



Our Experience in Meniscus Tears and Differences in Sport Recovery between Medial and Lateral Partial Meniscectomy in Young Athlete

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Abstract

Meniscus tears are the most frequent knee injuries. Menisci provide joint stability and local pressure distribution. A meniscus injury contributes to the early development of osteoarthritis. The aim of our study is to analyze the results of partial meniscectomy at 4 years follow-up, comparing time of sport recovery between lateral and medial partial meniscectomy.

At our institute 94 young athletes with meniscal tear were surgically treated with partial meniscectomy. 75 (80%) were males and 19 (20%) females. Medial meniscus was interested in 74 cases (79%), lateral meniscus in 20 (21 %). Mean age at treatment was 26 ± 4 , 98 (range 18-35) years. 15 (16%) patients with medial meniscus tear had associated an ACL tear, which was repaired with an arthroscopic reconstruction by hamstring.

Return to sport happened significantly earlier in the medial meniscus tears group than in the lateral meniscus tears group (average time 40 ± 4 , 14 days versus 59 ± 7 , 24 days). Student's T-test showed statistical significance (p -value = 0.0147).

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The average results of the clinical evaluation through the "KOOS" Score questionnaire comparable with previously published data. Patients with associated LCA lesions obtained scores comparable to those obtained from patients with isolated meniscal injury.

Time to return to sports is longer after lateral than medial meniscectomy, because lateral meniscectomy has a higher incidence of adverse events in the early recovery period, including pain/swelling. A functional ACL is the best guarantee for preserving joint cartilage from degeneration.

Keywords

Partial Meniscectomy; Sport Recovery; Lateral Meniscectomy; Young Athletes; Arthroscopy

Introduction

Meniscus tears are the most frequent knee injuries. Their incidence over the years has undergone an exponential growth, which is parallel to the increase in the practice of sports, both contact and non-contact sports, which expose the knee joint to forces that can exceed several times the body weight.

In 1883, it was time for the first meniscus surgery by Scottish surgeon Thomas Annandale [1]. Historically, the menisci were regarded as a functionless remnant tissue and they were often excised with open total meniscectomy [2].

However, in 1948, the English surgeon Fairbank reported the clinical outcomes of 107 patients after total meniscectomy, who had both clinical and radiological signs of osteoarthritis, such as progressive flattening of the condyle, narrowing of the joint space and ridge formation [3]. This study significantly changed our approach to deal with meniscal tears.

Currently, it is known the meniscus is an important structure for knee joint function. In fact, they provide several vital functions including mechanical support, localized pressure distribution, reductions friction during the movement, improving articular congruity, knee stability, lubrication and joint nutrition [4].

Increased knowledge of the function and long-term consequences in the knee, post meniscectomy has placed greater emphasis on meniscal preserving techniques.

Actually, meniscus tears are usually repaired (meniscal suture) or removed with a selective meniscectomy. The choice depends on the type and location of the tear and the patient's age. Only recent simple tears of the red zone, the most peripheral and vascularized of the meniscus, can be repaired [5,6].

The aim of the present study is to report the outcomes of young athletes with meniscal tears surgically treated with a selective meniscectomy at a 4-years follow-up, comparing time of sport recovery between lateral and medial partial meniscectomy (Fig. 1,2).

