Identifying Arterial Disease in Patients with Lower Extremity Wounds:

THE ASSESSMENT THAT EVERY CLINICIAN SHOULD KNOW

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Disclosures

None

Chronic Limb threatening Ischemia (CLTI)

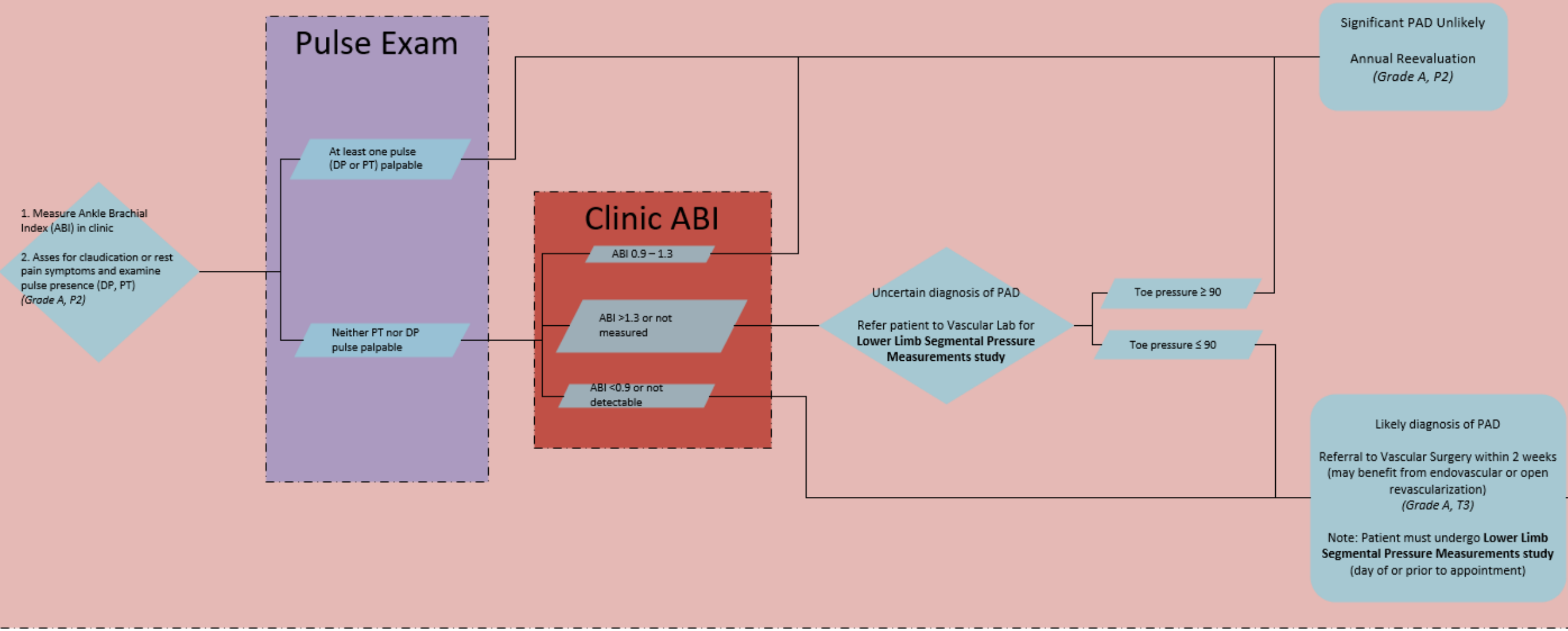
"CLTI is a clinical syndrome defined by the presence of **peripheral artery disease (PAD)** in combination with rest pain, **gangrene, or a lower limb ulceration >2 weeks duration**. CLTI is associated with amputation, increased mortality and impaired quality of life. . . . "

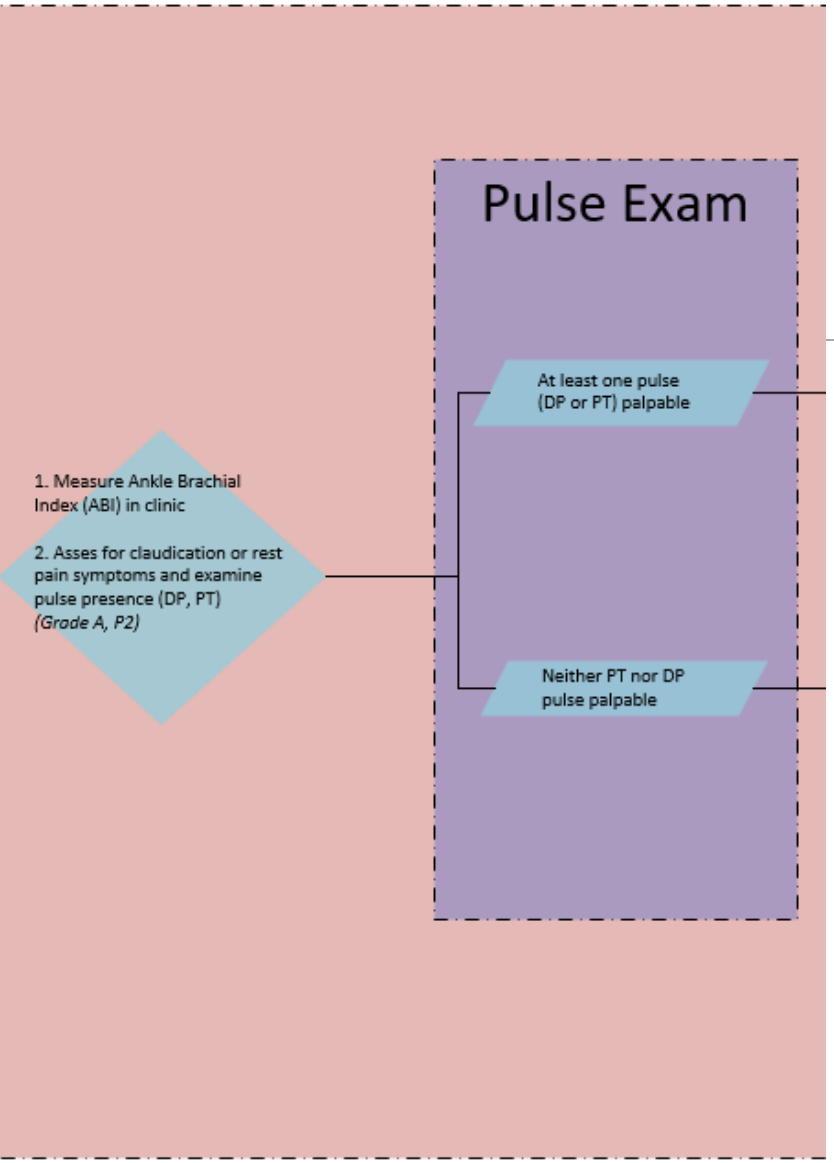
-Global vascular guidelines on the management of chronic limb-threatening ischemia, Conte et. al.

