

Speed of Recovery After Arthroscopic Rotator Cuff Repair

SS-10

May 18, 2017, 9:30 AM

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Introduction: The purpose of this study was to delineate the time taken to achieve maximum improvement (plateau of recovery) and the degree of recovery observed at various time points (speed of recovery) for pain and function following arthroscopic rotator cuff repair.

Methods: An institutional shoulder surgery registry query identified 627 patients who underwent arthroscopic rotator cuff repair between 2006 and 2015. Measured ROM, patient satisfaction, and patient reported outcome measures (PROMs) were analyzed for pre-operative, 3-month, 6-month, 1-year, and 2-year intervals. Subgroup analysis was performed based on tear size using retraction grade and number of anchors used.

Results: As an entire group, the plateau of maximum recovery for pain, function, and motion occurred at 1 year. Satisfaction with surgery was > 96% at all time points. At 3 months, 74% of improvement in pain and 45-58% of functional improvement was realized. However, only 22% of elevation improvement was achieved ($p < 0.001$). At 6 months, 89% of improvement in pain, 81-88% of functional improvement, and 78% of elevation improvement was achieved ($p < 0.001$) (Table I). Larger tears had a slower speed of recovery for SANE scores, forward elevation, and external rotation (Table II). Smaller tears had higher motion and functional scores across all time points. Tear size did not influence pain levels (Tables III and IV).

Conclusion: The plateau of maximum recovery following rotator cuff repair occurred at 1 year with high satisfaction rates at all time points. At 3-months, approximately 75% of pain relief and 50% of functional recovery can be expected. Larger tears have a slower speed of recovery.



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Introduction: To evaluate the role of combined ACL and Anterolateral Ligament (ALL) reconstruction in reducing graft rupture rates and improving return to sport in a high-risk population of young patients participating in contact sports.

Methods: A prospective series of 502 patients undergoing primary ACL reconstruction with either bone-patellar tendon-bone (BPTB $n=105$), quadrupled hamstring tendons (4HT $n=176$), or combined hamstring tendon and ALL reconstruction (HT+ALL $n=221$) was studied. Kaplan Meier analysis and multivariate Cox regression models were used to identify prognosticators of outcome.

Results: The mean age was 22.4 ± 4.0 years (range 16-30). The mean duration of follow-up was 38.4 months (range 24-54). The mean post-operative subjective IKDC score was 84.4 ± 11.6 . There was no difference between groups with respect to the postoperative improvement in IKDC or the mean side-to-side laxity difference 0.5 ± 0.9 mm. The rate of ACL graft failure in patients with HT+ALL grafts was 3.1 times less than with 4HT [hazard ratio, 0.327; 95% CI 0.13-0.758] and 2.5 times less than with B-PT-B [hazard ratio, 0.393; 95% CI 0.153-0.953]. There was no significant difference in the graft failure rate between 4HT and B-PT-B [hazard ratio, 1.204; 95% CI 0.555-2.66]. Overall, 93% of patients returned to sport at latest follow-up. Return to pre-injury level of sport was 64.6%. HT+ALL grafts were associated with higher odds of return to pre-injury level of sport than 4HT [Odds ratio, 1.938; 95% CI 1.174-3.224].

Conclusion: This study is the first to demonstrate that the rate of ACL graft failure with HT+ALL is significantly less than with ACL reconstruction performed with B-PT-B or 4HT only. HT+ALL is also associated with significantly greater odds of returning to the pre-injury level of sport when compared to 4HT. Clinical results at latest follow up show no evidence of increased complications or over-constraint compared to other common techniques of ACL reconstruction.

Anterolateral Ligament Reconstruction is Associated with Significantly Reduced ACL Graft Rupture Rates at a Minimum Follow Up of 2 Years

SS-11

May 18, 2017, 11:45 AM

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Single-Bundle Anterior Cruciate Ligament Reconstruction: Restoration of the Native Footprint - A Simple 3D CT Radiographic Evaluation for All Surgeons

SS-12

May 18, 2017, 11:50 AM

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Introduction: Anatomic ACLR leads to superior outcomes by restoring kinematics, reestablishing stability, minimizing recurrent injuries, and preventing degenerative changes. Surgical technique may play a role in the development and progression of knee OA. The ACL graft footprint position was evaluated following single-bundle, TT ACLR to determine if this technique can restore the



native ACL footprint while avoiding potential anteromedial portal complications.

Methods: Thirty-nine patients (24males, 15females; age 38.4 ± 9.9 years) that underwent single-bundle, TT ACLR by a single surgeon (1999-2015) were included. Radiographic evaluation ≥ 12 months following ACLR included radiographs, MRI, and CT scan. CT scan underwent 3D reconstruction to 0.625mm using the OsiriX program (Pixmeo, Geneva, Switzerland). The ratio of the posteroanterior and proximal-distal position for femoral footprints and medial-lateral and anteroposterior position for tibial tunnels were compared to normative cadaveric values using independent samples t-test ($p < 0.05$, corrected for multiple comparisons).

