PAD: When to monitor, when to refer and when it is not PAD

Anabelle Mizzi

PAD

- First most common symptom is Intermittent claudication
  - **Repeatable** pain in the calf / thigh or buttocks after X meters of walking
  - **Worse** uphill or going up the stairs
  - Can be bilateral or unilateral
  - Generally in the presence of DM and/or smoking
  - Can progress to CLI (rest pain, tissue loss, Toe pressures 35mmHg or less)

Issues with symptomatic PAD

- Patients who do not walk more than 100m do not experience the symptom
- Many patients adapt and stop experiencing IC
- Can be of neurological origin rather than vascular.
- It is often considered to be benign but might progress rapidly

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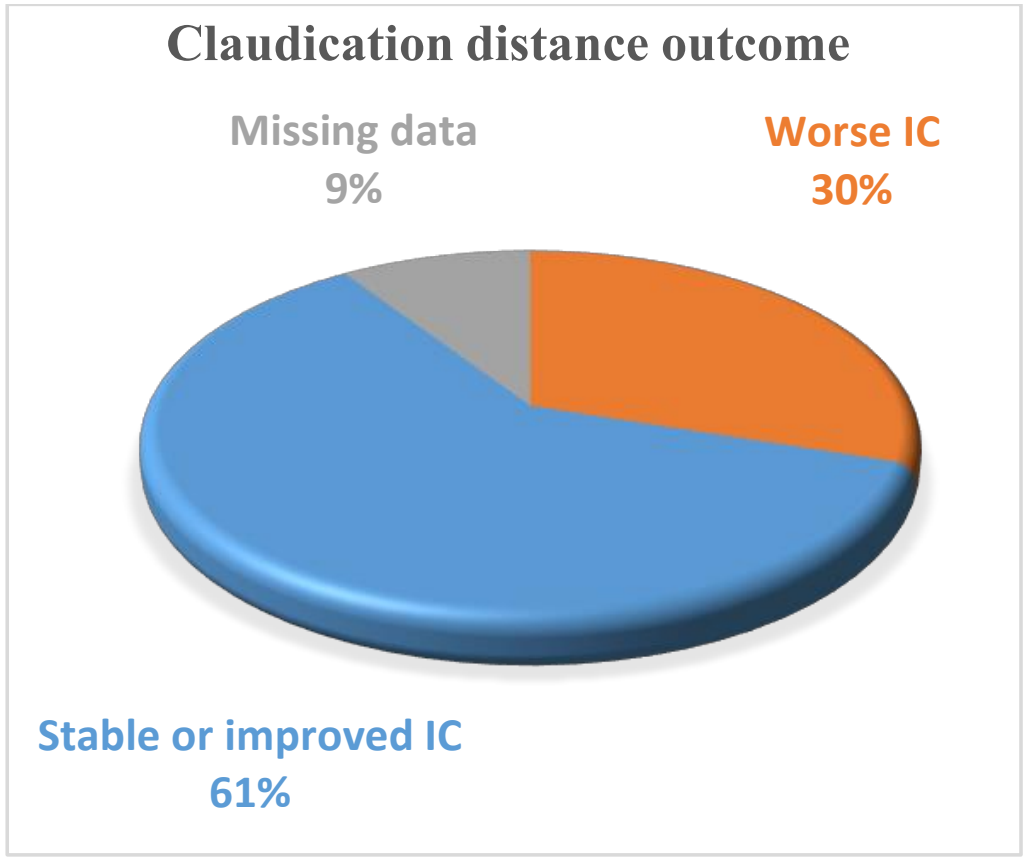

