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Comparison of conservative and surgical treatment methods in patients with meniscopathy

Hakan Bayraktar[1], Safak Ekinci[2], Fatih Ozcelik[3], Mesut Mehmet Sonmez[4], Cuneyt Tamam[5]

ABSTRACT

Objective: Arthroscopic surgery is currently a well-known treatment method for meniscal pathologies. This study aims to compare conservative and surgical methods in patients with meniscopathy.

Materials and Methods: The retrospective analyses of 68 patients with meniscal tear were included in this study. Patients were divided into two groups: a medical treatment group (MTG) and a surgical treatment group (STG). Diagnosis was perfomed by physical examination and magnetic resonance imaging (MRI). All patients were evaluated before and after treatment with main pain score (MPS), International Knee Documentation Committee (IKDC) score, body mass index (BMI), and Ultrasensitive C-reactive protein (US-CRP).

In the MTG group, 31 patients underwent medical treatment with naproxen sodium for three days, ice application, activity modification, and muscle exercises. In the STG group, 37 patients underwent arthroscopic partial menisectomy and naproxen sodium for three days. Parameters characterizing pretreatment and posttreatment states were compared statistically. The MPS, IKDC, BMI, and US-CRP values of both groups were recorded at baseline and three months after treatment.

Results:

Surgical treatment group (STG): In this group, after three months of treatment, MPS decreased and IKDC scores increased significantly when compared with baseline ($P < 0.0001$ and $P < 0.0001$, respectively). The difference for the US-CRP levels and BMI values was not statistically significant ($P = 0.1500$ and $P > 0.1799$, respectively).

Medical treatment group (MTG): In this group, MPS decreased and BMI increased significantly after three months compared with preoperative scores ($P < 0.0001$ and $P < 0.0001$, respectively). However, the difference between average IKDC scores and US-CRP levels was not statistically significant ($P = 0.1828$ and $P > 0.05$, respectively).

Conclusion: IKDC and pain scores of patients with meniscal tear improved by arthroscopic knee surgery.

Key words: *Meniscus tear, arthroscopy, knee-scoring questionnaire, pain assessment score*

Introduction

The menisci are the structures located on the upper surface of the tibia that provide integration with the femoral condyle [1,2]. Both menisci are in the fibrocartilage structure, and the medial meniscus has a half-semicircular shape, while the lateral meniscus is rounded. The superior surfaces of the menisci are concave soas to fit with the convex femoral condyles, and the inferior

Author affiliations : *Department of Orthopaedic Surgery, [1]Pendik Hospital, Istanbul, Turkey [2]Agri Military Hospital, Agri, Turkey [4]Sisli Etfal University Hospital, Istanbul, Turkey [5]Tatvan Military Hospital, Bitlis, Turkey [3]Department of Biochemistry, Erzincan Military Hospital, Erzincan, Turkey*

Correspondence : *Safak Ekinci, Department of Orthopaedic Surgery, Agri Military Hospital, Agri, Turkey. e-mail: safakekinci@yahoo.com*

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surface has a flat structure fitting with the tibial plateau [3]. The functions of the menisci are to ensure the distribution of the load on the knee, to absorb shock, to serve as secondary knee stabilizers, to provide nutrition and lubrication for the joint cartilage, to facilitate the sliding movement in the joint, to prevent hyperextension, and to protect the borders of the joint [3]. In summary, the meniscus prevents abrasion between the tibia and the femur during movement. The menisci can be torn off by the simultaneous effects of compressive and rotational forces in the tibiofemoral joints [3]. In addition, histological studies show that 1/3 of the middle and the outer portion of the meniscal tissue is mainly innervated by free nerve endings, and proprioceptive function in the knee is deteriorated after partial meniscectomy [4].

Meniscal tears are manifested by various symptoms, such as pain, stiffness, or swelling, and can cause early degeneration in joints. Also, they are the most common indications for orthopedic surgery [5]. Arthroscopic knee surgery is the most common technique for intra-articular pathologies like meniscal tear, osteocondral lesions, and cruciate ligament lesions.

Knee surgery is usually performed to resolve complaints and joint damage that may develop. The most common complaint in patients undergoing surgery is pain [6]. Advances in optical and electronic technologies in recent years have doubtlessly expanded the applicability of this treatment and offer the possibility for mobilization in the shortest time. Furthermore, patient satisfaction is the most important factor for the sustainability of these expensive investments and advanced technological methods.

In addition, although a group of surgeons prefers conservative treatment, there are no sufficient objective criteria to compare arthroscopic knee surgery and conservative treatment. Although compelling literature exists about long-term results of arthroscopic surgery, there remains no controlled study of short-term surgical healing and patient satisfaction [7].

