Prophylactically Enhanced Muscle Reflex Characteristics During Dynamic Ankle Perturbation

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The ability of prophylactic stabilization to minimize the stresses placed on the ligaments of the ankle has long been a topic of investigation. Traditional designs have employed static perturbation models to measure the effects of ankle taping or bracing. This study employed an innovative device designed to evoke a dynamic inversion perturbation at the ankle during functional activity.
PURPOSE: To determine the impact of selected ankle prophylaxes on measures of peroneus longus (PL) and tibialis anterior (TA) muscle reflex characteristics during a continuous lateral jump task. **METHODS**: 41 physically active, college-aged volunteers (21males, 20 females) with no history of dominant lower extremity injury participated in this study. Surface EMG of the PL and TA of the dominant lower extremity was used to measure reflex latency and time to peak amplitude under four treatment conditions (McDavid™ 195 lace-up brace, Aircast® Air-Sport™ semi-rigid brace, standard closed basketweave ankle tape, no support control) in response to a dynamic inversion perturbation. Comparisons between PL and TA muscle activity were also performed to determine differences between the two as a function of brace condition. **RESULTS**: The lace-up and semi rigid braces generated shorter reflex latencies in the PL when compared to the no brace ($p=0.004$, $p<0.001$) control. In addition, the semi-rigid brace was shown to produce shorter reflex latencies than the tape ($p<0.001$). In the TA, the lace-up brace demonstrated shorter reflex latencies than the no brace ($p<0.008$) condition. For time to peak amplitude, the lace-up and semi rigid braces generated shorter time to peak amplitude in the TA when compared to the no brace ($p<0.007$, $p= 0.001$) control. The semi-rigid brace was also shown to produce shorter time to peak amplitude than the tape ($p<0.001$) condition. No significant differences were observed between the PL and TA for either reflex latency or time to peak amplitude ($p>0.05$). **CONCLUSIONS**: The dynamic task carried out in this study better replicates the conditions which precipitate ankle injury when compared to traditional static models. The results indicate the application of lace-up and semi-rigid braces appear to be most effective in influencing measures of muscle activity in healthy ankles and may be beneficial in heightening the sensitivity of the dynamic restraint mechanism of selected lower leg muscles by minimizing the effects of a rapid and unexpected inversion mechanism. The implications for these findings are of particular interest to the clinician when recommending the type of support to use during sport activity and also when faced with budgetary challenges.