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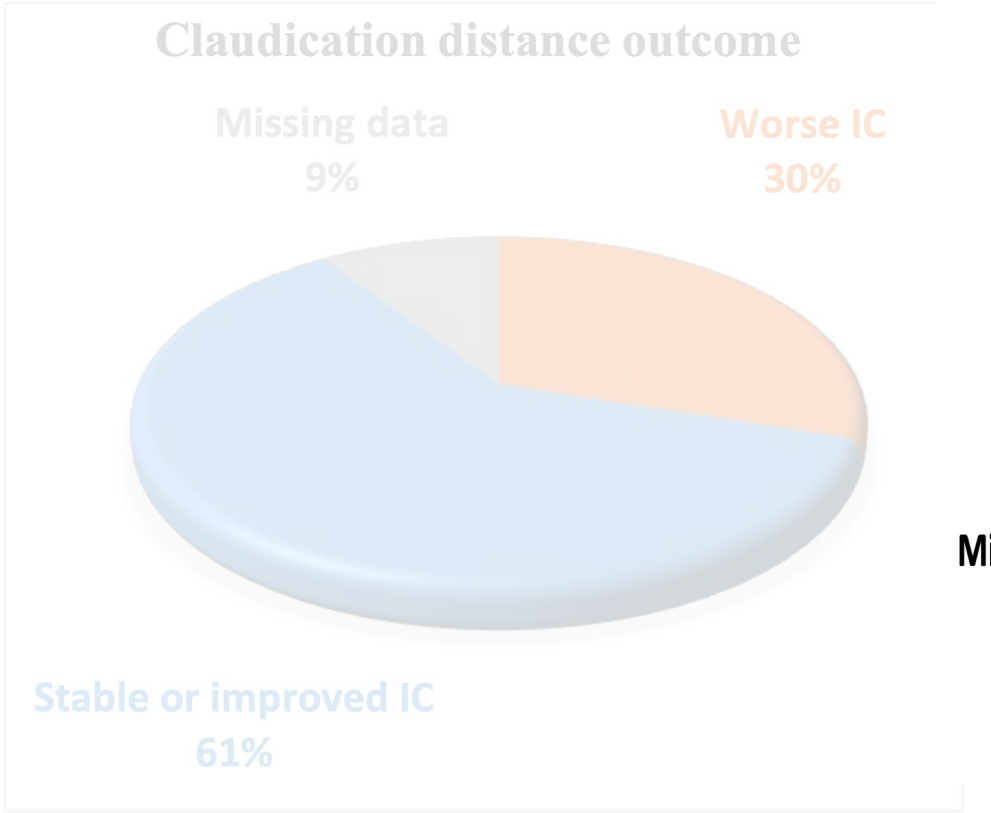

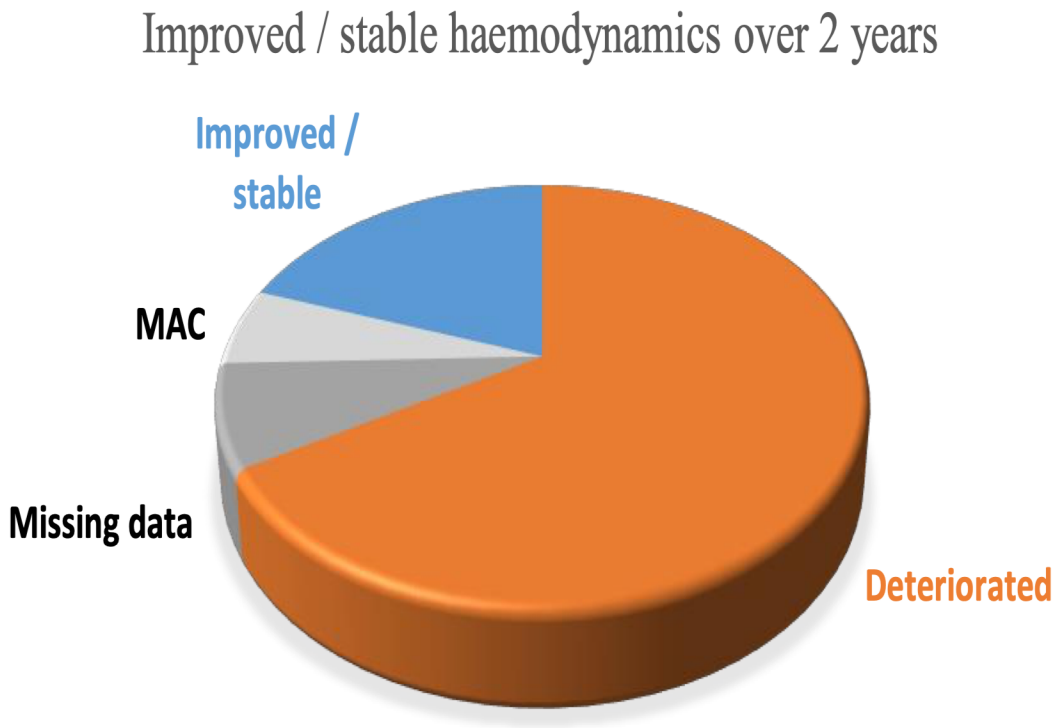

19.7% improved, 67% had haemodynamic deterioration

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When it is not PAD

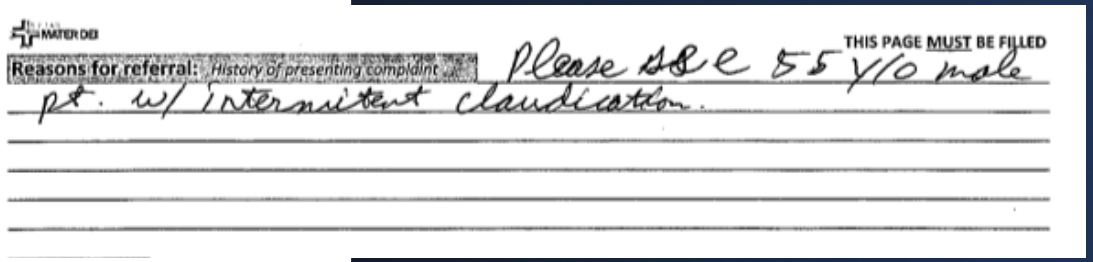
Condition	Location	Characteristic	Effect of Exercise	Effect of Rest
Symptomatic Baker's cyst	Behind knee, down calf	Swelling, tenderness	With exercise	Also present at rest
Venous claudication	Entire leg, worse in calf	Tight, bursting pain	After walking	Subsides slowly
Chronic compartment syndrome	Calf muscles	Tight, bursting pain	After much exercise (jogging)	Subsides very slowly
Spinal stenosis	Often bilateral buttocks, posterior leg	Pain and weakness	May mimic claudication	Variable relief but can take a long time to recover
Nerve root compression	Radiates down leg	Sharp lancinating pain	Induced by sitting, standing, or walking	Often present at rest
Hip arthritis	Lateral hip, thigh	Aching discomfort	After variable degree of exercise	Not quickly relieved

Can be of neurological origin rather than vascular

- 40% of referrals to vascular unit due to IC

- Biphasic waveforms
- ABPI 1.2
- TBPI 0.75

- Without assessment this would lead to
  - Delayed management of actual issue
  - Unnecessary use of important appointment result in delayed Rx for those who really need it