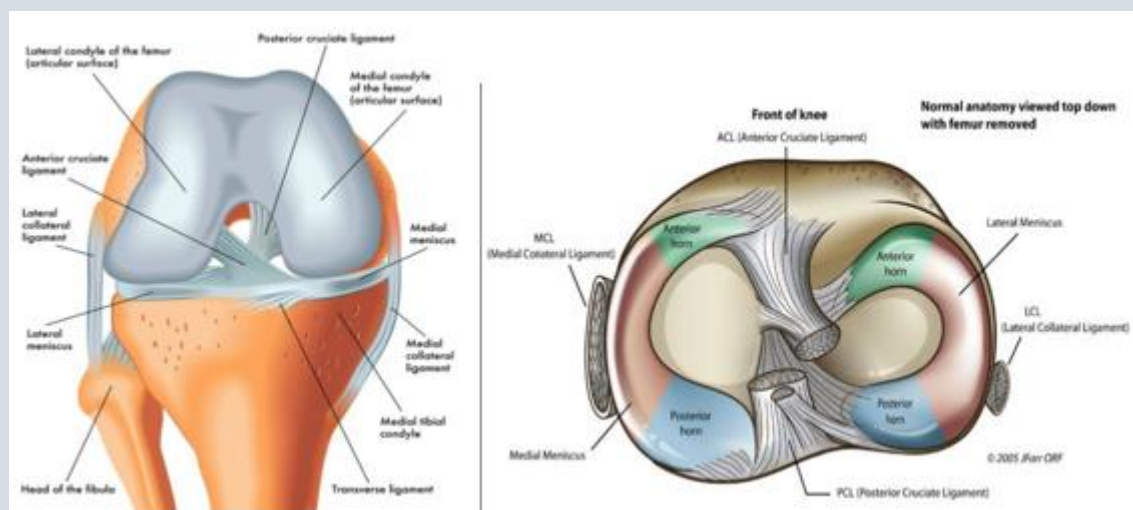


Figure 1: Frontal view of the knee and menisci and meniscal horns.

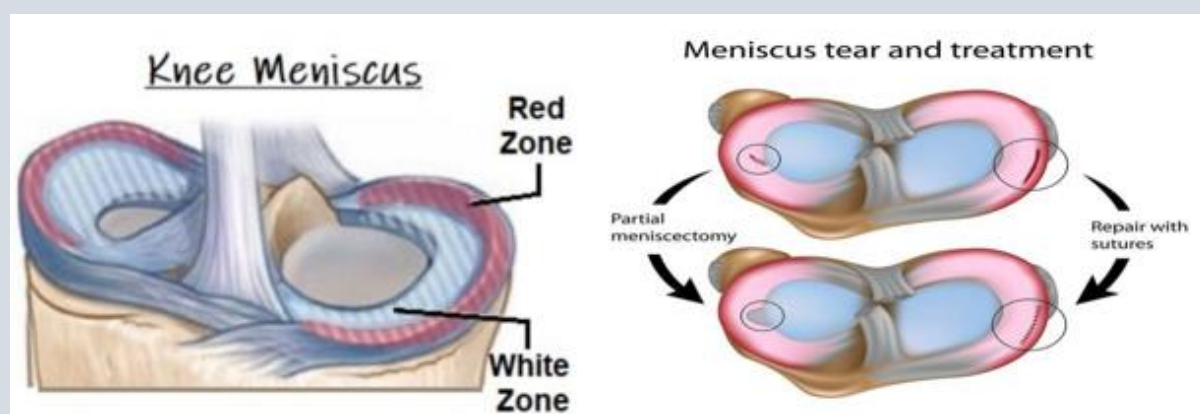


Figure 2: Meniscal vascularization and treatment.

Patients and Methods

Selection Criteria

Between January 2015 and December 2017 at our institute, a sample of 94 young athletes with meniscal tear were surgically treated arthroscopically with selective meniscectomy.

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Inclusion criteria were: Age at the time of surgery between 18 and 35 years; Amateur athletes; Arthroscopic selective meniscectomy. Patients with age > 35 years, < 18 years, arthroscopic meniscal suture, sedentary patients were ruled out of the study.

We have excluded 15 patients undergoing meniscus repair. A comparison between meniscus repair and meniscectomy would have been fascinating, but the two groups were too different numerically.

Demographic Data

Of a total of 94 selected patients, 75 were males (79, 78%) and 19 females (20, 22%), with an average age of 26 years (range 18-35 $\pm$ 4, 98). Because of the young age, there were no comorbidities.

