discoid meniscus by arthroscopic evaluation. We retrospectively studied 24 patients (25 knees) had a peripheral tear that underwent partial central meniscectomy in conjunction with suture repair. The mean age at the time of operation was 9.2 years (range, 4 to 15 years) and the mean follow-up period was 59.3 months (range, 24 to 108 months). The partial central meniscectomy was performed in either a 1-piece or piecemeal fashion using arthroscopic instrument such as iris scissor, arthroscopic scissor or basket forceps. We found that 12 knees were a peripheral tear of anterior horn; 7, from midhorn to posterolateral corner; and 6, posterior horn. The tear was repaired as modified outside in technique if the segment was the anterior horn of the meniscus; modified inside-out technique, from midhorn to posterolateral corner; and all-inside technique, posterior horn with the absorbable sutures(No. 0 PDS: Ethicon, Sommerville, NJ, USA). The clinical results were evaluated according to Lysolm knee score and Hospital for Special Surgery (HSS) score at preoperatively and final follow-up.

Results: All patients showed good clinical results with no reoperation after an average follow-up time of 59 months. At final follow-up, full range of motion was achieved in all patients. However, there were 2 knees with limited function during squatting and jumping because of pain. The mean preoperative Lysholm knee score, which was 79.0 (range, 69-89), improved to 95.1 (range, 85-100) at final follow-up ($p<0.0001$). The mean preoperative HSS score, which was 80.1 (range, 69-89), improved to 96.1 (range, 90-100) at final follow-up ($p<0.0001$).

Conclusions: We believe that the our technical guide in arthroscopic meniscal repair techniques, arthroscopic partial meniscectomy in conjunction with the repair of the peripheral tear can be effective method in patients with a symptomatic discoid lateral meniscus in children.

Collagen Meniscus Implant (CMI) Decreased the Rate of Re-Operation in Chronic Patients: A Survivorship Analysis (SS-33). *Karen K. Briggs, MPH, MBA, William Rodkey, MD, J. Richard Steadman, MD*

Summary: In those patients who maintained the implant, the CMI decreased the need for additional surgery for chronic knee injuries. Controls were 3.8 times [CI 95%: 1.2 to 12.4] more likely to require repeat surgery than CMI patients who maintained the implant.

Purpose: Meniscus loss increases the rate of knee degeneration, leading to additional surgeries or even knee replacement. We determined if replacement of meniscus tissue with the Collagen Meniscus Implant (CMI) decreased the need for additional surgeries in multi-operated chronic knees.

Methods: Patients 18 to 60 years old who had undergone one to three prior partial medial meniscectomies and currently had clinical symptoms of meniscus pathology were randomized either to receive CMI or have additional partial meniscectomy (control). Seventy-seven CMI were implanted, but 5 were removed within 6 months for technical reasons. The remaining 72 were compared to 66 controls over 4 years to determine survivorship. Survivorship was defined as not having a second surgery on the study knee.

Results: Four CMI (6%) and 12 control patients (18%) required reoperation through 4 years. Survivorship at one year was 89% for control and 97% for CMI, 87% for control and 95% for CMI at 2 years, 83% and 94% at 3 years, and 79% for control and 94% for CMI at 48 months (Figure 1). CMI patients had a significantly higher survivorship than controls ($p=0.02$). Controls were 3.8 times [CI 95%: 1.2 to 12.4] more likely to require repeat surgery than CMI patients who maintained the implant.

Conclusions: In those patients who maintained the implant, the CMI decreased the need for additional surgery for chronic knee injuries. The additional tissue regeneration supported by the CMI may decrease progression of degenerative changes and reduce necessity for additional surgeries.

A Biomechanical Comparison of Suture Anchor Placement on Repair Strength for Type II Superior Labral Anterior Posterior (SLAP) Lesions (SS-34). *Robert Morgan, MD, Richard Peindl, MD, Marshall Kuremsky, MD, James Fleischli, MD*

Purpose: To evaluate the biomechanical repair strength of two different suture anchor configurations utilized for type II superior labral anterior posterior (SLAP) lesions.

Methods: Standardized type II SLAP lesions were created in eight match paired cadaveric shoulders using a previously established protocol. Two different suture anchor configurations were used to repair the SLAP lesion. One arrangement ($n=8$) placed a suture anchor anterior and another posterior to the biceps labral insertion; a second arrangement ($n=8$) placed two suture anchors posterior to the biceps labral insertion. Specimens were mounted and a posterior directed load was applied to generate displacement of the biceps tendon.

Results: The mean load required to displace the biceps labral insertion 2mm was 35.8N after repair of a type II SLAP lesion with a suture anchor placed anterior

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 envrionment, 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-