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14.07.2016

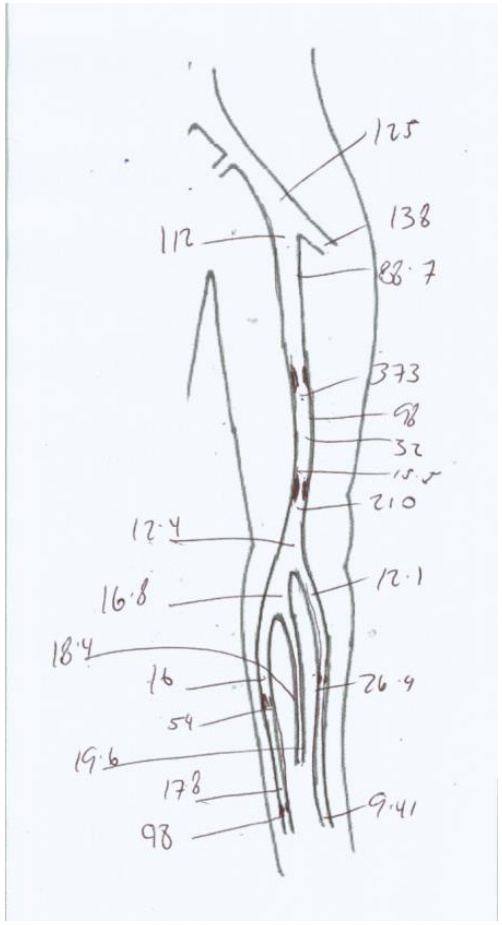


Fig 7.18 Duplex scan of participant at baseline

26.04.2017

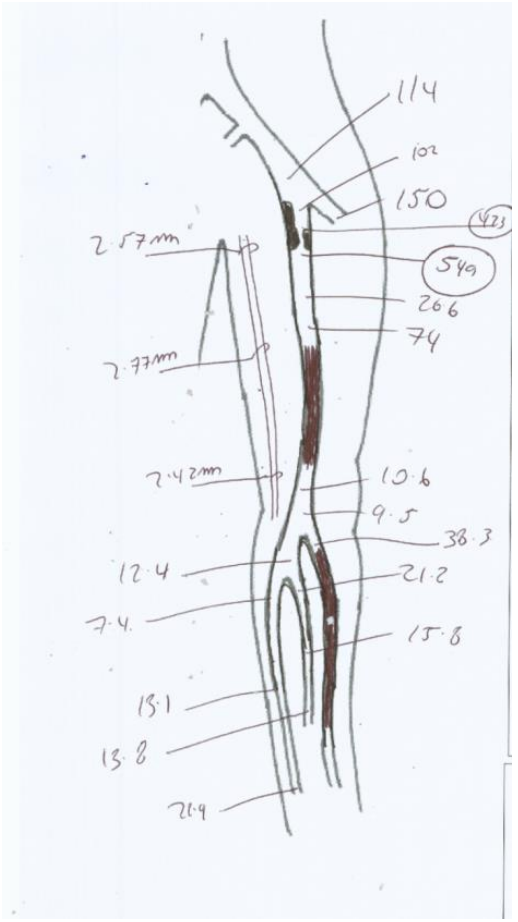
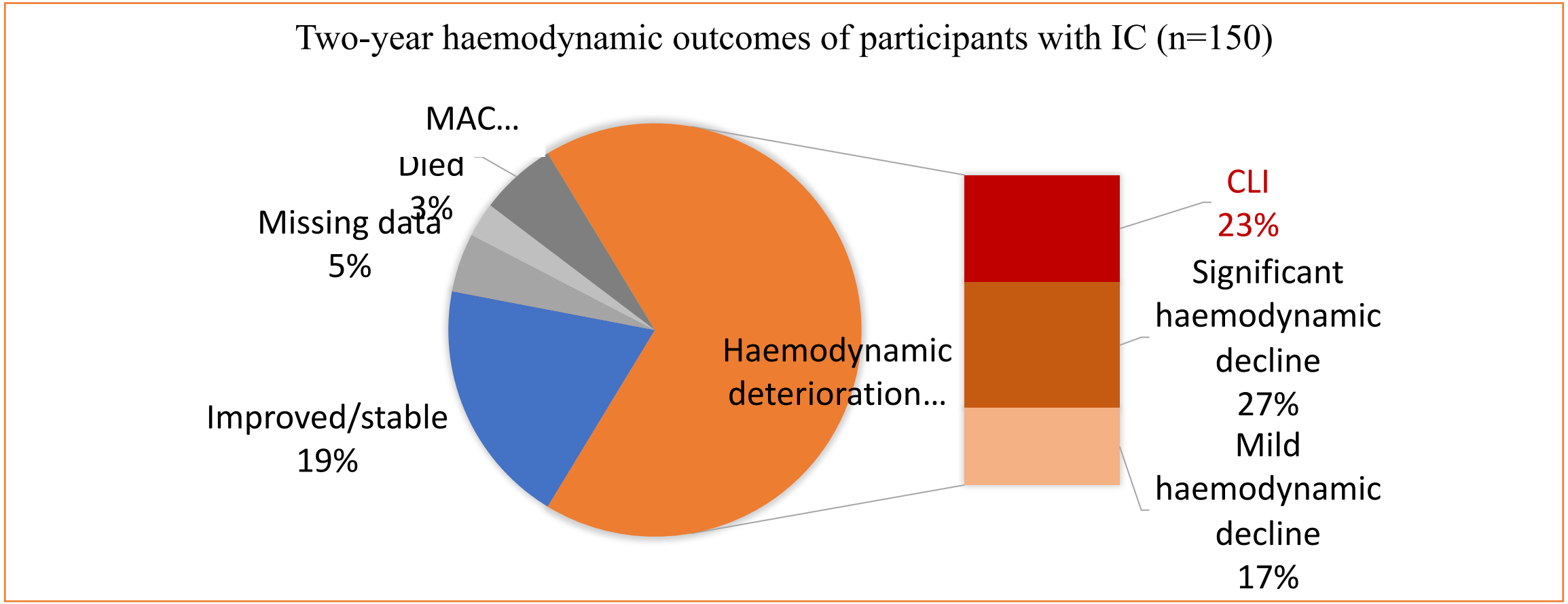
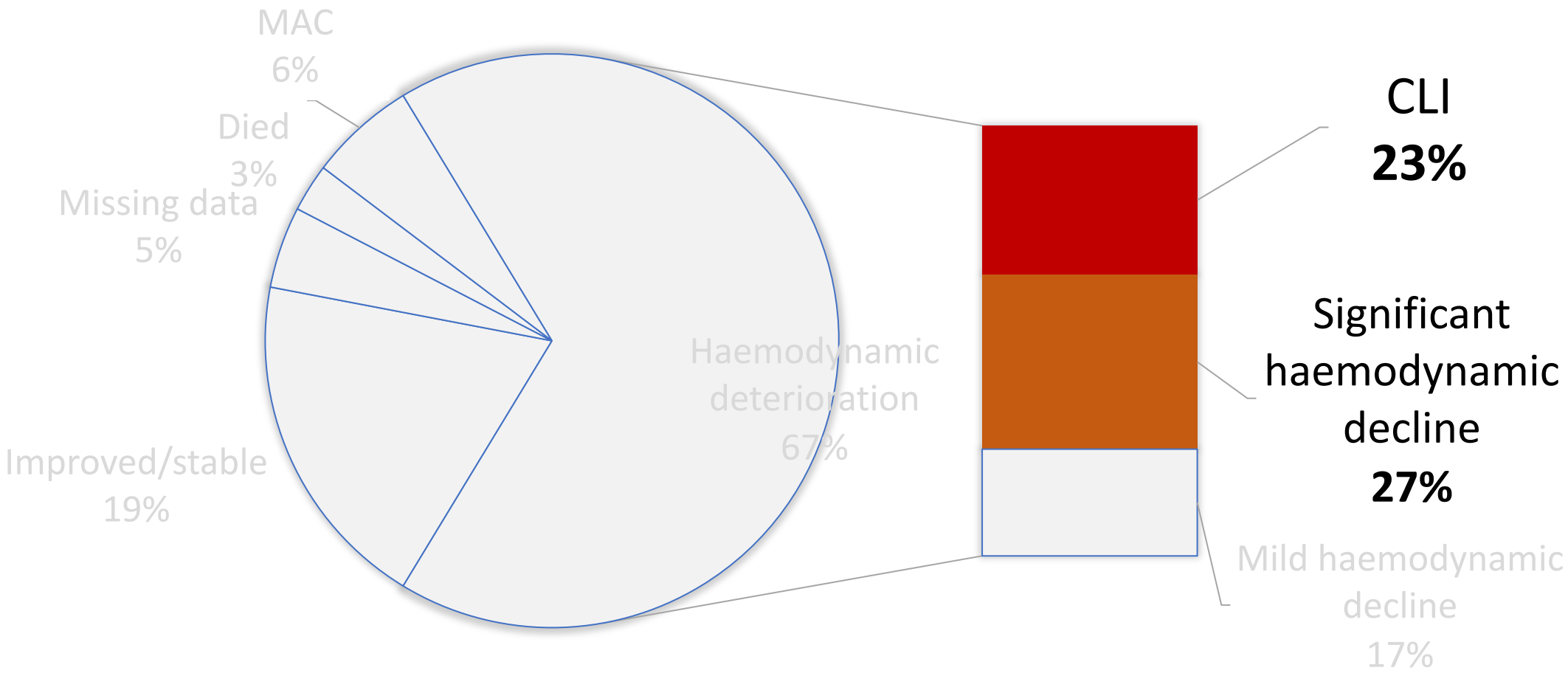


