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| Student Name: Reid MedlinTopic: Outcomes Associated with the Use of Patellar Tendon vs Hamstring Tendon Autografts |
| **Author/ Year** | **Purpose/Design/ Subjects** | **Intervention or description**  | **Outcome Measurements** | **Findings** | **Comments****/limitations** |
| Mohtadi N, et al. 2011. | Cochrane Review (Level 1a)19 RCTs and quasi-randomized control trials for 1597 young to middle-aged adultsNo available consensus on choice between patellar and hamstring tendon grafts for ACL reconstructive surgery | Arthroscopically assisted ACL reconstructions using either a PT or a HT autograft | Functional assessments (single hop test), Return to activity/level of sport participation (Cincinnati score, questionnaire, IKDC score, Tegner activity level, Lysholm score) subjective knee scores, static stability measures, ROM, strength testing w/ Cybex Dynamometer | Neither graft was better with functional assessment, return to activity, subjective measures of outcome, or IKDC scores.PT grafts more likely to have statically stable knee, but are also more likely to have problems in anterior knee (kneeling) | Lack of consistency with how outcomes are measured and not enough long-term follow up data. Subjective knee scores rarely reported. 12 of 19 trials were only quasi-randomized. The only blinding possible is of outcome assessors and was only done in 2 of 19 trials. Incomplete outcome reporting and follow up loss |
| Taylor D, et al. 2009 | RCT (Level 1b)Hypothesized no significant difference in outcomes between HT and PT autografts after ACL reconstructionsN=64, (32 PT, 32 HT grafts)Mean age PT= 21.7Mean age HS=22.1Active military population with vigorous lifestyle | ACL reconstruction using either a PT or a HT autograft | Single-legged hop test for distance and 6-m single-legged hop test for time, Biodex Medical System 3 dynamometer for peak isokinetic concentric knee extension and flexion torqueSingle Assessment Numeric Evaluation score, Lysholm score, IKDC score, and Knee Injury and Osteoarthritis Outcome Score. | No statistically significant differences between 2 groups on any objective, subjective, or patient-reported measures (single leg hop test, SANE or KOOS subscale, ROM, patient reported pain with kneeling, isokinetic strength,  | Objective evaluations of overseas study participantswere not all obtainable3 year follow up considered only midterm duration study of ACL reconstructionDiffered from other RCTs in patient age and activity level required to return to more vigorous because of military affiliation |
| Mascarenhas R, et al. 2012 | Matched-pairs, retrospective case-control study (Level 3b)N=23 matched pairs, follow-up ranging from 2-10 years (57% women, mean age 18 years old +/- 3 years for PT and HS)Hypothesis: hamstring autograft for ACLreconstruction would provide no statistically significant differences compared with PT autograft | ACL reconstruction with either bone-patellar-bone or hamstring tendon autografts | Patient Reported: return to play data, IKDC, SAS, ADLS and SF-36 formsClinical: Knee ROM, manual assessment of knee laxity (Lachman and pivot shift testing), KT-100 arthrometer testing, functional strength using hop and vertical jump indices, post-op radiographs | Post-op level of return to sporting activity was not significantly different between groupsHS patients showed higher patient-reported outcome scores, better preservation of extension ROM and less radiographic evidence of osteoarthritis | Low patient numbers, did not measure kneeling pain, isokinetic strength, and harvest-site symptoms, post-hoc power analysis revealed that with a larger sample size, more significant differences could have been observedBecause of lack of evident difference between groups, likely that both graft types are similar in terms of ability to restore patient-perceived activity level post-surgery |
| Ejerhed L, et al. 2003 | Prospective randomized clinical trial (Level 1b)N=71 (34 PT, 37 HS)Mean age PT=26(range 14-49)Mean age HT=29(range 15-59)Hypothesis: Use of semitendinosus tendon grafts will cause less donor site morbidity and result in better knee-walking ability | Arthroscopic reconstructionwith interference screw fixation and use of either PT or Semitendinosus tendon graft | Lachman test, KT-1000 arthrometer for stabilityLysholm score, Tegner activity level, and IKDC scores ROM, measurement of disturbances in sensitivity in anterior knee, knee walking test, single-legged hop test, isokinetic concentric peak torque test on Cybex dynamometer for functional performance | Both grafts have similar improvements in function and laxityKnee-walking test rated difficult or impossible to perform by 53% of PT group, but only 23% of HS groupNo significant differences in subjective anterior knee pain, loss of extension or flexion | Authors believe that HS harvesting is better for people who must be on their knees a lot because the resulting damaged neuromas are not loaded when in contact with the floorToo few strength measurements from PT group and not able to compare groups on flexion strength |
