

Effects of electrical nerve stimulation on force generation, oxygenation and blood volume in muscles of the immobilized human leg

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Abstract

Background

Transcutaneous electrical stimulation of the common peroneal nerve may be an additional clinical tool for enhancing venous return by active and passive mechanisms of muscle action in the immobilized leg

Purposes

Transcutaneous electrical stimulation of the common peroneal nerve may be an additional clinical tool for enhancing venous return by active and passive mechanisms of muscle action in the immobilized leg.

Methods

A novel electrical stimulator was applied to 28 legs of 14 healthy subjects. The force during isometric ankle joint dorsiflexion and myoelectric responses produced by stimulation-induced leg muscle contractions were investigated. Muscle oxygen saturation, blood volume and deoxygenated haemoglobin in the tibialis anterior and medial gastrocnemius muscles were measured by near-infrared spectroscopy during venous stasis (40 mmHg thigh tourniquet), with or without electrical stimulation

Conclusion

Nerve stimulation with a newly developed device partly counteracts increases in muscle blood volume and deoxygenated hemoglobin of the resting leg during venous stasis.

Clinical Relevance

The device stimulates active and passive mechanisms of leg muscle action that seems to enhance venous return in patients with impaired function.