Fig 7.19 Duplex scan 9 months following recruitment

It is often considered to be benign but can progress rapidly



Two-year haemodynamic outcomes of participants with IC (n=150)



23% had tissue loss or amputation, 27% decline in ABPI by 0.15 or in TBPI by 0.1 (M. S. Conte et al., 2019)

Key Points from AHA / ACC Guidelines

1. *Patients at increased risk of PAD are:*
2. *In patients with possible PAD, a resting ankle-brachial index (ABI), with or without segmental pressures and waveforms, is recommended to establish a diagnosis.*
3. *A toe-brachial index (TBI) should be measured to diagnose patients suspected of PAD when the resting ABI is >1.40.*
4. *In patients suspected of having critical limb ischemia (CLI; e.g., rest pain, nonhealing wound, or gangrene), an anatomic study, such as duplex ultrasound, computed tomography angiogram, magnetic resonance angiogram, or invasive angiogram should be performed* ***when arterial pressures are abnormal (ABI or TBI).***
5. *Patients with symptomatic PAD should be initiated on antiplatelet therapy (aspirin 75-325 mg daily or clopidogrel 75 mg daily) and statin therapy, preferably atorvastatin 80 mg daily. Antihypertensive therapy, smoking cessation, and coordinated diabetes management should also be initiated*

7. Supervised exercise is recommended to improve functional status and quality of life as well as to reduce leg symptoms. This should be discussed prior to possible revascularization treatment options. Structured community-based or home-based exercise programs are an alternative to supervised exercise for patients with claudication.

8. Patients with PAD should be followed periodically to assess cardiovascular risk factors, limb symptoms, functional status, and ABI testing

Key Points from AHA / ACC Guidelines

1. ***Patients at increased risk of PAD have risk factors for atherosclerosis***
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Haemodynamic assessment required

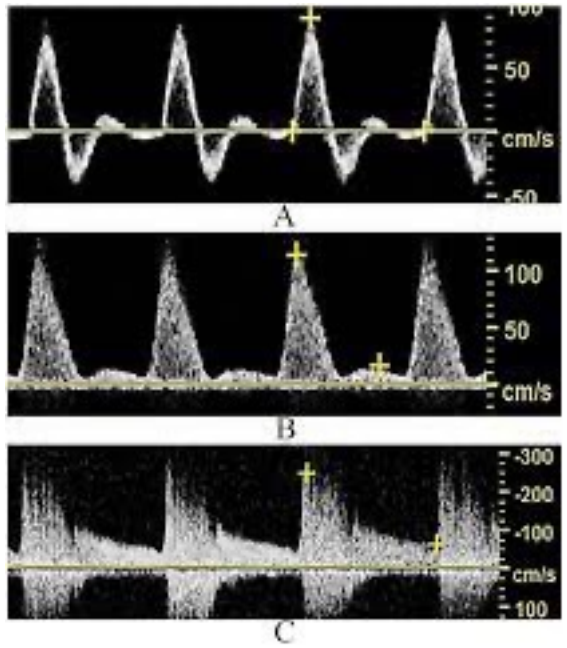
Patients at increased risk of PAD are:

