TACSM Abstract

Intermuscular EMG Coherence between Shoulder Muscles during Fatigue in Older Adults with and without Rotator Cuff Disease

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ABSTRACT

The risk of degenerative rotator cuff disease (RCD) increases with age, partly due to changes in neuromuscular control, especially during fatiguing contractions. Intermuscular electromyographic (EMG) coherence, reflecting shared neural inputs between motor neuron pools, is essential for maintaining shoulder joint stability. **PURPOSE**: To determine differences in EMG coherence within the rotator cuff muscles, and between the rotator cuff and deltoid muscles, during sustained isometric fatiguing contractions in older adults with and without RCD. **METHODS**: Thirteen older adults with RCD (68 ± 8 yrs) and 20 without RCD (69 ± 8yrs) participated. Intramuscular EMG was recorded from the supraspinatus (SS)， and surface EMG was recorded from the infraspinatus (IS) and middle deltoid (MD). Participants performed an isometric fatiguing contraction at 30° scaption at 25% maximal voluntary contraction until endurance limit. Endurance time was divided into 2 phases: initial (first 30 seconds) and final (last 30 seconds). Z-transformed pooled coherence of each muscle pair (SS-IS, SS-MD, and IS-MD) in the delta (2–5 Hz) and beta (15–35 Hz) bands in each phase were compared with a two-way repeated-measures ANOVA with Bonferroni post-hoc analysis. **RESULTS**: For SS-IS, there was a significant main effect of group for both the delta (p=0.03) and beta (p<0.001) bands, with the asymptomatic group showing greater SS-IS coherence than the symptomatic group in both phases. Both groups increased SS-IS coherence with fatigue in both bands. For SS-MD, there was also a significant main effect of group for both the delta (p=0.04) and beta (p<0.001) bands, with the asymptomatic group displaying lower SS-MD coherence than the symptomatic group during both phases. Significant main effects of time were also found for both the delta (p=0.006) and beta (p<0.001) bands, with the SS-MD coherence of both groups decreasing with fatigue. **CONCLUSION**: In both two groups, SS-IS coherence increased, but SS-MD coherence decreased with fatigue in both delta and beta bands. Compared to the asymptomatic group, the symptomatic group exhibited lower SS-IS coherence, but greater SS-MD coherence in both bands during fatigue. This could be a potential risk factor that contributes to humeral head instability in RCD.