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Paper #46

Transosseous Meniscal Root Repair Can Be Improved Using a Knotless Anchor for Fixation

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Summary:
The use of a knotless anchor for fixation in a transosseous meniscal root repair improves the biomechanical properties of the construct compared to knotting the sutures over a cortical button

Abstract:

Introduction

In transosseous pullout repair of meniscal root tears, to secure the meniscal root, sutures are passed through a bone tunnel drilled from the anterior aspect of the tibiae and fixed at the distal exit of the tunnel by knotting them over a post or a cortical button. Clinical results of this technique are not completely satisfactory regarding healing and extrusion observed after surgery, which indicate the need for improvement. Biomechanical studies on the technique have shown considerable root displacement, which seem to be responsible for the non-satisfactory clinical result found. A possible source of such displacements may be the knots tied to fix the sutures. Therefore, using a knotless suture anchor may be

Method

to improve the outcome of the technique by reducing root displacements. There have been some descriptions of transtibial techniques using this type of suture fixation, but the mechanical properties have not been assessed yet.

Purpose

To compare the initial biomechanical properties of transosseous root repairs using a suture button or a knotless anchor to fix the sutures. The study hypothesis was that the use of a knotless anchor provides superior biomechanical properties to tying the sutures over a cortical button

Methods

Twenty porcine tibia with their posterior medial meniscal roots detached, were randomized into two groups depending on the method employed to fix the sutures after transtibial root repair: knotless anchor (KA) or suture button (SB). Each specimen was subjected to cyclic loading (1000 cycles, [10, 30]N) followed by load-to-failure testing. From cyclic test data, residual displacements accumulated at 100, 500 and 1000 cycles were computed. From load-to-failure tests, stiffness, displacements at loads of 30, 50 and 70N, loads needed to produce construct elongations of 3 and 5 mm and ultimate failure loads were determined.

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Results

Compared to the SB group, the KA group showed a significantly smaller residual displacement after 100 ($p=0.015$), 500 ($p=0.003$) and 1000 cycles ($p<0.002$). In load-to-failure, the KA group resulted stiffer with a 49% higher mean stiffness ($p=0.006$) and lower displacements at 30N ($p=0.003$), 50N ($p=0.001$) and 70N ($p=0.001$). Resistance to produce elongations of 3mm and 5 mm were also significantly higher ($p<0.028$) for group KA, as it was the ultimate failure load ($p=0.028$).

Conclusion

In a transtibial repair of the posterior meniscal root, use of a knotless anchor to fix the sutures improved the biomechanical properties compared to tying the sutures over a cortical button.