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Comparison of pre- and post-operative shoulder muscle EMG profiles in reverse total shoulder arthroplasty patients

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Title: Comparison of pre- and post-operative shoulder muscle EMG profiles in reverse total shoulder arthroplasty patients

Background: To date, there have been no randomized control trials to evaluate a patient's need for surgical vs non-surgical conservative treatment of rotator cuff (RC) deficiencies. Additionally, few tests exist to evaluate specific muscle metrics pre and post operatively. Electromyographic (EMG) data collection is minimally invasive and allows for observation of motions with multifaceted analysis of movement with little patient demand. Understanding the change in muscle activation in patients before and after reverse total shoulder arthroplasty (RTSA) can further advance the procedure and rehabilitation.

Methods: Ten individuals were recruited for this study: all patients underwent RTSA by the same surgeon. Participants executed shoulder abduction, forward flexion in the sagittal plane, internal and external rotation at slow, medium and fast speeds as well as static maximum contraction of these motions against force at each EMG testing session. EMG activation of the anterior, middle and posterior aspects of the deltoid, upper and middle trapezius, supraspinatus, infraspinatus, teres major and teres minor was recorded on the surgical shoulder preoperatively, and 6 weeks, 3 months and 6 months postoperatively. Delsys EMG acquisition software linked to Bluetooth sensors captured shoulder motion.

Results: Analysis pending- will be fully available at the symposium. Preliminary data show an overall increase in concentric muscle activity (RMS) and frequency (PSD) in action-specific muscles pre to post-operatively, and at each consecutive post-operative testing. Furthermore, we saw increased frequency of firing with decreased muscle activation time for a given movement when comparing pre to post operative and early to later post operative EMG profiles. We continue to compare the predominate muscles activated for each movement between pre and post-operative groups to assess muscle compensation for the altered shoulder mechanics associated with the RTSA procedure.

Conclusion: Post-RTSA patients showed increased concentric muscle activity and muscle fiber frequency when compared with pre-RTSA patients. Increased frequency of muscle firing with a shorter muscle activation time suggest increased efficiency in post-operative patients.