

Comparison of Athletes and Non-Athletes on Meniscal Repair Outcomes: A Retrospective Study

Sporcu ve Sporcu Olmayanların Menisküs Onarım Sonuçlarının Karşılaştırılması: Retrospektif Çalışma

^{ID} Mehmet Cenk TURGUT^a, ^{ID} Muhammet Salih AYAS^a, ^{ID} Mehmet KÖSE^b, ^{ID} Ahmet KÖSE^a

^aDepartment of Orthopedics and Traumatology, University of Health Sciences Erzurum City Hospital, Erzurum, Türkiye

^bDepartment of Orthopedics and Traumatology, Atatürk University Faculty of Medicine, Erzurum, Türkiye

ABSTRACT Objective: Menisci play a key role in knee biomechanics and load transfer. Studies on meniscus repair have often been done on professional athletes. This retrospective study clinically and functionally compared athletes and non-athletes on post-meniscal repair health outcomes. **Material and Methods:** The sample consisted of 49 patients who underwent all-inside meniscal repair between 2018 and 2020 in our clinic. The sample was divided into two groups including athletes (n=22; Group 1) and non-athletes (n=27; Group 2). Demographic characteristics (affected side, gender, and age) were recorded. Data were collected using the International Knee Documentation Committee (IKDC) and Tegner Lysholm Knee Scoring Scale (TLKSS) scores. The 6th-month preoperative (preop) and postoperative (postop) IKDC and TLKSS scores were compared based on the demographic characteristics at a significance level of 0.05. **Results:** The groups were similar in terms of gender, age, and the affected side. Participants had significantly higher postop IKDC and TLKSS scores than preop scores. There was no significant difference in preop IKDC and TLKSS scores between the groups. However, Group 1 had significantly higher postop IKDC and TLKSS scores than Group 2. **Conclusion:** Post-meniscal repair physical therapy protocols are closely associated with good surgical outcomes. Observance with physical therapy protocols vary from person to person. Athletes had better surgical outcomes than non-athletes. We think that this is due to the better observance of the athletes with the physical therapy protocols for early return to sports.

ÖZET Amaç: Menisküs, diz biyomekaniği ve yük transferinde anahtar rol oynar. Menisküs onarımı üzerine yapılan çalışmalar sıklıkla profesyonel sporcular üzerine yapıldı. Bu retrospektif çalışma ile sporcu ve sporcu olmayan hastalarda menisküs tamirinin klinik ve fonksiyonel sonuçlarını karşılaştırmayı amaçladık. **Gereç ve Yöntemler:** Kliniğimizde 2018-2020 yılları arasında "all-inside" yöntemiyle menisküs onarımı yapılmış olan 49 hasta örneklemini oluşturdu. Örneklem sporcular (n=22;; Grup 1) ve sporcu olmayanlar (n=27; Grup 2) olmak üzere iki gruba ayrıldı. Demografik özellikler (etkilenen taraf, cinsiyet ve yaş) kaydedildi. Veriler Uluslararası Diz Dökümantasyon Komitesi [International Knee Documentation Committee (IKDC)] ve Tegner Lysholm Diz Skorlama Skalası [Tegner Lysholm Knee Scoring Scale (TLKSS)] ile toplandı. Preoperatif (perop) ve postoperatif (postop) 6. ay IKDC ve TLKSS skorları demografik özelliklere göre 0.05 anlamlılık seviyesinde karşılaştırıldı. **Bulgular:** Gruplar cinsiyet, yaş ve etkilenen taraf açısından benzerdi. Katılımcıların postop IKDC ve TLKSS skorları preop skorlarına göre anlamlı olarak daha yüksekti. Fakat Grup 1'in postop IKDC ve TLKSS skorları Grup 2'ye göre anlamlı olarak daha yüksekti. **Sonuç:** Menisküs tamiri yapılan hastaların cerrahi sonrası fizik tedavi protokolleri iyi cerrahi sonuçlarla yakın ilişkilidir. Bu protokollere uyum bireyden bireye değişmektedir. Sporcuların, sporcu olmayan bireylere göre menisküs cerrahisi sonuçları daha iyidir. Bunun sporcuların spora erken dönüş amacıyla fizik tedavi protokollerine daha iyi uyum göstermeleri nedeniyle olduğunu düşünüyoruz.

