the double-row group, retears were found in 3 double tendon repairs. All 3 tears failed near the musculotendinous junction (Cho type 2). All clinical outcome measures were significantly improved from the preoperative level ($p<0.0001$), but there was no statistical difference between groups postoperatively

Conclusion: There is no MRI difference in 12 month rotator cuff retear rates between triple-loaded single-row repairs or suture-bridging double-row repairs. Double-row repairs failed at the musculotendinous junction while single-row repairs failed at the reattachment site. No difference could be demonstrated between in clinical outcome scores either.

The Effect of Medial Knots on Footprint Contact and Self-Reinforcement in TOE Rotator Cuff Repair

SS-08

April 14, 9:35 AM

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Introduction: Transosseous-equivalent (TOE) rotator cuff repair has been shown to demonstrate a self-reinforcing effect, providing a protective mechanism in the face of potentially destructive forces. A variant, which uses tape-type sutures, has been performed clinically with and without medial row mattress knots. This study assessed the effect of medial row knots at the tendon-footprint interface.

Methods: In 8 fresh frozen human shoulders, TOE supraspinatus repairs using tape-type sutures with (knotted) and without (knotless) two medial row mattress knots were performed in each specimen. A Tekscan pressure sensor was fixed at the tendon-footprint interface prior to all repairs. Parameters included footprint contact force, area, pressure and peak pressure. The supraspinatus tendon was loaded with 0, 15, 30, 45, and 60 N at 0° and 30° abduction, with 0° humeral rotation.

Results: Medial row knots did not significantly change footprint contact force, area, pressure, or peak pressure under all conditions. The knotted repair had increases in footprint contact pressure with increasing load at both abduction angles. The knotless repair demonstrated the same relationships for footprint contact pressure with increasing load. This relationship was also seen for footprint contact force for both repairs. With increasing load, the knotless repair had a significantly higher progression (slope) of footprint force and pressure ($P < 0.05$).

Conclusion: There is no measurable change in tendon-footprint contact force, area, pressure, or peak pressure with the addition of medial row knots at both abduction angles. In addition, the lower progression (slope) of footprint force and pressure seen with the addition of medial row knots demonstrates that they can inhibit the self-reinforcing effect of the TOE repair. Knotless TOE repair using tape-type sutures may provide superior tendon-footprint interface characteristics and improve healing potential under post-operative conditions, while avoiding the risk of medial over-tensioning, strangulation, and catastrophic failure at the medial tendon.

Cost-Effectiveness of Reverse Total Shoulder Arthroplasty vs Arthroscopic Rotator Cuff Repair for Symptomatic Large and Massive Rotator Cuff Tears

SS-09

April 14, 9:40 AM

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Introduction: The goal of this study was to compare the cost-effectiveness within the United States healthcare system of arthroscopic rotator cuff repair versus reverse total shoulder arthroplasty in patients with symptomatic large and massive rotator cuff tears without cuff-tear arthropathy.

Methods: An expected-value decision analysis was constructed comparing the costs and outcomes of patients undergoing arthroscopic rotator cuff repair and reverse total shoulder arthroplasty for large and massive rotator cuff tears. Comprehensive literature search provided input data to extrapolate costs and health utility states for these outcomes.

Results: Arthroscopic rotator cuff repair was the preferred strategy, superior to non-operative care, with an incremental cost effectiveness ratio (ICER) of $15,500 / quality adjusted life year (QALY), and dominant over primary reverse total shoulder arthroplasty. The results in favor of arthroscopic rotator cuff repair as the dominant strategy held as long as the lifetime progression rate from re-tear to end-stage cuff-tear arthropathy was less than 89%.

Conclusion: Arthroscopic rotator cuff repair — despite high rates of tendon re-tearing — for patients with large and massive rotator cuff tears presents as a more cost-effective initial treatment strategy when compared to primary reverse total shoulder arthroplasty.