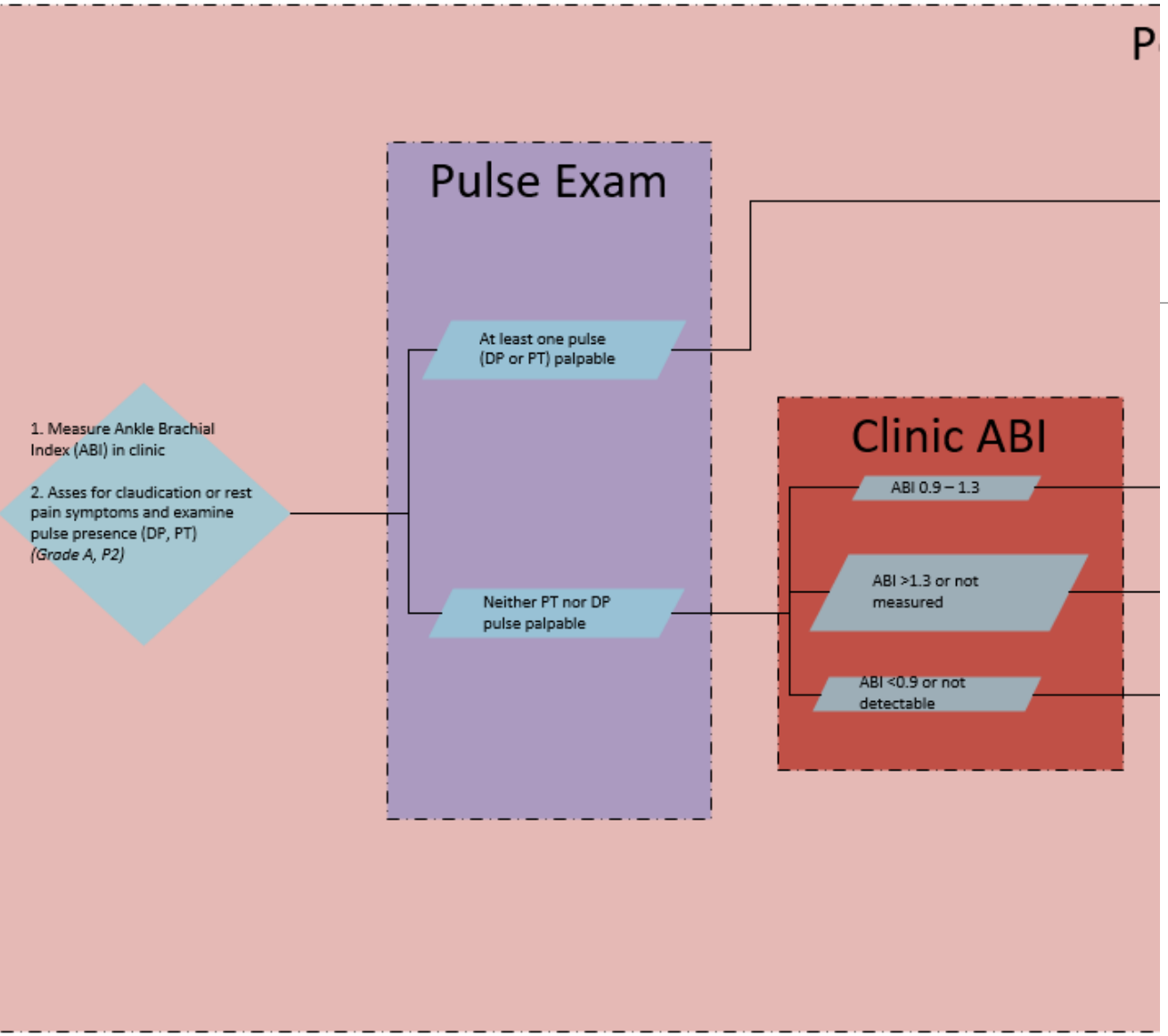
Recognizing Arterial wounds

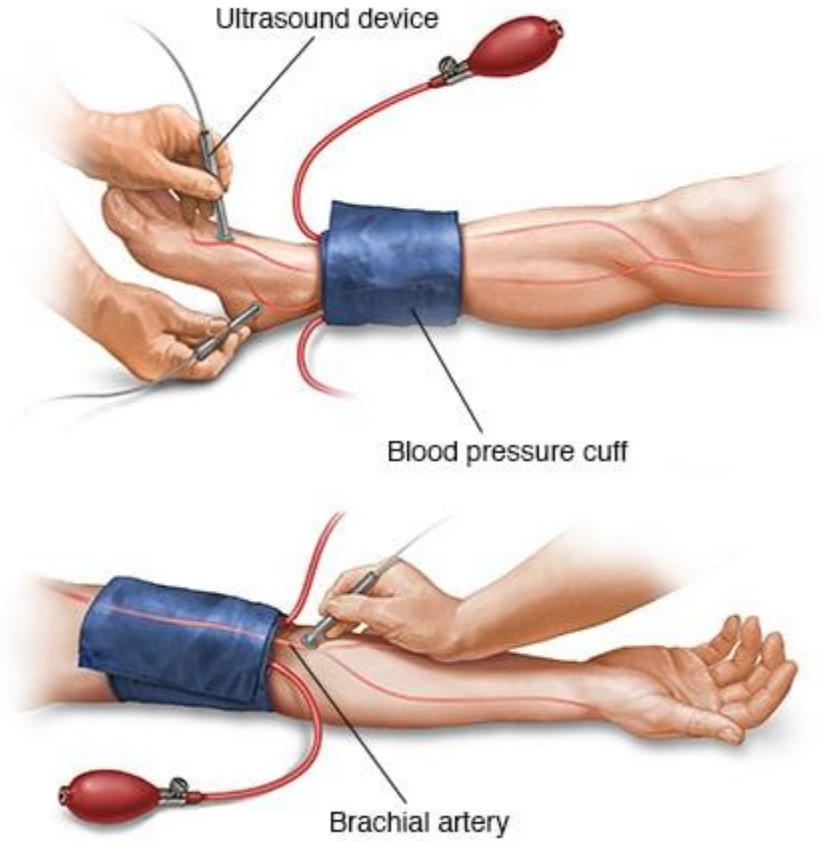
- Pulse exam is an important part of every foot exam
  - Check Doppler signal and correlate it with the pulse
  - Check ABI
  - Check pulses at all levels – not JUST the foot
  - Toe/heel gangrene
- Examine the foot for other signs of vascular insufficiency
  - Dependent rubor
  - Absent hair growth
- History
  - Pain with walking relieved with rest
  - Nocturnal pain/rest pain/foot dangling at night

Perfusion Optimization

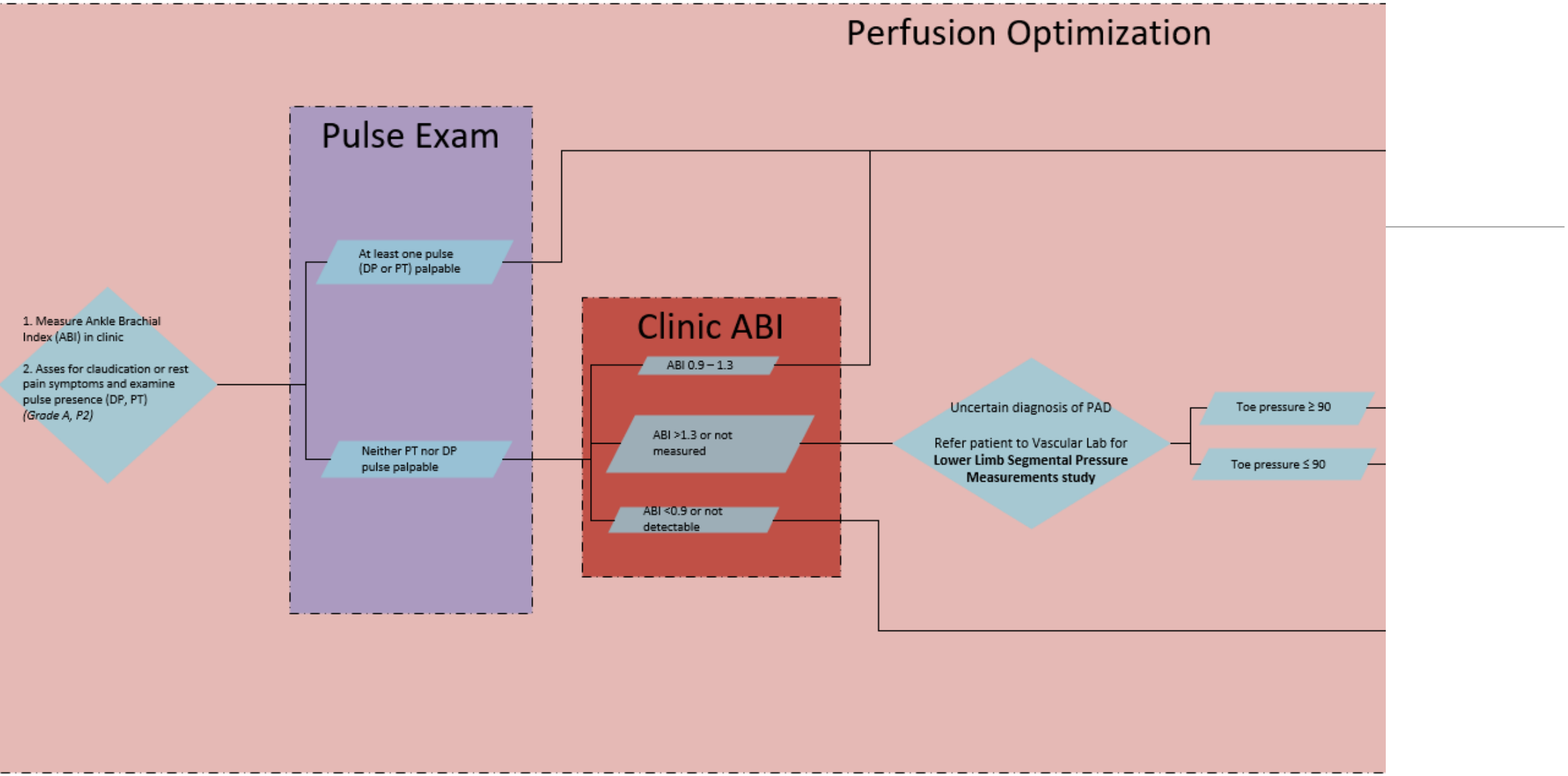



Pulse Exam
At least one pulse (DP or PT) palpable
Neither PT nor DP pulse palpable
1. Measure Ankle Brachial Index (ABI) in clinic
2. Asses for claudication or rest pain symptoms and examine pulse presence (DP, PT)
(Grade A, P2)





$$\text{Right ABI} = \frac{\text{Highest Pressure in Right Foot}}{\text{Highest Pressure in Both Arms}}$$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At least one pulse (DP or PT) palpable
Neither PT nor DP pulse palpable
1. Measure Ankle Brachial Index (ABI) in clinic
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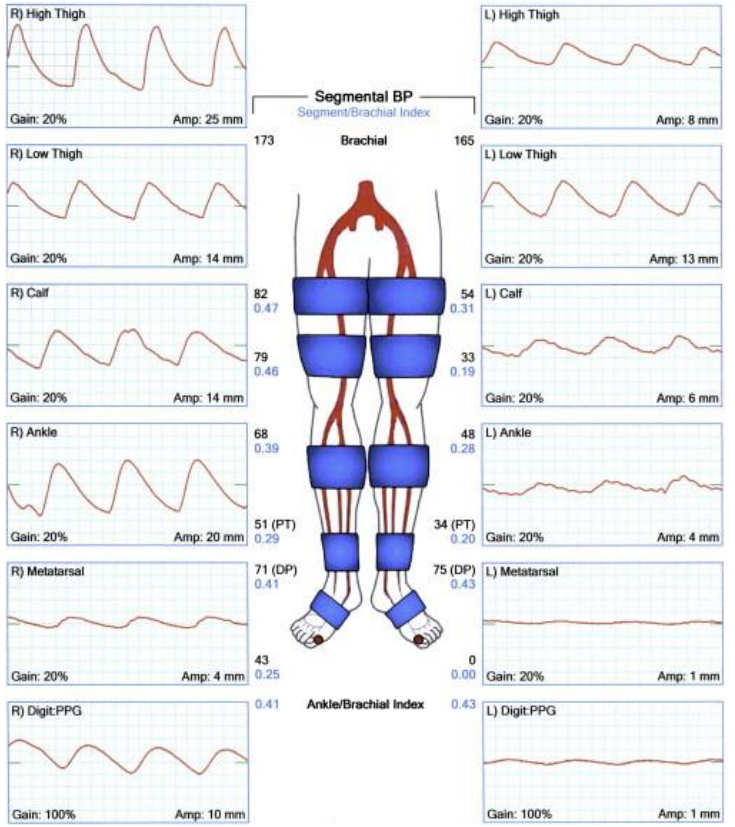
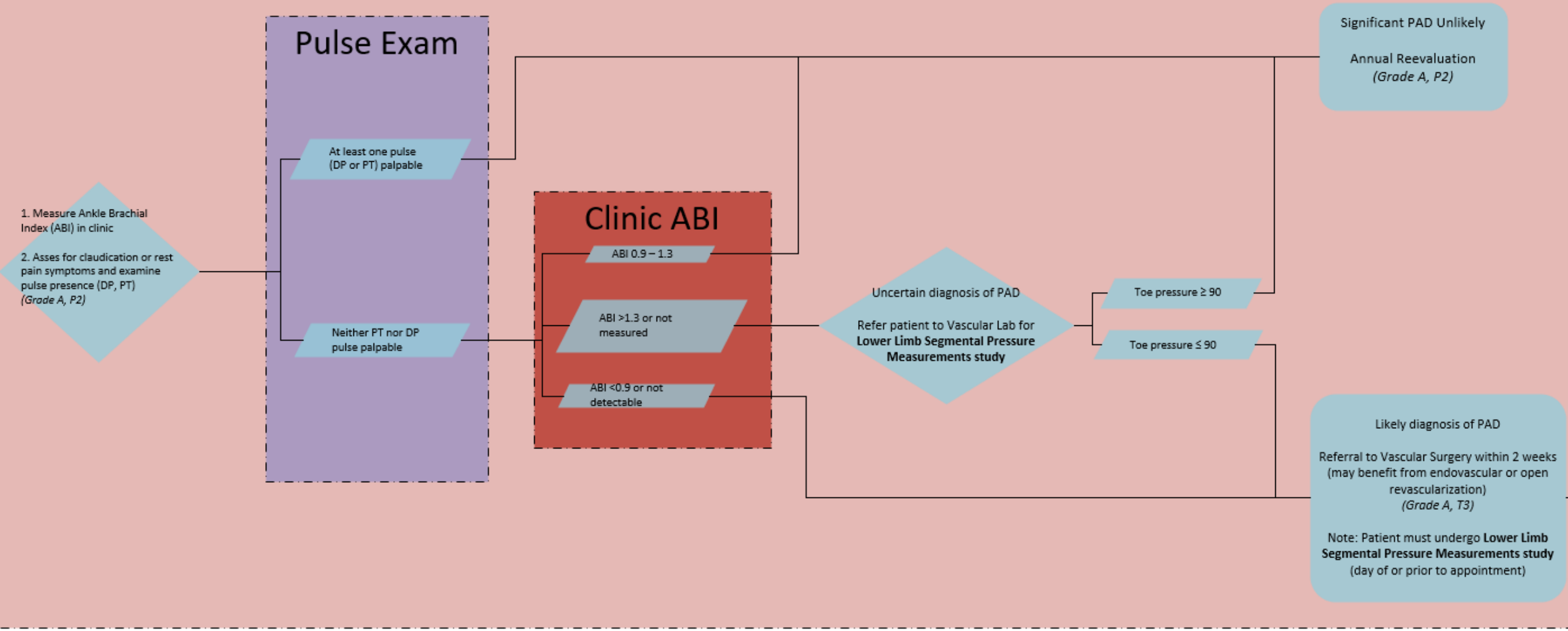
(Grade A, P2)
Clinic ABI
ABI 0.9 – 1.3
ABI >1.3 or not measured
ABI <0.9 or not detectable
Uncertain diagnosis of PAD
Refer patient to Vascular Lab for Lower Limb Segmental Pressure Measurements study
Toe pressure ≥ 90
Toe pressure ≤ 90

The Vascular lab – what to order?