Keywords: Meniscus; athletes; sport injury

Anahtar Kelimeler: Menisküs; sporcular; spor yaralanmaları

Menisci used to be considered organs. However, research over the past decades has shown that menisci are tissues that play a vital role in knee joint functions. They also have secondary functions, such as

shock absorption, stability, lubrication, nutrition, and proprioception.¹ Menisci are crescent-shaped fibrocartilaginous structures that are on the lateral and medial sides of the knee. They provide articulation

Correspondence: Mehmet Cenk TURGUT

Department of Orthopedics and Traumatology, University of Health Sciences Erzurum City Hospital, Erzurum, Türkiye

E-mail: m.cenkurgut@hotmail.com



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between the concave femoral articular and tibial plateau surfaces and reduce the stress on the articular cartilage by increasing tibiofemoral joint congruency.²

Menisci play a key role in knee biomechanics and load transfer. Biomechanical research in recent years has shown that it is of paramount importance to maintain meniscal health. More and more people are interested in sports as they appreciate the health benefits of physical activities. However, this leads to an increase in the incidence of meniscal injuries. Healthcare professionals should properly treat meniscal lesions and monitor the recovery process to keep tabs on the degenerative changes of the knee, prevent osteoarthritis, and make sure that patients return to sports as early as possible.^{3,4}

The symptoms of meniscal injuries are pain, swelling, and a locked knee. Unstable tears are displaced between the joints and cause mechanical symptoms, such as locking. Tenderness and pain are present at the medial and lateral joint line during an examination. There are specific tests (e.g., McMurray and Apley) used to diagnose meniscal tears. Direct graph (X-ray) is the first imaging technique to use to rule out a fracture. Magnetic resonance imaging (MRI) is the gold standard method because it is highly sensitive and original. However, incidental meniscal tears are observed in the MRI of 2 out of 10 people with no knee complaints.⁵

Physicians sometimes turn to conservative treatment for meniscal tears. It involves activity restriction, physical therapy, and nonsteroidal anti-inflammatory drugs (NSAIDs). Cellular treatment methods, such as platelet-rich plasma, have also become popular in recent years. The primary goal of conservative treatment is to reduce pain and improve functionality, but most importantly, prevent possible osteoarthritis. A physician should consider the location, stability, and type of a meniscal tear, as well as the presence of mechanical symptoms, before deciding on surgical intervention.⁶

In recent years, there has been a considerable increase in sports injuries, including meniscal tears. With advances in arthroscopic methods, physicians prescribe surgery to treat meniscal tears more and

more often.⁴ Studies have shown that patients can return to their normal lives in about 3 months after surgery. Returning to active sports takes about 5-6 months.^{7,8}

Some studies focus on meniscal repair outcomes in athletes, but there is no published research comparing athletes and non-athletes on surgical outcomes. Therefore, this paper clinically and functionally compared athletes and non-athletes on preoperative (preop) and postoperative (postop) surgical outcomes.

MATERIAL AND METHODS

The sample consisted of 49 patients who underwent isolated meniscal repair between 2018 and 2020 in our clinic. Data were derived retrospectively from the hospital registry system. This study was approved by the Local Ethics Committee of Erzurum Regional Training and Research Hospital (date: June 21, 2021; number: 2021/12-203), and the study was conducted according to the Declaration of Helsinki principles 1975.

The sample was divided into 2: athletes (n=22; Group 1) and non-athletes (n=27; Group 2) (Table 1). All participants were patients with mechanical symptoms who did not respond to conservative treatment. The diagnosis was confirmed by clinical examination and MRI. The exclusion criteria were 1) additional injury (chondropathy ≥ Grade 3, ligament injury, and fracture), 2) being operated on by a different surgical team, 3) having undergone surgery before, 4) older than 40, 5) younger than 16, 6) tobacco use, and 7) limb deformity.

TABLE 1: Distribution of occupational groups of patients.

