Vector Volume Flow in Arteriovenous Fistulas

The majority of patients with end stage renal disease are in hemodialysis, and therefore dependent on a well functioning vascular access. The arteriovenous fistula is the recommended access and in order to maintain and keep the fistula patent, regular monitoring of the function is necessary. The Ultrasound Dilution Technique is the reference method for volume flow measurement, but it only works in conjunction with the dialysis machine, and use is therefore restricted to dialysis sessions. Volume flow measurement with conventional Doppler ultrasound provides a non invasive, highly accessible solution, but is very challenging due to the angle dependency of the Doppler technique and the anatomy of the fistula. The angle independent vector ultrasound technique Transverse Oscillation provides a new and more intuitive way to measure volume flow in an arteriovenous fistula. In this paper the Transverse Oscillation has been used to measure volume flow directly on four patients’ arteriovenous fistulas, and the measurements were compared to subsequent measurements with the Ultrasound Dilution Technique. The results obtained with the Transverse Oscillation deviate -35.1 – 14.9 % from the reference method, and indicates potential for the method.

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