

recalcitrant lateral epicondylitis and compare them to each other. **Methods:** 316 Patients were treated operatively over a 5 year period for recalcitrant lateral epicondylitis by two surgeons. All patients failed an aggressive course of non-operative treatment consisting of NSAIDs, bracing, physical therapy, and steroid injections. Of those 316 patients, 76 were treated with percutaneous release performed in the office, 94 patients were treated with arthroscopic release, and 125 patients were treated with open lateral epicondylectomy. The follow-up averaged 2.2 years. Patient outcomes were evaluated with the Andrews Carson rating scale. Additionally patients' ability to return to previous level of vocation, activities, and the need for additional intervention was noted. **Results:** Satisfactory results were 93% in the percutaneous group, 95% in the arthroscopic group, and 97% in the open group. There were no significant statistical differences comparing the Andrews Carson scale, participation in vocation and recreational activities postoperatively, and need for further treatment. **Conclusions:** The most frequent treatment for recalcitrant lateral epicondylitis has been open release; however, percutaneous as well as arthroscopic techniques are equally efficacious treatment options.

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Arthroscopic Ulnohumeral Arthroplasty for Elbow Arthritis in Patients Under the Age of 50 Years (SS-39)

Degenerative arthritis of the elbow in patients under age 50 can cause disabling pain, severely restricted range of motion (ROM), and functional limitations. Open ulnohumeral arthroplasty has been demonstrated to produce satisfactory pain relief and ROM gains. We report the results of an all-arthroscopic ulnohumeral arthroplasty for degenerative arthritis of the elbow in young patients. **Materials and Methods:** Eleven consecutive patients under age 50 with radiographically documented degenerative elbow arthritis underwent an all-arthroscopic ulnohumeral arthroplasty as described by Savoie. Indication for surgery was pain and limited ROM refractory to 12 months of conservative treatment. Mean age at time of surgery was 36 years (range 23 to 47 years). Mean postoperative follow-up was 15 months (range 12-18 months). **Results:** Mean preoperative flexion was 100° (range 70°-140°), and extension (short of neutral) was 40° (range 10°-60°). Mean postoperative flexion was 140° (range 130°-150°; $P < .01$) and extension was 7° (range 0°-20°; $P < .01$). Total arc of motion averaged 60° preoperatively and 133° postoperatively (improvement of 73°; $P < .01$). Mean subjective pain level

improved from 9.2 to 1.7 (10 = worst pain; 0 = no pain). Mean subjective patient satisfaction improved from 1.8 to 9.0 (0 = unsatisfied; 10 = completely satisfied). **Discussion:** All-arthroscopic ulnohumeral arthroplasty provides significant short-term pain relief and restoration of elbow ROM and function in patients under age 50 with degenerative arthritis of the elbow. Long-term durability of this procedure with regard to preservation of ROM and radiographic progression of arthritis remains unknown.

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An Adenosine-2A Receptor Agonist Reduces Joint Inflammation and Joint Destruction Following Septic Arthritis (SS-40)

Infectious arthritis can cause long-term joint morbidity regardless of appropriate early treatment. In addition to the bacteria, the inflammatory response appears to contribute to joint degradation through the production of cytokines (such as IL-8), superoxides, and metalloproteases. We have shown that an adenosine-2A receptor agonist (ATL146e) could be chondroprotective following joint infection with *Staphylococcus aureus*. The purpose of this study was to determine whether an adenosine agonist might augment the current treatment regimen to prevent the arthritic effects associated with joint sepsis. **Methods:** An infectious arthritis model was created in rabbit knees. *S aureus* bacteria were injected into both knees of each rabbit. Sixteen hours following infection (time zero), treatment or no treatment was begun. The 48 rabbits were divided into 4 treatment groups: no treatment (control), ATL146e only, antibiotics only, or antibiotics plus ATL146e (12 rabbits per group). At time zero, mini-osmotic pumps filled with saline (control) or ATL146e were implanted in each rabbit based on the treatment group. Rabbits in the antibiotic treatment groups were given 7 days of intramuscular ceftriaxone, and those in the ATL146e group were given the drug for 72 hours. Analysis at days 1, 3, and 7 consisted of gross appearance, synovial fluid analysis (WBC counts, culture, and interleukin-8 (IL-8) assay), serum WBC count and culture, histologic analysis, and biochemical analysis for glycosaminoglycan (GAG). Results were determined and compared among treatment groups and analyzed statistically by analysis of variance (ANOVA). **Results:** Serum WBC counts were within normal range for rabbits in all treatment groups. Blood cultures taken prior to euthanasia were negative in all groups despite bilateral knee infections. Synovial fluid cultures at day 7 were positive in 83% of the untreated knees and 100% of the ATL146e only treated knees, but negative in all antibi-

