AN INVESTIGATION OF THE ACTIVATION OF THE SUBDIVISIONS OF GLUTEUS MEDIUS DURING ISOMETRIC HIP CONTRACTIONS

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INTRODUCTION: Gluteus medius is involved in movement and stability of the hip and gluteus medius dysfunction is commonly implicated in many lower limb pathologies (Fredericson et al 2000). It is proposed that functional subdivisions exist within the gluteus medius muscle (Conneely and O'Sullivan 2008). There is however a lack of empirical evidence examining the role of the subdivisions of gluteus medius. This study compared the muscle activation of these subdivisions (anterior, middle and posterior) during isometric contractions of hip abduction, internal and external rotation in normal subjects.

METHODS: A single-test design was undertaken. Standardised electrode locations were determined in advance. Three surface electromyography (sEMG) electrodes were placed on each subject (n=15) to record muscle activity of each muscle subdivision. Subjects performed three maximal voluntary isometric contractions for hip abduction, internal and external rotation on the Biodex System 3 Isokinetic Dynamometer with simultaneous recording of sEMG activity of the subdivisions of gluteus medius (Motion Lab System multi-channel EMG system). The average root mean square of the sEMG was calculated. Data was analysed using a one-way ANOVA for muscle segment, with repeated measures on isometric contraction direction (post-hoc Bonferroni).

RESULTS: There was a significant main effect for subdivision ($p<0.001$) and isometric contraction direction ($p<0.001$), and a significant interaction between subdivision and direction ($p<0.005$). The anterior gluteus medius had a significantly greater activation across all three isometric contractions than the middle and posterior gluteus medius (both $p<0.001$). Furthermore, there was a significantly greater activation of all three functional subdivisions during abduction and internal rotation when compared to external rotation (both $p<0.001$).

DISCUSSION: The results suggest that gluteus medius is more active during abduction and internal rotation than in external rotation, in line with previous research (Earl 2004). The results support the hypothesis that muscle activation is not homogenous throughout the entire gluteus medius muscle and that functional subdivisions exist within the muscle.

CONCLUSION: Functional subdivisions exist within the gluteus medius muscle. Muscle activation is effected by both subdivision and isometric contraction direction with the greatest activation found in the anterior gluteus medius subdivision, and during abduction and internal rotation. Future studies should examine the role of the functional subdivisions in subjects with lower limb pathologies.

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