Age 65 and older

Age 50-64 yrs with risk factors for atherosclerosis

Age <50 with DM and 1 additional risk factor

Individuals with known atherosclerotic disease in another vascular bed



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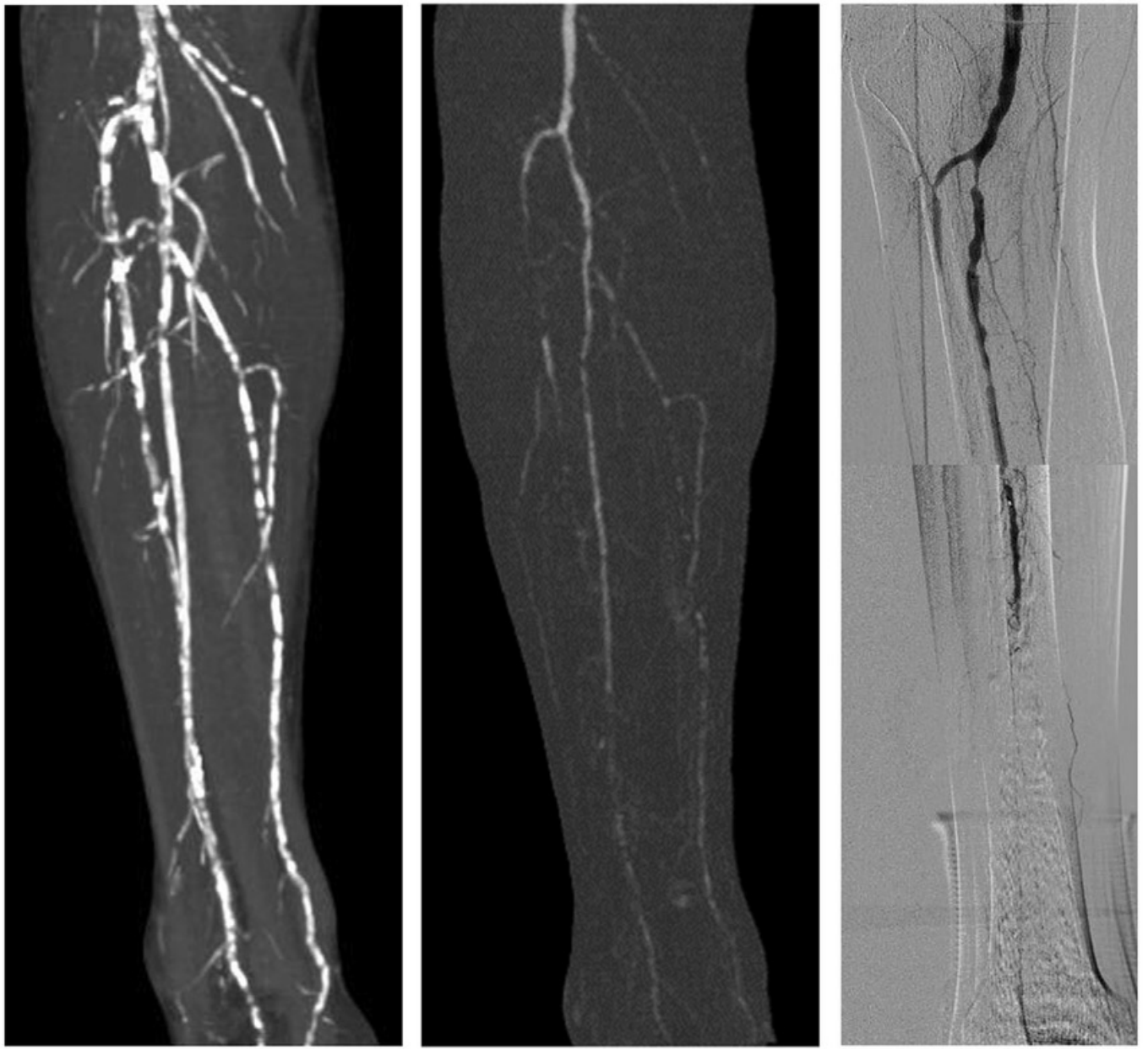
Medial arterial calcification

- **Causes artefactually elevated ABI**

- **Patients at higher risk include**
  - **DM patients**
  - **smokers**
  - **Renal patients**



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> Diabetes Res Clin Pract. 2013 Nov;102(2):112-6. doi: 10.1016/j.diabres.2013.10.006.
Epub 2013 Oct 9.

