Biomechanical evaluation of different suture techniques for arthroscopic transtibial pull-out repair of posterior medial meniscus root tears.

Abstract:
A tear of the posterior medial meniscus root (PMMR) is increasingly recognized as a serious knee joint injury. Several suture techniques for arthroscopic transtibial pull-out repair have been described; however, only limited data about the biomechanical properties of these techniques are currently available. There are significant differences between the tested suture techniques, with more complex suture configurations providing superior biomechanical properties. Controlled laboratory study. A total of 40 porcine medial menisci were randomly assigned to 1 of 4 groups (10 specimens each) according to suture technique: two simple stitches (TSS), horizontal mattress suture (HMS), modified Mason-Allen suture (MMA), and two modified loop stitches (TLS). Meniscus-suture constructs were subjected to cyclic loading followed by load-to-failure testing in a servohydraulic material testing machine. During cyclic loading, the HMS and TLS groups showed a significantly higher displacement after 100, 500, and 1000 cycles compared with the TSS and MMA groups. After 1000 cycles, the highest displacement was found for the TLS group, with significant differences compared with all other groups. During load-to-failure testing, the highest maximum load and yield load were observed for the MMA group, with statistically significant...
differences compared with the TSS and TLS groups. With regard to stiffness, the TSS and MMA
groups showed significantly higher values compared with the HMS and TLS groups. The MMA
technique provided the best biomechanical properties with regard to cyclic loading and load-to-failure
testing. The TSS technique seems to be a valuable alternative. Both the HMS and TLS techniques
have the disadvantage of lower stiffness and higher displacement during cyclic loading. Using a MMA
technique may improve healing rates and avoid progressive extrusion of the medial meniscus after
transtibial pull-out repair of PMMR tears. The TSS technique may be used as an alternative that is
easier to perform, but a more careful rehabilitation program is possibly necessary to avoid early
failure.