

Underwater investigation of leg veins morphology and hemodynamics

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No study by duplex ultrasound (DU) has evaluated the effects of Hydrostatic Compression HC on venous morphology and hemodynamics. The aim of this pilot, proof-of-concept study was to assess the technical feasibility of DU in evaluating venous morphology and hemodynamics in subjects standing in a water pool.

Vein morphology and flow were initially evaluated in standing position out of the pool and the sites of venous measurements were marked by a water-proof marker. The measurements were repeated after immersion into the pool, water level 120 cm.

The DU allows an excellent underwater evaluation of both the superficial and deep veins morphology and hemodynamics. Under the water, the subcutaneous tissue appears more echogenic. The HC significantly reduced the diameter of the deep (femoral vein: $P = .004$; popliteal: $P = .008$;) and superficial veins (GSV: $P = .045$ at the thigh but not $P = .012$ at the ankle). In legs with varicose Valsalva and compression/release manuevres showed a significant reduction of blood reflux during immersion.

This study has clearly demonstrated the feasibility of underwater DU evaluation of venous morphology and flow. The HC significantly reduces venous diameters in normal and varicose veins and reflux when present. The present findings are the basis for future studies on the effects of HC on venous morphology and blood return, in healthy and pathologic conditions.