available sutures and treatment solutions are necessary to propose the best approach.

Category: Knee - Meniscus

Progression of Osteoarthritis after Conservative Treatment for Medial Meniscus Posterior Root Tear

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Summary: Insufficient fracture, which is shown not only in MR but also in simple X-ray, is an important risk factor for aggravation of arthritis.

Data:
Background: There are limited data describing the long-term outcome of non-operative treatment of medial meniscus posterior root tear (MMPRT). The purpose of this study was to investigate the natural history of MMPRT and find out prognostic factor for poor outcome of non-operative treatment. Methods: Patients who were diagnosed as MMPRT and initially treated with non-operative management were retrospectively reviewed. Patients with severe OA(Kellgren-Lawrence(K-L) grade 4) were excluded and 94 patients were enrolled. The mean follow-up period after diagnosis was 45.9 month (from 17.6 to 170.5). Demographic characteristics and radiographic features including hip-knee-ankle angle (HKAA), medial proximal tibial angle (MPTA), joint line convergence angle (JLCA), joint line width and K-L grade in plain radiographs and meniscus extrusion, bone edema and insufficient fracture in MRI were assessed. Results: At initial assessment, Four (4.3%) patients were K-L grade 0, 17 (18.1%) patients were grade 1, 59 (62.8%) patients were grade 2 and 14 (14.9%) patients were grade 3. During follow-up period, K-L grade of 34 (36%) patients were aggravated and 60 (64%) patients were not. The average of joint width was 3.2mm at initial assessment, 2.9mm at 1 year, 2.9mm at 2 years, 2.9mm at 3 years and 2.7mm at final follow-up. The average of JLCA was 2.49°, 3.13°, 3.23°, 3.28° and 3.37° at initial, 1 year, 2 years, 3 years and final follow-up. Demographic data and radiographic features were compared between two groups; those whose K-L grade were aggravated and those whose K-L grade weren’t. Only site of knee was different (73% vs. 27%, P=0.033) and other demographic features were not significantly different between two groups. In radiographic features, insufficient fracture was higher in aggravated group (7% vs. 24%, P=0.033) and other demographic features were not significantly different. Conclusions: K-L grade of most MMPRT patients(64%) didn’t aggravated during follow-up period. Since insufficient fracture was risk factor for aggravation of arthritis, clinician should carefully assess the insufficient fracture and decide to treat.

Category: Knee - Meniscus

A Comparison of All-Inside Versus Inside-Out Meniscus Repair in Elite Athletes

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Summary: A study of 170 elite athletes demonstrated that all-inside medial meniscal repairs had a significantly higher failure rate when compared with inside-out medial meniscus repairs and all types of lateral meniscus repairs.

Data:
Introduction The two most common methods of meniscal repair are all-inside (AI) utilising arthroscopically placed suture devices and inside-out (IO) where sutures are passed through the meniscus and the capsule and tied on the external surface of the capsule. Even though few studies exist comparing the results of these two techniques there has been a shift away from the historic gold standard of IO towards more AI repairs. The aim of this study was to compare the failure rate and the time to failure of all-inside and inside-out meniscus repair performed in elite athletes. Methods A retrospective review was performed of all elite athletes who underwent meniscal repair, under the care of the senior author, between 2013 and 2019. All meniscus repairs with a minimum of two-year follow-up were included in the study, including patients who underwent concurrent cruciate ligament reconstruction. If a patient had both medial and lateral menisci repaired during the same surgery, they were tracked separately for failure. Meniscus repairs were classified as AI or IO depending on the type of repair performed. Failure was defined as undergoing a subsequent surgery to address a persistent meniscal tear. The Fisher exact test was used to analyse categorical data while continuous variables were evaluated using analysis of variance (ANOVA) with Bonferroni adjustment for multiple comparisons. Survival analysis or specifically Cox proportional hazards modelling was used to determine if meniscal repair failure rates differed by location and technique of meniscal repair. Results 170 elite athletes (192 repairs) with an average age of 25.1±4.9 years underwent meniscus repair, 55% played football, 37% played rugby and 8% participated in gymnastics, hockey, cricket, or other sports. Concurrent cruciate ligament reconstruction was performed in 59% of patients. 41 (21%) meniscus repairs failed during the study period. Medial meniscus tears repaired with the IO technique failed at a significantly higher rate (58%) than medial meniscus tears repaired with the IO (23%) or lateral meniscus tears repaired with the Al (12%) or IO (14%) technique (P<0.001). Overall, meniscus repair failure in patients with a meniscal meniscus tear repaired with the Al technique were almost 8 times higher at any point in time as compared to Al repair of the lateral meniscus. At 1 year following repair, 5% of lateral meniscus repairs had failed (regardless of technique), while medial meniscus repairs failed at rate of 16% for IO and 42% for AI. By 2 years, the failure rate of a medial meniscus tear repaired with the AI technique was 53% and at 5 years was 63%. Conclusion All-inside medial meniscal repair led to a higher rate of failure compared to inside-out medial or lateral meniscus repair in elite athletes. Medial meniscus repairs failed at a high rate than lateral meniscal repairs.

