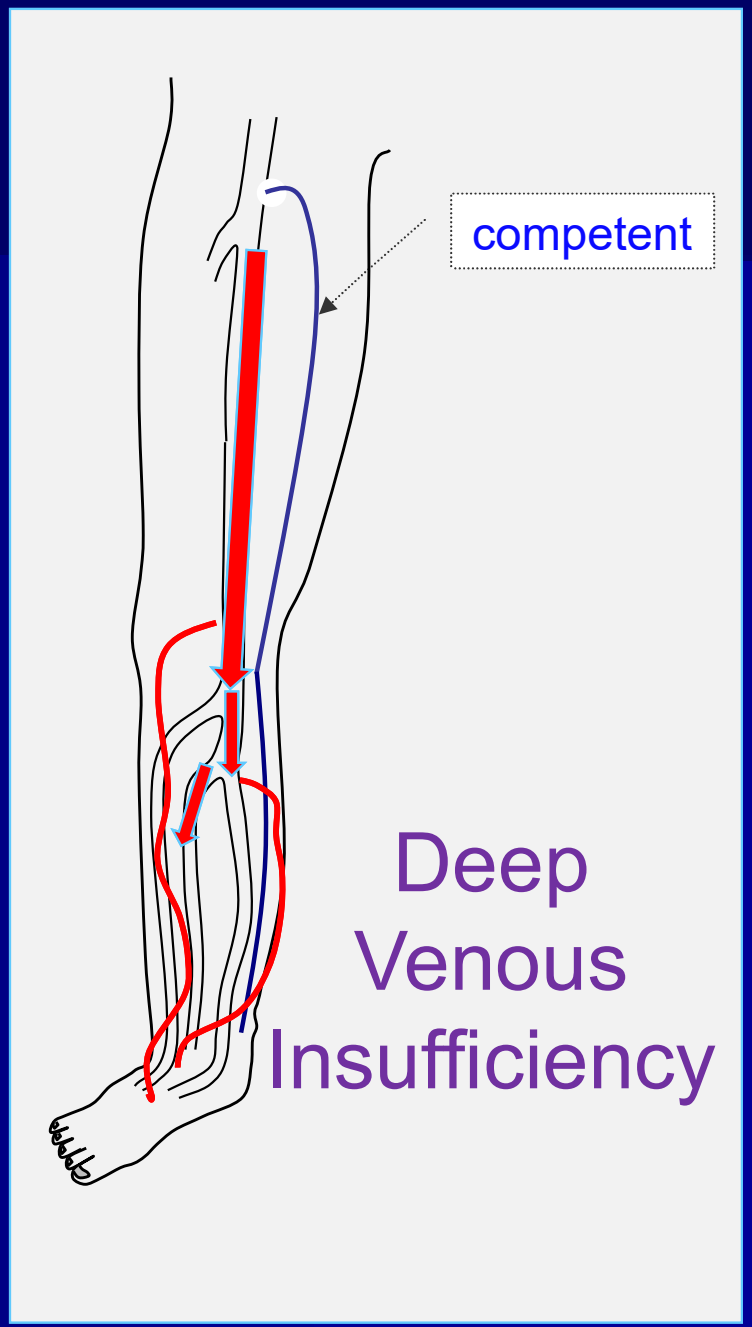
Endovenous Ablation

competent

Ultrasound Guided Sclerotherapy

SUITABLE FOR ENDOVENOUS Rx (EVT)?