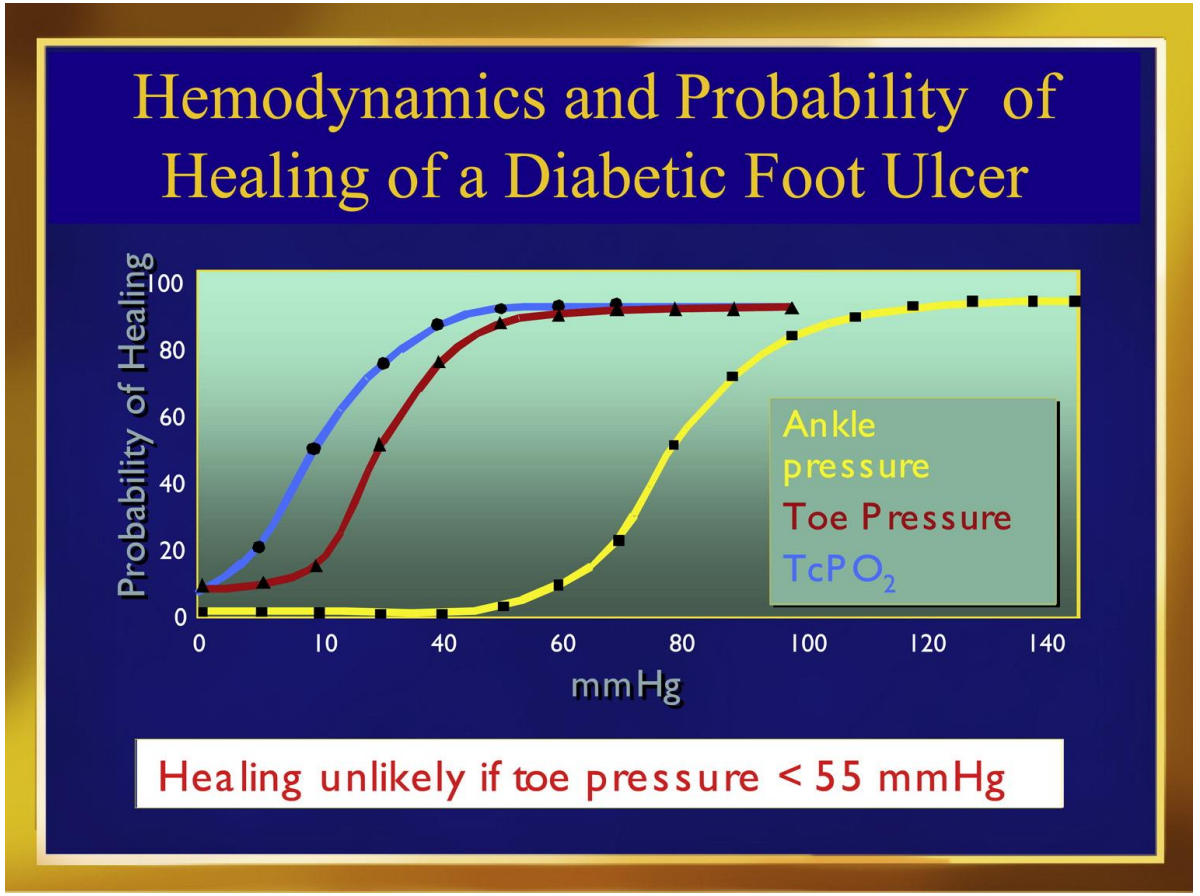
- Multilevel ABI/PVRs with toe pressures
  - Pulse volume recordings
- Beware of noncompressible ABI's
  - Extremely common in diabetics and patients with ESRD due to medial calcinosis
- "Trust the ABI if low, but not if high"



Perfusion Optimization



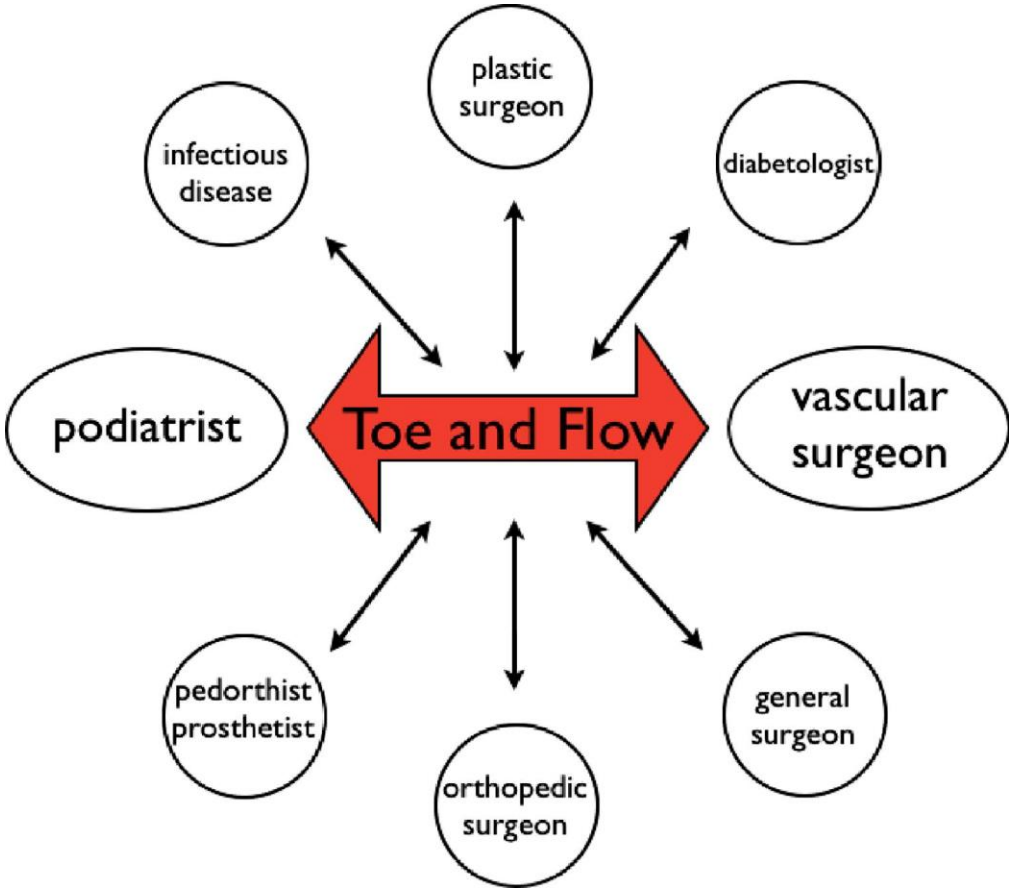
Does everyone with PAD need revascularization?



Multidisciplinary approach

Higher proportion of limb salvage and lower amputation rates: The impact of a wound centre on a vascular surgery practice

31st August 2018 6373



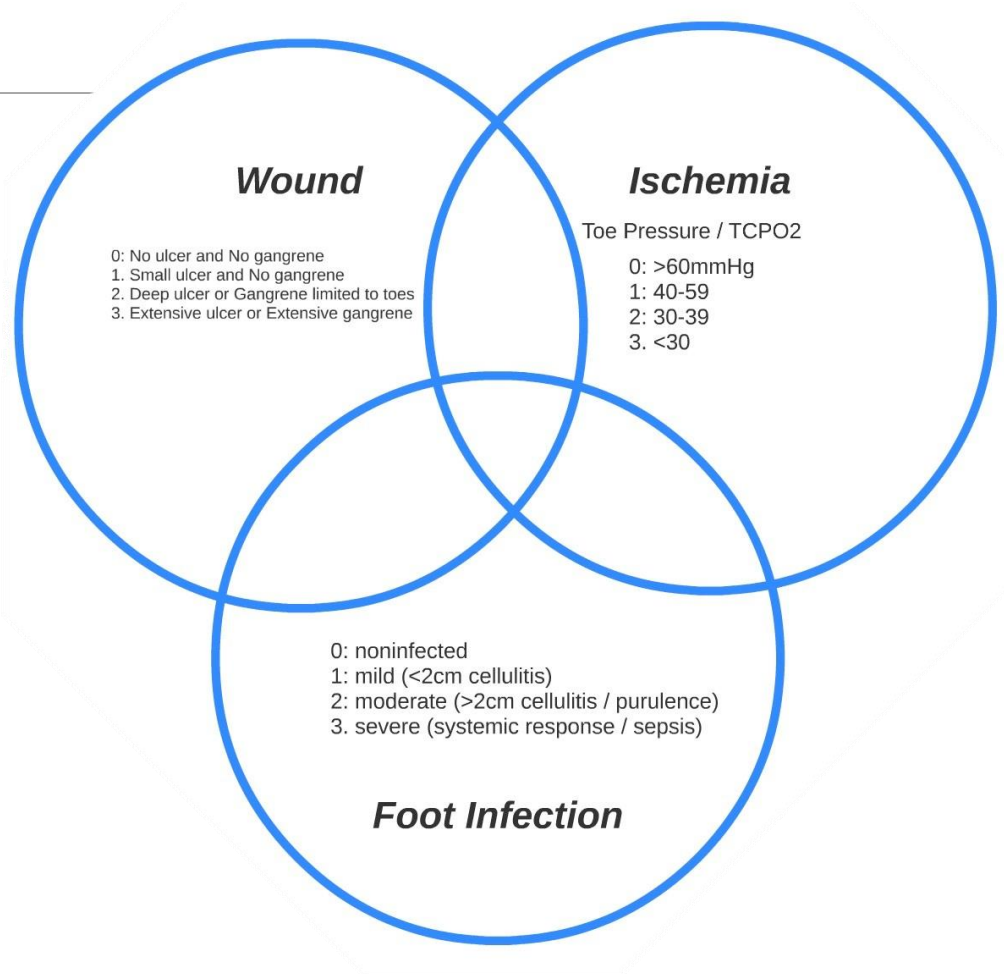
Results from a limb salvage program

- Reduction in urgent surgery
- Reduction is high/low amputation ratio decreased due to an increase in low-level (midfoot) amputations
- A reduction in below-knee amputations
- Vascular reconstructions increased

The impact and outcomes of establishing an integrated interdisciplinary surgical team to care for the diabetic foot. Armstrong et. al.