Hidden dangers revealed by misdiagnosed peripheral arterial disease using ABPI measurement

Cynthia Formosa [1], Kevin Cassar, Alfred Gatt, Anabelle Mizzi, Stephen Mizzi, Kenneth P Camileri, Carl Azzopardi, Clifford DeRaffaele, Owen Falzon, Stefania Cristina, Nachiappan Chockalingam

Affiliations + expand

PMID: 24209599 DOI: 10.1016/j.diabres.2013.10.006

Approximately 35% of subjects had inconsistencies between their ABPI result and waveform interpretation

Limitations of resting ankle-brachial index in the diagnosis of symptomatic peripheral arterial disease patients

Patients with PAD	Sensitivity	Overall Accuracy
All	57%	74%
Diabetics	51%	66%
Non-Diabetics	66%	81%
With CKD*	43%	67%
No CKD*	60%	76%

43% of DM patients who had >50% stenosis had normal ABPIs

AbuRahma, A. F., Adams, E., AbuRahma, J., Mata, L. A., Dean, L. S., Caron, C., & Sloan, J. (2020). Critical analysis and limitations of resting ankle-brachial index in the diagnosis of symptomatic peripheral arterial disease patients and the role of diabetes mellitus and chronic kidney disease. *Journal of vascular surgery*, *71*(3), 937-945.

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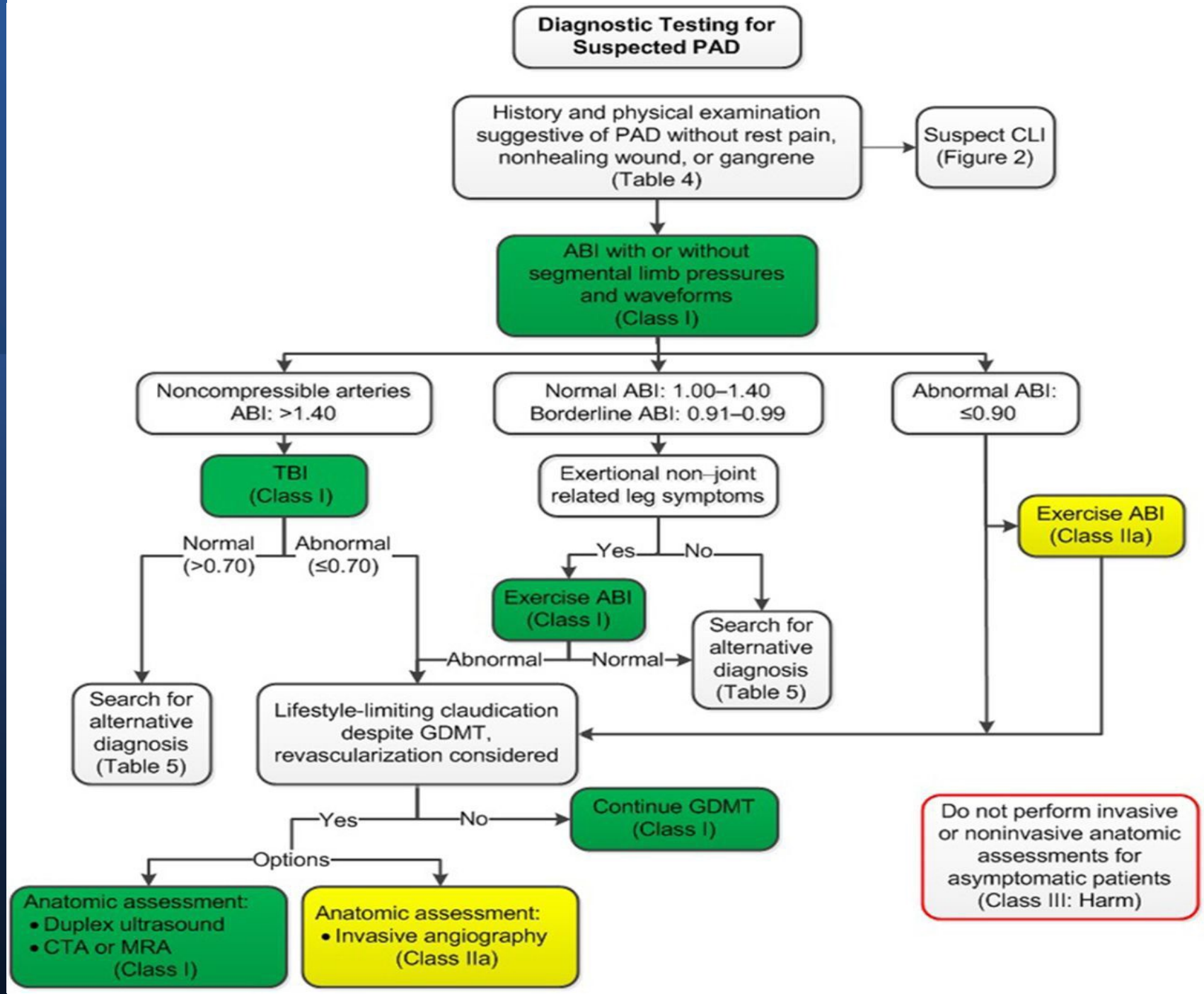
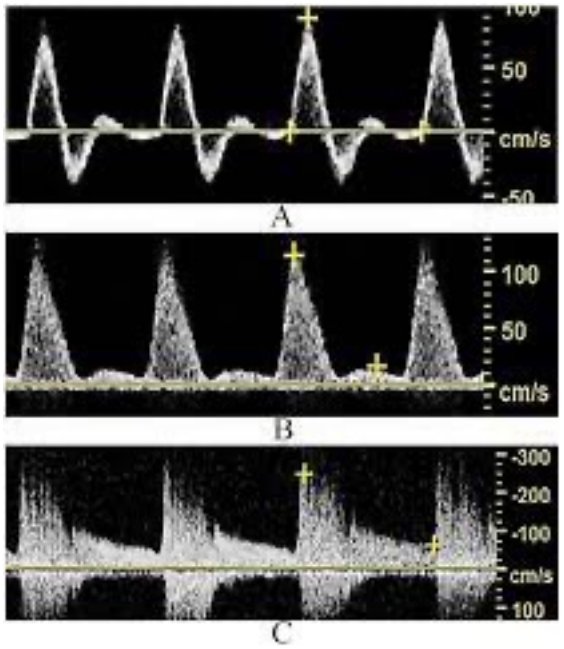
ADA guidelines for management of PAD