Revision ACL Reconstruction in Children and Adolescents

SS-10

April 14, 11:30 AM

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Introduction: Results of revision ACL reconstruction in pediatric patients has not been well studied. The purpose

of this study was to assess the demographics, technique, and results of ACL revision in children and adolescents.
Methods: This was a retrospective case series and outcomes assessment of all pediatric/adolescent patients (<18 years) who underwent revision ACL surgery at a single institution. Charts were reviewed for patient demographics, injury characteristics, operative details, surgical complications, and patient outcome. Patient-oriented outcome measures were also sent to all patients and included the Pedi-IKDC, Tegner Activity Scale, Lysholm Knee Score, and a self-designed Physical Activity Survey to assess return to sport.
Results: Ninety revision ACL reconstructions were performed in 88 patients. Average patient age at the time of revision was 16.6 years (SD 1.69), and 28.8% were skeletally immature. Time to failure after primary ACL reconstruction was 1.28 years (SD 1.06), and the most common mechanism of failure was noncontact sports injuries. 74.4% had additional intraarticular injuries that required surgical intervention at the time of revision. Revision graft type included allograft (61.1%), patellar tendon (21.1%), hamstring (16.7%), and iliotibial band (1.1%). There was a 20% graft reinjury rate. Additional procedures after revision were required in 25.5% of knees, and 20% of revision reconstructions had contralateral ACL injuries. 50% of patients completed outcome measures with an average time since revision of 5.1 years. The mean outcome scores were: Pedi-IKDC 71.7 (SD 12.6), Lysholm 79 (SD 13.2), Tegner 6.6 (range 6-10). 69% of patients reported returning to sports at an average of 8.9 months (3-36), however, only 55.2% of these reported being able to return to the same level of play.
Conclusion: Revision ACL reconstruction in pediatric patients was associated with worse functional outcome, lower activity level, higher rates of graft retearing, and lower return to sports rates than primary ACL reconstruction.

Biomarker Changes in ACL Deficient Knees Compared with Contralaterals

SS-11

April 14, 11:35 AM

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Introduction: Though ACLR outcomes are overwhelmingly positive, patients' recovery processes are highly variable, and typically based off generalized timetables derived from population data. In an attempt to individualize prognostic estimates, we sampled knee joint synovial enzyme concentrations in patients with ACL tears with, and without cartilage injury, and compared them with the contralateral non-injured knee.
Methods: 480 patients indicated for knee arthroscopy had samples drawn to form a database. If no pathological history existed in the contralateral knee, samples were drawn as well. For this study, only patients that had confirmed ACL injury on arthroscopy were included. Samples were drawn 3-12 weeks after initial injury. Associated cartilage injury was noted. Samples were centrifuged, and concentrations were determined using an Elissa test. Concentrations were then compared between the three study groups (ACL tear with cartilage injury (without cartilage injury, and contralateral) using a Welch ANOVA test with pairwise comparisons.
Results: The study included samples from 132 knees which included: 34 ACL tears without cartilage damage (mean age 34.00 years); 28 ACL tears with cartilage damage (36.29 years), and 72 contralaterals (41.06 years). ANOVA testing demonstrated significant differences among groups for: MMP-3 (p,>001); TIMP-1 (p=.001); TIMP-2 (p=.015); FGF-2 (p=.011); IL-6 (p=.001); and MIP-1b (p=.001). Pairwise comparisons demonstrated no significant differences between ACL tears with, and without cartilage damage, but did show both types of ACL tears had significantly higher concentrations of MMP-3, TIMP-1, IL-6, and MIP-1b than contralaterals. ACL tears without cartilage damage had significantly lower concentrations of TIMP-2 and FGF-2 (13).
Conclusion: The course from repair to symptomatic relief is highly variable. Cytokine concentrations are shown here to be significantly different between ACL tears (+/- cartilage damage) and healthy knees. These validated differences can help establish these biomarkers as a method for injury stratification ultimately providing patient-specific prognostic data.

Transphyseal ACL Reconstruction in Skeletally Immature Patients: Does Independent Femoral Tunnel Drilling Place the Physis at Greater Risk Compared to Transtibial Drilling?

SS-12

April 14, 11:40 AM

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Introduction: The purpose of this study was to radiographically assess differences in physeal disruption between transtibial and independent tunnel drilling techniques following ACL reconstruction in skeletally immature patients.
Methods: A retrospective, matched comparative cohort study was performed of skeletally immature patients who underwent transphyseal ACL reconstruction between January 1, 2008 and March 31, 2011. All skeletally immature patients between 10 and 15 years old who underwent independent femoral tunnel drilling and had adequate baseline and post-operative radiographs were analyzed. These patients were matched with a transtibial technique cohort based on age and sex. Demographic characteristics and peri-operative metrics were collected. Radiographic measurements were recorded from pre-operative MRI and post-operative plain radiographs.
Results: Twenty patients were analyzed. Between groups, there were significant differences in the