

The Effect of Platelet-Rich Fibrin on Donor Site Healing and Anterior Knee Pain Following Bone–Patellar Tendon–Bone ACL Reconstruction in Athletes: A Randomized Controlled Trial

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INTRODUCTION:

Bone–patellar tendon–bone (BPTB) grafts are the gold standard in anterior cruciate ligament (ACL) reconstruction, particularly in athletes. However, donor site morbidity and anterior knee pain remain significant clinical concerns. This study aimed to evaluate the impact of platelet-rich fibrin (PRF) on bone and ligament defect healing and anterior knee pain in patients undergoing BPTB ACL reconstruction.

METHODS:

This randomized controlled study included 55 male athletes (aged 17–45 years) with isolated ACL rupture treated with anatomical BPTB ACL reconstruction. Patients were randomized into two groups: the PRF group (n = 26), in which the donor site defect was filled with autologous PRF, and the control group (n = 29), in which the defect was left unfilled. All patients were preoperatively assessed using the Tegner Lysholm Knee Scoring Scale, Modified Cincinnati Rating System, IKDC, and Tegner Activity Score.

Postoperative MRI was performed on day 2 or 3 to measure the depth and width of the patellar bone defect and the width of the patellar ligament defect. Follow-up evaluations were conducted at 4, 8, and 12 months postoperatively and included clinical scoring, MRI, kneeling pain evaluation, and VAS scoring.

RESULTS:

At the 8-month follow-up, patients in the PRF group reported significantly less kneeling pain ($p < 0.05$). Cochrane's Q test and Bonferroni-adjusted pairwise comparisons confirmed statistically significant differences across follow-ups. McNemar's χ^2 test with Bonferroni correction revealed significant improvement in kneeling pain within the PRF group, but not in the control group.

VAS analysis (Wilcoxon Signed Rank Test with Bonferroni correction) showed a statistically significant reduction in pain over time in the PRF group ($p < 0.001$), while in the control group significant improvement was observed only between the 4th and 12th months, and between the 8th and 12th months.

MRI analysis revealed statistically significant changes in the depth and width of bone defects over time in both groups, with faster healing in the PRF group, particularly in defect width at 8 and 12 months ($p < 0.05$). While between-group differences in defect depth were not significant at any single time point, bone defect width was significantly smaller in the PRF group at the 8- and 12-month follow-ups.

The width of the patellar ligament defect decreased over time in both groups, but a statistically significant difference in favor of the PRF group was observed only at 12 months ($p < 0.05$).

Functional scores (Tegner Lysholm, Modified Cincinnati, IKDC, and Tegner Activity Score) improved over time in both groups, with no statistically significant differences between groups at any individual follow-up.

DISCUSSION AND CONCLUSION:

The application of autologous PRF to the donor site during BPTB ACL reconstruction significantly accelerates bone and ligament healing and reduces anterior knee pain during kneeling, particularly between 8 and 12 months postoperatively. Functional recovery was comparable between groups, but structural healing was more favorable in the PRF group.

