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Femoral Aperture Fixation Versus Cortical Fixation for ACL Reconstruction Using Autologous Hamstring Graft: A Computer Navigation Study

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Summary:

Using computer navigation in 25 patients with an acute isolated ACL rupture, undergoing soft issue ACL reconstruction using autologous hamstring graft, the addition of femoral aperture fixation to cortical suspensory fixation significantly reduced both the anterior translation and internal rotation during the pivot shift, without altering the length-tension of the graft.

Abstract:

Introduction and aims: The influence of the method of graft fixation used on the function of a soft tissue ACL graft remains unknown. Our aim was to compare the effect of the method of femoral fixation used on the ability of soft tissue ACL graft to control the pivot shift.

Methods: Patients presenting with an acute isolated ACL rupture and who satisfied the study criteria, were invited to participate. Study participants underwent an "anatomical" ACL reconstruction using an autologous hamstring graft. Computer navigation was used to measure the anterior translation (AT) and internal rotation (IR) during the pivot shift test. This was performed prior to reconstruction, and was repeated twice. First, following ACL reconstruction using tibial interference screw and femoral cortical fixation (or "button"), and again, following femoral interference screw fixation. The length of the intra-articular graft was measured before and after the addition of the femoral screw. Changes in AT and IR at each stage were compared using statistical analysis (p<0.05) Results: Between 1st March 2015 to 21st June 2015, twenty-five patients took part in the study. There were 69 potential candidates for this study but 44 patients were found to have additional injuries at arthroscopy that excluded them from the study. There were 10 male and 15 females. The mean age of the patients was 25 years (SD = 6.2). Sixteen of the knees were dominant, 9 were non-dominant.

We used paired samples tests to compare AT before reconstruction with that after reconstruction using femoral cortical fixation, and with that after the addition of the femoral interference screw. Similarly we compared IR before reconstruction with that after reconstruction with cortical fixation, and then aperture fixation on the femoral side. For each comparison a post-hoc power analysis using generalised linear models confirmed adequate power of the study. Before ACL reconstruction using femoral cortical suspension these figures were significantly reduced to 6.2mm (SD 3.5), and 12.5 (SD 3.2), P<0.001, respectively. The addition of the aperture fixation was associated with a further significant reduction to 4.6mm (SD 3.2), and 10.4 (SD 2.7), respectively, P<0.001. There was no measurable change in the length of the intra-articular graft.

Conclusions: The addition of femoral aperture fixation to suspensory fixation, significantly reduces the anterior translation and internal rotation that occurs during the



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pivot shift test. When the same bone tunnels are used, the method of graft fixation used significant effects the bio-mechanical function of a soft tissue ACL graft.