

and one posterior (AP repair). SLAP lesions repaired with two suture anchors placed posterior (PP repair) to the biceps insertion required a mean load of 46.7N to displace the biceps labrum insertion 2mm.

Conclusions: When measuring load on the biceps anchor to cause 2mm of displacement, there was no significant difference in repair strength of type II SLAP lesions using the two different suture anchor configurations.

Clinical Relevance: Anatomic studies have shown that the predominant pattern of biceps tendon insertion is posterior into the posterior-superior labrum. Also, the primary mechanism for SLAP lesions in overhead athletes is peel-back of the posterior superior labrum off the glenoid in the abducted, externally rotated shoulder. Placement of an anterior anchor could, theoretically, tension the anterior capsulolabral structures via the MGHL and SGHL attachments to the superior labrum and thus could result in a loss of external rotation. The results of this study suggest that there is no biomechanical advantage to placing an anterior anchor and so the use of two posterior anchors may be preferable in the overhead athlete in whom loss of external rotation cannot be tolerated.

Abrasion and Shear Failure of Arthroscopic Sutures (SS-35). *Steven T. Kelley, MD, David Morrison, MD*

Summary: This is the first known report of the response of the newer generation of sutures to shear forces which appear to be an important mode of failure during arthroscopic surgery.

Purpose: Although the tensile strengths of the newer generation of sutures have been well described, no studies to date have examined the resistance of these sutures to abrasion and shear forces. We feel that resistance to shear forces is an important characteristic of sutures that are used arthroscopically, as one of the most common methods of failure is fraying during knot tying. The purpose of this study was to define these characteristics for five sutures commonly used in arthroscopic procedures.

Methods: Ethibond, Orthocord, Fiberwire, Ultrabraid and Maxbraid were used for this study. Abrasion resistance was determined using a simple mechanical device with a scalpel blade for abrasion force. Shear force was tested using the same device but with the suture passing through an arthroscopic knot pusher mimicking what occurs during surgery. Twenty strands of each suture type were used for testing resistance to each kind of force. Each was tested in a cyclical fashion in a saline environment, recording the cycles to failure.

Results: Ethibond performed the most poorly of all suture types against both abrasion (18 cycles) and shear forces (23 cycles). When examining abrasion resistance, Orthocord (251 cycles) was significantly more susceptible than Fiberwire (479 cycles), Maxbraid (441 cycles) and Ultrabraid (467 cycles). However, when facing shear stress Fiberwire (102 cycles) failed much more rapidly than Orthocord (393 cycles), Maxbraid (473 cycles) and Ultrabraid (635 cycles).

Conclusions: Resistance to abrasion and shear forces are characteristics that have not been previously described for the newer suture types. Orthocord was found to have significantly less resistance to abrasion forces while Fiberwire was found to fail much more rapidly under shear stress. The mode of failure was usually stripping of the braided external sheath of the suture exposing the parallel oriented core fibers. Both Maxbraid and Ultrabraid performed well under both testing conditions. Nothing is more frustrating than to have a suture fail during an arthroscopic procedure, particularly where an anchor is involved. This is the first known report of the response of these sutures to shear forces which appear to be an important mode of failure during arthroscopic surgery.

Thromboembolic Events After Arthroscopic Shoulder Surgery: A Case Series of Unusual Complications (SS-36). *Marshall A. Kuremsky, MD, Lyle Cain, MD, James Fleischli, MD*

Purpose: In contrast to arthroscopic knee surgery, deep venous thrombosis and pulmonary embolism after arthroscopic shoulder surgery are infrequent events. The purpose of this study was to review a case series of patients who sustained thromboembolic events and attempt to identify risk factors associated with this unusual complication.

Methods: A retrospective database review was performed to identify patients. Search strings for postoperative complications included emergency room visit or hospital admission for deep venous thrombosis (DVT) or pulmonary embolism (PE). Seven total patients were identified in a two-year period.

Results: Over a four-year period, two surgeons performed 2872 arthroscopic shoulder surgeries. A total of 7 cases (0.24%) of thromboembolic disease were identified in our healthcare system, with 5 cases of DVT and 2 cases of PE. The average patient age was 44 years (range, 18-61). All patients were diagnosed with Doppler ultrasound, admitted as inpatients for initial therapy and workup, and treated with coumadin for a minimum of 3 months. All patients underwent hypercoagulability test-

ing; one patient had protein C deficiency while another had protein S deficiency. There were no fatalities associated with these complications. Six patients were placed in the lateral decubitus position and one patient was placed in the modified-beach chair position ($p < 0.05$) during arthroscopic shoulder surgery. Of interest, five of these seven events involved the operative upper extremity (71%), and two of these seven events (29%) involved the ipsilateral lower extremity. Six patients underwent rotator cuff repair, 5 patients underwent subacromial decompression, and three patients had distal clavicle resections. Five patients were smokers, and two were worker's compensation.