Results: Average femoral posteroanterior footprint position ($28.6 \pm 4.4\%$) was not statistically different from normative AM bundle footprint ($p = 0.0547$) but was from normative PL bundle footprint ($p = 0.0001$). Average femoral proximal-distal position ($39.8 \pm 9.0\%$) was statistically different from normative AM and PL bundle footprints ($p = 0.0044$, $p = 0.0001$). Average tibial medial-lateral footprint position ($47.3 \pm 2.0\%$) was not statistically different from normative AM or PL bundle footprints ($p = 0.4215$ and $p = 0.0909$). Average tibial proximal-distal position ($47.9 \pm 6.0\%$) was statistically different from normative AM bundle footprint ($p = 0.0001$) but not from normative PL bundle footprint ($p = 0.2041$).

Conclusion: The TT, single-bundle technique for ACLR yields a combined AM/PL bundle restoring anteroposterior and rotatory stability of the knee following ACL injury. These results suggest that the femoral footprint is similar to cadaveric values derived for the AM bundle on the femoral side and the PL bundle on the tibial side. This simple, easy to use program can aid all physicians in determining whether their anteromedial portal or TT technique successfully restores the anatomic ACL footprint.

The Relationship of Anterior Cruciate Ligament Insertion Sites to the Distal Femoral Growth Centers: an MRI study

SS-13

May 18, 2017, 11:55 AM

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Introduction: Anterior cruciate ligament (ACL) injury and reconstruction have become increasingly common in the pediatric and adolescent populations. The ACL is close to the distal femoral physis and posterior epiphysis, a growth center for the distal femur. We sought to explore the changes in the anatomic relationship of the two bundles of the ACL in order to provide guidelines for surgical reconstruction.

Methods: We reviewed knee MRIs in patients ages 6-18 (IRB approved), excluding patients with cruciate injury. Standardized measurements of anterior-medial (AM) and posterior-lateral (PL) bundle area, distance from physis

and posterior epiphysis to edge and center of each bundle were evaluated for each MRI.

Results: 154 studies were included. The footprints of each bundle increase predictably with age. The PL bundle footprint is larger than the AM bundle in both genders (16.2 ± 5.3 vs. 12.0 ± 4.1 mm², $p < 0.001$). The average distance across all groups from the center and edge of the AM bundle to the physis was 8.2 ± 1.9 mm and 7.0 ± 1.8 mm respectively (figure). The average distance of the PL bundle center and edge to the posterior epiphysis was 5.6 ± 1.9 mm and 4.4 ± 1.8 mm respectively. Patients had an increase in the average distance from the AM bundle to the physis with age, which was < 10 mm in skeletally immature patients. Males had consistent increase in distance of the PL bundle to the physis. Minimum distance increased gradually with age.

Conclusion: We demonstrated increase in area of each bundle footprint with age, with the PL bundle footprint being larger. We found that the AM bundle inserted < 10 mm from the distal femoral physis in patients under age 15, closer than previously recognized, while the PL bundle is adjacent to the posterior epiphysis. This should provide better guidelines for surgical reconstruction in the pediatric patient to avoid growth disturbance.

Thirty-year Experience with ACL reconstruction using Patellar Tendon: A Critical Evaluation of Revision and Reoperation

SS-14

May 18, 2017, 12:00 PM

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Introduction: To describe and analyze a single surgeon's experience with primary and revision single-bundle ACLR over a 30-year focusing on incidence and risk factors for revision and reoperation.

Methods: Patients who underwent ACLR from 1986 to 2016 were identified from a prospectively maintained database. Covariates of interest included age, sex, time, and graft selection. Outcomes of particular interests included reoperation rates after primary/revision ACLR, and rate of revision ACLR.

Results: A total of 2450 ACL reconstructions (mean age, 29 years; 58% male) were reviewed. Among primary ACL reconstructions performed ($n = 2225$), 68% had BTB autograft and 30% had a BTB allograft. Patients undergoing autograft and allograft ACLR had an average age of 22 and 37 years, respectively ($P < .05$). The rate of personal ACLR revision was 1.8% ($n = 40$) for primary cases and 3.5% ($n = 7$) for revision cases. There was a higher revision rate among female (2.6%) than male patients (1.2%), particularly in patients under 20 years of age. There was a higher revision rate among primary allograft (2.7%) than autograft (1.3%) reconstruction, with a greater difference in patients under 30. Low dose irradiation for sterilization did not affect allograft revision



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