

The Effect of Growth Factors on Biomechanical Properties of the Bone–Patellar Tendon–Bone Graft After Anterior Cruciate Ligament Reconstruction

A Canine Model Study

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Background: No studies have dealt with the effect of growth factors on the free tendon autograft in anterior cruciate ligament reconstruction.

Hypothesis: Application of exogenous transforming growth factor- β and epidermal growth factor may affect the structural properties and histology of the bone–patellar tendon–bone autograft after anterior cruciate ligament reconstruction.

Study Design: Controlled laboratory study.

Methods: Twenty dogs underwent anterior cruciate ligament reconstruction with the autogenous bone–patellar tendon–bone graft in bilateral knees. In 10 animals, 12 ng transforming growth factor- β and 300 ng epidermal growth factor mixed with fibrin sealant of 0.6 mL were applied to the left knee. In the remaining 10 dogs, fibrin sealant alone was applied to the left knee. No additional treatments were applied to the right knee.

Results: The growth factor application increased the stiffness and maximum failure load of the femur-graft-tibia complex at 12 weeks ($P = .016$ and $P = .012$, respectively); the sham treatment did not significantly affect them. Histologically, most of the cells in the grafts treated with growth factors had spindle-shaped nuclei; cells in the other grafts had round-shaped nuclei.

Conclusions: Application of transforming growth factor- β and epidermal growth factor improves the structural properties of the autograft after anterior cruciate ligament reconstruction in the canine model.

Clinical Relevance: Application of growth factors is a possible strategy to prevent graft deterioration in anterior cruciate ligament reconstruction.

Keywords: anterior cruciate ligament (ACL) reconstruction; bone-tendon-bone autograft; transforming growth factor- β (TGF- β); biomechanics; growth factor
