A Biomechanical Comparison of All-Inside Meniscus Repair Techniques

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摘要

Abstract

BackgroundThe aim of this study was to assess the biomechanical characteristics of six all-inside meniscal single suture repair techniques using a porcine model.

Materials and MethodsPeripheral longitudinal tears were created in freshly isolated porcine menisci. Tears were repaired using the single vertical technique with six different repair complexes including those involving sutures (#2 FiberWire, #2 Ethibone, flexible anchors (Fast-Fix, RapidLoc), and rigid anchors (Meniscal-Dart, BioStinger). Displacement, ultimate failure strength, stiffness, and site of failure were measured using a Materials Testing System machine. An initial 2 N preload was applied, followed by loading between 5 and 20 N for 300 cycles. Failure strength was determined lastly by increasing tension at a rate of 5 mm/min until failure.

ResultsFailure strength was highest in the #2 FiberWire group (175.6 N). This was significantly higher than in all other groups ($P < 0.05$). The second highest failure load was evident in the #2 Ethibone group (113.8 N). This was significantly higher than in all other groups bar the #2 FiberWire group ($P < 0.05$). Stiffness was also significantly higher in the #2 FiberWire group compared with all other groups (8.5 N/mm, $P < 0.05$). There were no between-group differences in displacement. When grouped by repair technique, failure load was significantly higher, and displacement was significantly lower, in suture compared with both flexible and rigid anchor repaired menisci ($P < 0.01$ for all comparisons). Although stiffness was also higher in the suture group, there were no significant between-group differences detected.

ConclusionsSuture techniques exhibited biomechanical superiority over biodegradable flexible and rigid anchor devices for meniscus repair.