DETERMINING ARTERIAL BLOOD VELOCITY USING MAUI SOFTWARE FROM RECORDED DOPPLER ULTRASOUND VIDEOS

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Objectives: The purpose of this study was to investigate the repeatability and reproducibility of a new software, developed to provide measurements of arterial blood velocity from recorded Doppler ultrasound videos.

Methods: The "Measurements from Arterial Ultrasound Imaging" (MAUI) software (Hedgehog Medical Inc.), developed for the measurement of arterial dimensions, has been expanded to measure the blood velocity from ultrasound videos. MAUI uses an adaptive based segmentation and intelligent outlier removal image analysis method to determine the instantaneous peak velocity in the positive and negative directions and the intensity weighted mean of the signal. Three recorded videos of popliteal arterial velocity were used to evaluate the reproducibility and repeatability of MAUI. For this assessment, two investigators (E1 and E2) each performed 10 measurements of the three test videos using MAUI.

Results: MAUI provided blood velocity measurements (cm/s) for each frame of each video. The ten measurements made by E1 and E2 were averaged and are listed below (mean ± SD).

Video #	Velocity Measure	E1	E2
1	Positive Envelope	27.84 ± 0.15	27.31 ± 0.28
	Negative Envelope	-13.99 ± 0.28	-13.68 ± 0.19
	Mean Signal	13.80 ± 0.24	13.81 ± 0.10
2	Positive Envelope	42.30 ± 0.13	42.34 ± 0.33
	Negative Envelope	-11.51 ± 0.28	-11.53 ± 0.24
	Mean Signal	29.69 ± 0.02	29.08 ± 0.36
3	Positive Envelope	53.48 ± 0.11	53.54 ± 0.20
	Negative Envelope	-13.66 ± 0.10	-13.40 ± 0.21
	Mean Signal	38.60 ± 0.12	38.47 ± 0.17

Conclusion: Preliminary assessments suggest that MAUI is a viable method for the measurement of blood velocity from recorded Doppler ultrasound video with high repeatability and low interrater variability. In future, measurements of velocity may be combined with existing continuous measurements of arterial diameter for the calculation of blood flow and assessments of vascular health and disease.