HUNTLEIGH

DOPPLEX®

ADVANCED POCKET DOPPLERS
CLINICAL APPLICATION NOTES

NOTE 1 Arterial Investigation of the Lower Limb

HOW TO USE THIS APPLICATION NOTE

- *PATIENT SYMPTOMS* Verify that your patient's symptoms correspond to one or more of those listed in Figure 1.
- ***DOPPLEX®** EQUIPMENT REQUIRED* Select the most appropriate ***Dopplex®*** Pocket unit to perform the examination. For suggestion of suitable ***Dopplex*** equipment, refer to Figure 2.
- *PROCEDURE* If you have the ***Dopplex®** Printa //* Package or ***Dopplex®** Reporter* Software Package (and a computer), connect your ***Dopplex®*** bi-directional Doppler and begin your examination, refer to Figure 3.
- *LOCATING ARTERIES* Figure 4 suggests probe position for locating an artery.
- *EXAMINATION RESULTS* Taking careful note of your ***Dopplex®*** display and arterial waveforms (if applicable), refer to Figure 5 overleaf and compare your examination results with those shown.
- *NOTES* Refer to Figure 6 overleaf for general notes relating to this form of examination for arterial disease.

FIGURE 1 PATIENT SYMPTOMS

- WALKING PAIN
- REST PAIN
- COLD FEET
- SKIN CHANGES
- WEAK OR ABSENT PULSES
- CRAMPS
- NUMBNESS

FIGURE 2 DOPPLEX EQUIPMENT REQUIRED

Multi, *Maxi* or *Rheo* ***Dopplex® II*** unit, 5 or 8 MHz probe, ***Dopplex®** Printa //* Package or *Reporter* Software Package.

FIGURE 3 PROCEDURE

- Lay patient supine and encourage relaxation.
- Connect *Printa //* Package or a computer to your bi-directional Doppler.
- Ensure ambient temperature is comfortable and pulse rate is stable.
- Commence examination at the common femoral.
- Apply gel.
- Hold ***Dopplex®*** probe between forefinger and thumb at a 45 degree angle and place over vessel.
- Check ***Dopplex®*** display for directional flow and record waveform.
- Proceed with next examination site.

FIGURE 4 LOCATING ARTERIES

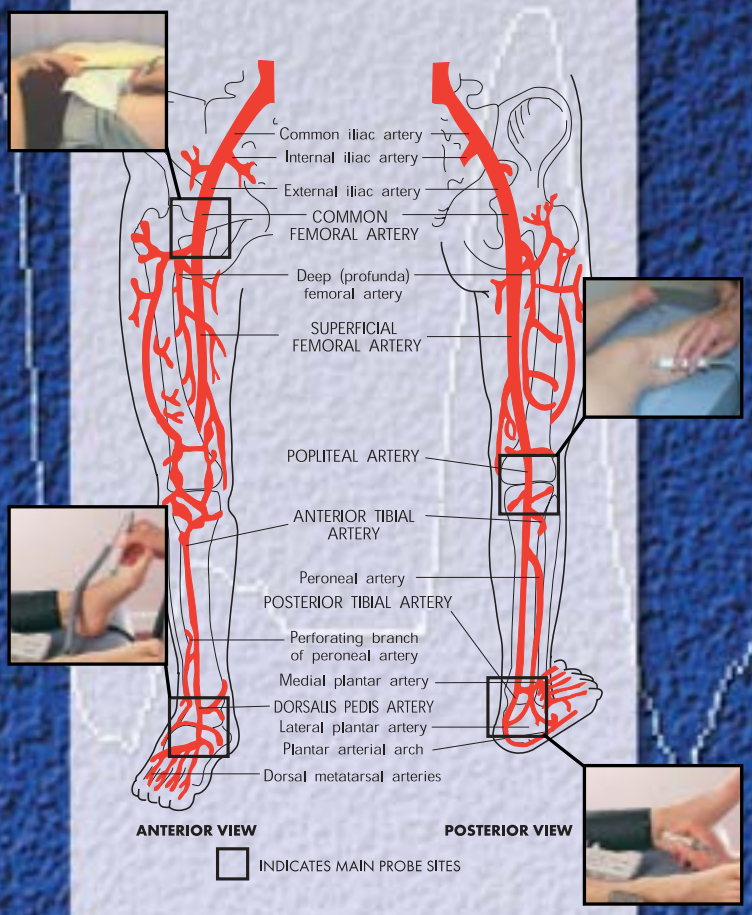


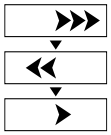
FIGURE 5 EXAMINATION

DOPPLEX DISPLAY

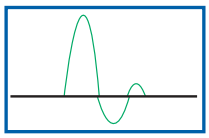
DOPPLEX WAVEFORM

NORMAL COMMON FEMORAL ARTERY

At the common femoral examination site in the lower limb, the ***Dopplex***® signal is typically tri-phasic. The initial systolic flow phase is followed by a reverse flow phase where blood actually travels backwards up the leg. This is usually followed by a third phase of forward flow before the next systole.