The frequency of diagnosed lateral meniscus injuries in our series was considerably lower than medial meniscus injuries. In fact, partial meniscectomy was necessary for medial meniscus tears in 74 cases (78, 7%), for lateral meniscus tears in 20 cases (21, 3%). 43 patients (45,8%) had a right knee injury, 51 (54, 2%) a left knee one.

10 patients had bucket handle tear morphology, with pre-operative joint block (10, 6%). 15 (16%) patients with medial meniscus tear had associated an ACL tear, which was repaired with an arthroscopic reconstruction by hamstring.

All the patients had a sports injury and the most practiced sport was soccer (60%). It should be noted that 13 (14%) patients did not refer to a specific traumatic event.

The pie chart below shows the sports which most cause injuries. Soccer is not the most dangerous sport, but the most practiced one in our country.

9 patients (3 patients with an ACL tear, 5 patients with a medial meniscus tear e only one with a lateral meniscus tear) no longer practice sports due to fear new injuries (Fig. 3).

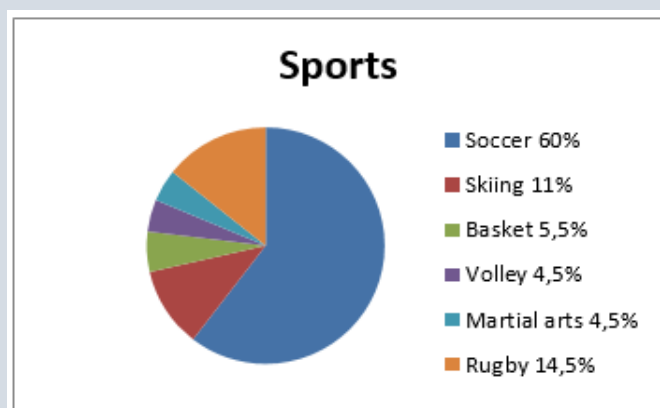


Figure 3: Practiced sports by the sample.

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Surgical Technique

The patient is positioned for standard knee arthroscopy. Two small incisions are made in the anterior region of the knee below the patella, according to the arthroscopic portals, anteromedial and anterolateral. The first one is located 1 cm above the lateral joint line and 1 cm lateral to the margin of the patellar tendon. The second one, located 1 cm above the medial joint line and just medial to the margin of the patellar.

After diagnostic arthroscopy, meniscal tear is managed by a basket forceps and a motorized shaver is used to smooth the remnant rim of the meniscus.

ACL reconstruction has been performed with single-bundle using the transtibial technique for drilling the femoral tunnel and hamstrings for transplant.

Postoperative treatment has scheduled antithromboembolic prophylaxis for 2-4 weeks. Physical rehabilitation started the day after surgery. Full load was immediately granted in isolated meniscal tears, a progressive partial load with crutches was granted in ACL tears (Fig. 4).

