Diabetes Professional Care® - DPC®
Foot & Wound Clinic

Vascular Assessment

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Learning Outcomes

- Understand what consists of a vascular screening and vascular assessment
- Review the location of the pulses into the foot
- Review what sounds a Doppler makes and what this means
- Understand what other tests can be used in assessment (ABPI, Top Pressure, Pole, CRT, Duplex etc)
- Understand when to refer on
- Understand what services and pathways are available

Amputation and Diabetes

- 85% of amputations start with a single foot ulcer

Ref: https://*www.diabetes.org.uk/resources-s3/2019-02/1362B_Facts%20and%20stats%20Update%20Jan%202019_LOW%20RES_EXTERNAL.pdf*

- Here to aim to improve outcomes

Annual Foot Check

This is an x-ray image of an actual foot in high heels

WHEN CARING FOR YOUR FEET, WHAT SORT OF PROBLEMS SHOULD YOU LOOK OUT FOR?

Damage to your nerves might be indicated by:

- tingling sensation; pins and needles
- pain (burning)
- sweating less
- feet that are red and hot to touch
- changes to the shape of your feet
- hard skin
- loss of feeling in your feet/legs.

Damage to your blood supply might be indicated by:

- cramp in your calves (at rest or when walking)
- shiny smooth skin
- loss of hair on your legs and feet
- cold, pale feet
- changes in the skin colour of your feet
- wounds or sores that do not heal
- pain in your foot/feet
- swollen feet.

If you notice any of these things, or have concerns about your feet, tell your GP or diabetes team – do not wait until your annual foot check!

Annual Review: Vascular

- Palpation of Dorsal Pedis and Posterior Tibial arteries
- Review of Skin quality
- Capillary refill time

Trophic Changes

Changes occur secondary to tissue malnutrition from arterial compromise and include:

- hair loss
- thin, smooth, shiny skin
- thick brittle nails
- tapering of toes

- plus fissuring (especially of heels) and oedema could be indicative of ischaemia (Edmonds et al, 2004).

Palpation of Foot pulses

- ***Top tip:*** Asking the patient to relax their foot and leg muscles fully and then the examiner dorsiflexing the foot prior to palpating for Dorsalis Pedis and inverting the foot slightly prior to palpating for post Tibial Pulses can relax the soft tissues and help identify a palpable pulse.

Palpation of Foot pulses

- ***Top tip:*** It is important to classify the pulse as non-palpable if the pulse is not easily felt and put this result in the context of other history and clinical findings.

Vascular Assessment

A minimum vascular assessment should include:

1. History of modifiable and non-modifiable risk factors
2. Palpation of foot pulses
3. Skin, temperature and other visible clinical features
4. Intermittent claudication and ischaemic rest pain
5. Differential diagnosis common leg symptoms
6. Identifying arterial ulceration and severity
7. History of venous disease

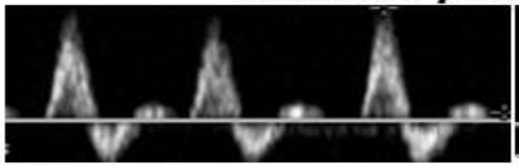
Doppler Sounds

Doppler Sounds

Doppler waveform analysis

- Alternative test useful to unmask PAD when ABI >1.40

Disease progression – distal flow



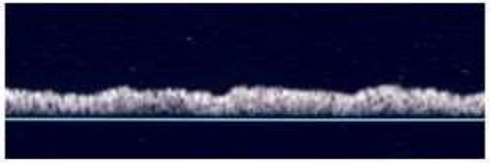
Norm –Triphasic →

Consists of forward flow in systolic peak, reversal of flow in early diastole , forward flow in late diastole