Athletes		Patients, f (%)	
Soccer		9	(40.9)
Skier		7	(31.8)
Wrestler		5	(22.7)
Ice hockey		1	(4.5)
Non-athletes		Patients, no. (%)	
Worker		12	(44.4)
Officer		7	(25.9)
Amateur athlete		5	(18.5)
Other		3	(11.1)

Demographic data and 6th-month preop and postop International Knee Documentation Committee (IKDC) and Tegner Lysholm Knee Scoring Scale (TLKSS) scores were recorded.

All patients underwent surgery under spinal anesthesia. All operations were performed by the same surgical team. Surgery was arthroscopically performed using standard portals. The all-inside method was used to repair the isolated meniscal tear (excluding combined meniscus injuries). They were repaired with 1-3 stitches. The pathological plicae were excised. The microfracture method was used to treat the patients with chondropathy ≥ Grade 3. Those patients were excluded from the study. All patients underwent meniscal repair. None of the patients underwent partial meniscectomy, and none developed postop complications.

All patients were mobilized the day after surgery and discharged 2 days after surgery with no braces. No analgesia protocol other than cold compress and NSAIDs was used after surgery. Patients received antibiotic therapy before and after surgery. Knee flexion strain and full weight-bearing were restricted for 3 weeks after surgery. Physical therapy and rehabilitation were implemented in the same center according to a standard protocol. In the early post-operative period (first 5 days), cold pack for 30 minutes and Transcutaneous Electrical Nerve Stimulation for 30 minutes per day were applied to all patients. All patients used an exercise bike with low resistance for range of motion between the 2nd and 4th weeks. Isometric exercises were started at the 6th week. After the 8th week, the running were started. If the quadriceps strength was good, dag walking was started after the 12th week.

The TLKSS consists of eight subscales: limp, the need for support, locking, instability, pain, swelling, stair climbing, and squatting. Each subscale is scored on a scale of 0 to 100 (<65=poor, 65-83=fair, 84-90=good, and >90 excellent).⁹

The IKDC questionnaire is a clinical-functional scoring system on a scale of 0 to 87 under 10 headings for 3 categories: symptoms, sports activity, and knee function (before-after).¹⁰

STATISTICAL ANALYSIS

The data were analyzed using the Statistical Package for the Social Sciences (SPSS) (IBM Corp., Version 23.0. NY) at a significance level of 0.05. Mean and standard deviation were used for continuous variables. Number and percentage were used for categorical variables. Histograms were used for normality testing. Repeated numerical data were analyzed using the Wilcoxon test. The Mann-Whitney U test was used for inter-group comparison.

RESULTS

The sample (12 women and 37 men) consisted of 22 athletes and 27 non-athletes. Participants had a mean age of 24.94±4.34 years. The groups consisted of a similar number of male and female participants (p=0.282). Thirty-three participants had a meniscal tear on the right side (67.3%). The groups were similar in terms of the side of the meniscal tears (p=0.910). Table 2 shows the participants’ descriptive characteristics.

Preop and postop IKDC and TLKSS scores were compared. Postop scores were higher than preop scores on all parameters (Table 3).

TABLE 2: Descriptive characteristics of the participants.

		Athlete		Non-athlete		p value
		n	%	n	%	
Gender	Man	15	68.2	22	81.5	0.282
	Woman	7	31.8	5	18.5	
Side	Right	15	68.2	18	66.7	0.910
	Left	7	31.8	9	33.3	
Age	Mean±SD	22.18±2.80		27.19±4.10		<0.001

SD: Standard deviation.

TABLE 3: Preop and postop scale scores.

	Mean	n	SD	p value
Preop IKDC	29.51	49	7.246	<0.001
Postop IKDC	82.59	49	3.360	
Preop TLKSS	37.71	49	9.452	<0.001
Postop TLKSS	85.45	49	9.023	

SD: Standard deviation; IKDC: International Knee Documentation Committee; TLKSS: Tegner Lysholm Knee Scoring Scale.

TABLE 4: Gender independent preop and postop scale scores of the groups.