PRACTICAL PRIORITIES

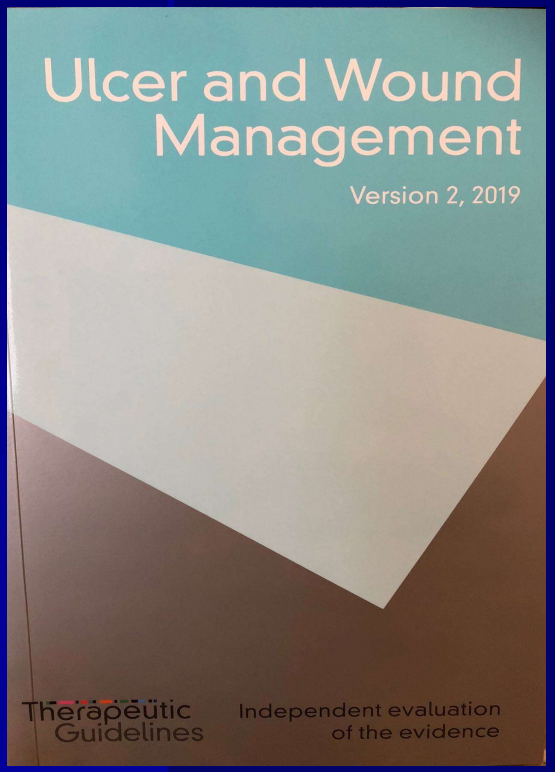
- Ensure Vascular Supply
- Drain Sepsis
- Treat Infection
- Determine Aetiology
- Debridement
- Granulation / Wound Contracture
- Epithelisation
- Prevention

Debridement

DEBRIDEMENT

To debride or not (bony prominences etc.)

