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Allograft Bone Dowels Show Better Incorporation in Femoral versus Tibial Tunnels in Two–Stage Revision Anterior Cruciate Ligament Reconstruction: A CT-based Analysis

Purpose: The purpose of this study was to quantitatively evaluate the radiographic outcomes of allograft dowels used in two-stage revision ACLR and to compare the incorporation rates of dowels placed in tibial and femoral tunnels.

Methods: Prospective review of patients who underwent 2-stage revision-ACLR with allograft bone dowels. Inclusion criteria were tibial/femoral tunnel diameter of ≥14 mm on pre-operative computed tomography (CT) or overlapping of prior tunnels with planned tunnels**.** Second stage timing was determined based on qualitative dowel integration on CT obtained at ~3 months after first stage. Quantitative analysis of incorporation rates was performed with the Union Ratio (UR) and Occupying Ratio (OR) on post-operative CT scans.

Results: 21 patients, aged 32.1 ± 11.4 (range, 18-50) years, were included. Second-stage procedures were performed at 6.5 ± 2.1 (range, 2.4 – 11.5) months after first-stage revision. All dowels showed no signs of degradation at the host bone/graft junction at the second-stage procedure. The average diameter of the dowels placed in tibial tunnels were greater than those placed in femoral tunnels (16.1 mm [SD, 2.3 mm] vs 12.4 mm [SD, 1.6 mm]; $p = < .05$). CT was obtained at mean of 121 ± 28 (range, 59-192) days after the first-stage surgery. There was no difference between the OR of femoral and tibial tunnels (87.6% [SD, 4.8%] vs 85.7% [SD, 10.1%]; $p = .484$), however, the UR was significantly higher in femoral tunnels (83% [SD,

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6.2%] vs 74% [SD, 10.5%], $p = 0.005$). The intraclass correlation coefficients (ICC) of OR and UR measurements indicated good reliability.

Conclusion: Allograft bone dowels are a viable graft choice to improve bone stock in the setting of a staged revision ACL reconstruction. Allograft dowels placed in femoral tunnels had a higher healing union ratio than tibial tunnel allografts, with no difference seen in occupying ratio.