| Aune A, et al. 2001 | Randomized study (Level 1b)N=72 (37 HS, 35 PT)Mean age= 26(range=15 to 50)Subacute rupture= 18 patientschronic rupture=54 patientsHypothesis: no difference in outcomewith regard to stability, strength, function, subjective assessment,and donor-site morbidity between ACL reconstructionswith HS grafts vs.PT grafts | ACL reconstruction using either a PT or a HT autograft & 2 different techniques of fixation | Knee joint laxity using KT-1000 knee arthrometer, knee function using Cincinnati knee score system, isokinetic strength using Cybex 6000 dynamometer, stairs hopple test and single-legged hop top used for lower limb function, VAS for patient satisfaction at each follow up, kneeling test (knee walking test) | Better results in patient satisfaction, functional ability, quadriceps muscle strength, and endurance for HT group at 12 months, these parameters equalized after 2 yearsHT group had less anterior knee pain when kneeling, but lack of hamstring muscle strength and endurance compared to PT groupLess donor site pain present in HT group compared to PT group | Possible performance bias-2 different fixation techniques were used for the 2 graftsExclusion of patients and loss to follow-up indicated transfer biasSmall study size may not have allowed for detection of small differences between groups (possible Type II error)Authors propose that patients with HS graft need to follow an aggressive strengthening program for knee flexors |
| Li, et al. 2012 | Systematic review and meta-analysis of 9 RCTs including 798 total patients (Level 1a)Follow-up ranged from 24-105 monthsHypothesis: Similar stability and functional outcomes with both autografts, with BPTB being associated with more post-operative complications | ACL reconstruction comparing BPTB to HT autografts | 1995 IKDC score, Lachman test, pivot test, anterior knee and kneeling pain, extension and flexion loss, graft failure, infection rate, patellofemoral crepitation | Hamstring and bone-patellar tendon-bone autografts provide similar results on knee joint function, anterior stability, flexion and extension loss, graft failure Statistically significant differences were found in regards to the Pivot test, with HT autografts being inferior to BPTB autografts in maintaining knee joint stabilityHigher incidence of post-operative pain and complications in BPTB group | Cautious interpretation of these knee joint stability measures must be made, as the authors reported nothing of the post-rehabilitative efforts of the included studiesOnly 3 of the 9 trials utilized adequate allocation concealment |
| Goldblatt, et al. 2005 | Systematic Reivew and Meta Analysis (Level 1a)11 studies with 1,039 patients included, with average follow up of 2 years | Compared effectiveness of ACL reconstruction using either BPTB or HT grafts | Lachman, giving-way, KT-1000 manual-max side-to-side difference, flexion/extension loss, graft rupture, return to previous level of activity, pivot-shift, complications, IKDC score, anterior knee pain | Incidence of instability is not significantly different between BPTB and HT grafts; however, BPTB was more likely to have normal Lachman, pivot-shift, KT-1000 manual-max side-to-side differences <3mm and fewer results with flexion lossHT had less kneeling pain, extension loss and patellofemoral crepitance | “If priority to outcomevariables can be assigned by the individual seekingreconstruction, the surgeon and patient will be able tomake an educated decision about the most appropriategraft for that individual.”“Rather thanmake generalizations about a particular graft, onemust assign significance to individual outcomes. Thepatient must define functional expectations and desiresfrom reconstruction, and prioritize these based onpersonal importance.” |
| Mohammadi et al. 2013 | RCT (Level 1b)N=42 male soccer players prospectively randomized (21 PT, 21 HT) and 21 healthy matched controlsMean age 25 yr in all 3 groups | ACL reconstruction using either a PT or HT autograft, compared with healthy controls with no known lower extremity pathologies | Cybex dynamometer for quad and hamstrings strength testing, hop tests (single, triple, and crossover hop), jump landing | At time of return to sport (8 months post-op), hamstring group had higher quad peak torque at studied velocities, statistically greater values on triple hop, cross-over hop and jump-landing testsBoth graft groups had significantly lower quad/hamstring peak torques and hop/jump tests compared to healthy controls | Results are only valid for the specific time period of 8 months post-op (return to sport)Included patients with and without partial meniscectomy |
| Zaffagnini S, et al. 2011 | RCT (Level 1b)N=79 (39 PT, 40 HT)Mean ages:PT: 26 HT: 27 Follow up: 8 years | ACL reconstruction using either a single-bundle PT or a double-bundled HT autograft | Objective and subjective IKDC scores, Tegner level, manual-max displacement with HT-2000 arthometer, radiographic evaluation with IKDC, time to return to sport, anterior knee pain | IKDC scores were similar in both groupsSignificantly higher Tegner level, PROM recovery, faster sport resumption, lower glide pivot-shift phenomenon, and lower-re-intervention rates found in HT groupRadiographic evaluation showed significantly lower degenerative changes in HT group at final follow up | Anterior knee joint laxity measurements were similar for both groups, so no clear superior graft in this aspect |
| Sajovic M, et al. 2006 | RCT (Level 1b)N=64 (32 PT, 32 HT)Mean age PT=27 (16-46 range)Mean age HT=24 (14-42 range) | ACL reconstruction using either a PT or a HT autograft | Lysholm knee score questionnaire, IKDC activity level for functional outcome, ROM, Lachman test, anterior drawer test, pivot shift test, KT-2000 arthrometer for knee stability, subjective knee pain ratings, single legged hop test | No statistically significant differences in Lysholm, clinical and KT-2000 arthrometer testing, anterior knee pain, IKDC scores or single-legged hop testNo difference in # of donor site symptoms between groupsGreater # of patients with PT grafts who had OA after 5 years | 3 patients lost to follow-upIncluded patients with additional meniscal injuries, not ACL tears onlyHigh IKDC results could be high because of limited number of patients |

**Resources**

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