In our study, we investigated the effects of conservative treatment and arthroscopic surgery on patient satisfaction by comparing the body mass index (BMI), ultrasensitive CRP (US-CRP), mean pain score (MPS), and the International Knee Documentation Committee (IKDC) values.

Methods

The selection of the study population

The research involved retrospective analyses of 71 patients who had meniscal lesions diagnosed by physical examination and magnetic resonance imaging (MRI), who were admitted to the Gümüşsuyu Military Hospital between 2003-2005. Three patients were later excluded because they discontinued the exercise program.The patients' mean age was 24.3 years (age range 20-31). The study was approved by the local ethics committee. Informed consent from the patients who participated in the study was obtained before the study. Patients who had pre-surgical procedures on their lower extremities, anterior cruciate ligament (ACL) and medial collateral ligament (MCL) lesions, and patients with advanced levels of chondral lesions (grades 3-4) were excluded from the study.

Follow-up

Before and three months after treatment, patient satisfaction was evaluated using the IKDC survey, which is used for the assesment of knee ligament injuries, meniscal injuries, articular cartilage, and patellofemoral damage [8]. Pain scores were calculated with the data obtained from the surveys of patients. After taking the arithmetic average of each group's pain score, the mean pain score was (MPS) established.

After physical and MRI examinations, 33 patients who had grade 1 and grade 2 meniscal lesions received conservative treatment. 38 patients who had grade 3 and grade 4 meniscal lesions were treated surgically. The MTG was treated with naproxen sodium, which is an oral non-steroidal anti-inflammatory drug (NSAID), for an average of three days (2-7 days), and with localized cooling. They were recommended to avoid sporting activities and were assigned exercises for strengthening the quadriceps muscles. In the STG, arthroscopic partial meniscectomy was performed, and postoperative quadriceps strengthening exercises were started from day one. In order to control the patients' exercises, they were accompanied by a physiotherapist. At this stage, two patients from the conservative treatment group and one patient from the surgical treatment group were excluded from the study because they discontinued the exercise program.

Statistical analysis

The statistical software package SPSS 15.0 (SPSS Inc., Chicago, Ill., USA) was used for the statistical analysis. A paired t-test was used for parametric testing, and a Wilcoxon paired test was used for nonparametric data to evaluate the MPS, IKDC, BMI, and US-CRP values of each group before and three months after treatment. For the evaluation of the relationship between IKDC and the MPS, Spearman correlation analysis was used.

Results

We found suprapatellar plica in four patients and a medial plica in one patient who had received arthroscopic partial meniscectomy. These plicae were excised. None of the patients had a chondral lesion in the tibial and femoral articular face. Chondromalacia patella detected in the majority of patients were evaluated as grade 1 or 2, and no additional intervention was made except for quadriceps exercises after surgery.

Arthroscopic surgical treatment group

The preoperative MPS of 37 patients who underwent arthroscopic surgical treatment was 7.4 ± 2.0, and the IKDC score was 47 ± 16. After three months of treatment, the arthroscopic surgery group had MPS of 3.0 ± 1.4, and the mean IKDC was concluded as 63.40 ± 17.37. There was a statistically significant difference between the MPS and IKDC values before and after surgical treatment ($P < 0.0001$) (Table 1). IKDC and MPS scores presented a moderate negative correlation between measurements recorded before and after arthroscopic surgery (Spearman $r = -0.6330$, $P < 0.0001$; Spearman $r = -0.5281$, $p< 0.0008$) (Figure 1).

Before the arthroscopic surgery, the mean US-CRP was 13.5 ± 8.3 mm/L, and after three months, it was 10.7 ± 6.9 mm/L. The difference was not statistically significant ($P = 0.1500$). Before and after arthroscopic surgery, there were also no statistical differences between BMI values ($P > 0.1799$) (Table 1).

Medical treatment group

The 31 medically treated patients' MPS values were 7.9 ± 1.1, and the mean IKDC score was 52 ± 16. After three months of medical treatment, the MPS was 6.6 ± 1.2, and the mean IKDC score was 58 ± 16.

The difference before and after medical treatment in the MPS was statistically significant ($P < 0.0001$). However, the difference between average IKDC scores was not statistically significant ($P > 0.05$). Similarly, before the medical treatment, US-CRP levels were 11.5 ± 7.5 mg/L, and three months after the medical treatment they were 9.9 ± 4.8 mg/L; this difference was not statistically significant ($P = 0.1828$). However, before and after medical treatment, there was a statistically significant difference between the BMI values (23.1 ± 2.0 and 24.0 ± 1.9, respectively; $P < 0.001$) (Table 2).

Comparison of all groups

When comparing the MPS and the IKDC data before and after treatment for both patient groups,we determined that the largest change was in the arthroscopic surgery group.