	Athlete		Non-athlete		p value
	Mean	SD	Mean	SD	
Preop IKDC	31.27	8.44	28.07	5.87	0.208
Postop IKDC	84.82	1.89	80.78	3.21	<0.001
Preop TLKSS	39.77	10.87	36.04	7.93	0.142
Postop TLKSS	90.64	5.72	81.22	9.08	<0.001

SD: Standard deviation; IKDC: International Knee Documentation Committee; TLKSS: Tegner Lysholm Knee Scoring Scale.

There was no significant difference in preop IKDC and TLKSS between the groups. However, Group 1 (athletes) had significantly higher postop IKDC and TLKSS scores than Group 2 (non-athletes) (Table 4).

DISCUSSION

Our results showed that athletes had better postop clinical and functional outcomes than non-athletes. This is probably due to 2 reasons. First, athletes stick to physical therapy programs more than non-athletes and perform exercise better than them. Second, athletes have better muscle strength than non-athletes.⁸

Menisci are important structures that should be preserved. They are responsible for joint loading, stability, proprioception, and lubrication.³ Articular cartilage loss after surgery (e.g., meniscectomy) is a phenomenon recognized by physicians.¹¹⁻¹⁴ All our participants underwent meniscal repair surgery. Meniscectomy and meniscal repair are 2 surgical options used to treat meniscal injuries.¹⁵ In recent years, there has been an increase in the demand for meniscal repair surgery, especially on the part of athletes.

There is a large body of research investigating the effect of various factors on meniscal repair outcomes. For example, Rothermel et al., conducted a systematic review and concluded that age did not affect meniscal repair surgical outcomes.¹⁶ We also did not detect a relationship between age and clinical and functional outcomes. Group 1 had 7 female patients who underwent meniscal repair surgery (31.8%), while Group 2 had 5 (18.5%) female patients who underwent meniscal repair surgery. However, this is probably because meniscal tears are common sports-related injuries, and women participate in sports less than men in general.

We performed meniscal repair on all our patients. It is particularly important to preserve the meniscus in athletes.¹⁷ Svantesson et al. reported that patients who underwent meniscectomy had better clinical and functional outcomes in the early period than those who underwent meniscal repair.¹⁸ Knee joint injury is more common in athletes.⁴ Given the key role of the menisci in knee stability, we can state that athletes who undergo meniscal resection are more likely to experience joint injury and osteoarthritis in the early period.^{14,19} We would also like to emphasize the fact that patients have a valid ground for demanding that their menisci be preserved.

Almost all studies have reported good to excellent health outcomes after meniscal repair surgery.^{8,20,21} We also found that athletes had good postop clinical and functional outcomes. However, few studies have compared athletes and non-athletes on meniscus repair surgical outcomes. Vanderhave et al., investigated IKDC and tegner scores after meniscus repair only in young athletes and found the results good-excellent.²² There was no significant difference in preop IKDC and TLKSS scores between athletes and non-athletes. However, athletes had significantly higher IKDC and TLKSS scores than non-athletes 6 months after surgery.

This study had 4 limitations. First, this was a retrospective study. Second, the sample was small. Third, all patients went through the same physical therapy protocol after surgery, but we did not take “protocol adherence” as a variable. Fourth, we did

not group the athletes according to the branch of sports they were engaged in.

CONCLUSION

Postoperative physical therapy protocols are closely associated with good surgical outcomes in patients who undergo meniscal repair surgery. We report that the athletes recover faster than non-athletes during the post-operative rehabilitation process.

Source of Finance

During this study, no financial or spiritual support was received neither from any pharmaceutical company that has a direct connection with the research subject, nor from a company that pro-

vides or produces medical instruments and materials which may negatively affect the evaluation process of this study.

Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

Authorship Contributions

Idea/Concept: Mehmet Cenk Turgut; **Design:** Mehmet Cenk Turgut, Muhammet Salih Ayas; **Control/Supervision:** Ahmet Köse, Mehmet Köse; **Data Collection and/or Processing:** Muhammet Salih Ayas; **Analysis and/or Interpretation:** Muhammet Salih Ayas; **Literature Review:** Ahmet Köse; **Writing the Article:** Mehmet Cenk Turgut; **References and Fundings:** Mehmet Cenk Turgut.

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