Biomechanical comparison of cross-suture and vertical suture technique in meniscal repair of radial tear

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Background: Although meniscal repair techniques have developed for several decades, meniscal repair of radial tears still remains challenging issue. For successful meniscal healing of radial tears, primary mechanical stability of meniscal repair is one of the essential requirements. All-inside vertical suture technique has been reported to provide superior stability compared to inside-out horizontal suture technique respectively. However, biomechanical comparison between vertical and cross-suture technique in meniscal repair of radial tear was not performed yet.

Purpose: The aim of this biomechanical study was to evaluate whether Cross-suture technique can show comparable stability to vertical suture technique in meniscal repair of radial tears.

Material & Method: Biomechanical test was performed on matched paired 60 fresh-frozen porcine menisci (3 groups, n=20 in each group). Complete radial tear was made at the mid-potion of each meniscus. In group A, menisci were repaired with parallel 2 stitch of inside-out horizontal sutures for control. In group B, menisci were repaired with 2 stitch of inside-out cross sutures. In group C, menisci were repaired with parallel 2 stitch of all-inside vertical sutures. Suture attachments were located at 5mm from the tear surface and 5mm and 15mm from the rim in all cases. The specimens were cyclically loaded 500 times between 5 and 20N, then gap of tear surface was measured. After completion of cyclic load testing, specimens were loaded to failure.

Results: The mean maximum failure load were 72 ± 15N (inside-out horizontal suture), 88 ± 20N (inside-out cross suture), and 105 ± 27N (all-inside vertical suture). The mean displacement after a 500-cycle loading test were 5.23 ± 1.82mm (inside-out horizontal suture), 4.56 ± 1.87mm (inside-out cross suture), and 3.23 ± 1.67mm (all-inside vertical suture). Cross suture technique showed significantly higher failure load compared with horizontal suture technique (p<0.05). However, cross suture technique also showed significantly lower failure load (p<0.05) and increased displacement (p<0.05) compared with vertical suture technique.

Discussion: In respect that both cross suture and vertical suture were superior to horizontal suture, our results matched with recent biomechanical studies which analyzed mechanical stability of horizontal suture technique, vertical suture technique, and newly suggested cross suture technique. Also, new finding of our study was that vertical suture was superior to cross suture, as well as horizontal suture technique.

Conclusion: Despite superior stability over horizontal suture technique, biomechanical properties of cross suture technique was not comparable to vertical suture technique in meniscal repair of complete radial tear. Cross suture technique can be a recommendable choice over horizontal suture technique when all-inside vertical repair is impossible.

Reference:

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Analogic effect and safety of single-dose intra-articular magnesium after arthroscopic surgery: A systematic review and meta-analysis

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Objective: To examine the analogic effect and safety of single-dose intra-articular (IA) magnesium (Mg) after arthroscopic surgery.

Material: Randomized controlled trials (RCTs) that evaluate the effects of single-dose IA in comparison of (1) Mg versus placebo, (2) Mg versus bupivacaine and (3) Mg plus bupivacaine versus bupivacaine alone after arthroscopic surgery. Additionally, in vivo and in vitro experimental studies of Mg supplementation were also targeted.

Results: A total of eight RCTs and eight experimental studies were included. IA Mg exhibited a significantly lower pain score after arthroscopic surgery when compared with placebo (MD, -0.41, 95% CI, -0.78 to -0.05, p<0.05). Meanwhile, Mg and bupivacaine presented the similar postoperative pain level and time to first analogic request. Furthermore, statistically significant differences both in pain score (MD, -0.62, 95% CI, -0.81 to -0.42, p<0.05) and time to first analgesic request (MD, 6.25, 95% CI, 5.22 to 7.29, p<0.05) were observed between Mg plus bupivacaine and bupivacaine alone. There was no statistically significant difference between various groups in each separate trial with respect to side effects, and it seemed that none of the witnessed side effects was related to IA injection. Most of the included in vitro studies showed a chondrocyte protective effect of Mg supplementation, with only two exceptions which suggested that high level of Mg might exhibit an opposite effect. There were also two in vivo studies showing a cartilage protective effect of IA Mg.

Conclusion: This systematic review and meta-analysis was performed on a total of 8 RCTs (published 2006 to 2015) and 8 in vitro and in vivo experimental studies. The most important finding of the present study is that the administration of single-dose IA Mg at the end of arthroscopic surgery was effective in pain relief without increasing side effects when compared with placebo, and it was a preferable comparable analgesic effect to the common IA injection with bupivacaine. In addition, IA Mg could enhance the analogic effect of bupivacaine. Another important finding is that Mg seemed to possess cartilage or chondrocyte protective effects according to the included experimental studies. Thus, IA Mg should perhaps be considered as an alternative to local anesthetics for pain relief after arthroscopic surgery. However, the optimal concentration and dosage of IA Mg still needs to be further explored.

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Preoperative measure of individualized anatomic ACL reconstruction in west Chinese patients: Correlation between preoperative MRI and intra-operative measurements

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Purpose: This study was to identify coronal and sagittal length of tibial insertion, tibial insertion site area, length and inclination angle of ACL of patients undergoing ACL reconstruction. The secondary aim was to evaluate the correlation of the measurements between gender, age, BMI, Height and weight.

Methods: Sixty nine patients undergoing ACL reconstruction, a preoperative measurement on MRI and intra-operative measurements using a specialized ruler were going to detected the coronal and sagittal length of tibial insertion, tibial insertion site area, length and inclination angle of ACL. Then, a linear regression model was established by multivariate analysis.

Conclusions: Our series showed good to excellent mid-term results in unstable ACL patients of the knee treated with trans-articular drilling. This technique is minimal invasive, effective, as well as cost-effective.

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