Discussion

As pain is a subjective sensation, it is isdifficult to measure and is commonly seen after orthopedic surgery. The measurement of pain is benefical for determining prognosis and the response to treatment. Eliminating the disease or satisfying the patient in the medical care provided is not always consistent. Medically, the best outcome can be unsatisfying for a patient because of disinformation and high patient expectations [9]. A patient's age, gender, socioeconomic status,

Table 1. Comparison of the data of before and after arthroscopic surgery.

	Before Arthroscopic Surgery Mean ± SD	After Arthroscopic Surgery Mean ± SD	Comparison of groups
n	37	37	-
Age, years	24.9 ± 3.1	-	-
BMI, kg/m^2	23.6 ± 2.1	23.8 ± 2.0	[a] 0.1799
US-CRP	13.5 ± 8.3	10.9 ± 6.9	[a] 0.1500
Pain Score	7.4 ± 2.0	3.0 ± 1.4	[b] <0.0001
IKDC Score	47 ± 16	66 ± 19	[b] <0.0001

SD: Standard Deviation, a: P value for paired t-test, b: P value for Wilcoxon pairs test (nonparametric)

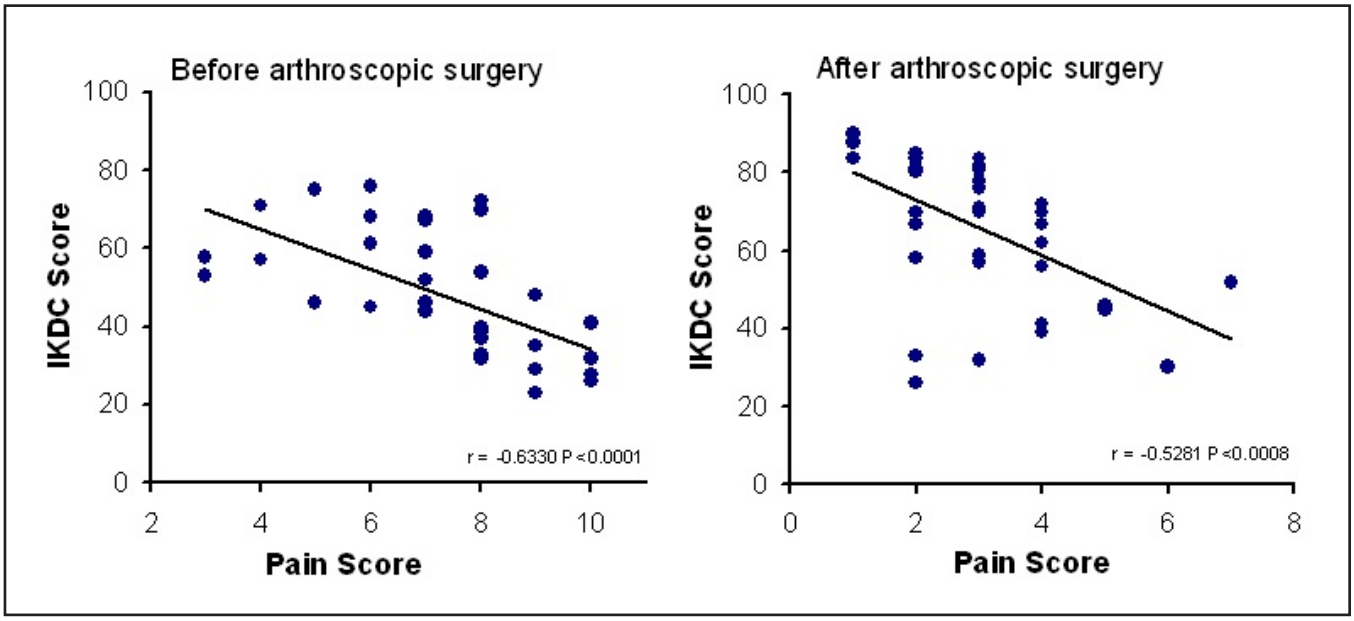

Figure 1. International Knee Documentation Committee (IKDC) scores before (left) and after (right) arthroscopic surgery. Each correlation coefficient (r) was calculated by using Spearman correlation analysis, and was calculated independently.

Table 2. Comparison of the data of before and after medical treatment.

	Before Medical Treatment Mean ± SD	After Medical Treatment Mean ± SD	Comparison of groups
n	31	31	-
Age, year	23.4 ± 3.0	-	-
BMI, kg/m^2	23.1 ± 2.0	24.0 ± 1.9	[a] 0.0002
US-CRP	11.5 ± 7.5	9.9 ± 4.8	[a] 0.1828
Pain Score	7.9 ± 1.1	6.6 ± 1.2	[b] <0.0001
IKDC Score	52 ± 16	58 ± 16	[b] 0.0561

SD: Standard Deviation, a: P value for paired t-test, b: P value for Wilcoxon pairs test (nonparametric)

demographic features, treatment expectancy, physician time per patient, and availability of the health care team are the factors that influence the patient's overall satisfaction.