What happens first? WIFI

- Decision to revascularize combines clinical judgement and objective assessment of perfusion, wound and infection extent
- Prediction of patients that will benefit from revascularization based on the WiFi classification



a, Estimate risk of amputation at 1 year for each combination

	Ischemia – 0				Ischemia – 1				Ischemia – 2				Ischemia – 3			
W-0	VL	VL	L	M	VL	L	M	H	L	L	M	H	L	M	M	H
W-1	VL	VL	L	M	VL	L	M	H	L	M	H	H	M	M	H	H
W-2	L	L	M	H	M	M	H	H	M	H	H	H	H	H	H	H
W-3	M	M	H	H	H	H	H	H	H	H	H	H	H	H	H	H
	fI-0	fI-1	fI-2	fI-3	fI-0	fI-1	fI-2	fI-3	fI-0	fI-1	fI-2	fI-3	fI-0	fI-1	fI-2	fI-3

b, Estimate likelihood of benefit of/requirement for revascularization (assuming infection can be controlled first)

	Ischemia – 0				Ischemia – 1				Ischemia – 2				Ischemia – 3			
W-0	VL	VL	VL	VL	VL	L	L	M	L	L	M	M	M	H	H	H
W-1	VL	VL	VL	VL	L	M	M	M	M	H	H	H	H	H	H	H
W-2	VL	VL	VL	VL	M	M	H	H	H	H	H	H	H	H	H	H
W-3	VL	VL	VL	VL	M	M	M	H	H	H	H	H	H	H	H	H
	f-0	fI-1	fI-2	fI-3	fI-0	fI-1	fI-2	fI-3	fI-0	fI-1	fI-2	fI-3	fI-0	fI-1	fI-2	fI-3

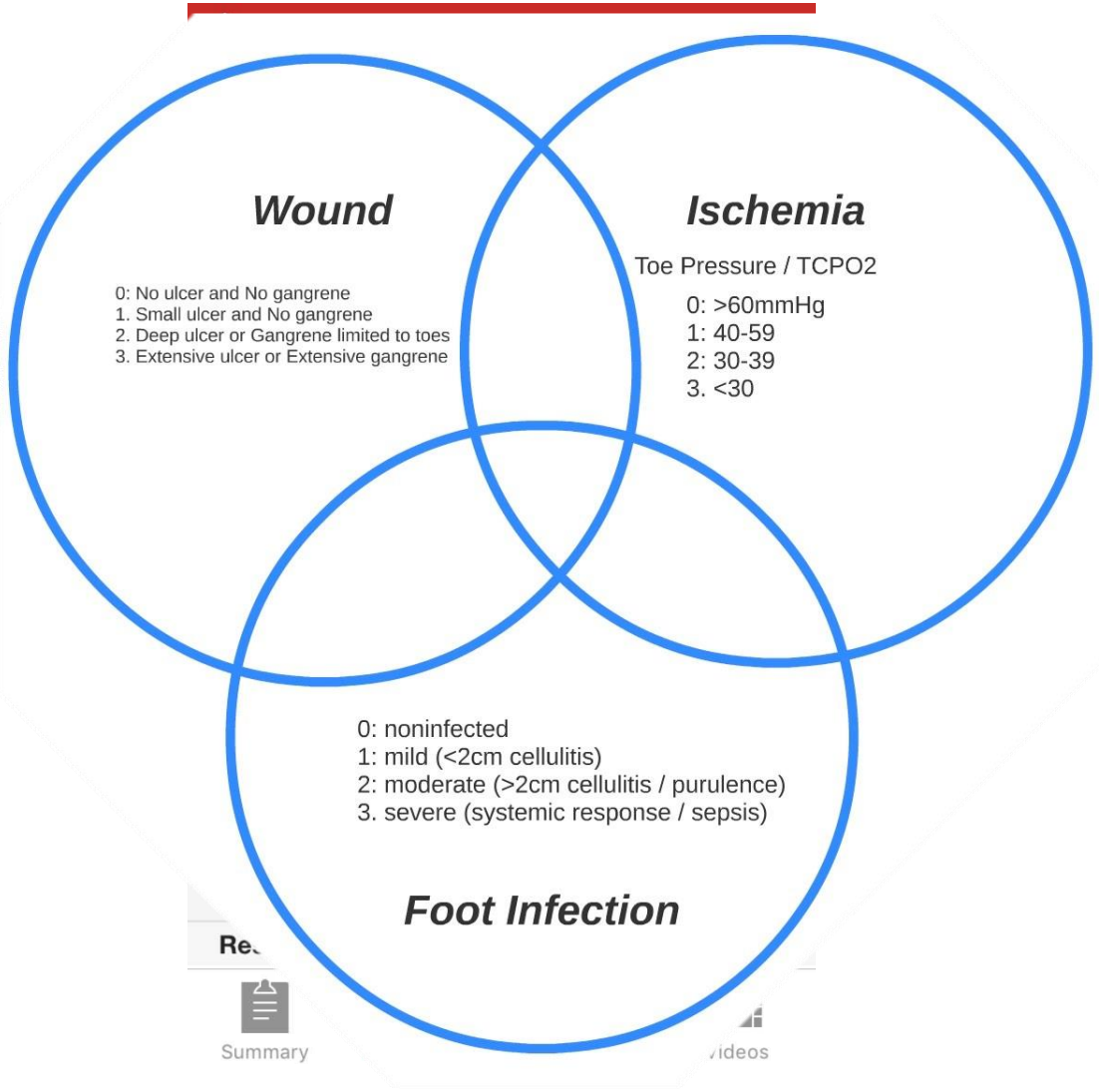
fI, foot Infection; I, Ischemia; W, Wound.

Premises:

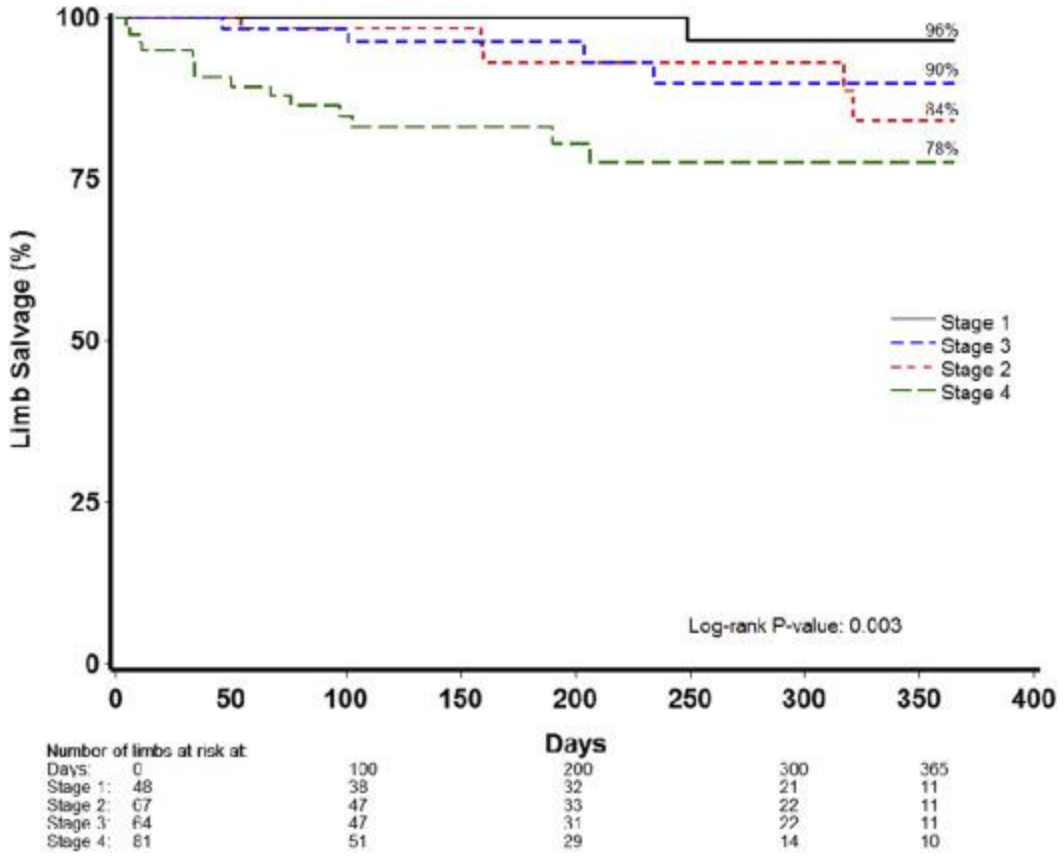
1. Increase in wound class increases risk of amputation (based on PEDIS, UT, and other wound classification systems)
2. PAD and infection are synergistic (Eurodiale); infected wound + PAD increases likelihood revascularization will be needed to heal wound
3. Infection 3 category (systemic/metabolic instability): moderate to high-risk of amputation regardless of other factors (validated IDSA guidelines)

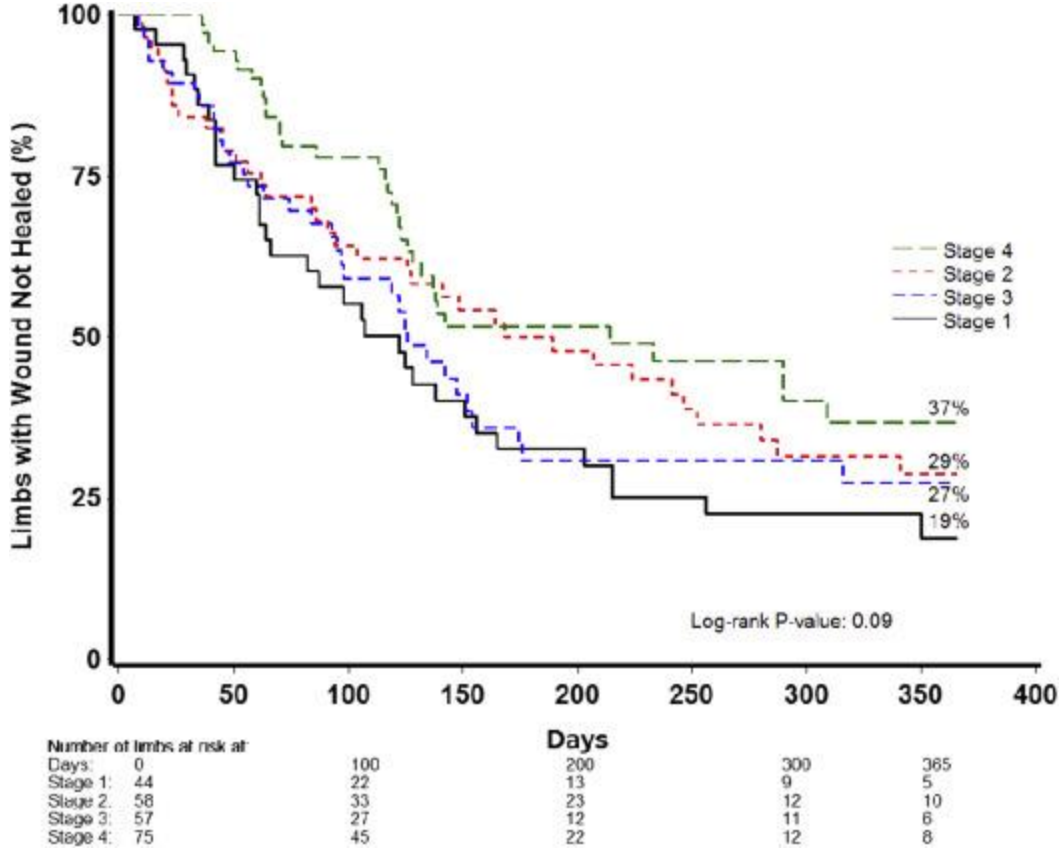
Four classes: for each box, group combination into one of these four classes

