Introduction to CW Doppler

Why are we even talking about CW Doppler?

•Duplex ultrasound has become the "gold standard" in the diagnosis of both deep venous thrombosis and venous insufficiency. Most diagnostic centres have replaced CWD and PPG with duplex ultrasound.

•It is still controversial whether CW Doppler examination alone is sufficient before undertaking treatment.

•Not very "specific" and may detect return signals from many vessels in the line of fire. Is it the SSV or Popliteal vein or the SPJ. It is this lack of specificity that has put CW Doppler out of favour

•There are two schools of thought with respect to the use of CW Doppler. Many feel there is no point if there is a Duplex scan handy. However an educated Phlebologist must have understanding of these tests and their physiologic background.

Is there a Role for CW Doppler?

•ABI index in patients with suspected arterial insufficiencies that also have features of CVD.

•Is very "sensitive" to weak signals such as small perforators in areas of poor responding telegiectasias or persisting pigmentation. These small sites of reflux are often missed with duplex scanning. Be assured that if you detect reflux with CW Doppler then you have almost 100% chance of confirming reflux.

• Considered to be the" Stethoscope of the Phlebologist and should be present at every venous examination which allows for coupling of the physical examination and physical investigation."

•CW Doppler is considered by many the minimum level of investigation before any treatment is initiated.

•Is an excellent screening tool.

CW Doppler

•Takes practice and is user dependant and can identify flow abnormalities such as reflux in the superficial veins and deep veins.

•Requires methodical and systematic approach

What are the Doppler principles?

•If a source is emitting sound waves, the frequency of reflected sound waves from an object in the path increases or decreases if the object is moving towards or away from the source respectively. This is the **Doppler Effect** (Austrian mathematician-Christian Andreas Doppler-1803-1863). The essence of the principle is when an object is moving

towards the observer each sound wave is reflected from a position a little closer than the one before, thus each wave comes back a little sooner than expected, and the frequency appears to be higher. When the object is moving away from the observer, each wave comes back a little later than it would if the object were not moving, so the frequency appears to be lower.

•The change in frequency can be measured and is the **Doppler shift**.

CW Doppler-important points.

• As one reduces the frequency of the transmitting probe so does the penetration into tissue increase. With CW Doppler there are two fixed frequency probes. 8-10MHz penetrates to about 2cm and 5MHz penetrates to about 5cm.

• The angle of incination of the probe is critical. The Doppler Effect detects movement only towards or away from the probe. If a probe is at right angles to the skin there will be no net doppler shift and no flow will be detected. A probe angle of between 30-45 degrees gives the most sensitive signal.

•Need gel as an interphase between the probe and skin to prevent signal loss.

Who do we use CWD on?

•All patients during the initial examination.As it has been shown that clinical examination alone misses underlying reflux in 40% of cases.

•And most patients at subsequent reviews.

Where on the Lower Limb do we use CWD?

•I focus on the most common sites of superficial reflux

•Sapheno-femoral junction and great saphenous vein in the thigh.

•Sapheno-popliteal junction and small saphenous vein in the calf.

•Perforator sites.

•Small incompetent veins.

CWD and deep system.

•The CWD was first introduced by Strandness and Baker in 1960's. It was applied to the diagnosis of DVT and later deep vein insufficiency.

•Examination is performed with patient supine and slightly leg down.

•Again the commonest sites of deep vein reflux are examined.

•I say this is a complete waste of time.

Refined uses described in textbooks.

·Some textbooks describe at length refined uses of CW Doppler interpretation by using tourniquets and augmentation above and below perforators.
·This is a complete waste of time. Many texts are written without any benefit to practical or realistic running of a day to day practice.
·If you detect reflux you have reflux. You then have a reasonable idea where the reflux is located and hence allows for a more focused examination usually with duplex scanning.
·Why?
·Limitations in anatomy with CW Doppler. You have detected reflux with the Doppler shift. Is it coming from AAV or GSV or Femoral vein? We don't know and thus require duplex scanning to define the site of reflux.

NOTES:

NOTES: