

Tibial Tunnel Fluid Proliferation: Comparing Retrograde and Antegrade Fixation Techniques

C. Morgan, M.D. - Morgan Kalman Clinic
Arthrex Research and Development
Arthrex Medical Education

Objective

Many advantages are hypothesized for all-inside reconstruction using a RetroScrew and RetroCutter. One of these proposed advantages is a reduction in synovial fluid proliferation in the tibial tunnel. The proliferation of synovial fluid may lead to tunnel widening and bone necrosis in the tibial tunnel. The purpose of this study is to elucidate differences in fluid proliferation in tibial tunnels when grafts are fixated using an all-inside technique compared to a traditional transtibial technique.

Methods and Materials

Five matched pairs of human cadaver tibias were dissected of all soft tissue. Ten bovine extensor tendons were whip-stitched to create 9 mm ACL grafts. For group 1, a tibia from each matched pair was randomly selected to receive a tunnel created using a 9 mm transtibial drill, and graft fixated using a 9 mm x 28 mm Bio-Interference Screw inserted distally. For group 2, the contralateral tibia specimen received a tunnel created using a 9 mm RetroCutter, and a graft fixated with a 9 mm x 20 mm RetroScrew inserted proximally. Post fixation, a dam was created around the orifice using bone cement. 10 mL of methylene blue dye was introduced to the specimen and allowed to proliferate for 30 minutes under atmospheric pressure. The specimens were frozen then sectioned using a band saw. The tunnel angle, tunnel length, depth of dye penetration, and width of fluid proliferation were measured.

Results

No statistical difference was found in tunnel angle or tunnel length, eliminating any bias due to a result of tunnel placement. The depth of fluid proliferation in the RetroScrew group was significantly less than that of the distally placed screw group (6 ± 6 mm vs. 36 ± 13 mm, $p < 0.05$). The width of fluid proliferation in the RetroScrew group was significantly less than that of the distally placed screw group (2 ± 3 mm vs. 15 ± 7 mm, $p < 0.05$). Figures 1 and 2 show the depth of fluid penetration.

Figure 1.

Group 1: Cross section of tibia and Bio-Interference Screw showing depth of fluid penetration.

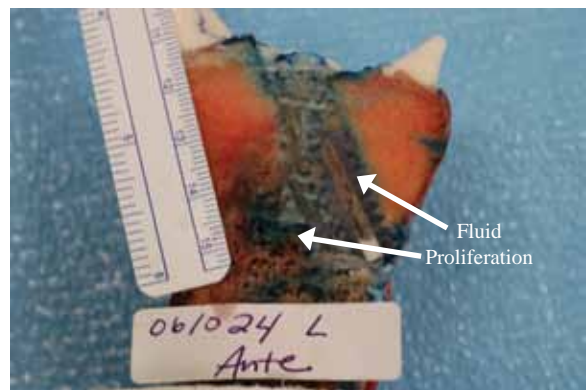


Figure 2.

Group 2: Cross section of tibia & RetroScrew showing depth of fluid penetration.



Conclusion

Tibial tunnel creation using RetroDrill and RetroScrew fixation significantly reduce the amount of fluid proliferation in the tibial tunnel compared to traditional transtibial ACL fixation techniques. Reducing synovial fluid proliferation in the tibial tunnel may reduce tunnel widening and bone necrosis which could lead to more successful outcomes.