Marie D. Gerhard-Herman. Circulation. 2016 AHA/ACC Guideline on the Management of Patients With Lower Extremity Peripheral Artery Disease: Executive Summary: A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines, Volume: 135, Issue: 12, Pages: e686-e725, DOI: (10.1161/CIR.0000000000000470)

Vascular assessment to confirm diagnosis by haemodynamic analysis



Doppler waveforms

ABPI

TBPI

After diagnosis of PAD

What we do

- **Mild PAD** -refer back to GP for statins and antiplatelet therapy
  - Lifestyle modification
  - Monitor
- **Moderate PAD-** monitor or refer depending on medical status
- **Severe PAD-** refer and monitor

Monitoring / referral involves

- Periodic recall for monitoring depending on severity
- Immediate referral directly to surgeon indicating reason
  - Deterioration
  - Tissue loss
  - Rest pain
  - IC (non-urgent)

Referral due to IC

Dear Profs Cassar,

I would like to refer to the Vascular Surgery team Mrs. – **due to IC R**.

PMH: HT, HLD.

Symptoms: She is active indoors only and is complaining of **IC in her right calf after 5 mins walk**. She has **dusky purplish skin colouration in both feet** bilaterally with right more than left. Pt has h/o Eczema in plantar aspect of feet bilateral.

Medication: Unclear ?simvastatin, perindopril, ?Aspirin

She **was referred to GP for medical management** and better control of hypertension since she stated it is always high.

Doppler Waveform Analysis	Left- DP: Biphasic	**Right – DP: monophasic**
	PT: Biphasic	**PT: Mono- cont.**
Absolute toe pressure	Left – 108mmHg	**Right – 80mmHg**
TBPI	Left – 0.66	**Right – 0.5**
ABPI	Left – 0.68	**Right – 0.59**

Systolic brachial pressure: 160mmHg

Reply: We will give her a soon appointment. Appointment booked in 2 months

Referrals to Vascular surgeons

Dear Prof. Cassar,

Mr. ------ attended vasc clinic today. You have previously seen to this pt. He already underwent **By-pass L 2014**, **stents bil lower legs**, **hallux amputation L 2021** and cardiac stents.

- **Symptoms:**
  - **IC after about 2mins R starting at groin radiating to gastrox, L gastrox.** R leg gives out when he tries to walk. Not going for long walks though active at home
  - oedema and redness R foot present from last month
  - continuous numbness legs and arms L>R

Current Medication: Aspirin, Dipyridamole, Insulin, Isosorbide mononitrate, Metformin, Omeprazole, Perindopril, Ranitidine, Simvastatin.

PMH: IDDM x 20 years not well controlled. HTN, HF. Pt has h/o smoking but stopped 13 years ago

Would he benefit from further assessment at this stage? His haemodynamic results are as follows:

Waveform Analysis

	Left-	**DP: Mono cont**	**Right – DP: Mono cont**
		PT: Mono cont	**PT: Mono cont**
Absolute toe pressure:	**Left –**	**waveform second digit**	**Right – 62 mmHg**
TBPI:	**Left –**	**N/A**	**Right – 0.44**
ABPI:	**Left –**	**0.80**	**Right – 0.26**

- ***Reply: We will see him but the symptoms are suggestive of a neuropathic cause***

Take home message

Vascular Assessment is recommended for diagnosis of PAD

When PAD is suspected refer for diagnosis by email on: podiatryvascularclinic.phc@gov.mt

Name and ID

Reason for referral

Initiate medical management if PAD is confirmed

Investigate other vascular beds if PAD is confirmed

References

Bevan, G. H., & White Solaru, K. T. (2020). Evidence-based medical management of peripheral artery disease. *Arteriosclerosis, thrombosis, and vascular biology*, *40*(3), 541-553.

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Thank you