

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

severity of the cartilage damage. A maximum of the 3 most significant articular lesions was then recorded on the data sheet and subsequently entered into the database. Fisher's exact test, Pearson chi-square test, *t* test and Mann-Whitney *U* test were used for the statistical analysis. All tests were two-tailed with a confidence level of 95% ($P < .05$). An increased incidence of articular lesions was found in patients with synovial shelves, in comparison with patients without shelves (94.7% versus 81% respectively; $P < .001$). Patients with shelves type B2-D3 were found to have increased incidence of cartilage lesions in comparison with patients with type A0-B1 shelves (96.5% versus 86.4% respectively; $P = .002$), as well as cartilage lesions with bigger size (84% versus 71.4% respectively; $P = 0.02$). Patella and F2, F3 zones of the medial femoral condyle were areas with increased incidence of cartilage lesions, in patients with synovial shelves in comparison with patients without shelves, with percentages 47.7% versus 27.5% for the patella ($P < .001$), and 80.2% versus 45% for the F2 and F3 zones ($P < .001$), respectively. In conclusion, Synovial shelves of the knee are a risk factor for cartilage lesions. Even small shelves with chronic inflammation (type B2-D3) predispose towards more frequent and larger articular lesions. Areas at risk particularly include the patella and the non-weight-bearing medial femoral condyle.

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Cartilage Resurfacing with Precut Fresh Osteochondral Core Allografts (SS-43)

Objective: To familiarize the clinician with the development of a new and simple method to resurface full-thickness cartilage defects of the knee. **Methods:** Large articular cartilage defects of the knee can be managed with various methods. These include mosaicplasty and chondrocyte reimplantation which can be technically difficult, associated with a prolonged recovery period and expensive. Fresh chondral allografts can now be preserved for as long as twenty one days with maintenance of chondrocyte viability. Precut full-thickness osteochondral core allografts are now available in 2 mm incremental sizes from 10 to 20 mm in diameter. The grafts are harvested from multiple sites on the donor femoral condyle to orthotopically match the recipient defect. The required size of the donor osteochondral plug is determined by prior arthroscopy or an MRI utilizing 3 plane high resolution sequencing with fast-spin echo proton density. The graft can be inserted arthroscopically or via a mini-arthrotomy on an out-patient basis. No internal fixation is required. Range of motion and early weight bearing

is encouraged. **Results:** Twenty-three grafts have been inserted over the past 38 months. Six cases have undergone follow-up arthroscopy with visualization of the graft and cartilage biopsy. Excellent maintenance of the resurfaced cartilage site has been observed in all cases. Chondrocyte viability has been observed to be in the range of 80%. **Conclusions:** This new, easily reproducible process provides the simplest and most cost effective method for cartilage resurfacing of large femoral condyle defects and is associated with low morbidity and early recovery.

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Chondral Osseous Replacement (COR) Technique for Femoral Defects (SS-44)

Localized, full-thickness articular cartilage defects of the femoral condyle are often found unexpectedly. An arthroscopic repair technique that transplants chondral osseous plugs to fill the defect (COR technique) offers an immediate solution for these lesions. The purpose of this study is to review the clinical and radiographic results of chondral osseous replacement for full-thickness articular cartilage lesions. **Methods:** A prospective two center study of full-thickness articular cartilage lesions was initiated in 1995. All knees were evaluated both pre and postoperatively by physical examination, radiographs, Lysholm and Tegner knee scores. Inclusion criteria were full-thickness femoral condyle defects >1 cm and <3.5 cm in diameter, and a minimum 24 months follow-up. Exclusion criteria were associated tibial defects, patellar defects, or generalized arthritic change. ACL tears, concurrent ACL surgery, and meniscal tears were not contraindications. Grafts harvested from the superior and lateral femoral notch were press fit into holes drilled into the defect placed adjacent to the articular cartilage margin. Cancellous bone bridges were maintained between grafts. Relook arthroscopic examinations were done when possible. **Results:** 39 patients met the inclusion criteria with an average follow-up of 48 months (24-89 months). The average age was 45. There were 20 males and 19 females. The MFC was involved in 30 and the LFC in 9. The average Lysholm score increased from 43 preoperatively to 84 at follow-up. The average Tegner score at follow-up was 4.9. Relook arthroscopies were obtained in 14 of the 39 and demonstrated good incorporation of the grafts in all cases. Biopsies of these grafts over time demonstrated viable chondral and osseous components at intervals out to 12 months. Radiographic examinations demonstrated early arthritic changes in some patients. **Discussion:** The technique successfully transplants chondral osseous grafts within the knee that remain