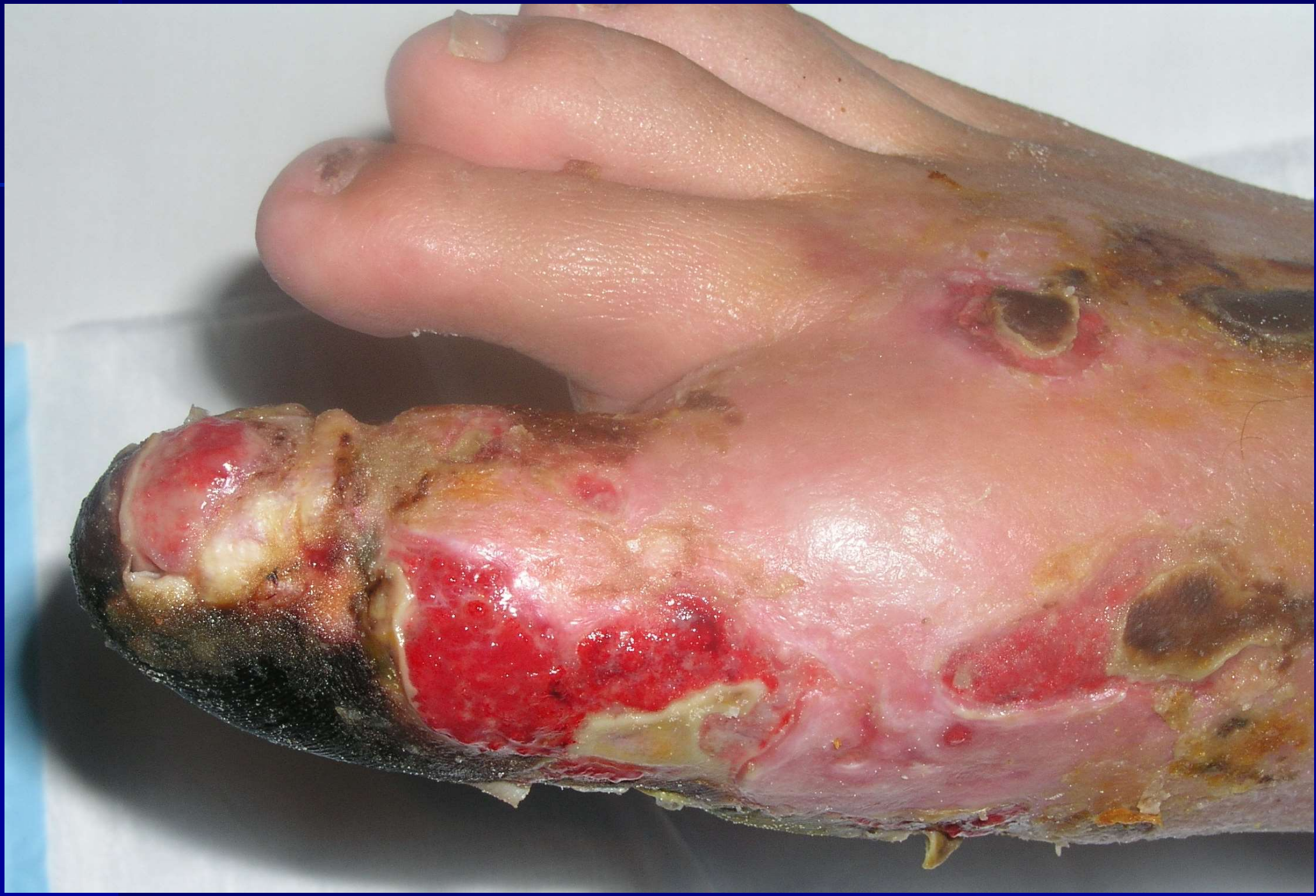
Mechanism Surgical



Mechanical ultrasonic
suction
dressings

Chemical dressings

Autolytic



Locally Infected Wound or Heavy Wound Colonisation

“Versajet” or Ultrasonic debridement

“Versajet” or Ultrasonic debridement

Wound bed preparation

ULTRASONIC DEBRIDEMENT

28/12/2001

31/12/2001

27/2/2002

18/3/2002

VERSAJET

Larval Therapy (Maggots)

PRIORITIES

- Ensure Vascular Supply
- Drain Sepsis
- Treat Infection
- Determine Aetiology
- Debridement
- Granulation / Wound Contracture
- Epithelisation
- Prevention

Granulation / Wound Contracture

Healing

- Promote Granulation
  - Restore vascular supply
  - Reduce oedema
  - Remove Wound fluid
  - Restore oxygenation (possibly Hyperbaric therapy)
- Protect granulation
- Wound Contracture
  - Delayed primary closure
  - VAC dressing system

Wound closure / coverage

Plastic surgery Free flaps / local flaps

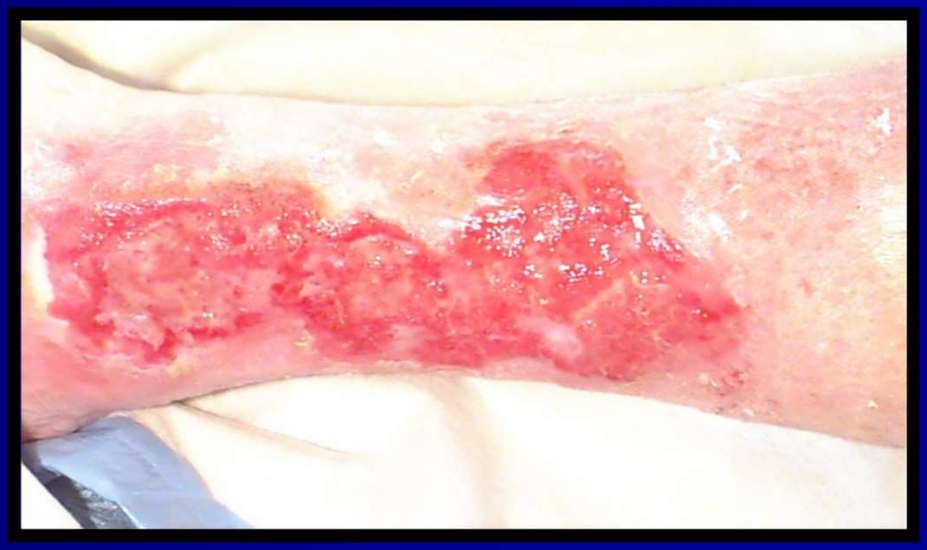
Wound Contraction
Negative pressure wound dressings / VAC dressings

Wound Contraction
Negative pressure wound dressings / VAC dressings

WOUND EPITHELISATION

Granulation.

Epithelialisation.



