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## Shoulder Update, Part II

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As a continuation of last month's focus on new shoulder research, here are more interesting articles on the shoulder. Consider the following questions:

- What are the best exercises for rehabilitation of the serratus anterior?
  - What effect does scapular protraction have on the stability of the shoulder?
  - What is the value of weighted views in treatment decisions regarding AC separations?
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**Decker MJ, Hintermeister RA, Faber KJ, Hawkins RJ. Serratus Anterior Muscle Activity During Selected Rehabilitation Exercises. *Am J Sports Med* 1999;27:784-791.**

This study determined surface electromyographic (EMG) activity in 20 healthy subjects performing the following exercises:

Shoulder extension - elastic tubing is used. The subject stands with the elbow flexed 90 degrees and starts at waist height (tubing in front of body). The subject extends their shoulder while flexing the elbow and then returns to start position.

● **Forward punch** - using elastic tubing, the subject stands with tubing behind. Then, with starting position at side and elbow flexed 90 degrees, the subject punches forward, flexing shoulder to shoulder height and extending elbow.

● **Serratus anterior punch** - uses elastic tubing attached behind subject. With the shoulder at shoulder height and the elbow extended, the subject starts with the humerus internally rotated 45 degrees and scapula retracted. The subject then protracts the scapula, moving the fist forward, then retracts to the starting position.

- **Dynamic hug** - elastic tubing is attached behind the subject. The subject stands with elbows flexed 45 degrees, arms abducted to 60 degrees and shoulders internally rotated to 45 degrees. The subject then horizontally flexes following an imaginary arc until the hands touch, then returns to starting position.
- **Scaption with external rotation** - performed with a small dumbbell. The subject is standing and lifts the shoulder in the scapular plane to shoulder height with shoulder externally rotated (thumbs up).
- **Press-up** - the subject is seated with hands on chair at level of buttocks, then extends elbows to lift the body off the chair and holds for three seconds.
- **Push-up plus** - the prone subject performs a standard push-up with hands shoulder-width apart, then protracts the scapula to rise higher vertically.
- **Knee push-up plus** - same as push-up; however, the patient is supported by the knees.

The serratus anterior punch, scaption with external rotation, dynamic hug, knee push-up plus and push-up plus exercises demonstrated muscle activity greater than 20% of a maximal voluntary contraction. The greatest activity was demonstrated for the push-up plus and the dynamic hug. Both accentuated scapular protraction while maintaining an upwardly rotated scapula.

The advantage of these exercises is that they are all performed at or below 90 degrees of abduction, avoiding potentially painful or damaging higher elevations. These exercises were ranked primarily by average amplitude. They represent low resistance and high repetitions, emphasizing an endurance training approach. The serratus anterior is also maximally stimulated at all higher ranges of elevation, including abduction, scaption and flexion. However, these higher positions may be unattainable or dangerous with an injured or painful shoulder.

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**Weiser WM, Lee TQ, McMaster WC, McMahon PJ. Effects of Simulated Scapular Protraction on Anterior Glenohumeral Stability. *Am J Sports Med* 1999;27:801-805.**

Using cadavers, simulated protraction of the scapula was performed and anterior translation using a 15N force was added at neutral, 10 degrees and 20 degrees of protraction. Significant decreases in anterior translation were measured as more protraction occurred. A difference of 6.3 +/- 1.6mm at neutral versus 2.5

+/- 0.5mm with 20 degrees protraction was found.

The researchers determined that the primary restraint with increasing protraction was provided by the anterior band of the inferior glenohumeral ligament. They conclude, that repetitive protraction of the scapula may lead to overstrain of the ligament and increase anterior laxity. It should be mentioned that no muscular contribution to stability or protection of the inferior glenohumeral ligament was studied in this cadaveric model.

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**Yap JLL, Curl LA, Kvitne RS, McFarland EG. The Value of Weighted Views of the Acromioclavicular Joint: Results of a Survey. *Am J Sports Med* 1999;27:806-809.**

One hundred and five physicians responded to a questionnaire regarding the value of weighted views in making decisions regarding surgical management of third-degree AC sprains. Eighty-one percent did not recommend taking weighted views in the emergency department. Fifty-seven percent did not use weighted views, and most of them indicated it would not influence their decisions regarding surgery. Forty-three percent did use weighted views; however, only nine percent of physicians felt the weighted views changed their treatment decision. It is interesting to note that a study indicating limited efficacy of weighted views with acute AC separations in the emergency department was published in 1988.<sup>1</sup>

*Reference*

1. Bossart PJ, Joysce SM, Manaster SJ, et al. Lack of efficacy of "weighted" radiography in diagnosing acute acromioclavicular separations. *Ann Emerg Med* 1998;17:20-24.



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