



Best Practice, Leadership, Support

# POSITION PAPER FOR ANKLE BRACHIAL PRESSURE INDEX (ABPI)

Informing decision making prior to the application of compression therapy

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 The British Lymphology Society



The aim of this document is to provide:

1. Practical information for clinical decision-making for health care professionals managing lymphoedema.
2. Key principles for practice
3. How to undertake a full vascular assessment for those with lower limb lymphoedema.

The British Lymphology Society (BLS) would like to extend thanks to Lymphoedema Network Northern Ireland (LNNI) and Tissue Viability

Nurse Network (TVNN) in Northern Ireland for allowing BLS to share and use their Best Practice Statement to inform this BLS paper.

## Background

At the British Journal of Community Nursing Lymphoedema conference, London (March, 2018) a debate regarding ABPI/Doppler assessment in lymphoedema was held with the expert panel comprising BLS members: Paula Lawrence, Macmillan Clinical Nurse Manager Lymphoedema and Tissue Viability, Betsi Cadwaladr University Health Board, Professor Vaughan Keeley, Lymphoedema Consultant, Derby Teaching Hospitals NHS

Foundation Trust, Robin Cooper, Vascular / Lymphoedema Nurse Specialist, Salisbury District Hospital and Rebecca Elwell, Macmillan Lymphoedema ANP, Royal Stoke University Hospital. This lively debate concluded that ABPI assessment in patients with lower limb oedema is not standard practice in most specialist lymphoedema clinics and that the BLS should develop a position paper to reflect this as soon as possible.

## Introduction

The ankle-brachial pressure index (ABPI) is the ratio of the blood pressure at the ankle to the blood pressure in the upper arm. Compared to the arm, lower blood pressure in the leg suggests blocked arteries due to peripheral artery disease (PAD). ABPI is calculated by dividing the systolic blood pressure at the ankle by the systolic blood pressure in the arm.

ABPI is only part of vascular lower limb assessment along with the patient's past medical history and current medication, and

recording of symptoms and risk factors and a clinical examination being of paramount importance.

It is well recognised that lymphoedema is a progressive condition which, if left untreated, may result in an increased risk of cellulitis (and thus sepsis), lymphorrhoea and skin changes, delayed healing of skin tears and wounds along with reduced mobility, due to increase size and weight of the limb.

## Best Practice

A questionnaire study by Todd et al (2006) showed that 46% of lymphoedema specialists felt that the ABPI was inaccurate in the presence of lower limb oedema. BLS recognises that in the field of lymphoedema there are a considerable number of allied health care professionals who specialise in lymphoedema for whom ABPI and wound care is not integral to their training.

The Best Practice Document for the management of lymphoedema (2006) however, recommends measurement of the ABPI prior to the use of compression, whilst recognising its limitations particularly in lymphoedema.

The paper by Guest et al (2015) showed that in a patient group where assessment of peripheral perfusion is a recognised requirement, only 16% of all patients with a leg

or foot ulcer had an ankle brachial pressure index recorded. The Wounds UK Best Practice Statement for compression hosiery (second edition 2015) supports prompt application of compression of 14-17mmHg in the absence of ABPI to promote effective efficient wound healing.

Although this position paper has been developed for BLS members, the majority of whom are lymphoedema therapists, the information is directly relevant to other specialities and generalists alike e.g. community nurses and will be made available freely on the BLS website ([www.thebls.com](http://www.thebls.com)) and to Friend of BLS members. A vascular assessment checklist is included (see appendix 1) for ease and to identify when referral on is necessary.