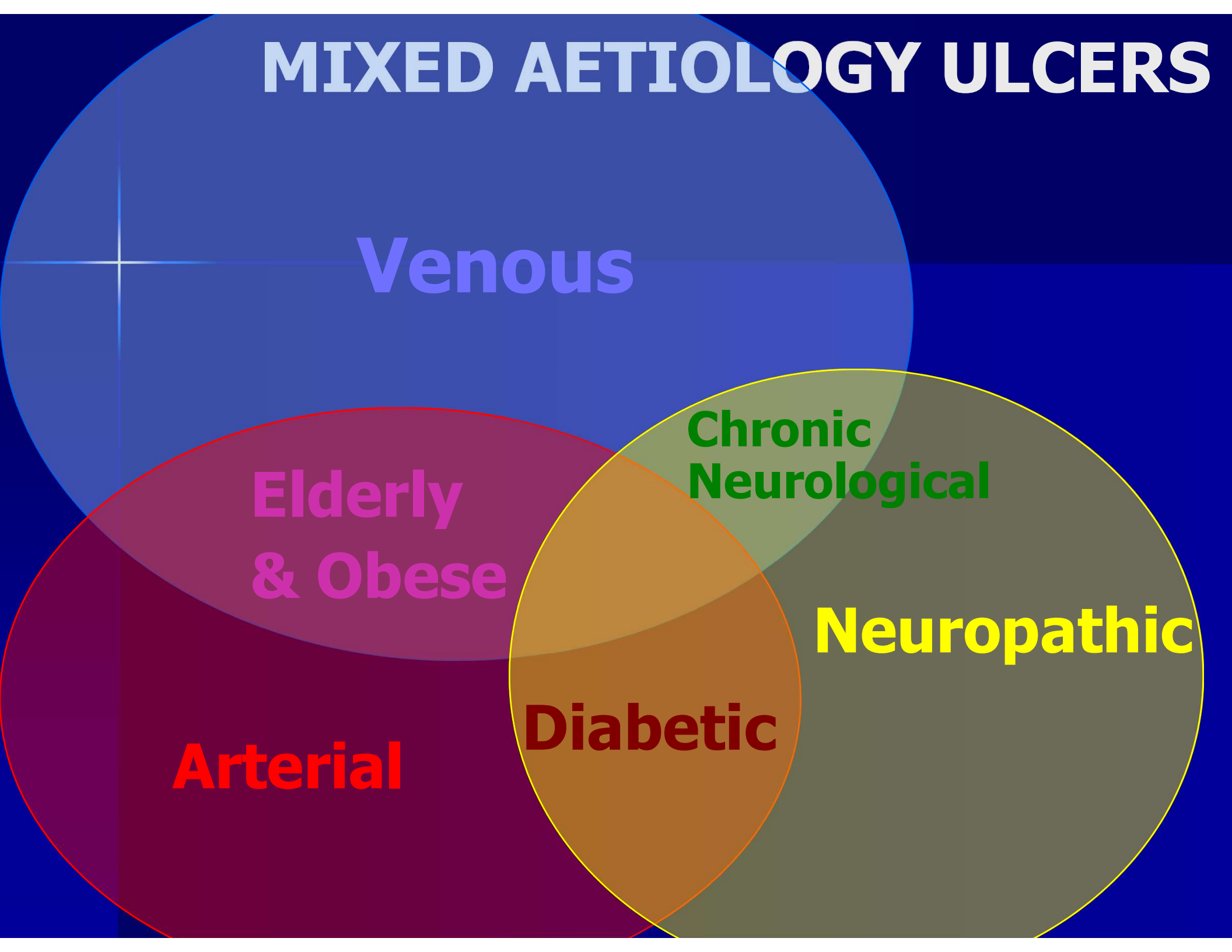
Epithelisation

- Vascular Supply
- Sepsis / Infection
  - Aetiology
    - Debridement
- Granulation / Wound Contracture
  - Epithelisation

