

## ASSET 2013: ANNUAL CONFERENCE

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**Title:** The Mechanisms of Posterior Shoulder Tightness and Effectiveness of Manual Therapy

**Background:** Posterior shoulder tightness (PST) has been associated with increased injury risk among baseball players. There is a current lack of consensus regarding the specific tissues responsible for these deficits in range of motion (ROM).

**Study Design:** Randomized Controlled Trial, Level of Evidence, 1.

**Methods:** 60 asymptomatic baseball players ( $19 \pm 2$  years) with PST (defined as dominant total arc of motion and/or horizontal adduction deficit  $\geq 15^\circ$ ) were enrolled, receiving a single treatment of posterior shoulder stretching and instrumented soft-tissue mobilizations ( $n = 30$ ), or stretching alone ( $n = 30$ ). Shoulder ROM, instrumented glenohumeral joint translation, humeral torsion, and rotator cuff stiffness were examined before and after the intervention. A 3-way analysis of variance (group x side x time) was used to determine the treatment effects of each dependent variable. Bivariate Pearson correlation coefficients ( $r$ ) were used to determine the relationships between ROM deficits and mechanisms.

**Results:** Rotator cuff stiffness decreased with manual therapy ( $F_{(1,59)} = 3.90$ ,  $P = .050$ ) and was related to deficits reductions of IR ( $r = .35$ ,  $P = .034$ ) and HA ( $r = .44$ ,  $P = .008$ ). No treatment effects were observed for A/P translation or humeral torsion between groups or over time ( $P > .05$ ). Players receiving ISTM plus stretching displayed additional increases in total arc of motion ( $+5^\circ \pm 2^\circ$ ,  $P = .010$ ), internal rotation ( $+6^\circ \pm 2^\circ$ ,  $P = .010$ ), and horizontal adduction ( $+7^\circ \pm 2^\circ$ ,  $P = .004$ ) when compared to stretching only.

**Conclusion:** Of the three local mechanisms of PST assessed in this study 1) bony morphology, 2) capsuloligamentous stability, and 3) musculotendinous stiffness; posterior rotator cuff stiffness was the only tissue to respond concurrently with deficit reductions.

**Clinical Relevance:** Soft-tissue interventions applied to the posterior shoulder may provide added benefits to self-stretching by reducing muscle stiffness and ROM deficits of PST. Future studies should examine the long-term effects of these treatments over multiple days and throughout the course of a competitive season.

**What is known about the subjects:** Recent evidence shows that baseball players with dominant-sided deficits in shoulder range of motion are at an increased risk of injury. However, there is no current evidence to guide clinicians for treating the known tissue(s) responsible for these deficits.

**What this study adds to existing knowledge:** This is the first study to consider each of the mechanical contributions to posterior shoulder tightness (bony morphology, capsuloligamentous stability, and rotator cuff stiffness) and demonstrates that instrumented manual therapy in conjunction with shoulder stretching significantly improves ROM deficits and rotator cuff stiffness in baseball players displaying PST.