Category: Knee - Meniscus

Leave It or Repair It? Comparison of the Arthroscopic and Clinical Outcomes after High Tibial Osteotomy with or without Medial Meniscus Posterior Root Repair

Abstract ID# 22406
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Summary: A high tibial osteotomy combined with medial meniscus posterior root repair for the treatment of medial meniscal posterior root tear increases the meniscus healing rate and cartilage generation but is not correlated with clinical outcome scores.

Data:
[Introduction] There is still no consensus on whether a concurrent medial meniscus posterior root (MMPR) repair is beneficial in combination with a high tibial osteotomy (HTO) for the treatment of posterior meniscal meniscus tear with varus deformity. The objective of this study was to evaluate the necessity of concurrent repair of PMMR during the primary HTO procedure. We hypothesized that concurrent MMPR repairs affect the healing rate of MMPR tear (MMPRT) and cartilage generation; therefore would be beneficial for clinical outcomes. [Materials and Methods] The medical record of patients who underwent HTO between 2014 to 2022 was studied retrospectively. Of 61 patients, 32 patients underwent HTO with either arthroscopically-assisted shaving arthroplasty or partial meniscectomy (Group A) and 29 underwent a concurrent MMPR repair using tibial bone tunnel pullout suture repair technique during HTO (Group B). The healing status of the MMPRT was categorized into healed, partially healed, and non-healed conditions. Outerbridge classification was used to evaluate cartilage regeneration. Clinical outcomes were evaluated according to the Lysholm score, IKDC, and KOOS. [Results] After a minimum follow-up of 24 months, all osteotomies had healed and the clinical outcomes showed no significant differences between the two groups (P<0.05). Twelve (37.5%) patients in group A and 15 (51.7%) patients in Group B underwent hardware removal and examination through arthroscopy at least one year following the primary surgery which showed Group B exhibited a higher healing rate (93.3% to 50.0%) and...
similar cartilage regeneration (31.3% to 41.7%). In consistency with previous studies, the integrity of MMPR played a minor role in cartilage regeneration. This leads to the interpretation that healing rate and cartilage regeneration are not correlated with clinical outcome scoring. [Discussion] An HTO could unload the pressure in the medial compartment, thus relieving varus-induced medial knee pain. According to previous studies, HTO alone without MMPR repair achieved favorable outcomes. Lee et al. and Ke et al. also described similar findings in their cohort studies. The beneficial effects of concurrent MMPR repair during HTOs increase the rate of meniscal healing. However, long-term follow-up should still be conducted in order to further investigate whether the repair technique could help provide longer survivorship of the HTOs. [Conclusions] Concurrent MMPR repair during HTOs presented with a better MMPR healing rate but similar cartilage regeneration rate in short-term to mid-term follow-up. However, a better healing rate was not associated with higher clinical scores. For deeper and more extensive conclusions to be drawn, follow-up should be continued long-term.

Category: Knee - Meniscus

Survivorship And Reoperation of 324 Consecutive Isolated or Combined Arthroscopic Meniscal Allograft Transplantation Using Soft-Tissue Fixation

Abstract ID# 21992
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Summary:
The female sex and the need to combine MAT with cartilage procedure or ACL reconstruction could result in an increased rate of clinical failure at a mid-term follow-up.

