

Increased Risk of Revision After Anterior Cruciate Ligament Reconstruction With Soft Tissue Allografts Compared With Autografts

Graft Processing and Time Make a Difference

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Background: The optimal graft for anterior cruciate ligament reconstruction (ACLR) remains controversial.

Purpose: To compare the risk of aseptic revision between bone–patellar tendon–bone (BPTB) autografts, hamstring autografts, and soft tissue allografts.

Study Design: Cohort study; Level of evidence, 2.

Methods: Prospectively collected ACLR cases reconstructed with BPTB autografts, hamstring autografts, and soft tissue allografts were identified using the Kaiser Permanente ACLR Registry. Aseptic revision was the endpoint. The type of graft and allograft processing method (nonprocessed, <1.8-Mrad irradiation with and without chemical processing [Allowash or AlloTrue], ≥1.8-Mrad irradiation with and without chemical processing, and chemical processing alone [BioCleanse]) were the exposures evaluated. Analyses were adjusted for age, sex, and race. Kaplan-Meier curves and Cox proportional hazards models were employed.

Results: The cohort included 14,015 cases: there were 8924 (63.7%) male patients, there were 6397 (45.6%) white patients, 4557 (32.5%) ACLRs used BPTB autografts, 3751 ACLRs (26.8%) used soft tissue allografts, and 5707 (40.7%) ACLRs used hamstring autografts. The median age was 34.6 years for soft tissue allografts, 24.3 years for hamstring autografts, and 22.0 years for BPTB autografts. The crude nonadjusted revision rates were 85 (1.9%) in BPTB autograft cases, 132 (2.3%) in hamstring autograft cases, and 83 (2.2%) in soft tissue allograft cases. After adjusting for age, sex, and race, compared with hamstring autografts, a higher risk of revision was found with allografts with ≥1.8 Mrad without chemical processing after 2.5 years (hazard ratio [HR], 3.88; 95% CI, 1.48-10.12) and ≥1.8 Mrad with chemical processing after 1 year (HR, 3.43; 95% CI, 1.58-7.47) and with BioCleanse processed grafts at any time point (HR, 3.02; 95% CI, 1.40-6.50). Nonprocessed allografts and those irradiated with <1.8 Mrad with or without chemical processing were not found to have a different risk of revision compared with hamstring autografts. Compared with BPTB autografts, a higher risk of revision was seen with hamstring autografts (HR, 1.51; 95% CI, 1.15-1.99) and BioCleanse processed allografts (HR, 4.67; 95% CI, 2.15-10.16). Allografts irradiated with <1.8 Mrad with chemical processing (Allowash or AlloTrue) (HR, 2.19; 95% CI, 1.42-3.38) and without chemical processing (HR, 2.31; 95% CI, 1.40-3.82) had a higher risk of revision, as did allografts with ≥1.8 Mrad without chemical processing after 2 years (HR, 6.30; 95% CI, 3.18-12.48) and ≥1.8 Mrad with chemical processing (Allowash or AlloTrue) after 1 year (HR, 5.03; 95% CI, 2.30-11.00) compared with BPTB autografts. **Nonprocessed allografts did not have a higher risk of revision compared with autografts.** With the numbers available, direct comparisons between the specific allograft processing methods were not possible.

Conclusion: When soft tissue allografts are used for ACLR, processing and time from surgery affect the risk of revision. Tissue processing has a significant effect on the risk of revision surgery, which is most profound with more highly processed grafts and increases with increasing follow-up time. Surgeons and patients need to be aware of the increased risks of revision with the various soft tissue allografts used for ACLR.

Keywords: ACL; autograft; allograft; revision; ACL reconstruction; BPTB; soft tissue allograft
