



Relation between abnormal patterns of muscle activation and response to common peroneal nerve stimulation in hemiplegia

J H Burridge and D L McLellan

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Abstract

Objective—To investigate the relation between response to common peroneal nerve stimulation, timed to the swing phase of walking, and abnormal ankle movement and muscle activation patterns.

Method—Eighteen patients who took part had a drop foot and had had a stroke at least 6 months before the study. Twelve age matched normal subjects were also studied. Response to stimulation was measured by changes in the speed and effort of walking when the stimulator was used. Speed was measured over 10 m and effort by the physiological cost index. Abnormal ankle movement and muscle activation were measured in a rig by ability to follow a tracking signal moving sinusoidally at either 1 or 2 Hz, resistance to passive movement, and EMG activity during both passive and active movements. Indices were derived to define EMG response to passive stretch, coactivation, and ability to activate muscles appropriately during active movement.

Results—Different mechanisms underlying the drop foot were seen. Results showed that patients who had poor control of ankle movement and spasticity, demonstrated by stretch reflex and coactivation, were more likely to respond well to stimulation. Those with mechanical resistance to passive movement and with normal muscle activation responded less well. **Conclusions**—The results support the hypothesis that stimulation of the common peroneal nerve to elicit a contraction of the anterior tibial muscles also inhibits the antagonist calf muscles. The technique used may be useful in directing physiotherapy by indicating the underlying cause of the drop foot.