A Novel Stocking to Improve Venous Return Compared to the Class 1 Compression Stocking

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Introduction/Purpose: Venous thromboembolism (VTE) is a serious risk of major orthopaedic surgery, associated with significant morbidity and mortality. VTE events are annually costing the US healthcare system over $13.5 billion and causing approximately 200,000 deaths each year. In current clinical practice, the risk of VTE events are reduced with various pharmacological and mechanical thromboprophylactic measures. Class 1 compression stockings are frequently used as mechanical prophylaxis due to few associated complications. The purpose of this study was to determine if the addition of a novel device to the conventional compression stockings improved venous return.

Methods: This prospective study measured ejected venous volume (EVV) of the superficial femoral vein in both legs of healthy volunteers (n=10). The novel device wraps around the heel and holds the meta-tarsophalangeal joint of the great toe flexed, encouraging active toe dorsiflexion and partial ankle dorsiflexion. EVV was obtained using duplex scanning, and measured 1) when participants were supine at rest 2) with the addition of the compression stocking and 3) with the novel device in addition to the compression stocking.

Results: The use of compression stockings compared to the baseline did not demonstrate a difference in EVV (6.13±0.43 ml vs 6.02±0.32 ml, p=1.000). However, the addition of the novel device significantly increased EVV compared to the baseline (6.13±0.43 ml vs 12.16±1.20 ml, $p < 0.001$) and more importantly compared to the compression stockings alone (6.02±0.32ml vs 12.16±1.20ml, $p < 0.001$). The novel device therefore augmented the EVV, two times greater than the compression stocking used as monotherapy.

Conclusion: We have demonstrated that the addition of the novel device significantly improves venous return, compared to the compression stocking used as a monotherapy. DVT outcome studies assessing efficacy of this novel device in the clinical setting are now required. Nevertheless, these preliminary results demonstrate excellent potential in the next generation of VTE prophylaxis.

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