OnPulse™: A Potential Management for Venous Thromboembolism

H. **Jawad**[1] - DS. **Bain**[1] - H. **Dawson**[2] - K. **Adams**[2] - A. **Johnston**[1] - A. T. **Tucker**[1,2]

Email: a.t.tucker@qmul.ac.uk

1Clinical Pharmacology, William Harvey Research Institute, Barts and The London School of Medicine and Dentistry, Charterhouse Square, London EC1M 6BQ; 2The Ernest Cooke Vascular & Microvascular Unit St Bartholomew's Hospital, Barts and The London NHS Trust, London EC1A 7BE

Barts and The London NHS Trust

Barts and The London Queen Mary's School of Medicine and Dentistry

William Harvey Research Institute

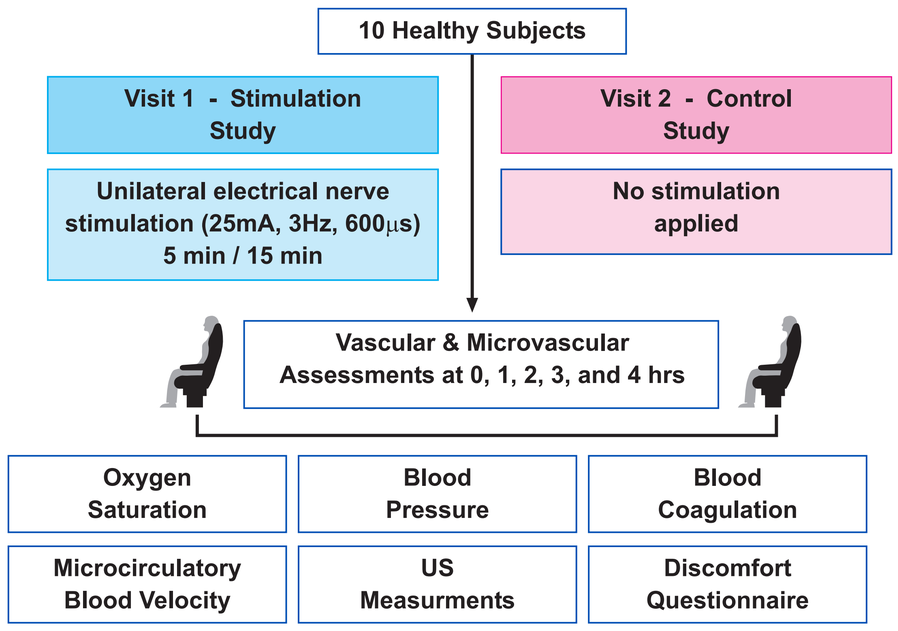
Introduction

Venous thromembolism (VTE) is a preventable complication that causes morbidity and mortality not only in hospitalised patients, but also healthy individuals. Pharmacological and mechanical methods are the most commonly used, however they are associated with inconsistent use and adverse events [1]. OnPulse™ is a novel technique developed, that activates venous muscle pumps in the calf, via transcutaneous electrical nerve stimulation to the common peroneal nerve located in the popliteal fossa. [2, 3]

Aims

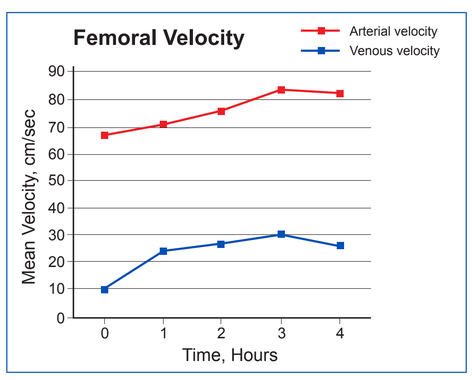
The study investigates the efficacy and tolerability of this novel technology (OnPulse™) in enhancing lower limb circulatory dynamics. It also explores its potential for preventing DVT and other vascular disorders.

Methodology

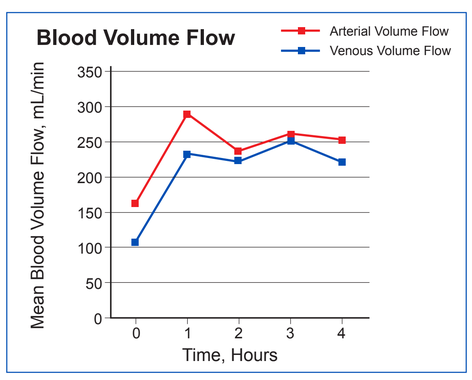


Results

I. US Measurements

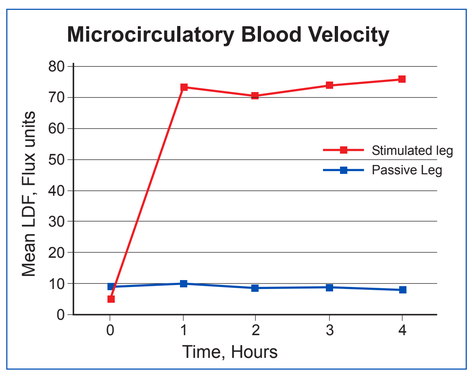


Highly significant increase following stimulation as compared to baseline, ($p \leq 0.001$)



