Quantifying Gait Differences and Muscle Activation Between Conventional Footplates and Neurological Footplates in Subjects with Spastic Paralysis

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The purpose of this study is to investigate gait characteristics and Soleus muscle activity with the use of a neurological footplate over standard footplate ankle foot orthoses (AFO) in a 43-year-old female subject with spastic paralysis. A single subject, single session design with multiple trials was carried out to compare gait characteristics and EMG Soleus muscle activation over six different testing configurations 1) shoes only (baseline), 2) Solid AFO, standard footplate 3) Solid AFO, neurological footplate 4) Articulated AFO, standard footplate 5) Articulated AFO, neurological footplate 6) shoes only. The subject ambulated over a GAITRite walkway providing gait characteristics while muscle activity in the Soleus was recorded using a Bagnoli 2-Channel Electromyelograph capture system. The results obtained demonstrated that the inclusion of an AFO (regardless of footplate design) significantly effects Soleus activity ($p < 0.001$), walking velocity ($p = 0.005$), step time differential ($p = 0.003$) and step length differential ($p = 0.003$). No significant effect was present in Soleus activity or gait characteristics between the six conditions. This investigation ultimately suggests that a neurological footplate has no significant neurophysiologic effect.