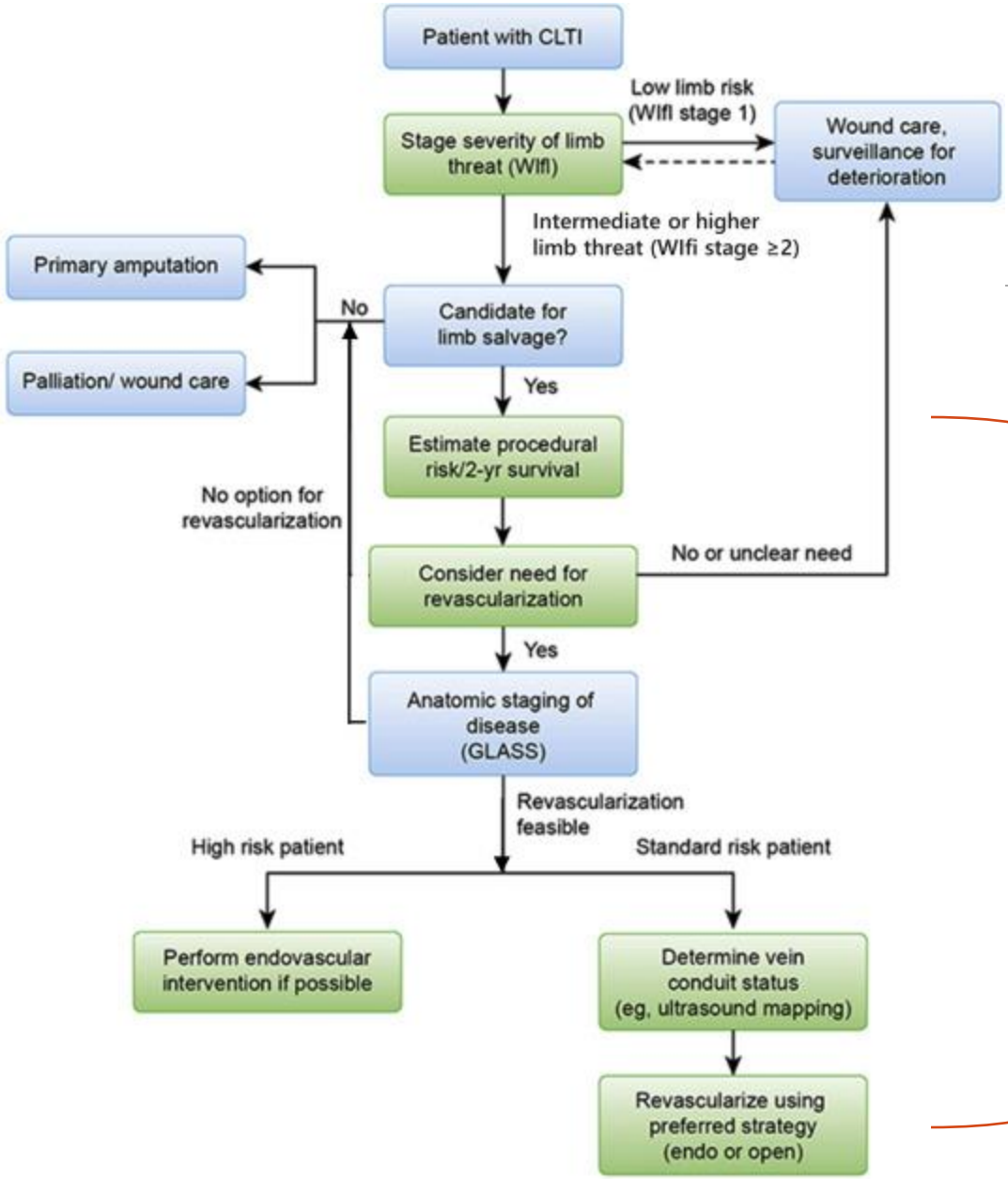
Very low = VL = clinical stage 1
Low = L = clinical stage 2
Moderate = M = clinical stage 3
High = H = clinical stage 4
Clinical stage 5 would signify an unsalvageable foot



WIFI Validation






Patient with CLTI
Low limb risk (WIfI stage 1)
Stage severity of limb threat (WIfI)
Wound care, surveillance for deterioration
Intermediate or higher limb threat (WIfi stage ≥2)
Primary amputation
No
Candidate for limb salvage?
Palliation/ wound care
Yes
Estimate procedural risk/2-yr survival
No option for revascularization
Consider need for revascularization
No or unclear need
Yes
Anatomic staging of disease (GLASS)
Revascularization feasible
High risk patient
Standard risk patient
Perform endovascular intervention if possible
Determine vein conduit status (eg, ultrasound mapping)
Revascularize using preferred strategy (endo or open)

PLAN

PLAN: Approach to revascularization

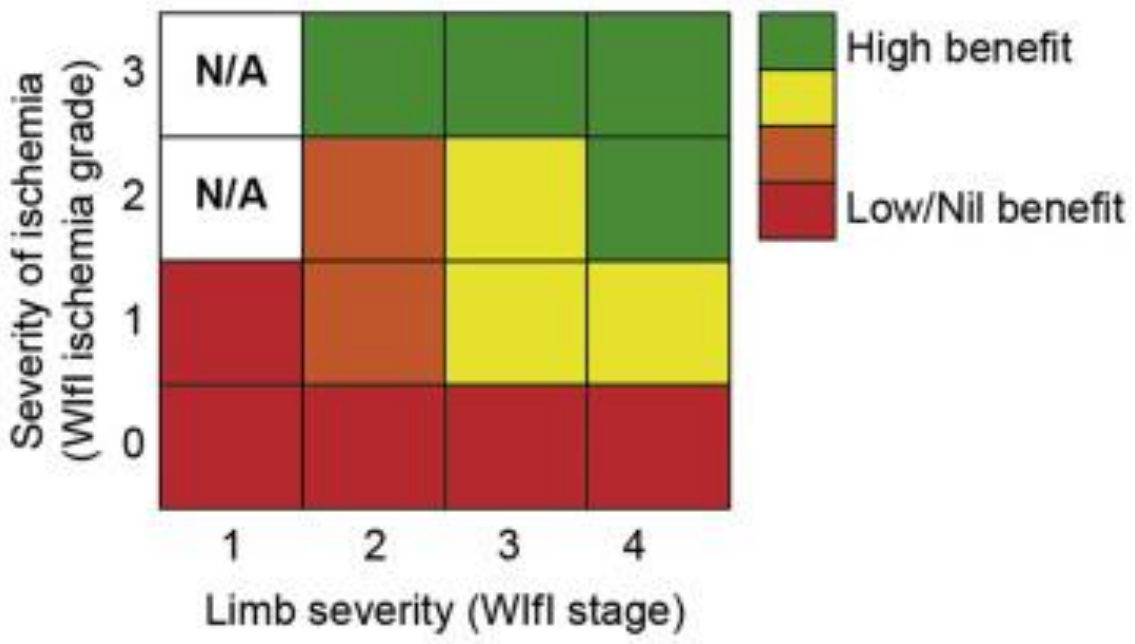
P: Patient risk estimation

- Primary amputation in nonambulatory, unsalvageable limbs, high surgical risk
- Shared decisiom making

L: Limb staging

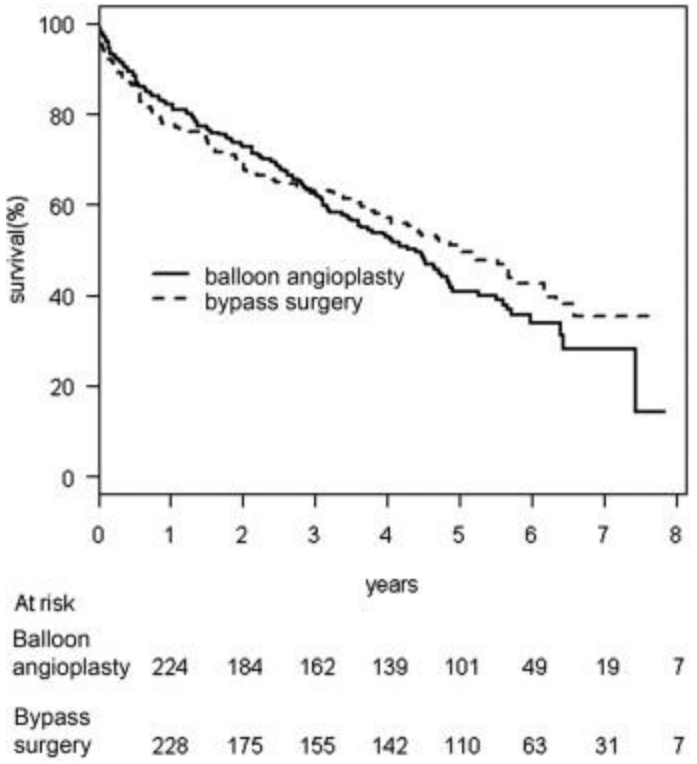
- WIFI
- Restaging

AN: Anatomic pattern of disease (and conduit availability)



Endovascular vs. Open

- Evidence Is sparse
- BASIL Trial: Bypass vs Angioplasty in Severe Ischemia of the Leg
  - Only multicenter RCT to have directly compared an endovascular-first with a bypass surgery-first strategy in limb-threatening ischemia due to infrainguinal disease
  - No significant difference in terms of AFS and overall survival.
  - However, for the approximately 70% of patients who lived for >2 years, HRs for overall survival (0.65; *P* = .009) and AFS (0.85; *P* = .108) were better for those treated initially with bypass surgery.
  - Prosthetic bypasses performed very poorly (worse than PBA)
  - Patients having bypass after failed PBA had a highly significantly worse AFS and overall survival compared



What we can say…

- "No option anatomy" is overestimated
  - Patients deserve imaging with delayed views of foot to look for pedal/plantar target
- Endovascular "first" may have impact on future bypass success/outcomes
- Surgical bypass with nonautologous conduits to IP targets in CLTI performs poorly
- ESRD at high risk no matter what
- Inflow only may be adequate in minor tissue loss, however in the majority of wounds, inline flow to the foot is preferred

Revascularization Strategy

- The choice of intervention depends:
  - Degree of ischemia
  - Extent of arterial disease
  - Extent of the wound
  - Presence or absence of infection
  - Available expertise

- In functional good risk patients with long segment occlusive disease and good autologous conduit, bypass is likely preferable.

Endovascular First best when:

- Minor tissue loss
- High medical risk (10-15% of traditional bypass pts)
- Inadequate vein (20-30% of surgical candidates)
- Increased surgical complexity e.g. prior bypass, compromised soft tissue/skin for graft coverage

Case 1

Frail 82 yo female presenting with tissue loss across dorsum of right foot and nocturnal pain