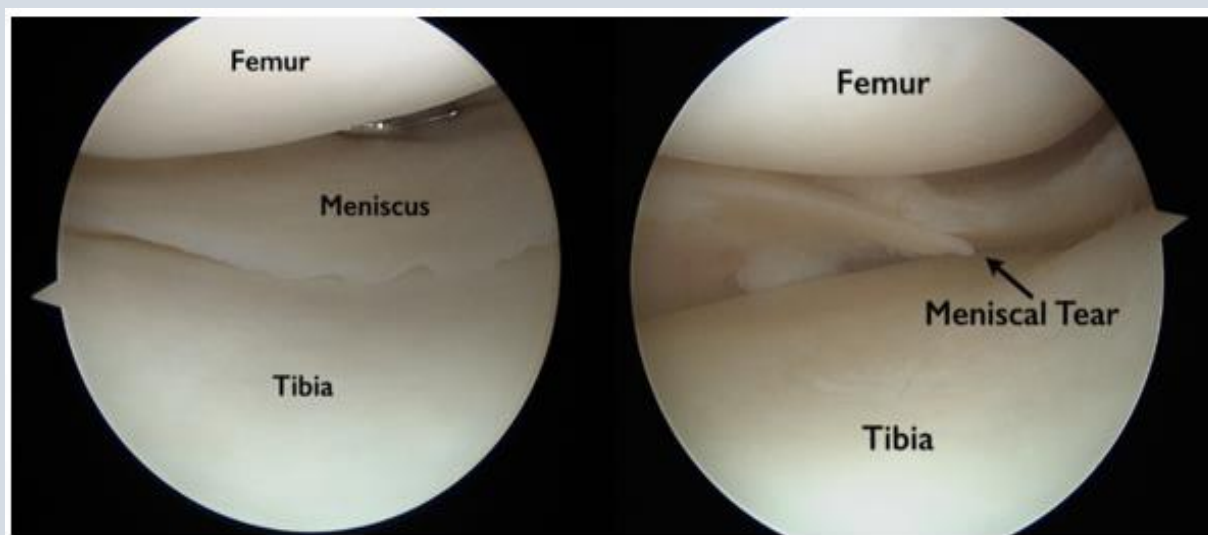


Figure 4: Arthroscopic view of healthy meniscus and meniscal tear.

Clinical and Radiographic Assessment

All the patients were interviewed and examined from 3 to 5 years (average 4 years) after surgery.

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For the purpose of a clinical evaluation, in addition to clinical tests (McMurray Test and Apley Test) patients performed tests which included Active and Passive Range of Motion (ROM), Stair Ascent and Descent, Step-up and Step-down.

For active ROM, patients maximally extended and flexed their injured knee without assistance or use of the upper extremities. For passive ROM, the observer moved the patient's knee from full extension to full flexion. Stair Ascent and Descent test required patients to ascend and descend (Fig. 2) a flight of 15 stairs (step height 15 cm). Step-up and Step-down were assessed using a 15 cm tall riser.

Finally, KOOS score was used to ask patients to self-report pain, symptoms, functions, and quality of life reported on a normalized scale, with 100 indicating no symptoms. KOOS SCORE (Knee injury and Osteoarthritis Outcome Score) is a points questionnaire created by Ewa M Roos in 1995.

The average age of the patients was very low and the follow-up not long enough to present the conditions for an osteoarthritic degeneration, so we did not consider it appropriate to implement the study with an Rx-graphic evaluation.

Statistical Analysis

To assess the statistical significance of the results, we referred to the Student's T-test, which allows you to check if the average value of a distribution deviates significantly from a reference value.

Results

The average results of the clinical evaluation of patients, through the "KOOS" Score questionnaire at an average 4-year follow-up, are shown in the following Table 1:

KOOS Score Parameters	Average $\pm$ DS
Pain	90,53 $\pm$ 4,17
Symptoms	87,26 $\pm$ 5,04
Function, Daily Living	93,06 $\pm$ 3,98
Function, Sports and Recreational Activities	84,71 $\pm$ 5,68
Quality of Life	86,94 $\pm$ 6,18

Table 1: KOOS SCORE results.

The highest score was obtained on the item function, daily living (93, 06%), the minimum score about this, 88, only obtained by 2 patients. Instead, the lowest score was obtained on the item function, sports and recreational activities (84, 71%). The main symptom complaint was the sensation of joint rattle.

The following histogram compares the average scores obtained by patients who have resumed sport (general group, 85 patients) and patients no longer practice sports due to fear new injuries (sedentary group, 9 patients) (Fig. 5).

