

2009 Scientific Program Abstracts — Wednesday

(An asterisk (*) by an author's name indicates the presenter.)

Wednesday, December 16, 2009

SESSION III — SPORTS UPPER EXTREMITY

Moderators: **Craig R. Bottoni, MD, Army**
LCDR Matthew T. Provencher,
MD, Navy
LtCol Warren R. Kadrmas, MD,
Air Force
Richard Ryu, MD, Civilian
Moderator

0725-0730

Biceps Tenodesis with Interference Screw Fixation: A Biomechanical Comparison of 4 Different Screw Sizes and 2 Repair Locations

Major Mark Slabaugh, MD
Rachel M. Frank, BA, BS
Anthony A. Romeo, MD
Geoffrey S. Van Thiel, MD
Nikhil N. Verma, MD
Vincent M. Wang, PhD

Objective: The purpose of this study was to compare the cyclic and failure properties of proximal biceps tenodesis with interference screw fixation among four different screw sizes and two different locations (arthroscopic, mini-open), using a novel interference screw fixation system.

Methods: Forty-two fresh-frozen human cadaveric shoulders with a mean age of 65 ± 8 years were randomized into 6 treatment groups: Arthroscopic biceps tenodesis with interference screw utilizing 7x15mm, 7x25 mm, 8x15 mm, or 8x25 mm screws, or mini-open biceps tenodesis with interference screw utilizing 7x15mm or 8x15mm screws (n=7 per group). Each humerus/biceps graft complex was mounted onto a materials testing machine, preloaded to 5N for 2 minutes, cycled from 5N to 70N for 500 cycles (1 Hz), and then loaded to failure at 1 mm/sec. Displacement during cyclical loading, pullout stiffness and ultimate load to failure were computed, and the mechanism of failure was noted.

Results: Mean cyclical displacement for the proximal 7x15 fixation was 5.99 ± 5.00 mm; for proximal 7x25, 3.34 ± 1.23 mm; proximal 8x15, 10.95 ± 5.87 mm; proximal 8x25, 2.16 ± 1.46 mm; distal 7x15, 4.27 ± 2.67 mm; and distal 8x15, 2.5 ± 1.31 mm. Respective ultimate loads to failure were 154.5 ± 26.4 N, 143.8 ± 39.2 N, 135.8 ± 25.2 N, 176.8 ± 30.6 N, 181.6 ± 53.9 N, and 165.6 ± 80.1 N. All failures occurred at the tendon/screw interface.

Conclusion: The results from this study indicate that there is increased gap formation with shorter interference screws in the proximal or arthroscopic tenodesis site. No difference in ultimate load to failure was observed between any of the screw sizes or lengths. Overall, the results suggest that longer screws for proximal tenodesis in the softer metaphyseal bone may provide a more robust repair than shorter screws. The results from this study may serve as a guide to the orthopaedic surgeon performing proximal biceps tenodesis in selecting appropriate interference screw size and length.

Notes:

0730-0735

Does Biceps Tenodesis Alter Shoulder Kinematics? A Novel In Vivo Biplane Fluoroscopy Study

LCDR Christopher B. Dewing, MD
COL Edward D. Arrington, MD
CPT Stephen A. Parada, MD

Summary: Our in vivo study is the first of its kind to apply high precision biplanar fluoroscopy to demonstrate no altered glenohumeral kinematics during external rotation in shoulders post biceps tenodesis

Introduction: The stabilizing role of the long head biceps tendon (LHB) remains controversial.

Purpose: The purpose of this *in vivo* study is to determine the role of the LHB in controlling shoulder kinematics, using dynamic, biplane fluoroscopy. The null hypothesis is that gle-

nohumeral kinematics are not altered by sub-pectoral LHB tenodesis.