Treated initially as venous ulcer with compression and elevation

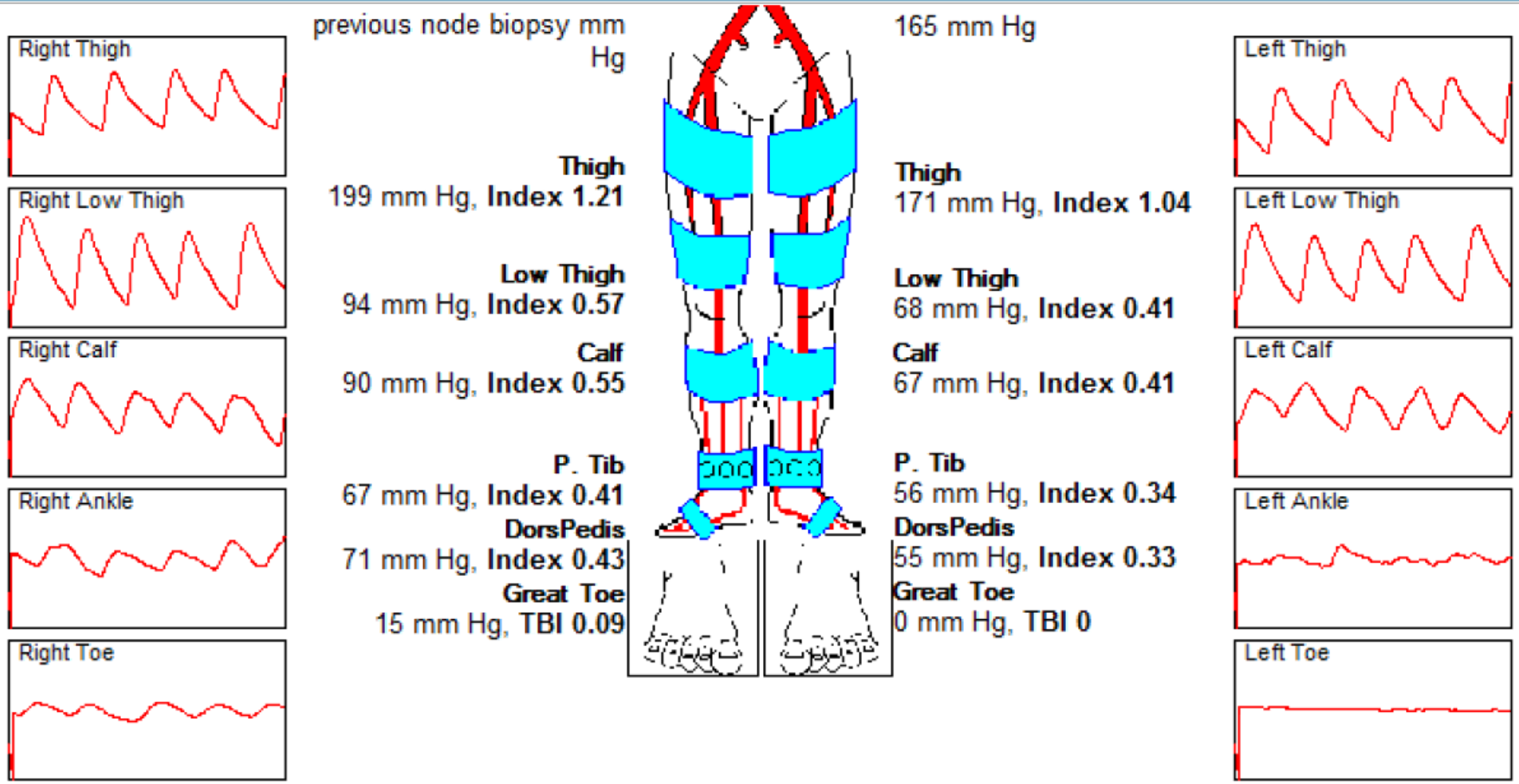
Palpable femoral pulses, nonpalpable pedal pulses

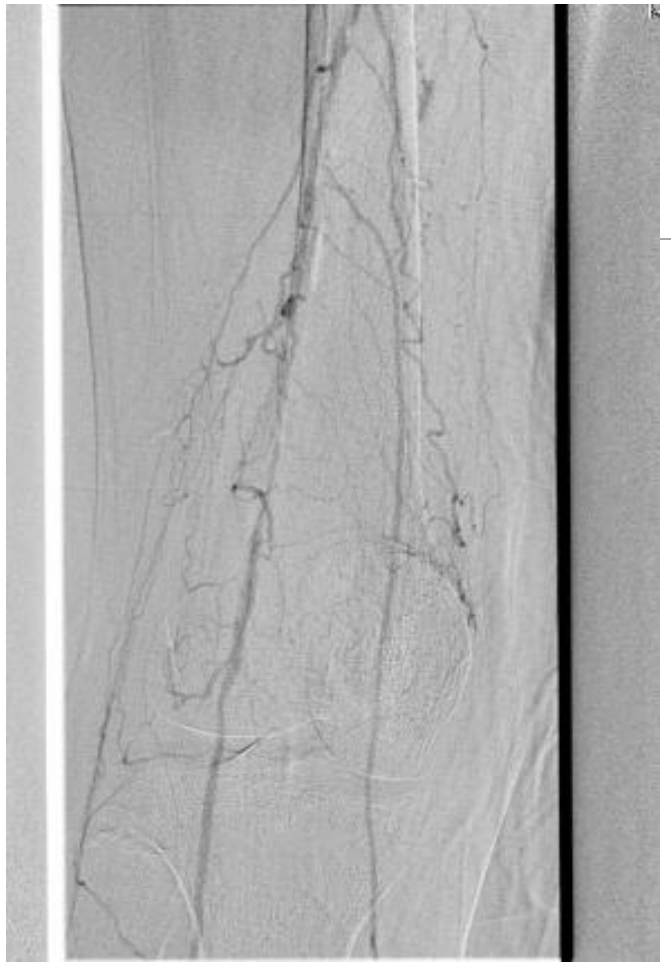
Foot cool, absent hair growth, delayed cap refill

WIFI: 3 3 0, Clinical stage 4

Amputation risk: High

Potential benefit of revasc: High


Right Thigh
Right Low Thigh
Right Calf
Right Ankle
Right Toe
previous node biopsy mm Hg
Thigh
199 mm Hg, Index 1.21
Low Thigh
94 mm Hg, Index 0.57
Calf
90 mm Hg, Index 0.55
P. Tib
67 mm Hg, Index 0.41
DorsPedis
71 mm Hg, Index 0.43
Great Toe
15 mm Hg, TBI 0.09
165 mm Hg
Thigh
171 mm Hg, Index 1.04
Low Thigh
68 mm Hg, Index 0.41
Calf
67 mm Hg, Index 0.41
P. Tib
56 mm Hg, Index 0.34
DorsPedis
55 mm Hg, Index 0.33
Great Toe
0 mm Hg, TBI 0
Left Thigh
Left Low Thigh
Left Calf
Left Ankle
Left Toe

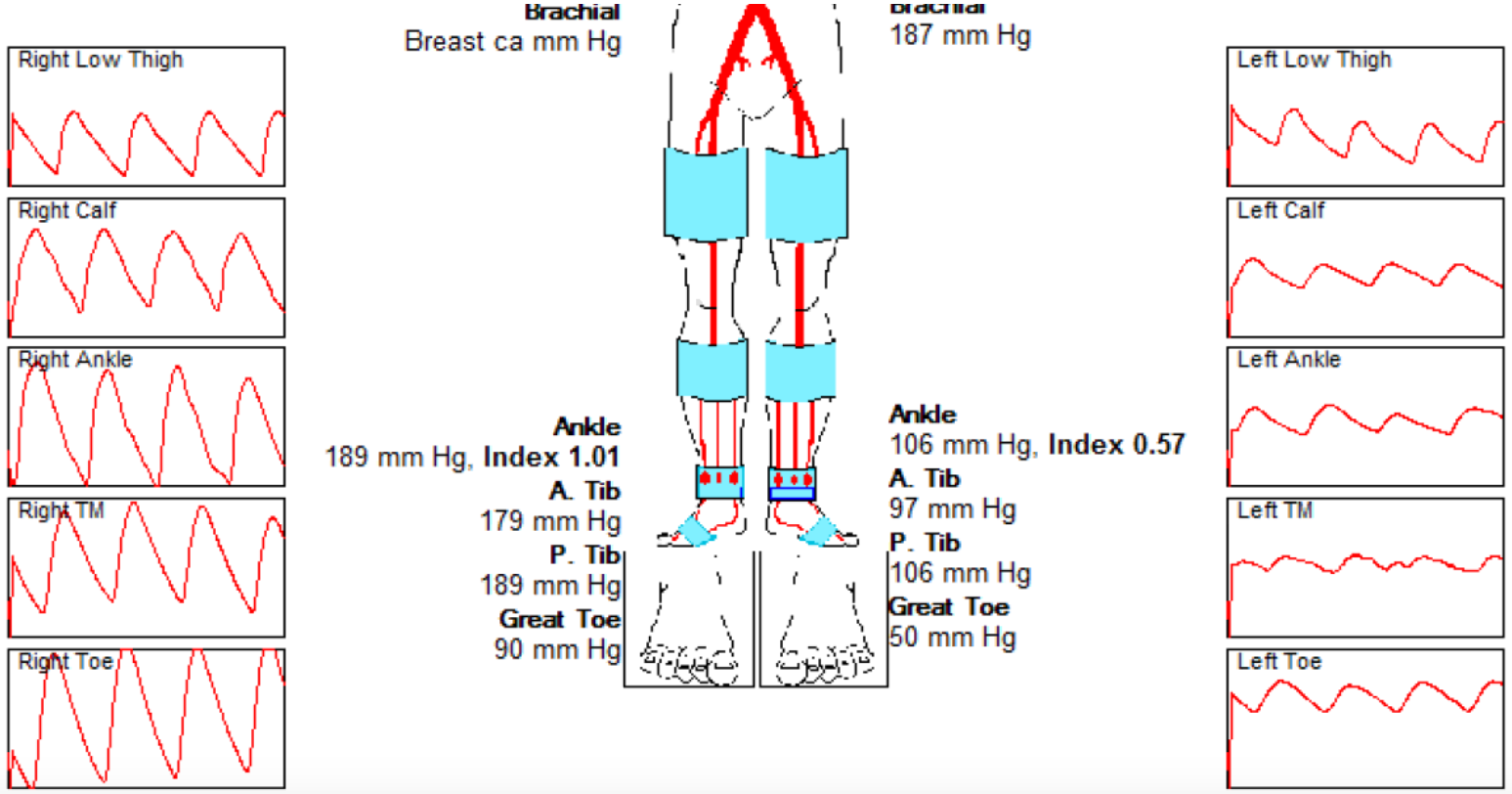


Drug coated balloon angioplasty

Converted to wet gangrene

Underwent I&D with podiatry team

Theraskin application in followup


Right Low Thigh
Right Calf
Right Ankle
Right TM
Right Toe
Brachial
Breast ca mm Hg
Ankle
189 mm Hg, Index 1.01
A. Tib
179 mm Hg
P. Tib
189 mm Hg
Great Toe
90 mm Hg
187 mm Hg
Ankle
106 mm Hg, Index 0.57
A. Tib
97 mm Hg
P. Tib
106 mm Hg
Great Toe
50 mm Hg
Left Low Thigh
Left Calf
Left Ankle
Left TM
Left Toe


Use 4" x 4" dressing or larger
Use 5.5" x 5.5" dressing or larger
MRN: 784785348
MCCRAY, HARRIETTE I
00986709-3690
83Y
DOB
07/01
Date
Description

Case 2

Active 63 yo female

DM, smoker

Hx of multiple failed endovascular interventions and failed femoral popliteal bypass with ispsilateral saphenous vein