Biphasic →

After mild – moderate stenosis

Delayed acceleration, decreased systolic peak, increase of flow in diastole



Monophasic →

After setere stenosis, thrombosis

Delayed acceleration, decreased systolic peak, increase of flow in diastole

Absent

Thrombosis

ABPI

Doppler ABPI Measurements

- Position patient supine and rest for 15-20 minutes
- Measure both Brachial pressures
- Measure two pedal pressures per foot
- Calculate ABPI using highest ankle/highest brachial pressure

ABPI > 1.0 - 1.3	Unlikely to be arterial in origin	Apply compression therapy
ABPI = 0.8 - 1.0	Mild peripheral disease	Apply compression therapy with caution
ABPI = 0.5 - 0.8	Moderate arterial disease	Do not compress refer to specialist
ABPI < 0.5	Severe arterial disease	Do not compress - refer urgently to vascular specialist.
ABPI > 1.3	Measure toe pressures or refer to specialist	

ABPI

Doppler ABPI Measurements

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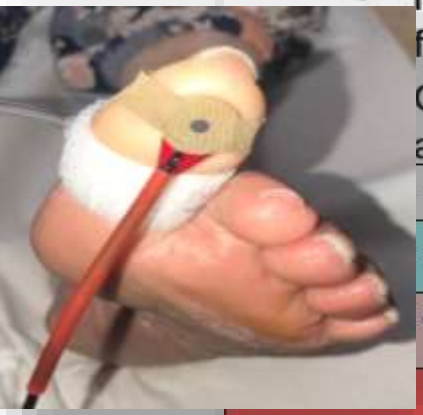


1.3	Unlikely to be arterial in origin	Apply compression therapy
1.0	Mild peripheral disease	Apply compression therapy with caution
0.8	Moderate arterial disease	Do not compress refer to specialist
	Severe arterial disease	Do not compress – refer urgently to vascular specialist.
ABPI > 1.3	Measure toe pressures or refer to specialist	

Common errors of an ABPI….

- The clinician ‘slips off’ the Doppler waveform signal with the probe during sphyg cuff inflation, which can produce a false low systolic ankle pressure result.
- The pulse is irregular or the cuff is deflated too rapidly, missing the true systolic ankle pressure.
- The vessels are calcified and this is not taken into account with other indicators such as clinical signs / symptoms or monophasic Doppler signals
- The legs are large or oedematous
- The cuff size is inappropriate e.g. small cuff used on a large limb
- The legs are raised too high or too low, or the patient is not lying flat for 10 minutes before readings are taken?

Toe Pressures

- As toe arteries are less likely to be calcified taking toe systolic pressures may be helpful for patients with a falsely elevated ABPI measurement, if the clinician has the skills, experience and the equipment to do it (Norgren et al, 2007).

Toe Pressures

- However, digital calcification should not be ruled out, particularly if seen on previous X rays or if the toe systolic pressure is suspiciously high (Brooks et al, 2001)

Toe Pressures

Buerger Test

- A limb with a normal circulation the toes and sole of the foot, stay pink, even when the foot is raised by 90 degrees
- An ischaemic limb, elevation by 15-30 degrees for 30-60 seconds may cause pallor

Acute Limb Ischaemia: 6 Ps

- Pain: Onset, intensity and location, variance over time
- Pulseless: Non-palpation of pedal pulses is suggestive but not diagnostic of acute limb ischaemia.
- Pallor: Most important when differs from contra-lateral limb
- Parasthesia: Occurs in more than half of patients
- Paralysis: This is a poor prognostic sign in combination with other indicators
- Perishing cold: The limb is receiving little / no oxygenated blood

Management of PAD risk factors

- **Smoking cessation** is a factor that must be addressed
- **Supervised exercise regimes** are beneficial and effective for patients with intermittent claudication, to help improve claudication symptoms and walking distances.
- **Best medical therapy of antiplatelet and lipid lowering drugs** should be commenced and reviewed periodically for all people diagnosed with PAD, as should the effective control of hypertension (NICE, 2012).
- **Weight management** can be beneficial in people with arterial disease who present with hyperlipidaemia, hypertension and obesity.
- **Naftidrofuryl is the only medicines currently recommended by NICE which is effective in some people to help with the management of intermittent claudication**. It can be considered with people who have not been able to improve symptoms with exercise and prefer not to or are not appropriate for vascular

Location of Ischaemic Ulceration

- Arterial or ischaemic ulceration typically occurs over the toes, heels and bony prominences of the foot, often originating from minor trauma, for example ill-fitting footwear.

