Unwrapping the Truth: Did Your Compression Dressing Make Things Worse

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Introduction

Venous leg ulcers (VLUs) pose a significant challenge in patients with peripheral arterial disease (PAD), often requiring individualized treatment plans. The standard of care involves compression therapy, but its safety and efficacy depend on accurate vascular assessment. This study aims to compare the effectiveness of pre and post volume plethysmography* with ABI/TBI and PVR in guiding compression therapy for PAD with VLUs.

Methods

A cohort of diabetic patients with VLUs underwent mobile comprehensive vascular assessments, including pre volume plethysmography*, ABI/TBI, and PVR. Pre-compression arterial blood flow studies were conducted with patients in a supine or elevated leg position. Standardized care dressings were applied, followed by the application of 3-layer compression wraps. Post-compression arterial volume plethysmography* and TBI measurements were taken, and the results were compared with the pre compression ABI/TBI and PVR findings. (Arterial Duplex Ultrasound was used to validate results)

References

1. Nelson EA, Adderley U. Venous leg ulcers. BMJ Clin Evid. 2016 Jan 15;2016:1902. PMID: 26771825; PMCID: PMC4714578.
2. Schaefer,M (2016) NonInvasive Detection of Vascular Disease in the Arteries of the Lower Extremity; Clinical Evaluation of QuantaFlo® Compared to Doppler and Definitive Imaging.

*QuantaFlo®, Semler Scientific, Inc., Santa Clara, CA.

Patient 1

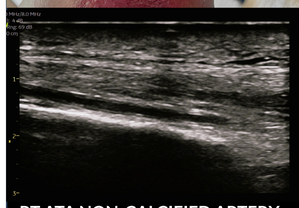
84 YEAR OLD MALE

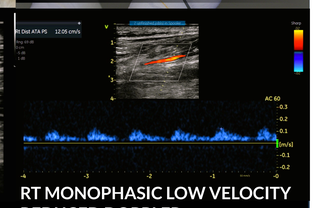
	RIGHT	LEFT	
ABI	0.84	0.86	
PRE TBI	N/A	0.48	
POST TBI	N/A	0.50	
PRE PLETHYSMOGRAPHY	0.21	0.99	
POST PLETHYSMOGRAPHY	0.14	0.23	50% COMPRESSION
POST PLETHYSMOGRAPHY	0.30	0.48	25% COMPRESSION


RT LEG ULCER


POST PLETHYSMOGRAPHY 1


POST PLETHYSMOGRAPHY 2


RT ATA NON-CALCIFIED ARTERY

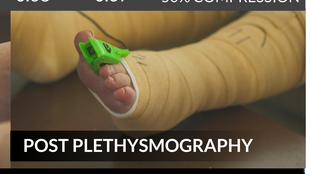

RT MONOPHASIC LOW VELOCITY REDUCED DOPPLER

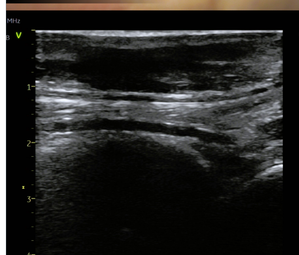
Patient 3

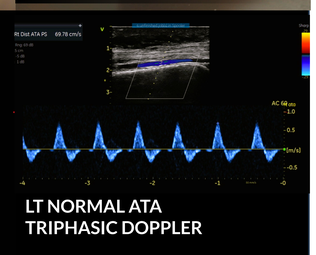
79 YEAR OLD FEMALE

	RIGHT	LEFT	
ABI	1.00	1.13	
PRE TBI	0.24	0.40	
POST TBI	0.34	0.47	
PRE PLETHYSMOGRAPHY	0.99	0.76	
POST PLETHYSMOGRAPHY	0.68	0.67	50% COMPRESSION


LT LEG ULCER


POST PLETHYSMOGRAPHY


LT NORMAL ATA ARTERY NO CALCIFICATIONS


LT NORMAL ATA TRIPHASIC DOPPLER

Patient 2

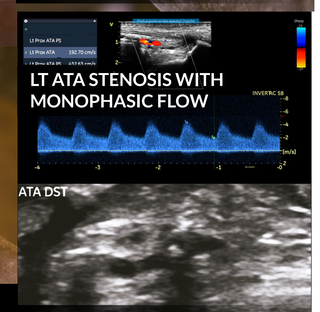
62 YEAR OLD MALE

	RIGHT	LEFT	
ABI	0.77	0.85	
PRE TBI	0.26	0.34	
POST TBI	0.18	0.39	
PRE PLETHYSMOGRAPHY	0.25	0.34	
POST PLETHYSMOGRAPHY	0.39	0.44	50% COMPRESSION


BL LEG ULCER


LT FOOT PARTIAL 2ND MET AMP
LT FOOT HALLUX AMP


PRE PLETHYSMOGRAPHY


LT ATA STENOSIS WITH MONOPHASIC FLOW

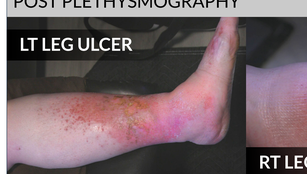
ATA DST


LT ATA VESSEL CALCIFICATION WITH ACOUSTIC SHADOW

Patient 4

67 YEAR OLD MALE

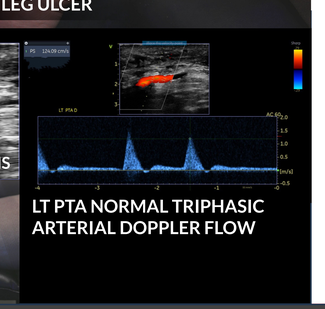
	RIGHT	LEFT	
ABI	0.95	1.07	
PRE TBI	0.48	0.32	
POST TBI	0.53	0.42	
PRE PLETHYSMOGRAPHY	0.54	0.84	
POST PLETHYSMOGRAPHY	0.81	0.95	50% COMPRESSION


LT LEG ULCER


RT LEG ULCER


LT PTA NO VESSEL CALCIFICATIONS

POST PLETHYSMOGRAPHY


LT PTA NORMAL TRIPHASIC ARTERIAL DOPPLER FLOW

Results

Early findings challenged the assumption that ABI/TBI and PVR alone are sufficient indicators for safe compression therapy. The introduction of pre and post volume plethysmography revealed alterations in arterial perfusion in diabetic patients with varying classifications of peripheral arterial disease (PAD). In some cases, compression therapy worsened arterial perfusion, highlighting the need for a more nuanced approach.

Discussion

This study underscores the importance of precise vascular assessment in diabetic patients with VLUs. While ABI/TBI and PVR remain standard, the inclusion of pre and post volume plethysmography* provides a more comprehensive understanding of arterial perfusion dynamics. This nuanced approach allows clinicians to identify patients at risk of worsening arterial perfusion under compression therapy. Further research is underway to refine guidelines for post-compression evaluation, ensuring safe and effective compression therapy in this challenging patient population.