## ABPI

Factors which may affect ABPI include:

Diabetes	Arteriosclerosis
Renal disease	Cardiac arrhythmias e.g. Atrial Fibrillation
Rheumatoid arthritis, scleroderma and related disease	

Extrinsic factors can also affect ABPI including:

Inadequate preparation e.g. room temperature	Inexperience of the operator
Patient anxiety	Repeated inflation moving Doppler probe during the procedure
Incorrect positioning of the patient	Prolonged inflation of the cuff or re-inflation mid procedure
Inappropriate gel	Releasing sphygmomanometer cuff too rapidly
Incorrect size of sphygmomanometer cuff	Excessive pressure on a vessel during the procedure
Wrong sized Doppler probe	Miscalculation of reading
Incorrect positioning of Doppler probe over vessel	

## Alternatives

A number of alternatives have been suggested but are not widely used in lymphoedema clinics and do have limitations. These include:

Pulse oximetry
Toe Brachial Pressure Index

## A full vascular assessment should include:

Recent and past medical history (diabetes, cardiac status, AF, previous cancer, DVT, CVA, hypertension, hyperlipidaemia)

Surgical history (interventions on the arteries or veins)

Cardiovascular Risk factors (including smoking status)

Medications

Symptoms:

- Intermittent claudication (can be described and experienced as: muscle pain on mild exertion - ache, foot pain/great toe pain, numbness or sense of fatigue classically in the calf muscle, which occurs during exercise, such as walking, and is relieved by a short period of rest)
- Chronic Ischaemic rest pain (usually described as night cramps with the inability to lie in bed and need to hang leg out/sleeping in chair)
- Acute ischaemic pain
- Neuropathic or musculoskeletal pain

**NB-** time of onset and clinical progression (improvement or deterioration) should be recorded

Clinical examination:

- Peripheral neurological status (e.g. motor and/or sensory deficit)
- Oedema (e.g. lipoedema, lymphoedema, pitting oedema)
- Peripheral pulse palpation (e.g. pulselessness)
- Skin colour (e.g. pallor or mottling in acute ischaemia; rubor or duskiness in chronic ischaemia)
- Nails e.g. atrophic nail changes.
- Temperature (e.g. thermal gradient (cooler) at the extremities)
- Trophic skin changes (e.g. ulceration, pre-ulcerative lesions)
- Venous hypertension (varicosities, telangiectasias, eczema)
- Capillary refill (the time taken for colour to return to an external capillary bed after pressure is applied to cause blanching)
- Buerger's test (elevating both legs between 30-45 degrees for 2-3minutes: in the case of ischaemia, pallor and delayed venous refilling can be observed)

**NB.** All symptoms and signs in the affected limb should be compared to the contralateral limb for differential diagnosis

## Signals with hand held Doppler - waveforms and phasic nature recorded:

**Triphasic (3 phases between heart beats)**

**Biphasic (2 phases)**

**Monophasic (1 phase)**

**Sound/strength and pitch of waveforms e.g. whooshing sound in monophasic foot pulses.**

**NB** Interpretation of these results may be necessary in inexperienced practitioners.

Many new hand held Doppler's have waveforms on the screen which would help inexperienced practitioners. A combination of tri and biphasic signals can be considered normal but monophasic sounds in both the dorsalis pedis and posterior tibial artery signals may indicate peripheral arterial disease.

With biphasic or triphasic signals and normal clinical assessment, full compression can be applied without carrying out a formal ABPI.

Those patients with suspected Peripheral Arterial Disease should be referred to a vascular department for an assessment. Depending upon the clinical problem, the application of reduced or modified compression may be appropriate in the interim in those with monophasic signals with no associated symptoms and in whom examination is unremarkable. However,

in those where critical limb ischaemia is suspected, compression is contraindicated.

Application of reduced/modified compression in those with monophasic signals should always be considered and monitored carefully. Compression should be discontinued if there is evidence of worsening peripheral vascular disease e.g. increased ischaemic pain. The level of compression can be revised as appropriate following formal specialist vascular assessment / treatment.

There is a need to focus on clinical assessment, rather than relying on an ABPI alone and recognise that it may be more harmful for the patient to omit / delay compression than to apply it. Ignoring the symptoms, or delaying treatment while awaiting an ABPI may lead to a deterioration of the condition.

