

tion activity and immune response to surgical intervention.

Bone-patellar Tendon-bone Autograft vs Hamstring Autograft Anterior Cruciate Ligament Reconstruction in the Young Athlete: A Retrospective Matched Analysis with 2 to 10 year Follow-up (SS-41) *Eric Kropf, M.D., Randy Mascarenhas, M.D., Michael Tranovich, B.A., James J. Irrgang, Ph.D., P.T., A.T.C., Freddie H. Fu, M.D., D.Sc., Christopher D. Harner, M.D.*

Introduction: Patellar tendon and hamstring autografts are the most common graft choices in anterior cruciate ligament (ACL) reconstruction, but the ability of these grafts to return young athletes not just to activity, but to their previous level of play is still somewhat uncertain. This study sought to examine clinical and patient-reported outcomes as well as return to sport in athletes younger than 25 following ACL reconstruction with either patellar tendon (PT) or hamstring (HS) autografts using a matched-pairs case-control experimental design.

Methods: Twenty-three matched pairs were obtained based on gender (56.5% Female), age (18.3 ± 2.5 yrs PT vs. 17.6 ± 2.6 HS), and length of follow-up (4.7 ± 2.1 yrs PT vs. 4.2 ± 1.6 HS). All patients reported participating in very strenuous (soccer, basketball etc.) or strenuous (skiing, tennis etc.) sporting activity 4-7 times/week prior to their knee injury. Patient-reported outcomes included return to play data, the IKDC, SAS, ADLS, and SF-36 forms. Clinical outcomes included knee range of motion, laxity, and hop/jump testing.

Results: Most patients in both groups were able to participate in very strenuous or strenuous sporting activity at follow-up [18 (78.3%) PT vs. 19 (82.6%) HS]. However, only 13(56.5%) of the PT subjects and 10 (43.5%) of the HS patients were able to return to pre-injury activity levels in terms of frequency and type of sport ($p=.63$). HS patients showed higher ADLS ($p<.01$) and SAS ($p<.01$) scores and better restoration of extension ($p<0.05$).

Conclusion: While both hamstring and patellar tendon graft types allow young athletes to return to some degree of strenuous or very strenuous sporting activity, only approximately half of all patients were able to return to their pre-injury level in terms of type and frequency of sport. Patellar tendon reconstruction may allow more patients to return to the same level of pre-injury sport, but hamstring grafts lead to better preservation of extension and higher patient-reported outcome scores.

Outcomes after Transphyseal Anterior Cruciate Ligament Reconstruction in Patients with Open Growth Plates (SS-42) *Christopher M. Larson, M.D., Christie Heikes, M.D., Chris Ellingson, M.D., M. Russell Giveans, Ph.D.*

Introduction: Concerns about growth disturbance after transphyseal ACL reconstruction in the presence of open growth plates exist. The hypothesis was that transphyseal soft tissue ACL reconstruction in individuals with open growth plates would result in minimal risk for growth disturbance.

Methods: Between 5/03 and 10/07, 30 skeletally immature individuals with a mean age of 13.9 years (range 9 - 15 years) underwent ACL reconstruction with soft tissue grafts (22 hamstring autograft, 8 tibialis anterior allograft) using extraphyseal fixation. 22 knees had wide open growth plates and 8 knees had partially open growth plates. Outcomes were prospectively evaluated with KT-1000 measurements, IKDC, Cincinnati, and Lysholm scoring. Radiographs were evaluated for asymmetric physeal closure, growth arrest lines, and knee alignment, and patients were also clinically evaluated for limb alignment and leg length inequality at minimum 2 year follow-up.

Results: The mean knee scoring was 93.8 pts (IKDC), 97.0 pts (Cincinnati), and 92.4 pts (Lysholm) at 3.2 years mean follow-up (range, 1 - 6 years). The mean KT-1000 side to side difference at most recent follow-up was 0.77 mm. Minimum two-year radiographic and clinic evaluation revealed three Harris growth arrest lines, no asymmetric physeal closure, and a mean side to side difference of 1.4 degrees for radiographic tibiofemoral angle, and 0.3cm leg length inequality. Three patients sustained a graft re-rupture (10.0%).

Conclusion: Transphyseal ACL reconstruction with soft tissue grafts and extraphyseal fixation in patients with open growth plates resulted in good to excellent outcomes in 90% without evidence for clinically significant growth abnormalities.

Fatigue Mediated Alteration of Knee Proprioception in the Adolescent Athlete: An Implication for Sports Related Injuries (SS-43) *Henry T. Goitz, M.D., Gaurav Jindal, M.D., Clinton Brawner, M.S., Nancy Hall, P.A., A.T.C., Clifford M. Les, D.V.M., Ph.D., Steve Keteyian, D.V.M., Ph.D., M.R.C.V.S.*

Introduction: Knee injuries generally occur late in the course of athletic play, suggesting that fatigue may contribute to altered neuromuscular control. The present study aims to investigate the effect of whole body fatigue on knee joint proprioception.