otic and antibiotic plus ATL146e treated knees indicating clearance of bacteria. Knees in the antibiotic plus ATL146e knees appeared normal with no effusion or loss of motion. Average WBC counts from the synovial fluid aspirates significantly decreased with treatment of antibiotics alone and antibiotics plus ATL146e. IL-8 assay results revealed considerably increased synovial fluid content compared to baseline values, but treatment with antibiotics plus ATL146e significantly decreased the IL-8 content when compared to other treatment groups ($P < .001$) indicating inflammatory response suppression. Histologic grading using Salter's scale (0 = best, 15 = worst) resulted in significantly improved scores in the antibiotic plus ATL146e group (2.79) compared to no treatment (6.70), ATL146e only (6.61), and antibiotics only (5.10) ($P < .00000001$). GAG assay revealed no significant difference among treatment groups. Discussion: Results of this study show the addition of an adenosine-2A agonist to antibiotic therapy diminishes WBC chemotaxis and inflammation in the joint, while not compromising the clearance of intra-articular bacteria. Early bacterial clearance with modulation of the inflammatory response may prevent the long-term arthritic effects of joint sepsis. Results of this study influence the future treatment of septic arthritis and prevent the associated morbidity.

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Osteochondral Graft Transplantation: Relationship between Graft Insertion depth, Insertion Forces, Cell Death, and Matrix Degeneration (SS-41)

Purpose: The objective of this study was determine the range of forces encountered during surgical insertion of osteochondral autografts and the effect on cellular viability and matrix degeneration. **Methods:** Osteochondral graft transplantation was performed in fresh frozen cadaveric knees. Forces required to extrude the cartilage from the harvester device, seat the cartilage flush with the surrounding cartilage and recess the cartilage 2 mm into the recipient site were measured using a uniaxial load cell. These forces were then applied to osteochondral grafts obtained from six fresh human femoral condyles harvested from total knee arthroplasty cases and one fresh normal knee. Applied loads varied from zero (sham) to 800 newtons. Chondrocyte viability and glycosaminoglycan release was determined at 48 and 120 hours post impact. **Results:** Graft insertion forces were relatively low (<400 newtons) during insertion or seating the graft compared to recession of the graft in the

recipient site (max 800 newtons). A mean of 91% of the cells were viable in unimpacted grafts from the total knee specimens and nearly 100% for the fresh normal knee. Total knee specimens demonstrated 50% decreased in viability at 800N ($P < .01$). The fresh normal specimen demonstrated a significant decrease in viability approaching 20% at 400N and 800N ($P < .01$) at 120 hours post impact. Glycosaminoglycan release did not correlate significantly with insertion loads although there was a trend toward increased release with higher loads at 120 hours. **Conclusions:** Typical insertion loads for osteochondral grafting may not be immediately harmful to the cartilage implant but recession or placement of a graft into a relatively shorter recipient hole may reduce cellular viability in the graft.

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Synovial Shelves of the Knee: Association With Chondral Lesions (SS-42)

Even though certain types of the knee plica are well recognized as being pathological, the long-term effects of such plicae upon the articular cartilage have not been quantitatively evaluated. Indeed, the majority of studies regarding plica deal mainly with the acute plica syndrome itself. The objectives of the present study were to evaluate how synovial shelves of the knee might predispose to chondral lesions and to determine which types of the plica are significant risk factors for articular damage. Data was collected prospectively from 1000 consecutive knee arthroscopies. Of the 1000 patients who had knee arthroscopy, 321 (32.1%) patients were found to have knee plicae. The mean age of the patients at the time of the procedure was 37.4 years (33.4 years for the patients with plicae and 39.2 years for the patients without synovial shelves). Patients details (age, sex, duration of symptoms, injuries, and possible mechanism of injury), operative details (types and number of portals, equipment used), intra-articular findings (articular, meniscal and synovial lesions, and stability characteristics) and procedures performed were recorded on a special database. Synovial shelves of the knee were recorded using a modification of the Sakakibara classification (Types A1-D3). Articular lesions were noted on anatomic articular maps of the different functional zones using a system which presaged the current ICRS system. From these maps it was then possible to evaluate the proportions of each articular lesion as well as its position. The Outerbridge classification was used for the evaluation of the