

## Paper #7

# Effects of Glenohumeral Abduction on Rotator Cuff Repair - A Biomechanical Analysis and Comparison of Clinical Outcomes

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### Summary:

An abduction pillow (small or large) will reduce tension on the repaired supraspinatus tendon by 30% to 60%. Patients should be encouraged to consistently wear their abduction pillows for six weeks post rotator cuff repair to minimize re-tear rate.

### Abstract:

#### Background

Abduction pillows are typically used to immobilize the shoulder following surgery however the benefits of using of an abduction pillow are unclear. The first part of this study examined the effect of shoulder abduction on repair tension in a human cadaver model. The second part of the study involved a prospective survey of patient compliance in wearing an abduction pillow post arthroscopic rotator cuff repair, with the aim to determine if the use of an abduction pillow following repair affected re-tear rate at six months.

#### Method

An X-ray study was performed to determine which position the shoulder is in when wearing a sling only and two types of abduction pillows. These positions were then reproduced in four human cadaveric shoulders using a custom made testing jig and the tension in the repaired supraspinatus were evaluated. A prospective study was conducted with 200 consecutive patients who underwent arthroscopic rotator cuff repair by a single surgeon. Patients were instructed to wear an abduction pillow for six weeks following surgery. Patients completed a modified L'Insalata Questionnaire and clinical examination prior to surgery and at one week, six weeks, 12 weeks and six months postoperatively. At six months, ultrasound assessed repair integrity and a questionnaire quantified sling and abduction pillow use.

#### Results

The sling with no abduction pillow placed the glenohumeral joint in  $4^\circ \pm 1^\circ$  (mean  $\pm$  SEM) of abduction, a sling with small abduction pillow placed the joint in  $13^\circ \pm 2^\circ$  of abduction and a sling with large abduction pillow placed the joint in  $25^\circ \pm 3^\circ$  of abduction. Placing the human cadaveric shoulders in the position of a sling with small abduction pillow caused a reduction in tension on the supraspinatus of 27% anteriorly ( $p < 0.05$ ) and 55% posteriorly ( $p < 0.006$ ) compared to placing the shoulder in the position of a sling without an abduction pillow; a large abduction pillow caused a further reduction in tension on the supraspinatus of 42% anteriorly ( $p < 0.001$ ) and 56% posteriorly ( $p < 0.0001$ ). The re-tear rate at six months for patients who reported that they wore the abduction pillow consistently for six weeks was 4% (5/133) compared to those who reported they did not wear the abduction pillow for the full six weeks was 9% (6/67;  $p = 0.19$ ). Interestingly, non-compliant patients had better strength in abduction in the scapular plane at 6 weeks (19N vs. 13N;  $p < 0.02$ ).

#### Discussion

An abduction pillow (small or large) will reduce tension on the repaired supraspinatus tendon by 30% to 60%. This study shows that patients who reported that they used an abduction pillow consistently for six weeks post

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arthroscopic rotator cuff repair had a 4% re-tear rate at six months. The non compliance group had a re-tear rate of 9% at six months. While the difference in re-tear rates was not statistically significant, we hold the view that this is a clinically significant finding, and use this data to encourage patients to consistently wear their abduction pillows post rotator cuff repair.