Methods: This was an IRB approved, prospective study, with data gathered on thirty-six healthy volunteers. All participants were male, healthy (high school) students with ages between 15 to 18 years (average 16 years) with no history of any neuromuscular disorders or lower limb injuries. Data regarding proprioception was measured with the Biometrics Electrogoniometer, Model ADU301. The Electrogoniometer was secured to the subject's dominant leg. Each subject was then verbally instructed to squat to a specific angle. Once the desired angle was reached, the subject was instructed to hold the angle for 3-5 seconds and then to return to a standing position. From the standing position, subject was asked to replicate the angle previously positioned. The protocol was carried out for a knee flexion range between 10 degree and 60 degrees at 5 degree intervals, where these target angles were chosen in a randomized order for each subject. Measurements were taken before and after a reproducible fatigue protocol. "Proprioceptive error" was defined as the achieved angle, minus the target angle. Proprioceptive error was evaluated in a two-way repeated-measures ANOVA, examining the effect of fatigue state and target angle. Alpha=0.05 for main effects, alpha=0.1 for interactive effects, and post-hoc Fishers LSD tests were performed at alpha=0.05 for all significant effects.

Results: There was a significant effect of target angle on proprioceptive error ($p < 0.001$); subjects consistently overshot the target angle at lower target angles. Proprioceptive error was significantly greater ($p < 0.001$) in the fatigued state. There was a significant target angle/fatigue interaction ($p = 0.071$); post-fatigue errors were significantly greater than pre-fatigue errors at target angles of 10-30, and 45-50 degrees.

Conclusion: Study subjects demonstrated statistically significant worsening of proprioception abilities with fatigue when measured in a closed chain, double leg stance, i.e., a functionally relevant position. Our study suggests that a fatigue mediated alteration in proprioception is a cause for an altered ability of body to dynamically stabilize the knee joint suggesting an increased incidence of sports related injuries with fatigue. This is particularly evident at the knee flexion angles that generally correlate with the risk of non-contact ACL injury, namely less than 30 degrees of knee flexion.

Anterior Cruciate Ligament Reconstruction Using Autologous Platelet Concentrate: Clinical, Functional Arthrometric and MRI Evaluation (SS-44) David Figueroa, M.D., Rafael Calvo, M.D., Alex Vaisman, M.D., Patricio Melean, M.D., Gonzalo Espinoza, M.D., Francisco Figueroa, M.D., Nicolas Zilleruelo, M.D.

Introduction: To evaluate clinical, functional and arthrometric outcomes as well as integration and maturation of STG grafts with Magnetic Resonance Imaging (MRI) in Anterior Cruciate Ligament reconstruction in two groups of patients that underwent ACL reconstruction with and without the use of Autologous Platelet Concentrate (APC) Hypothesis: The use of APC in ACL reconstruction could improve the maturation and the integration of the grafts.

Methods: A randomized single blinded evaluator prospective study was performed, two consecutive series of patients reconstructed in 14 months period; 30 with APC use (A) and 20 as control (B). At 6 months Lysholm, IKDC scores, Isokinetic and arthrometric parameters and an MRI evaluation was performed, observing the graft's maturation and presence or absence of synovial fluid in bone tunnel-graft interface. To facilitate interpretation a scoring scale was designed to evaluate graft integration and maturation ANOVA and Chi square test were performed

Results: There was no statistical difference between Lysholm, IKDC scores and Isokinetic and KT 1000 test. Presence of synovial fluid in bone graft interface: Negative: A 86.84%, B 94.74%. Average scores: A 1.9, B 1.96 points ($p = 0.720$). Autograft signal pattern: Disorganized: A 2.63%, B 5.26%. Hypointense: A 63.16%, B 42.11%. Isointense: A 34.21%, B 52.63%. Hyperintense: 0% in both groups. Average scores: A 2.58, B 2.32 points ($p = 0.316$). Final average scores: A 4.45, B 4.2 points ($p \geq 0.05$). Poor integration: A 2.63%, B 5.26% ($p = 0.214$). Good integration: A 97.37%, B 94.74% ($p = 0.784$).

Conclusion: No significant differences were found between groups related to clinical, functional or arthrometric outcomes. No differences were found when observing graft's signal pattern. A trend to more positives was found when evaluating the presence of synovial fluid in group A which could mean less integration. A trend to a more hypointense graft signal was also found in this group; this could be interpreted as better ligamentization.

Anterolateral Transtibial PCL Reconstruction Combined with Reconstruction of Posterolateral Corner Insufficiency: Comparison of Single-bundle vs Double-bundle PCL Reconstruction over a 2-6 Year Period (SS-45) Byoung-Yoon Hwang, M.D., Sung-Jae Kim, M.D., Yong-Min Chun, M.D., Sul-Gee Kim, M.D., In-Kee Cho, M.D., Sung-Hwan Kim, M.D., Duck-Hyun Choi, M.D., Dae-Young Lee, M.D.

Introduction: There is a paucity of clinical studies comparing single- and double-bundle posterior cruciate