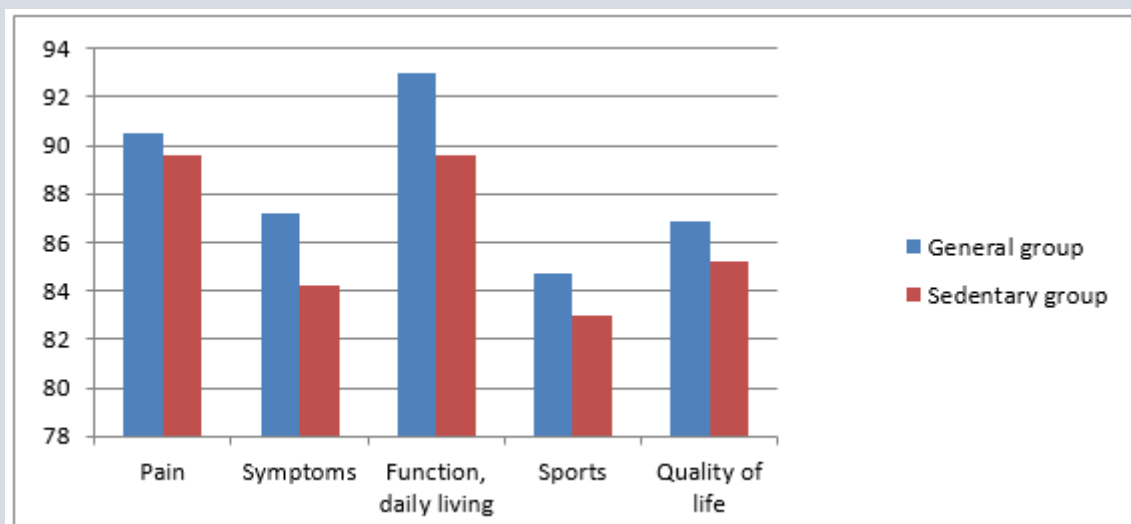


Figure 5: KOOS SCORE comparison between general group and sedentary group.

Note that the currently sedentary patients have achieved lower scores than the patients who have returned to sports.

The table below shows, instead, the average time necessary to return to sport in the injuries of the lateral and medial meniscus (Table 2).

Meniscus	Average $\pm$ DS
Medial Meniscus (54 Cases)	40 days $\pm$ 4,14
Lateral Meniscus (19 Cases)	59 days $\pm$ 7,24

Table 2: Average time necessary to return to sport.

Finally, patients with associated LCA lesions obtained scores comparable to those obtained from patients with isolated meniscal injury.

The histogram below shows the comparison between the means of the two samples:

All tests of physical examination were completed by all patients without knee problems. In particular, the range of motion of the operated knee appears similar to the contralateral in more than 90% of cases. Only 7 patients suffered from a slight deficit in both flexion and extension. Only 4 patients report an occasional effusion (Fig. 6).

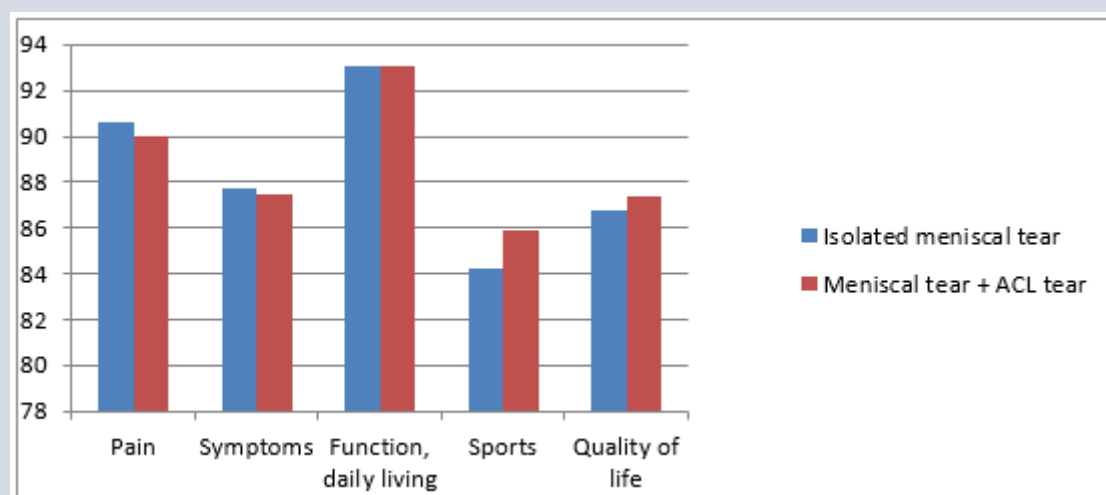


Figure 6: KOOS SCORE results between isolated meniscal tear group and meniscal tear + ACL tear group.