Location of Ischaemic Ulceration

- Gangrene may occur, particularly of the digits, and if not complicated by infection can eventually mummify and auto-amputate (Norgren et al, 2007).

The recommended PAD assessment:

1. Handheld Doppler assessment
2. Ankle brachial pressure index (ABPI) and ankle systolic pressure
3. Toe systolic pressures
4. Assessment of popliteal and femoral pulses
5. Other clinical tests (Buergers)

Case Example 75 Year Old Male

- Can you think of the outcome based on the clinical picture we will give you

Case Example 75 Year Old Male

- Can you think of the outcome based on the clinical picture we will give you

Feb 2019

- Type 2
- 46mmol/mol
- eGFR 32
- BMI 36

Case Example 75 Year Old Male

- March 2019

Case Example 75 Year Old Male

Late March 2019

Case Example 75 Year Old Male

- Left foot necrotic left 2nd toe, minor necrotic patches on hallux and 4th toe. No spreading infection.
- COPD, previous treated Lung carcinoma, recent diagnosis of oro-pharyngeal cancer

Case Example 75 Year Old Male

Case Example 75 Year Old Male

- Palpable popliteal pulses bilaterally. Biphasic flow in left PTA but no flow into plantar arteries or pedal arch.
- DP damped monophasic flow.
- Peroneal artery = brisk monophasic flow

Case Example 75 Year Old Male

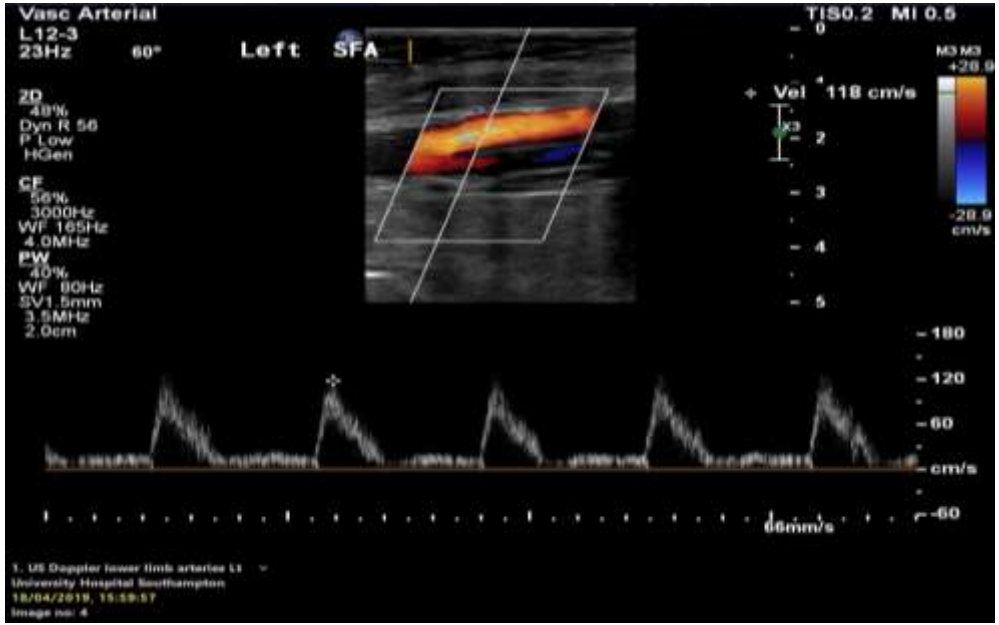
- Plan: Arterial Duplex scan followed by downstream angiogram + crural angioplasty