Conclusions: Postoperative deep venous thrombosis and pulmonary embolism are unusual but serious and potentially fatal consequences of arthroscopic shoulder surgery. We report a low incidence of just 0.24%, but all patients in this series required hospitalization and anticoagulation therapy. Despite the small size of this cohort, there was an association with patient positioning in the lateral decubitus position. It remains critical to be aware of this potential complication, and further investigation is necessary to determine if mechanical or pharmacologic DVT prophylaxis after arthroscopic shoulder surgery would be beneficial.

Arthroscopic Debridement of Severe Glenohumeral Osteoarthritis (SS-37). *Mark Burszty, MD, Robert Nirschl, MD*

Purpose: The role of arthroscopic debridement in the treatment of severe glenohumeral osteoarthritis (OA) has not been clearly defined. Our hypothesis is that arthroscopic debridement is a viable option in the treatment of severe glenohumeral OA.

Methods: A retrospective review was undertaken of twenty-one patients who underwent arthroscopic glenohumeral debridement for severe OA between 1996 and 2005 at our center. The operative procedure included intra-articular lavage, debridement of osteophytes, removal of loose bodies, capsular release, and synovectomy. Our technique utilized an accessory posterior-inferior portal in order to excise as much of the characteristic inferior humeral osteophyte as possible. The goals of removing the "goat's beard" osteophyte were the restoration of motion (particularly rotation through improved mechanics), and pain relief (via increased diffusion of load forces). Twelve patients were successfully contacted postoperatively, and completed questionnaires which focused on pre-and post-operative pain and activity restriction, as well as overall satisfaction. The twelve patients had a mean age of 59.1 years

(range 44-67) at time of surgery, and were contacted at a mean of 51.9 months (range 8-114) after surgery. Statistical analyses were performed using the paired t-test.

Results: Nine out of twelve patients responded that they would undergo the same procedure again given the same situation. Six were extremely satisfied with their result, three were somewhat satisfied, and three were dissatisfied. Subjective pain assessed using the VAS rating from 0-10 points decreased significantly from a mean of 6.2 pre-operatively to 3.2 post-operatively ($p = 0.01$). Subjective assessment of shoulder function using the scale incorporated in the Constant score significantly increased from a mean of 1 pre-operatively to 4.3 post-operatively ($p = 0.002$). Two thirds of our sample (eight out of twelve patients) returned to regular participation in sports or physically demanding recreational activity. Results did not deteriorate with time.

Conclusions: Arthroscopic glenohumeral debridement for severe OA led to substantial improvement in patient satisfaction, pain, and function, in eight out of twelve patients. Studies with a prospective design, incorporation of objective outcome measures, and comparison to other surgical options for severe glenohumeral OA would further elucidate the role of arthroscopic debridement.

In-Vivo Measurement of Rotator Cuff Perfusion Using Laser Doppler Flowmetry (SS-38). *Kenneth J. Accousti, MD, James Gladstone, MD, Bradford Parsons, MD, Raymond Klug, MD, Evan Flatow, MD*

Purpose: The purpose of this study is to examine the effects of tendon perfusion following arthroscopic rotator cuff repair. A laser Doppler flowmeter was used to measure the tissue perfusion of the rotator cuff before and after arthroscopic rotator cuff repair. There was a significant decrease in the perfusion of the bursal side of the supraspinatus tendon after both the medial and lateral sutures were tied compared with intact tendon.

Methods: A laser Doppler flowmeter (BLF21A Transonic Systems Inc. Ithaca, NY) was used to measure the tissue perfusion of the rotator cuff before and after arthroscopic rotator cuff repair using suture anchors with a double row configuration. Cuff perfusion was assessed in normal tissue as well as in torn cuffs both before and after the arthroscopic knots were tied.

Results: Average perfusion for intact tendon was 6.2 (ml/min/100gm). The average perfusion for torn supraspinatus tendons was 3.3 (ml/min/100gm) before repair and 1.9 after repair. There was a significant difference in perfusion between healthy tendon and torn supraspinatus both before and after repair. There was a