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# Relation Between Tunnel Enlargement and Graft Integration, and the Effect of Remnant-Preserved Technique on Tunnel Enlargement after Double-Bundle Anterior Cruciate Ligament Reconstruction with Semitendinosus Autografts

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**Summary**:
Tunnel enlargement did not influence graft-tunnel integration at 12 months after ACL reconstruction, and remnant-preserved ACL reconstruction did not decrease the incidence of tibial tunnel enlargement after ACL reconstruction.

**Abstract**:
Purpose: The relation between the tunnel enlargement and graft-tunnel integration has not been evaluated sufficiently to date. Furthermore, tibial remnant-preserved ACL reconstruction was expected to reduce the tibial tunnel enlargement. The purposes of this study were to evaluate the relation between the tunnel enlargement and the graft-tunnel integration, and to evaluate the effect on remnant-preserved technique for tibial tunnel enlargement after ACL reconstruction.
Methods: From April 2012 to March 2014, 112 consecutive double-bundle ACL reconstruction using ST grafts were performed. The inclusion criteria were primary ACL reconstruction, and subjects who underwent CTs one week and 12 months postoperatively and MRIs 12 months postoperatively. The exclusion criteria were revision surgery, multiligament lesion, osteoarthritis and chondral lesions requiring treatment. A total of 48 knees were enrolled in this study: 25 knees had ACL reconstruction without preserved remnant (remnant < 25% of intra-articular portion of graft) (NP group), and 23 knees had ACL reconstruction with preserved remnant (remnant > 25%) (RP group). The tunnel measurement was taken digitally at 10mm from the intraarticular outlet of both the femoral and the tibial tunnels in the sagittal and axial views of CT, respectively, perpendicular to the direction of the long axis of the tunnels. The percentage change in the diameter between the scans performed at 1 week and 12 months was defined as the degree of tunnel enlargement. The incidence of tunnel enlargement was determined by the number of femoral or tibial tunnels that enlarged more than 20%. At 12 months after reconstruction, axial (for tibial tunnel integration) and sagittal (for femoral tunnel integration) 1.5-T MRI sections with proton density T2-weighted sequence were obtained. Regarding graft-tunnel interface, positive or negative for synovial fluid presence was assigned to each: 1 and 2. The chi-square test was used to characterize the relationship of tunnel enlargement to tunnel integration at 12 months after ACL reconstruction. Comparison between the NR and RP groups was performed using the chi –square test for the incidence of tibial tunnel enlargement.
Results: The incidences of the femoral AM and PL tunnel enlargements were 42.5% and 40.4%, respectively, and those of the tibial AM and PL tunnels were 30.3% and 34.2%, respectively. The incidence of the graft-tunnel integration at 12 months after reconstruction in the negative tunnel enlargement was 62.9%, while that in the positive tunnel enlargement was 61.6%, and there were no significant differences between them =0.98). Furthermore, there were no significant differences of the incidence of tibial tunnel enlargement between the NR and RP groups (NR group: AM; 33.3%, PL; 20.0%, RP group: AM; 33.3%, PL; 53.3%. p=0.24).
Conclusions: Tunnel enlargement did not influence graft-tunnel integration at 12 months after ACL reconstruction. Remnant-preserved ACL reconstruction did not decrease the incidence of tibial tunnel enlargement after ACL

reconstruction.