

2009 Scientific Program Abstracts — Friday

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

Friday, December 18, 2009

CONCURRENT SESSION IX — HAND SURGERY

Moderators: COL Gerald Farber, MD, Army
CDR Eric Hoffmeister, MD, Navy
LtCol Paul D. Gleason, MD, Air
Force
Alexander Y. Shin, MD, Civilian
Moderator

0835-0840

Bioabsorbable Interference Screw Fixation of Distal Biceps Ruptures Through a Single Anterior Incision

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Objective: We present a series of acutely ruptured distal biceps tendons repaired using a biotenodesis screw through a single anterior incision. This is the first prospective series to be reported using this combination of fixation and approach and unlike many previous studies of disparate techniques incorporates both clinical assessment and patient scoring.

Methods: Prospective objective and subjective evaluation of a series of biceps tendon ruptures. A modification of the technique described by Mazzocca is utilised with the patient supine and the upper limb supported on an arm table. A transverse incision 2cm distal to the anterior elbow crease is made, the lateral cutaneous nerve of the forearm identified and protected and the medial edge of the mobile wad is mobilised. The repair process into the radial tuberosity is as per the surgical technique for the Bio-Tenodesis Screw System using an 8mm by 12mm screw. Post-operatively the limb is rested in an above elbow back slab with the elbow at 90 degrees with neutral forearm rotation. All patients were discharged with the limb immobilised in an above elbow plaster. Review was at 2 weeks, 6 weeks, 3 months and 6 months postoperatively.

Objective assessment of function was carried out at the last three visits in terms of goniometric measurement of elbow flexion, pronation and supination. Disabilities of arm, shoulder and hand outcome (DASH) and Mayo elbow performance (MEPS) were used for scoring. Function at six months was the primary end point and all patients completed the six months follow up prior to discharge. Six months was chosen specifically as numerous previous reports relating to the clinical assessment of these patients remark that no change in function or symptom profile is found after this time. To increase the follow up period on these individuals would not be clinically justified.

Results: 14 injuries in 14 male patients underwent surgical repair, representing all ruptures referred to the senior author over a two-year period. The mean age was 41.9 years (32 to 54) and 9 of the ruptures occurred in the dominant arm. Ten patients were in physically demanding occupations and all patients had a mechanism suggestive of excessive eccentric extensile loading of the flexed arm. Four patients smoked tobacco and 2 patients were using anabolic steroids around the time of injury. Average Body Mass Index (BMI) was 32 (23-38.) and average time to surgery was 10.4 days (4 to 25). Mean postoperative flexion 130° (110 to 145), extension 0° (-10 to + 5), supination 74° (50 to 90) and pronation of 66° (50 to 80). No comparison was made with the uninjured arm. The mean DASH score was 6.97 (0 to 42). There were two outliers: one of the patients with a score of 19 had a concurrent ipsilateral shoulder injury. One having a DASH of 42, but an excellent ROM of his elbow was experiencing intermittent pain in his forearm at last follow up. The mean MEPS was 96 (70 to 100). Complications were limited. One patient developed heterotrophic ossification (Fig 3). Transient altered sensation over the distribution of the lateral cutaneous nerve of forearm occurred in 8 patients, but resolved in all cases by the six month point. There was no posterior interosseous nerve (PIN) injury, no re-ruptures or infections.

Conclusion: This study represents the first prospective case series reported using a bioabsorbable interference screw for fixation of ruptured distal biceps tendons approached through a single anterior incision. The population demographics are representative of previous reports and reflect an injury pattern in the working and sporting activities of early middle aged

men. The clinical and patient assessed functions are excellent and complications are minimal. This is a safe and successful technique for the management of distal biceps tendon ruptures.

Notes:

0840-0845

Effectiveness of the Saline Load Test in Diagnosis of Traumatic Elbow Arthrotomies

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Objective: The saline load test is a common technique used to access for joint penetration in a periarticular wound. The saline load test of the elbow has not yet been evaluated significantly in the literature. This study looks at the amount of fluid necessary to load the elbow joint and the sensitivity of the saline load test of the elbow for joint penetration.

Methods: We included 36 fresh frozen cadaveric limbs. An elbow arthrotomy was made in the posterocentral portal site with a 4.5cm trochar. The elbow joint was then loaded with saline mixed with methylene blue with an 18 gauge needle through the midlateral portal site. During the injection, the known arthrotomy site was observed for leakage. If no leakage occurred after loading 20 mL of fluid, the elbow was taken through a range of motion. If still no leakage was appreciated, the elbow was again infused with fluid until outflow occurred at the arthrotomy site. We recorded the quantity of fluid injected and the position of the elbow when leakage occurred.

Results: Injection of 20 mL gave a positive result in 26 of the 36 elbows, with range of motion following the injection causing leakage in another 5 elbows. A total of 40 mL of injected fluid was required to indentify 9%% of the arthrotomies. There was no significant correlation between necessary injection volume and sex or age.

Conclusion: A saline load test of 20 mL gives a positive result in 72% of elbows, while adding range of motion following the injection raises the detection rate to 86%. In order to

indentify 95% of the arthrotomies, 40 mL of fluid must be injected.

Notes:

0845-0850

Biomechanical and Motion Analysis of a Transverse Olecranon Fracture Model: When Should Tension Band Wire Fixation Be Abandoned?

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Objective: The purpose of this investigation is to identify the location along the proximal ulna where the orthopedic surgeon should abandon tension band wire (TBW) fixation for transverse, length stable olecranon fractures and convert to plate fixation.

Methods: Twenty-three non-osteoporotic (DEXA scanned) fresh frozen upper extremities were divided into 4 groups. 22 specimens were paired from 11 cadavers; one specimen remained unpaired. For each elbow, care was taken to preserve the triceps tendon as well as ligamentous and capsular integrity. Under fluoroscopic guidance, the distance between the coronoid and the tip of the olecranon was measured and the olecranon joint surface was divided into quartiles. A transverse osteotomy was created at the 25% mark in Group I, the 50% mark in Group II, the 75% mark in Group III, and 100% of the olecranon articular surface in Group IV. Standard TBW technique was utilized to internally fix the osteotomy. Specimens were fixed at 90° elbow flexion in a custom-designed aluminium frame mounted on a servohydraulic biomechanical testing machine (MTS). Each triceps tendon was connected to the actuator of the MTS machine. The specimens were subjected to a sinusoidal load to 150N at 1Hz for 500 cycles, simulating the force of active extension of the elbow against gravity. An optical motion tracking system, sensitive to 0.1mm displacement and 0.2 degrees of rotation, measured displacement at 3 virtual points: midline posterior, lateral articular surface and medial articular surface. Upon completion of cycling, specimens were then loaded to failure at 1mm/s. Failure was defined as 2 mm displacement at any of the virtual points. Through synchronization of the motion tracking