Case Example 75 Year Old Male

- April 2019

CFA – minor atherosclerosis with Triphasic signals

Prox SFA – monophasic signals with sclerotic arterial walls, no obvious visual stenosis

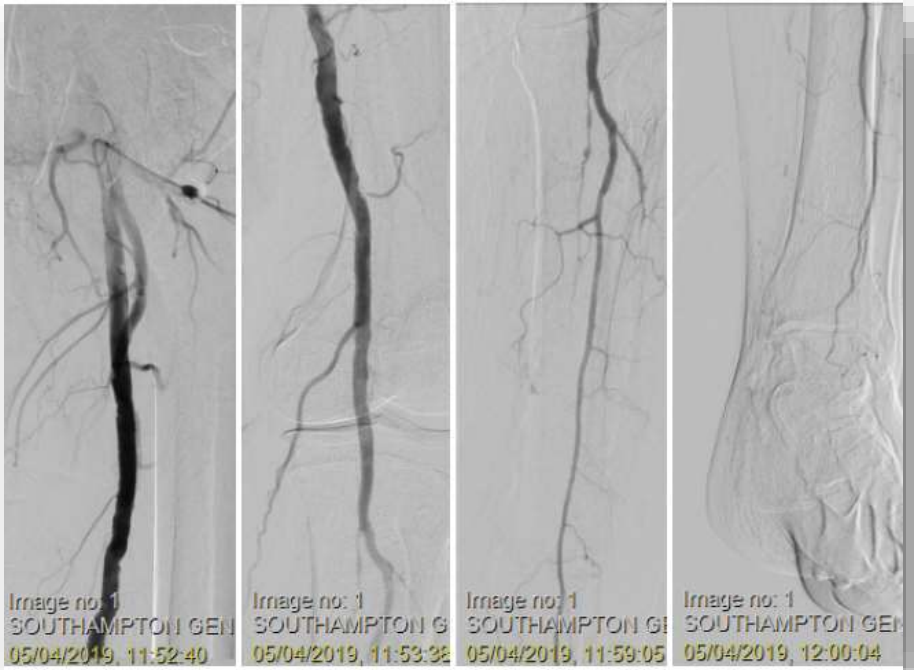


SFA – progressive atherosclerosis with acoustic shadowing, intimal irregularity

Distal SFA – Monophasic flow Distal SFA occlusion (lumen blocked) with single branch collateral visible.

Very damped flow in diseased distal PTA

Case Example 75 Year Old Male



Case Example 75 Year Old Male

- Covert to Trans Metatarsal Amputation trial and may need conversion to Trans Tibial amputation

Case Example 75 Year Old Male

Case Example 75 Year Old Male

- Trans Metatarsal Amputation trial and may need conversion to Trans Tibial amputation

Case Example 75 Year Old Male

- Converted to Lisfranc with trial of healing

Case Example 75 Year Old Male

- Discharge back to Community Podiatry Sept 2019

Case Example 75 year old Male

Vascular:

✓ Palpable pedal pulse on right foot.

X Vascular: Palpable popliteal pulses bilaterally. Biphasic flow in left PTA but no flow into plantar arteries or pedal arch. DP damped monophasic flow. Peroneal artery = brisk monophasic flow

Toe pressure - Level for healing > 50mmHg

Conclusion

- Know where the pulses are and how to palpate them
- If pulses absent, refer to your diabetes foot protection team
- Acute limb ischaemia – the 6 Ps – refer immediately for vascular review

Conclusion

- Sometimes there intervention can be more risky then leaving Auto amputation is appropriate and to keep the area dry and set patient expectations
- Level of amputation linked to vascular supply and function
- NICE guidance for PAD and Diabetes foot
- Know your local pathway