Discussion

Clinical evaluation with KOOS SCORE questionnaires demonstrated a higher response to treatment and quality of life has an excellent response to arthroscopic meniscus surgery. The KOOS SCORE showed a mean score comparable with previously published data [7-10].

Furthermore, our study has shown that the most frequent symptom in patients is not pain, but joint rattles, which, however, unlike pain, do not limit patient's activities.

In our own study there was a correlation, however not statistically valid ($p\text{-value} > 0, 05$), between sedentary and knee-related symptoms. The statistical non-validity of this correlation could depend on the excessive difference in the number of patients in the two groups.

This result invites us to reflect on the role of physical activity [11]. Physical activity is essential to promote the physiological metabolism of articular cartilage and its lack could explain the worst results [11].

Professional and sporting activities were resumed significantly earlier in the medial meniscus tears group than in the lateral meniscus tears group (average time 40 ± 4 , 14 days versus 59 ± 7 , 24 days). Student's T- test showed statistical significance (p -value = 0.0147). It happens because the lateral compartment of the knee has more mechanical load than the medial one (12). On the lateral side, the meniscus carries 70% of the load in the lateral compartment, whereas the medial meniscus carries only 50% of that of its compartment [13]. In the sagittal plane, on the medial side the convexity of the femoral condyle and the concavity of the medial tibial plateau give some degree of congruity, even in the absence of the medial meniscus. On the lateral side, however, the convexity of the femoral condyle is mirrored by convexity of the lateral tibial plateau. This, in the absence of the meniscus, on the lateral side there will be a greater tendency towards point loading and an increase in peak contact pressures [14,15].

Nawabi, et al., show the time to return to preinjury level of competition is significantly longer after lateral than medial meniscectomy, because lateral meniscectomy has a higher incidence of adverse events in the early recovery period, including pain/swelling [15]. Mariani, et al., also had the same feedback [16].

Sung-Gon Kim emphasizes the period of the return-to-sport was shorter in young age, high activity group, but more than half of athletes of lateral meniscectomy group have pain or effusion at the time of return to sport [11].

Finally, we could see how patients with associated LCA lesions obtained scores comparable to those obtained from patients with isolated meniscal injury. Capilla Ramirez, et al., achieved a similar result in their study [7].

We recall the reconstruction of the LCA which, according to Sommerlath, increases the success of meniscal sutures [17].

Krause WR, et al., explain this result by stressing the importance of ACL reconstruction in order to restore of joint stability [18]. In fact, a functional ACL is the best guarantee for preserving joint cartilage from degeneration [18].

In isolated meniscal tears, however, even in the absence of ligament injuries, distortional traumas, especially if repeated, cause joint stresses that can give joint instability and ligamentous laxity.

It should be stressed that our study has some limitations. First of all, the two samples (medial and lateral meniscus tear) are not numerically homogeneous (Fig. 7).

Furthermore, we can't able to estimate the exact quantity of meniscal tissue removed for each individual patient and we did not consider the injured meniscus region.

Finally, our sample is not homogeneous about practice sports and is not made up of professional sportsmen. Therefore, the differences in athletic level and rehabilitation intensity could affect recovery time [19-24].



Figure 7: Diagrammatic representation of different geometries of medial and lateral compartment.

Conclusion

Knee injuries are often sport injuries in young patients. So, osteoarthritis can be an early problem, with social and work repercussions. Therefore, it is important to save as much meniscal tissue as possible, especially the lateral meniscus, which, for anatomical and biomechanical reason, is subjected to a greater load than the medial meniscus. Unfortunately, this is not always possible due to the type and location of the tear.

Biomechanically, as the portion of the meniscus that is removed increases, greater contact pressures are experienced by the cartilage, which leads to altered knee mechanics.

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