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Tension level during preconditioning influences hamstring tendon graft properties.

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Abstract

BACKGROUND: Hamstring tendon grafts used for anterior cruciate ligament reconstruction are preconditioned to reduce the influence of viscoelasticity on the stiffness and tension.

HYPOTHESIS: Increasing the tension applied during preconditioning will decrease the loss of tension and stiffness due to viscoelasticity.

STUDY DESIGN: Controlled laboratory study.

METHODS: Six quadruple-strand hamstring tendon grafts were tested twice in vitro with 2 tension levels applied during preconditioning. The grafts were preconditioned at 80 N or 160 N, followed by 15 minutes of relaxation, and subsequently loaded to 80 N to represent application of initial tension. After 5 minutes of relaxation, the tension was recorded and the stiffness was measured over 0.06 mm of displacement. The tension and stiffness measurements were repeated 3 hours later. The data were compared between the 2 preconditioning levels with a 2-way repeated-measures analysis of variance.

RESULTS: Graft tension and stiffness were significantly larger ($P < .05$) for 160 N during preconditioning. For 80 N, the average tension at 5 minutes and 3 hours was 40 N and 21 N, respectively, compared with 50 N and 30 N, respectively, for 160 N. For 80 N, the average stiffness at 5 minutes and 3 hours was 152 N/mm and 124 N/mm, respectively, compared with 173 N/mm and 146 N/mm, respectively, for 160 N.

CONCLUSION: Increasing the tension applied to hamstring tendon grafts during preconditioning can decrease the postoperative loss of tension and stiffness due to viscoelasticity.

CLINICAL RELEVANCE: The increased graft tension and stiffness could reduce postoperative knee laxity.

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