Data:
Introduction: Meniscal allograft transplantation (MAT) is an effective treatment for relieving symptoms and improving knee functions in patients who experience symptomatic unicompartamental knee pain following a previous meniscectomy. However, in the literature there is a paucity of studies assessing the survival rate and prognostic factors of soft-tissue MAT. The present study aimed to report the survivorship of a large single-center cohort of consecutive patients treated with arthroscopic MAT using soft tissue technique and investigate variables that could potentially influence failures and outcomes. METHODS: 364 consecutive MAT performed in a single Institution between June 2004 and April 2019 were screened and assessed for eligibility. Subjective clinical scores (Lysholm score, Tegner Activity Scale and VAS) were collected pre-operatively and at 2 years, 5 years, 7 years and 10 years follow-up. Two survival analyses were performed using the Kaplan-Meier curves with (SF) surgical failure and (CF) clinical failure as endpoints. In addition, univariate analyses were performed using reoperations, surgical failure and clinical failure as endpoints, and different demographic and surgical characteristics as endpoints. RESULTS: 324 consecutive patients were evaluated at a mean follow-up 5.7 ± 3.0 years. Of them, 189 (58%) underwent an associated surgical procedure. A total of 22 patients (6.8%) were considered Surgical Failures. A significant improvement of all the PROMs was present between the pre-operative status and the last follow-up (p<0.001) with no significant decrease over time. Moreover, 70 (21.6%) patients were considered Clinical Failure: the need for concomitant Cartilage procedures (OR=0.16, p=0.001) or ACL reconstruction (OR=0.40; p=0.059) were predictors of failure. Finally, a lower survival rate was reported in Females (p=0.007) and in patients who required cartilage surgery (p=0.014). In particular, the latter group showed nearly half the survival rate with respect to those with no cartilage procedures at 10-year follow-up (36.4% vs. 71%, p=0.029). DISCUSSION AND CONCLUSION: The female sex and the need to combine MAT with cartilage procedure or ACL reconstruction could result in an increased rate of clinical failure at a mid-term follow-up. The present study results help the surgeon correctly set patients’ expectations regarding MAT survival and clinical failures. In particular females and patients with focal cartilage defects have nearly half the survival rate at long-term follow-up.

Category: Knee - Meniscus

Experimental Model of Medial Meniscus Posterior Root Tear Increases the Severity of Cartilage Damage in Rabbits

Abstract ID# 21404
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Summary:
Experimental model of medial meniscus posterior root tear increases the severity of cartilage damage in rabbits

Data:
Background Magnetic resonance imaging (MRI) is ideally suited for the investigation of joint diseases by virtue of its excellent soft tissue contrast, high spatial resolution, multiplanar capability, ability to allow direct visualization and to quantify cartilage thickness and volume distribution under normal and pathologic conditions. The main objective of this study was to identify and evaluate early osteoarthritic changes using high resolution magnetic resonance imaging after surgical release of medial meniscus posterior root in rabbit knees. Methods Knee osteoarthritis (OA) was experimentally induced by medial meniscus posterior root transection in the right knees of 12 male rabbits. Knees were evaluated with high MRI at baseline, at 8-, and 16-weeks post-surgery. Contralateral knees were used as healthy controls. The evaluation of the cartilage thickness was carried out by two independent observers and the measurements were performed on the two femoral condyles and the tibial surface. Results MRI before knee surgery disclosed no cartilage or bone abnormalities in any of the studied animal. The radiological alterations consisted of thinning of cartilage, sclerosis of the subchondral bone. Significant decrease in cartilage thickness was observed after 16-weeks of follow-up (p=0.023). Meniscal extrusion was evident after 8 weeks of post-surgery in all 12 animals after meniscal root release. Conclusions This study develops a novel model of knee OA that can aid in the early diagnosis of cartilage injury. These changes can be a promising therapeutic target, which promotes the interest of this model. Investigation of early osteoarthritic changes may lead to understanding of when and how rapidly knee OA develops after meniscal root injury.

Category: Knee - Meniscus

The Lateral Menisco-Tibial Ligament is a Restrictor of Radial Movement of the Lateral Meniscus, Its Injury Increases Meniscal Extrusion and its Repair and the Lateral Apseulsodesis Technique Restores the Extrusion to its Native Values

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Summary:
This study determines the role of the lateral menisco-tibial ligament in the phenomenon of meniscal extrusion and analyzes the biomechanical consequences of its repair as well as the capsulodesis technique.

Data:
Introduction. Previous studies have hypothesized that the lateral menisco-tibial ligament and the recently described Menisco-Tibio-Popliteus-Fibular Complex act together as a restrictor of the radial mobility of the lateral meniscus. The capsulodesis technique was described in 2017 as a quick and cheap solution to reduce meniscal extrusion after lateral meniscal allograft transplantation with satisfactory results at two and seven years of follow-up. The purpose of this study was to determine the function of the lateral menisco-tibial ligament in terms of radial mobility of the lateral meniscus as well as load distribution on the lateral tibial plateau and to determine if its repair as well as the capsulodesis technique restore this mobility and load to their native values in a biomechanical model using human cadaveric knees. Methods. Eleven human, fresh-frozen cadaveric knees were used for testing in this study. Prior authorization of an ethics committee. A diagnostic arthroscopy, simple radiographs and an MRI were...