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## BLS ABPI Statement

**BLS accept the following statements:**

1. Routine ABPI measurements for patients who present with lymphoedema are not required in the absence of significant cardiovascular risk factors and clinical signs or symptoms of PAD (Peripheral Arterial Disease), provided the vascular status has been thoroughly assessed. If there are concerns in terms of reduced arterial flow, a referral for further vascular assessment and possible intervention should be pursued.
2. Documentation and effective communication must be provided to all health care professionals involved in the ongoing management of the patient with Lymphoedema: which demonstrates the clinical assessment and rationale for not completing an ABPI

These statements form a basic guide for experienced clinical specialists working within the field of lymphoedema. If concern arises from clinical presentation or during holistic history taking regarding arterial insufficiency then onward referral can be sought if deemed necessary.

For further recommendations and rationale see Appendix 2

For a template to send to the relevant care provider see Appendix 3

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## References

Todd, M. Welsh, J. Key, M. Rice, M. Adam, J (2006) Survey of Doppler use in lymph practitioners in the UK. Chronic Oedema Supplement, BJCN.

Lymphoedema Framework. Best Practice for the Management of Lymphoedema. International consensus. London: MEP Ltd, 2006

Wounds UK (2015) Best practice statement: compression hosiery second edition.

Guest JF, Ayoub N, McIlwraith T, et al Health economic burden that wounds impose on the National Health Service in the UK BMJ Open 2015;5:e009283. doi: 10.1136/bmjopen-2015-009283

Al-Qaisi M et al Ankle Pressure Index (ABPI) An update for practitioners. Vascular Health and Risk Management 2009;5 833-841

Further reading

Mosti G et al. (2012) Compression therapy in mixed ulcer increases venous output and arterial perfusion. Journal of vascular surgery 55:122-8.

In patients with mixed ulceration, an ankle brachial pressure index >0.5 an absolute ankle pressure of >60mmHg, inelastic compression of up to 40mmHg does not impede arterial perfusion but may lead to a normalisation of the highly reduced venous pumping function. Such bandages are therefore recommended in combination with walking exercises as the basic conservative management for patients with mixed leg ulcers.

## Appendix 1

### Vascular Assessment Tool

Name:

Hospital Number/Pt identification Number:

Date of Birth:

Date of assessment:

Medical history (diabetes, cardiac status, previous cancer, DVT, CVA, hypertension, hyperlipidaemia):

Surgical history (intervention for the arteries or veins):

Risk factors (smoking status):

Medications:

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Signs and Symptoms	Yes	No
Muscle pain on mild exertion, such as walking, and is relieved by a short period of rest		
Sense of fatigue in the calf muscle which occurs during exercise		
Calf – Foot/great toe rest pain		
Inability to lie in bed and need to hang leg out/sleeping in chair		
Motor – sensory deficit		
Numbness/neuropathy		
Colour changes e.g. White, pale, dusky especially on elevation		
Skin changes e.g. toe ulceration		
Nails – hair changes e.g. atrophic nail changes		
Pulselessness		
Delayed capillary refill		
Temperature gradient in limb e.g. cooler at extremities?		

	Right				Left			
	P	M	B	T	P	M	B	T
Dorsalis Pedis or Anterior Tibial artery								
Posterior Tibial artery								
Other (e.g. peroneal artery)								

(P=Palpable pulse, M=Monophasic, B=Biphasic, T=Triphasic signals)

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If you have concerns regarding the arterial status of the patient referral to a vascular clinic/ department should be made.

Referral to vascular department required	yes	no
Referral completed	yes	Date:

Signed: ..... Date: .....

Date of review: .....