Presenting with great toe gangrene and cellulitis

ABI 0.54, toe pressure 0

WIFI: 2 3 1

Clinical stage 4

Amputation risk: High

Revascularization benefit: High

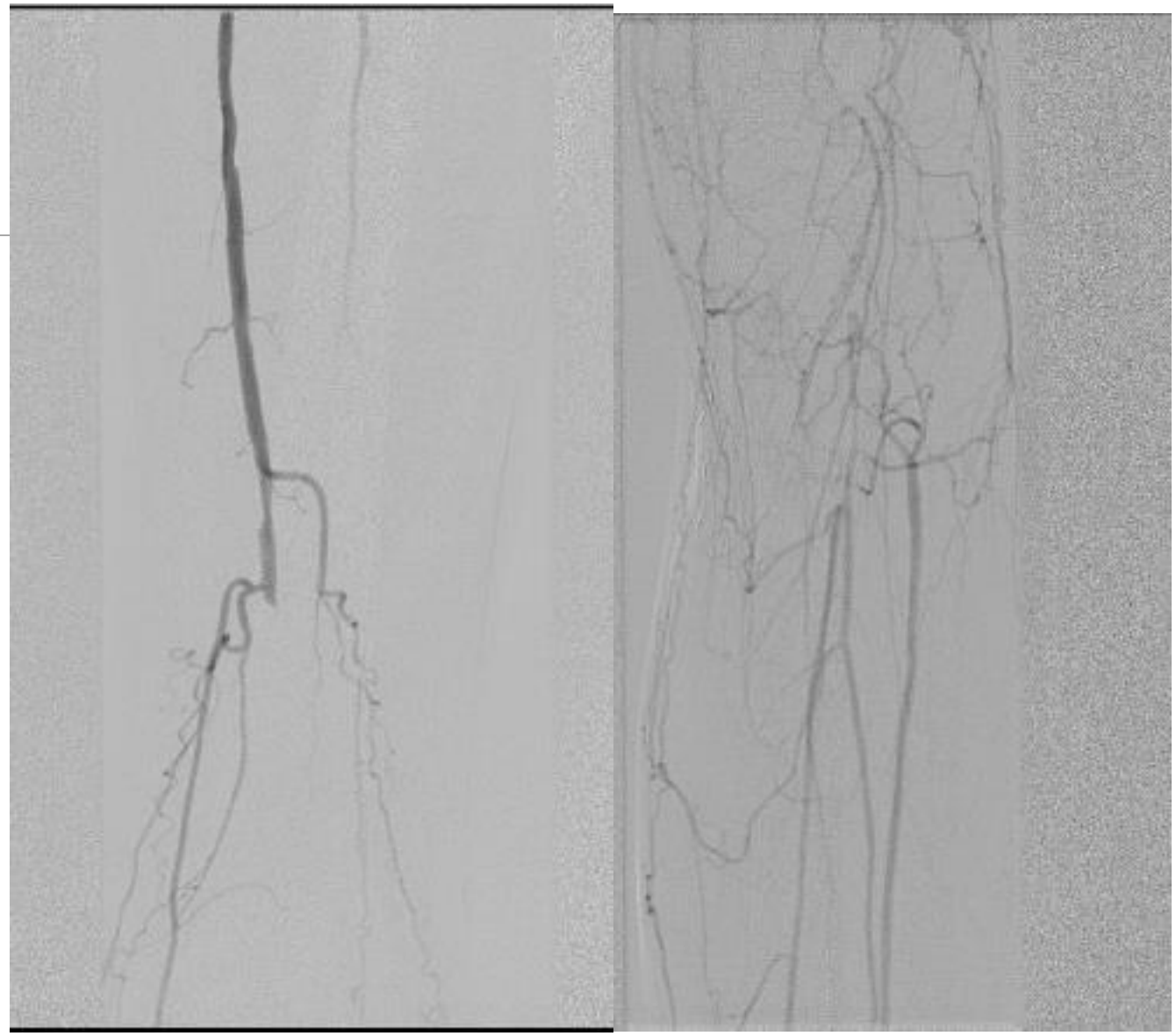
Reasonable health, active

Long segment occlusion across the knee

Previous endovascular failure

Tissue loss

Available R GSV single segment



Right SFA to PT bypass with contralateral reversed GSV

Podiatry: First ray amp

ID: IV abx converted to PO at discharge

Has done well since that time and remains healed

Remains with ABI of 1 and a palpable pulse at the ankle

Case 3

52 yo female with DM, lupus, PAD

ABI and PVR normal, toe pressure 0

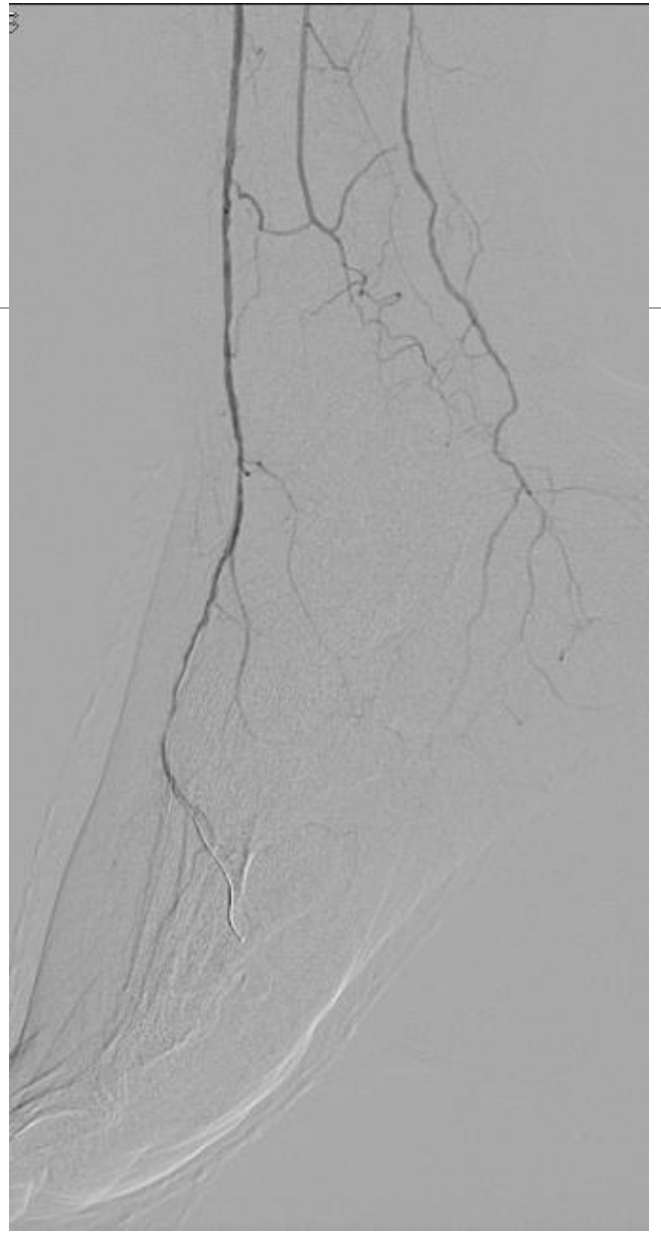
Toe gangrene

WIFI: 1 3 0

Clinical stage 3

Amputation risk: moderate

Revascularization benefit: High



Underwent toe amputations which healed

Case 4

72 yo heavy smoker, homeless gentleman presenting to clinic with extensive wounds on feet (L>R)

Thigh, buttock, calf claudication

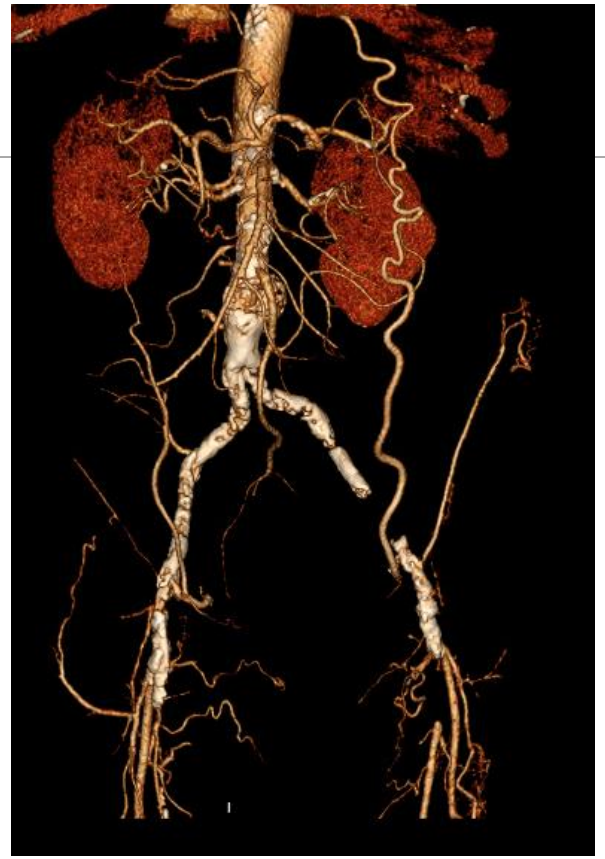
Right ABI 0.26, Left 0.11, Toe pressures 0

WIFI: 2 3 0

Clinical stage 4

Amputation risk: High

Potential Benefit of revascularization: High



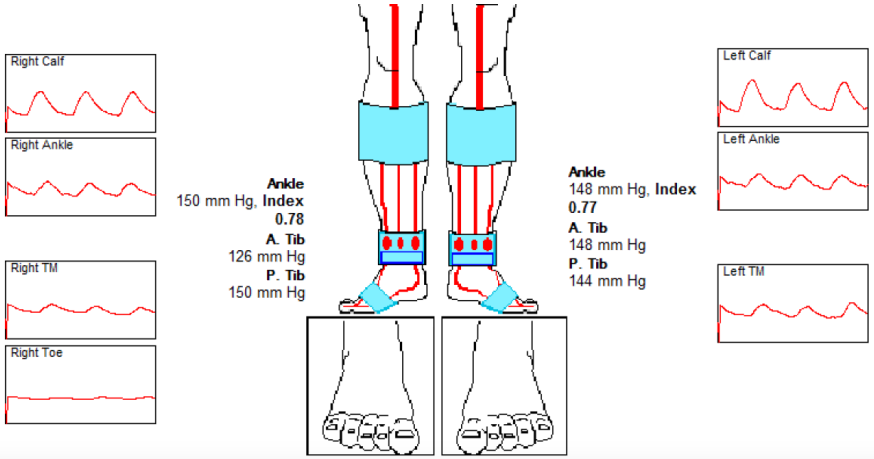

W RUNOFF

Aortobifemoral bypass (proximal end to end) with reimplantation of the IMA, omental pedical flap for retroperitoneal coverage of graft

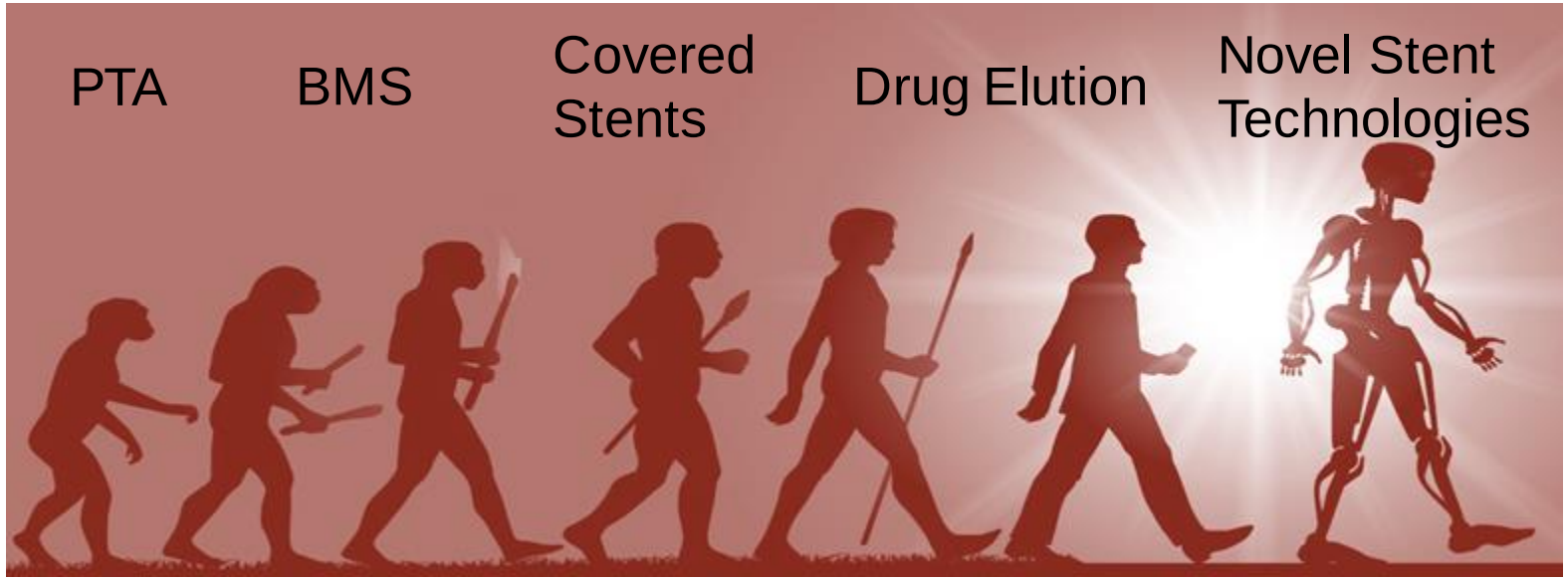
SFA cutdown and SFA recanalization and stenting