Methods: Six subjects with isolated, unilateral biceps tenonitis who underwent open sub-pectoral LHB tendodesis (>4 mos post-surgery) were identified from a surgical adatabase of over 900 patients. Five met inclusion criteria and were enrolled. After informed consent, each subject completed bilateral eccentric external rotation (drop of 5lbs) from the ABER position followed by concentric internal rotation while being filmed at high speed in a dynamic biplane fluoroscopy system. 3D glenohumeral rotations and translations were compared between patients' post-operative and normal, contralateral shoulders (paired t-test).

Results: No differences were found between post-op and normal, contralateral shoulders for Anterior/Posterior (all $P > .16$), Inferior/Superior (all $P > .60$) GH translations at three time points: initial position, maximal external rotation and maximal internal rotation. No translation difference was greater than 1.6mm.

Conclusion: This is the first *in vivo* study to examine the stabilizing role of the LHB with this level of precision (measurement accuracies 0.1mm). The data supports our hypothesis that LHB tenodesis does not alter GH kinematics in the motions studied. Our findings will be useful to surgeons who are contemplating LHB tenodesis as part of their clinical decision-making in individuals with LHB and superior labral pathology.

Notes:

0735-0740

Subcoracoid Impingement: A New Diagnostic Test with Arthroscopic Treatment and Follow-Up in a Series of Patients

MAJ Steven J. Lalliss, MD

Objectives: Subcoracoid impingement is a relatively uncommon source of shoulder pain which is underdiagnosed primarily due to a lack of recognition of the disorder. Indeed, there is no single exam finding that has been shown to be sensitive or specific for diagnosing the condition. Most reviews and discussions of this syndrome describe forward flexion combined with internal rotation as the most

painful position for patients suffering from subcoracoid impingement. The key component of subcoracoid impingement is actually internal rotation, and forward flexion decreases the subacromial space by bringing the lesser and greater tuberosities closer to the acromion. This position may cause overlap of symptoms of subacromial impingement and interfere with the diagnosis of subcoracoid impingement. A new diagnostic test involving solely internal rotation of the shoulder has been identified in patients suffering from subcoracoid impingement. Arthroscopic coracoplasty has been shown to be effective in the treatment of this disorder. The amount of the distal coracoid to remove has been the subject of debate; however, studies have shown that the distance between the humeral head and distal coracoid averages between 6.7 and 11 mm in asymptomatic individuals. Therefore, restoration of the space to approximately 10 mm should alleviate the symptoms.

Methods: Patients with symptoms of subcoracoid impingement with pain in the anterior shoulder in the "parade rest position" (maximal internal rotation with the arm at the side) were evaluated with radiographs and magnetic resonance imaging (MRI). A "parade rest test" was also performed where the elbow of the affected side is pushed anteriorly by the examiner, thus increasing the internal rotation of the shoulder. All patients had a decreased coracohumeral space on both plain films and MRI. All patients also had a subcoracoid injection of local anesthetic to confirm the diagnosis. Patients underwent shoulder arthroscopy to identify other pathology of the shoulder as well as subacromial and subcoracoid bursoscopy and arthroscopic coracoplasty. The posterolateral aspect of the coracoid was removed to increase the distance between the distal coracoid and humeral head to at least 10 mm with the arm in maximal internal rotation. The coracoplasty was performed through the subacromial space in order to maintain the integrity of the rotator interval. The coracoacromial ligament was preserved unless symptoms of subacromial impingement coincided with those of subcoracoid impingement.

Results: All patients had complete resolution of symptoms at the six-week postoperative visit. Coracoplasty involved only the posterolateral 5-10 mm of the coracoid. There were no complications, and the "parade rest test" was negative in all patients postoperatively. To prevent possible fracture of the tip of the remaining coracoid after coracoplasty, all patients were cautioned not to perform any resisted elbow flexion exercises for six weeks after the procedure. Postoperative radiographs showed increase in the coracohumeral distance. The average coracohumeral distance postoperatively was 11.7 mm. There was no weakness of the biceps or coracobrachialis as well.