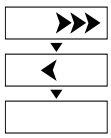
A: 

EXAMPLE OF NORMAL FLOW

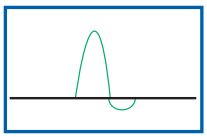


ABNORMAL COMMON FEMORAL ARTERY

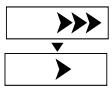
- Any proximal stenosis of the artery will produce a modification of the normal velocity waveform. With a stenosis present the reverse flow phase would be reduced and the third phase may disappear.

B: 

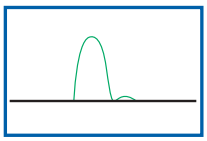
EXAMPLE OF PARTIAL STENOSIS



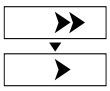
- The reverse flow phase disappears as the degree of proximal stenosis increases. With major stenosis or occlusion of the illiac arteries, the flow is in one direction only. (refer to diagram D)

C: 

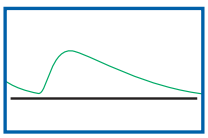
EXAMPLE OF SEVERE STENOSIS



- When a proximal occlusion and collateral circulation are present, the waveform shows a slow rise time in systole with continuous flow throughout the cardiac cycle. (see note in Fig. 6)

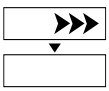
D: 

EXAMPLE OF OCCLUSION OF ILIAC ARTERIES

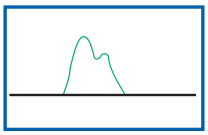


DISTAL SUPERFICIAL FEMORAL OCCLUSION

If a distal superficial femoral obstruction is present at the same time as B above, then a shoulder may appear on the downstroke of the systolic phase.If turbulence is present, then forward and reverse flow may occur at the same time.

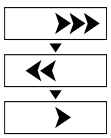
E: 

EXAMPLE OF DISTAL SUPERFICIAL FEMORAL OCCLUSION



NORMAL POPLITEAL AND TIBIAL ARTERIES

The waveform is similar to the common femoral artery but with decreased amplitude. The shape of the arterial waveform is sensitive to iliac, common femoral and superficial femoral arterial disease. As the size of the stenosis increases, the popliteal and tibial arteries may also lose the reverse flow phase. In cases of complete proximal occlusion and collateral circulation blood flow is mono-phasic and continuous over the cardiac cycle. (refer to diagrams B-D)

F: 

EXAMPLE OF NORMAL POPLITEAL AND TIBIAL ARTERY FLOW

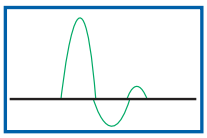


FIGURE 6 NOTES

Although the loss of reverse flow phase in the cardiac cycle is normally an indication of the severity of arterial disease, some patients will show no reverse flow due to recent exercise or high ambient temperature, producing vasodilated distal circulation.

This note is intended as a guide only. The above ***Dopplex***® displays are an indication only. The number of arrows actually displayed will vary according to the ***Dopplex***® gain setting and probe position. If in doubt contact your local vascular studies unit. If you have any questions regarding the products call Huntleigh Healthcare, Diagnostic Products Division.

References: Evans D.H., McDicken W.N. Skidmore R. and Woodcock J.P. Doppler Ultrasound: Physics, Instrumentation and Clinical Applications. John Wiley, Chichester, 1989, pp. 233-242

Our thanks go to Professor John P. Woodcock, Dept of Medical Physics, University Hospital of Wales, Cardiff, UK and Dr. Mo Aslam, Dept of Surgery. Hammersmith Hospital, London, UK

EDUCATIONAL MATERIAL AVAILABLE FROM HUNTLEIGH HEALTHCARE

- Library of Sounds Audio Cassette
- Assessment & Treatment of Leg Ulcers Video
- Vascular Investigations Video
- Assessment of the Diabetic Foot Video
- ABPI & TBPI guides.

APPLICATION NOTES AVAILABLE FROM HUNTLEIGH HEALTHCARE

NOTE 1 • Arterial Investigation Of The Lower Limb
NOTE 2 • Venous Investigation Of The Lower Limb Using Doppler
NOTE 3 • Venous Investigation Of The Lower Limb Using PPG
NOTE 4 • Screening For The Absence Of An Acute DVT Using PPG
NOTE 5 • Using A Hand Held Doppler To Assist With PICC Placement

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Vascular Assist with Doppler, PPG, PVR and BP.