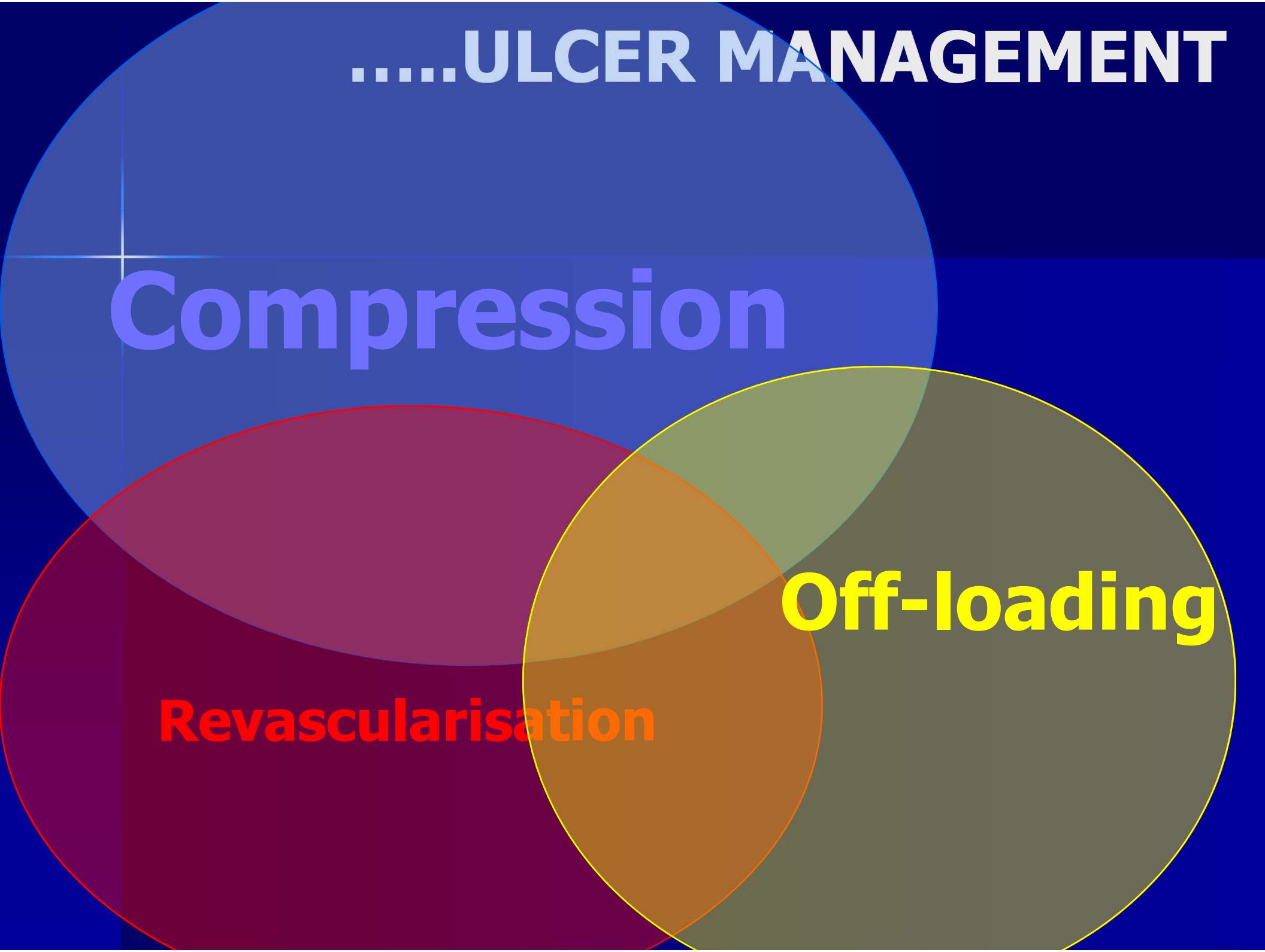
Pressure Offloading Splints, Orthotics, Casts

Pressure Offloading Splints, Orthotics, Casts

Pressure Offloading Splints, Orthotics, Casts


MIXED AETIOLOGY ULCERS
Venous
Elderly
& Obese
Chronic
Neurological
Neuropathic
Diabetic
Arterial