Podiatry did 1st hallux amp, I&D, integra application

Remains healed



Endovascular tools continue to improve



Endovascular options/techniques/skills improving

Retrograde pedal access

Re-entry devices

Covered stents

Drug eluting technology

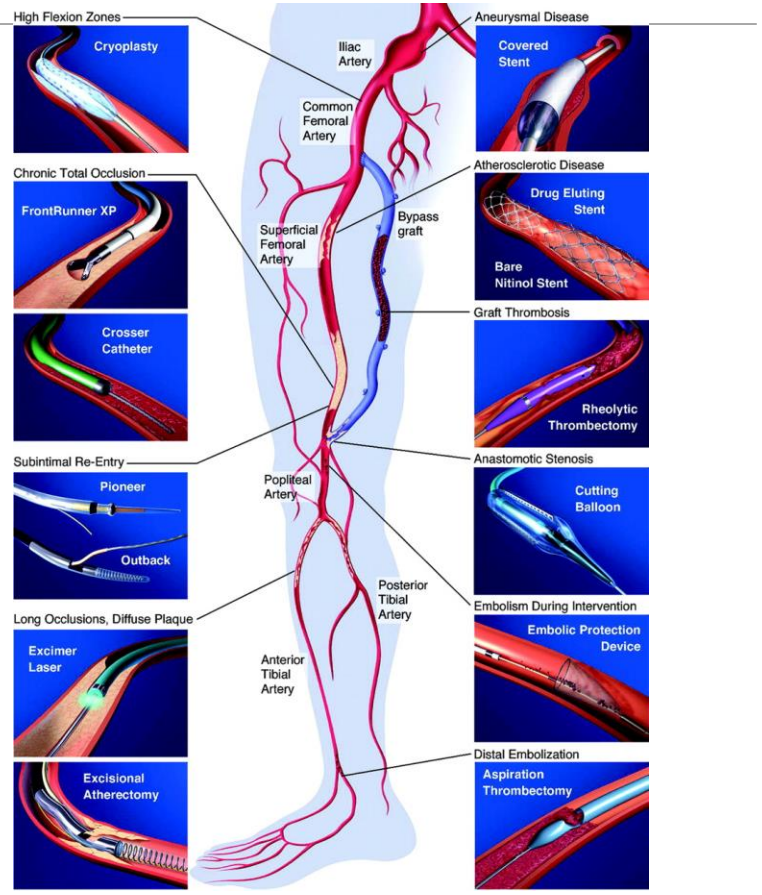
Biomimetic stents

Intravascular lithotripsy

However, open surgical revascularization and hybrid procedures remains critical for limb salvage

Multidisciplinary care that individualizes treatment that is medically appropriate and appropriate for the degree of tissue loss is key

Close follow up in a wound care center improves outcomes



Mixed wounds and wo
of underlying arterial/

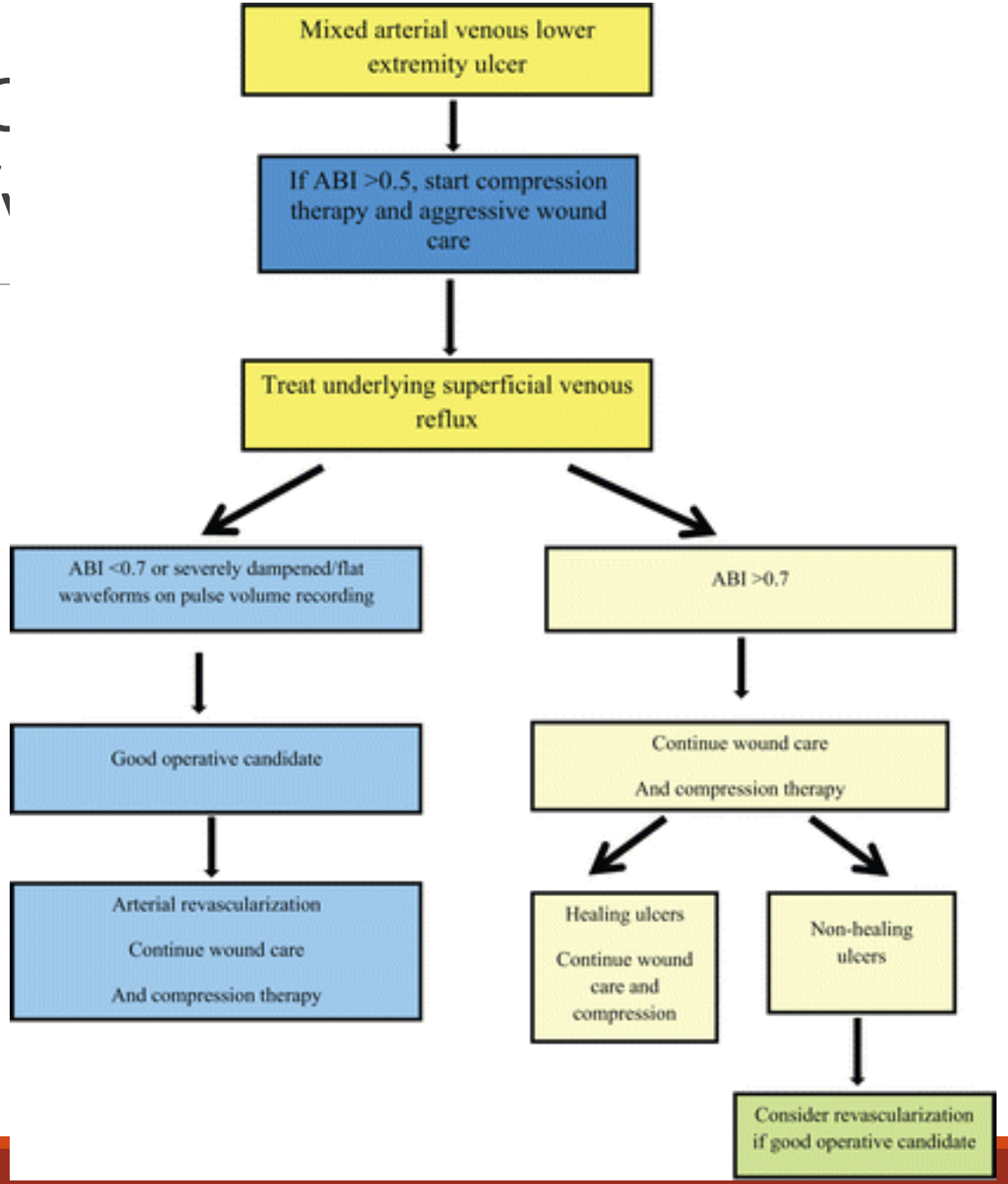
Always check pulses before initiating compression therapy

ABI/toe pressure if edema makes pulse difficult to feel

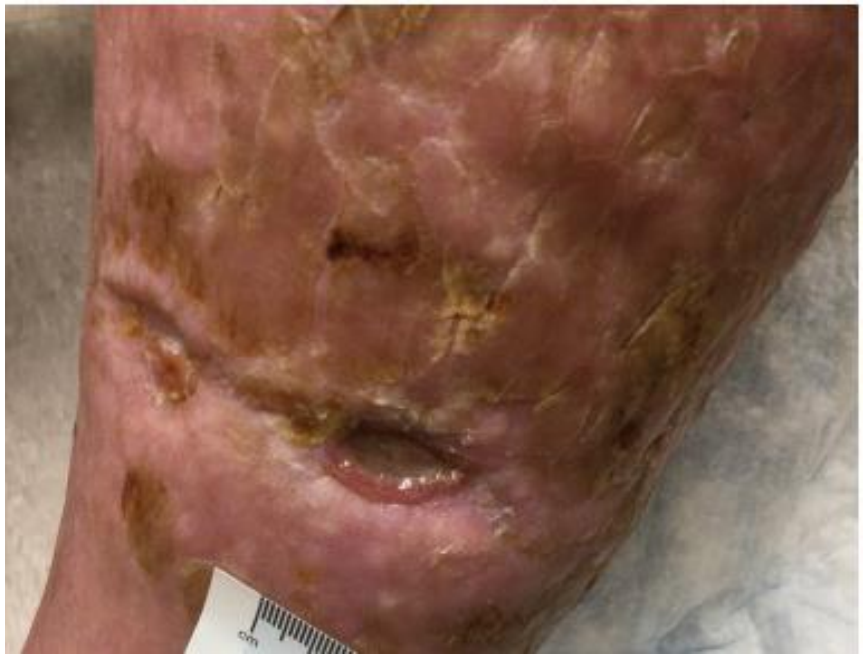
- "Don't trust a normal ABI"

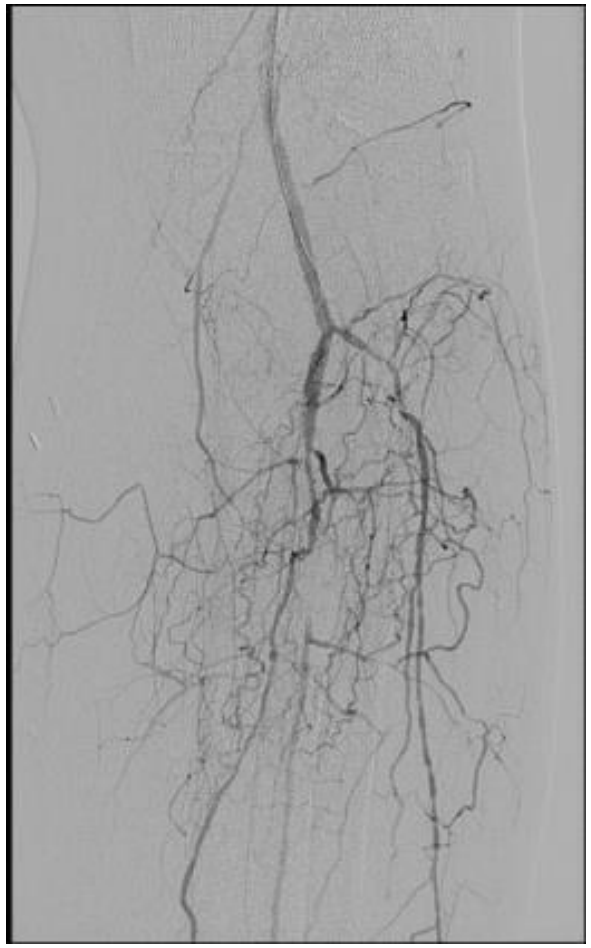
Refer to vascular surgery if reduced ABI/toe pressure

Complex management with frequent wound assessment is key



Mixed arterial/venous disease





Conclusions

Vital to recognize CLTI in wound care patients

Check an ABI in clinic

Early referral to a vascular surgeon

WIFI to stage and prioritize infection control vs. revascularization

Team based approach

Thank you!