Significant increase following stimulation as compared to baseline;
Arterial ($p \leq 0.05$), Venous ($p \leq 0.001$)

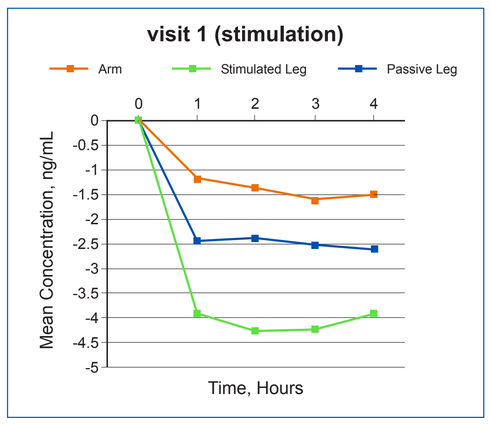
II. Laser Doppler Flowmetry



Significant increase ($p \leq 0.001$) in stimulated leg by ~ 73 flux units

Results continued

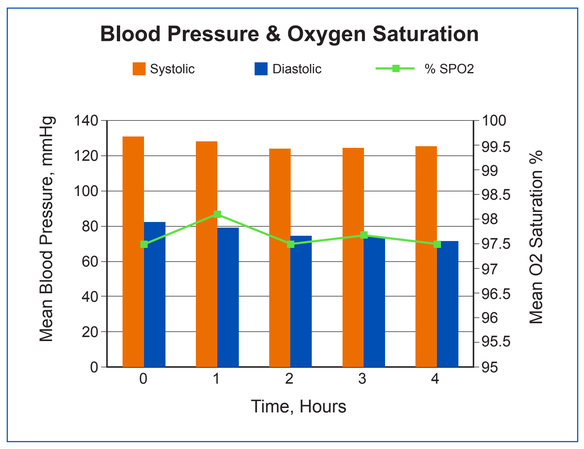
III. Blood Coagulation



Highly significant reduction ($p \leq 0.001$) in mean tPA Ag concentration in the arm and stimulated leg

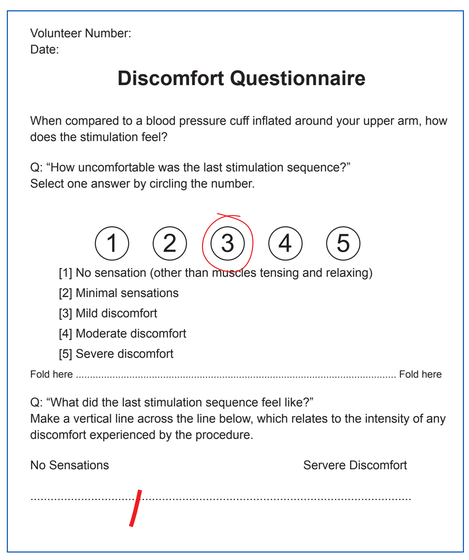
Highly significant reduction ($p \leq 0.001$) in mean tPA Ag concentration in left leg only

IV. BP and Oxygen Saturation



Highly significant reduction in blood pressure ($p \leq 0.001$) with stable tissue oxygen saturation throughout the study

V. Discomfort Questionnaire



Volunteer Number:
Date:

Discomfort Questionnaire

When compared to a blood pressure cuff inflated around your upper arm, how does the stimulation feel?

Q: "How uncomfortable was the last stimulation sequence?"
Select one answer by circling the number.

1 2 3 4 5

[1] No sensation (other than muscles tensing and relaxing)
[2] Minimal sensations
[3] Mild discomfort
[4] Moderate discomfort
[5] Severe discomfort

Fold here ..... Fold here

Q: "What did the last stimulation sequence feel like?"
Make a vertical line across the line below, which relates to the intensity of any discomfort experienced by the procedure.

No Sensations Servere Discomfort

Minimal Discomfort was reported following stimulation using Visual Analogue and Verbal Rating Scores

Conclusion

OnPulse™ is significantly effective in increasing lower limb blood perfusion. The enhancement of venous return, together with arterial and microcirculatory blood velocity observed may be of importance in the management of heart failure. The significant decrease in tissue plasminogen activator antigen concentrations may suggest increased systemic fibrinolysis. OnPulse™ is also well tolerated and therefore might be of beneficial use in and out of hospital settings.

References

[1] Treasure, T., et al., Venous Thromboembolism: Reducing The Risk, N.C.C.o.A. Care, Editor 2009.

[2] Tucker, A., et al., Augmentation of venous, arterial and microvascular blood supply in the leg by isometric neuromuscular stimulation via the peroneal nerve. Int Angiol, 2010. 19(1): p. e31-37.

[3] Jawad, H., et al., The effect of OnPulse In Improving Lower Limb Blood Flow In Healthy Volunteers, 2011: Prakt.Flebol. p. 41.

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OnPulse™ TECHNOLOGY

CPG111180_02_73