.....ULCER MANAGEMENT

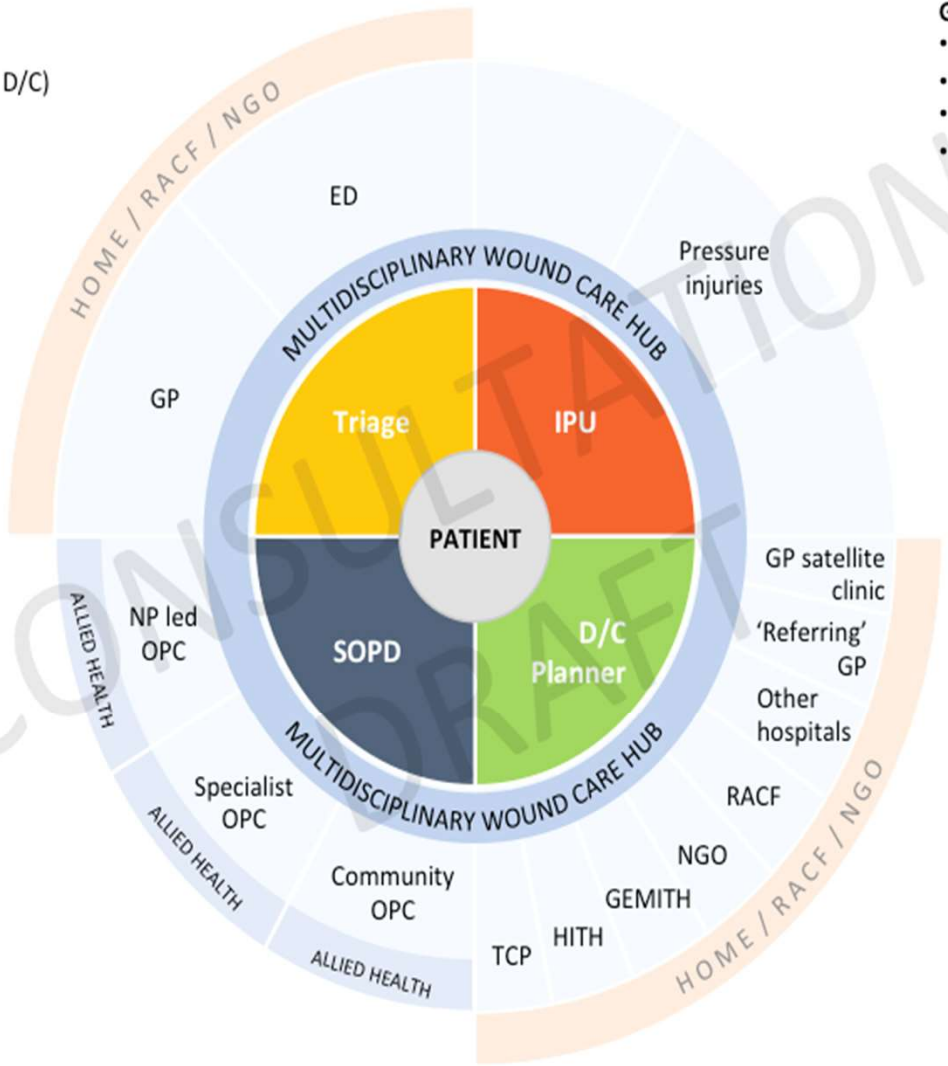


Multidisciplinary Care

Multidisciplinary Care

Integrated Wound Care and Tissue Integrity Service framework

Wound Care Hub:
- Referral triage
- Wound care planning (incl. D/C)
- Specialist consultation
  - GP
  - IPU/SOPD
  - NGO/RACF
- Research/education



GCUH and Robina hospital
- Vascular
- Endocrinology
- Orthopaedic
- Plastics

Specialist OPC:
- Podiatry
- Vascular
- Orthopaedic
- Plastics