## Appendix 2

Recommendation	Rationale
<p>The arterial/vascular status of the legs of all patients with lower limb oedema or lymphoedema should be assessed</p>	<p>The presence of peripheral vascular disease may contraindicate compression therapy or necessitate a reduction in the level of therapy used (Lymphoedema Framework 2006)</p>
<p>Vascular status will be determined primarily through:</p> <ol style="list-style-type: none"><li>1. A detailed history of the presenting complaint including night time rest pain and intermittent claudication</li><li>2. A clinical examination of the feet and lower limbs</li></ol>	<p>An ABPI is commonly thought to provide an objective measure of vessel patency by measuring the ratio systolic blood pressure at the ankle to that of the arm with a value of 1 – 1.4 deemed normal.</p> <p>Literature suggests that the value of an ABPI is limited in people with lymphoedema due to the presence of hyperkeratosis, tissue thickening and oedema. Some of these issues can be addressed through the use of a larger blood pressure cuff and a 4 or 5 MHz probe. However, some patients cannot tolerate this investigation and some readings will be inaccurate. In these situations practitioners need to rely on information obtained from a detailed history of the presenting complaint and the clinical examination. The handheld Doppler may enable the practitioner to hear and assess foot signals. If there is any doubt about the patient's peripheral arterial status, a vascular opinion should be sought.</p>
<p>Documentation and effective communication must be provided to all health care professionals involved in the ongoing management of the patient with lymphoedema: which demonstrates the clinical assessment and rationale for not completing an ABPI</p>	<p>Many practitioners are unaware of the limitations of a handheld Doppler in determining the arterial status of people with oedema or lymphoedema. They may therefore be reluctant to apply compression therapy without an ABPI as this investigation is cited as good practice in many documents, e.g. the National Institute for Clinical Excellence (NICE). It is therefore important to explain and record why it was not possible or necessary to carry out this investigation</p>

### Appendix 3

Insert clinic location and date:
Insert patient details:

Dear colleague

X patient requires compression therapy. Unfortunately, it was not possible to calculate the Ankle Brachial Pressure Index due to:

Please tick all that apply:

Oedema/lymphoedema	<input type="checkbox"/>	Ulceration	<input type="checkbox"/>
Pain	<input type="checkbox"/>	Tissue thickening	<input type="checkbox"/>
AF	<input type="checkbox"/>	Calcified vessels	<input type="checkbox"/>
Hyperkeratosis	<input type="checkbox"/>	Cellulitis	<input type="checkbox"/>
Other please explain:			

I do not, however, feel that they have any evidence of significant arterial disease due to:

Please tick all that apply

Absence of night pain	<input type="checkbox"/>	Absence of rest pain	<input type="checkbox"/>
Brisk capillary refill (< than 3 seconds)	<input type="checkbox"/>	Absence of intermittent claudication	<input type="checkbox"/>
Quality of foot pulses see below	<input type="checkbox"/>	Foot perfusion and temperature	<input type="checkbox"/>

	Right				Left			
	P	M	B	T	P	M	B	T
Dorsalis Pedis								
Posterior Tibial artery								
Other								

(P=Palpable pulse, M=Monophasic, B=Biphasic, T=Triphasic signals)

Further instructions re care plan:

Kindest regards

Name and signature

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**Glossary**

**Lymphoedema**

Lymphoedema results from a failure of the lymphatic system. Consequences are swelling, skin and tissue changes and predisposition to infection. It most commonly affects the lower or upper limbs, but may also affect midline structures such as the head and neck, trunk, breasts or genitalia (BLS, 2017).

**ABPI**

The ABPI is the ratio of the systolic blood pressure measured at the ankle to that measured at the brachial artery. The index should be calculated in each leg by using the systolic pressures for the anterior tibial and posterior tibial arteries and dividing the highest ankle pressure by the highest brachial pressure as this gives the most accurate result (Scottish Intercollegiate Guidelines, 2006)

**Duplex scan**

A Duplex Doppler ultrasound is a test to see how blood moves through your arteries and veins by recording sound waves reflecting off moving objects.

**Lymphorrhoea**

Lymphorrhoea is described as lymph leaking from oedematous tissues when breaks appear in the skin. Lymphorrhoea appears as beads of fluid which seep from the affected area, putting the patient at risk of skin damage and an increased risk of problems such as cellulitis