Adding a capsulodesis to transtibial posteromedial root repair, we can decrease the meniscal extrusion at 1 year follow up.

Data:

Purpose: the aim of the present study was to assess whether arthroscopic capsulodesis associated with transtibial posteromedial root repair may reduce meniscal extrusion which is frequently associated with the clinical failure of this kind of repair. Method: a multicenter randomized prospective study including patients with isolated lesions of the posteromedial meniscal root was performed. Only root lesion of type 2 and 4 according to LaPrade classification were included. Exclusion criteria were: varus knee > 4° and joint degeneration grade > 2 according to the Kellgren-Lawrence classification, BMI > 35. Power analysis was carried out using as primary outcome the difference in meniscal extrusion: 10 patients per group were enough for a power > 80%. We included 11 patients per group considering 10% of possible dropouts. The 22 patients were randomized: in group 1 a transtibial root repair was performed, in the group 2, in addition to the same repair, an arthroscopic capsulodesis was performed. A prospective follow-up by MRI at 3,6,12 months to assess meniscal extrusion was made. All measurements were performed by two different observers. For each case, measurements were taken twice, keeping the result of the first measurement blind. Inter and intra class agreements were calculated. The meniscal extrusion was calculated in coronal images at the maximum point of extrusion. Measurement was performed drawing two lines: one vertical line intersecting the peripheral margin of the lateral tibial plateau (LTP) at the point of transition from horizontal to vertical. A second perpendicular line was drawn from the outer margin of the meniscus to the former line to measure the degree of extrusion. Additionally, when the graft was extruded less than 3 mm beyond the LTP, it was considered minor extrusion, conversely, major extrusion was considered when the meniscus more than 3 mm of subluxation. Results: the intraclass correlation coefficient obtained was considered excellent (0.89; 95% CI: 0.84-0.92) and the high calculated k coefficient (0.78; 95% CI: 0.62-0.84) showed excellent agreement between observers. No differences were detected in preoperative meniscal extrusion (group 2 28.35 ± 11.28 mm VS group 2 27.12 ± 12.37 mm; p= 0.342). The meniscal extrusion in group 2 was lower both at 6 and 12 months postoperative (p=0.019). In both groups at 12 months, preoperative extrusion decreased (p=0.005). Preoperatively in 8 cases of group and 9 cases of group 2 presented major extrusion (p=0.965) whereas at 12 months postoperatively major extrusion was detected in 7 cases of group 1 and in 3 cases of group 2 (p=0.031). Conclusion: Arthroscopic capsulodesis limits meniscal extrusion at 1 year follow up when associated with transtibial repair of a posteromedial root tear. Longer-term clinical follow-up is needed to understand the clinical impact of this radiological finding.

Category: Knee · Meniscus

Biomechanical Comparison of Lateral Meniscus All-inside Radial Repair Techniques in a Cadaveric Model

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Summary:

This study evaluated biomechanical properties of four all-inside, meniscus-based repairs to radial tears of cadaveric human lateral meniscii and found that reinforcing vertical suture meniscus repairs with horizontal suture significantly increases load to failure.

Data:

Introduction: Meniscal injuries are among the most common orthopedic injuries in the United States. Radial meniscus tears were historically treated with partial meniscectomy, often leading to poor outcomes. Repairing radial tears preserves meniscal tissue, may delay knee degeneration, and leads to better long-term outcomes. Repair techniques for radial tears vary and should be evaluated for differences in biomechanical properties and failure mechanisms.1-3 All-inside, meniscus-based suture repairs have shorter operating times, minimize risk of nerve injury, and are increasingly possible with novel devices.3 Objective: Our objective was to evaluate four all-inside techniques to repair radial tears in human cadaveric lateral menisci. We chose two techniques – the Double Vertical (DV) and Double Vertical Cross (DVCX) – that bridged the tear directly. We chose two other techniques – the All-inside Rebar (AR) and our novel Oblique Box (OB) – that added reinforcing stitches to engage the bridging stitches. We hypothesized that AR and OB would have higher load to failure than DV and DVCX. Methods: 36 fresh-frozen lateral human menisci were randomized into four groups of nine. A complete radial tear was created at the midbody of the meniscus. Suture repairs were performed using 2-0 braided suture. We repaired the menisci using the DV, DVCX, AR, and OB techniques with meniscus-based suturing to simulate the all-inside, meniscus-based approach with all knots tied on the superior surface of the meniscus. The DV repair used two sutures in loops perpendicular to the tear. DVCX used two sutures in loops that crossed over the tear. AR used two sutures in loops parallel to the tear acting as reinforcing rebar and two bridging sutures perpendicular to tear and outside rebar suture box. OB used two sutures to create a trapezoidal reinforcing box on either side of the tear and two bridging sutures in loops perpendicular to tear and inside the box. The repaired menisci underwent load to failure testing and were analyzed statistically. Results: Failure occurred due to suture cutout. Repair constructs that lacked a reinforcing-type suture (DV and DVCX) cut through or “cheese-wired” at lower loads than repairs with reinforcing sutures (AR and OB). The AR repair sustained the highest load to failure, nearly 3x stronger than the two non-reinforcing type repair constructs. Mean load-to-failure values for each repair group were 60 N ± 24.5 for DV, 58 N ± 17.4 for DVCX, 168 N ± 33.9 for AR, and 105 N ± 9.0 for OB. These results show that reinforcing vertical suture meniscus repairs with some type of horizontal suture (e.g. AR or OB) significantly increases load to failure for all-inside, meniscus-based techniques. Conclusions: In a cadaveric lateral meniscus model, all-inside radial repairs using rebar suture techniques had higher ultimate load to failure and reduced risk of “cheese wiring”. These data may provide useful information for surgeons to consider when deciding how to repair radial meniscal tears to maximize patient outcomes. Future biomechanical study should compare all-inside vs. inside-out repairs. Clinical outcomes of these various all-inside radial repair techniques are also critical.

Category: Knee · Meniscus

Medial meniscus posterior root repair delays but not avoids histological progression of osteoarthritis: randomized in vivo experimental study

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Summary:

Medial meniscus posterior root repair delays but not avoids histological progression of osteoarthritis: randomized in vivo experimental study

Data:

Objective: The purpose of this study was twofold: (1) to describe and compare histopathological results of 3 different treatment options: nonoperative management, partial meniscectomy, and meniscal root repair and (2) to test the hypothesis that radial meniscal root tears treated conservatively predispose to a lower risk of osteoarthritic progression compared to partial meniscectomy. Study Design: Prospective, randomized, and experimental study. Methods: Posteromedial meniscal root tears were carried out in 39 NZW rabbits. The animals were randomly assigned into three experimental groups: partial meniscectomy after root tear (PM, n=13); root tear left in situ (CT, n=13); and transtibial root repair (RR, n=13). Contralateral limbs were used as healthy controls. The animals were euthanized at 16 weeks postoperatively; tissue samples of femoral and tibial articular cartilage were collected and processed for macro and microscopic assessment to detect signs of early osteoarthritis (OA). Each sample was histopathologically assessed using the AORSI grading and staging system. Results: Osteoarthritic changes were the hallmark in all three experimental groups. The