In the early 1960s and 1970s, orthopedists were completely dependent on physicial and plain radiograhpic examination for the diagnosis of knee diseases. Subsequently, knee arthroscopy began to be used more frequently for the diagnosis and treatment of knee diseases [10]. In the late 1980s, MRI provided the opportunity of examining intra-articular disorders without arthroscopy [11].

In a study that determined the accuracy of the diagnosis before arthroscopic surgery, meniscal pathology was the most common diagnosis, with 43% prevalence [12]. In another study, the ratio was found to be 40% [13]. At least one-third of the middle-aged and older patients had meniscus injury, as noted by Englund et al. [14]. Boden observed 16% meniscal damage by MRI in a population of 74 volunteers who had no trauma history and an average age of 34 years [15]. Kaplan's study used a group of 20 asymptomatic professional basketball players without a history of trauma with a mean age of 26.1, and revealed that 20% had meniscal damage, as diagnosed by MRI [16].

Arthroscopic surgery is a frequently applied method in the diagnosis and treatment of intra-artricular pathologies, and Selesnick et al. found that it has 95% - 99% accuracy in diagnosis [17].

Meniscal lesions are the most common knee pathologies and also account for the most frequent surgeries in the United States performed by orthopedists [18,19]. This number was estimated to be 636,000 per year by the American Academy of Orthopaedic Sur-

geons (AAOS) [20]. According to Accident Compensation Corporation (ACC) data, between July 2008-June 2009, $30 million was spent on a total of 8,999 simple and complex arthroscopic procedures, not including anterior cruciate ligament repair [21].

Conservative treatment, meniscus repair, partial meniscectomy, and complete meniscectomy methods can be used in the treatment of meniscus damage. The protection of the anatomical structures is important because removal of meniscal structures may result in degeneration. Surgical advances in technology resulted from a decreased rate of sequelae and an increased rate of meniscal tissue protection at longer follow-up periods [3]. Its known that only 20% of all meniscus tears are on vascular areas and suitable for repair [22,23]. According to Jee et al., horizontal, radial, and complex tears cannot be repaired, and most of them require partial meniscectomy [24]. Zanetti reported that all displaced ruptures are associated with trauma [25]. Other authors also reported the importance of trauma in developing meniscal degeneration [26,27].

In their prospective randomized study, Joklet et al. stated that the time interval with regard to returning to sporting activities is the same between subjects who underwent continuously controlled rehabilitation programs and those who did not [28].

In contrast, Moffet et al. [29] stated that muscle strengthening occurred earlier in patients who underwent controlled physical therapy of the quadriceps. In this study, they also reported that early stage and intensive rehabilitation programs have critical importance for obtaining successful results after meniscectomy. Our group of patients was treated in the early stages, and the exercise was carried out in the presence of a physiotherapist.

In their prospective study, Englund et al. reported that meniscal damage that was not treated surgically leads to osteoarthritis within 30 months. The authors showed that patients with minor tears had 3-fold and with severe tears had a 7.9-fold higher risk of osteoarthritis, compared with those with no meniscal damage [30].

In the presented study, although lesions addressed with surgical treatment were at an advanced stage, arthroscopic surgery resulted in better pain scores and improved physical activity with more patient satisfaction compared with medical treatment.

Quick mobilization of patients after arthroscopic surgery provides more patient satisfaction when compared with medical treatment. Despite Fabricant et al.'s [7] report of the ineffectiveness of BMI on predicting short-term postoperative results, other authors reported that obesity adversely affects long-term results after arthroscopic surgery [30,31].

In the presented study, arthroscopic knee surgery significantly increased the patients' satisfaction levels in the early period. Collins et al. [8] noted a high degree of correlation between IKDC and the visual pain scale. However, in the presented study, the relationships between the MPS and the IKDC scores were statistically significant, but were not strong. Therefore, we believe that the MPS and IKDC questionnaires cannot be used interchangeably. Using them together would be more appropriate in the evaluation of arthroscopic surgery.

In the literature, there are no published studies that have investigated the US-CRP levels in patients who underwent arthroscopic surgery for meniscopathies. However, Margheritini et al. measured the CRP levels and erythrocyte sedimentation rates in their patients who underwent arthroscopically assisted anterior cruciate ligament reconstruction [32]. These two values reached the highest levels on the 3rd and 7th days, respectively. However, CRP levels returned to normal levels at an earlier stage than the sedimentation rate. Therefore, they concluded that the CRP level is a more effective instrument for determining postoperative complications.

In our study, there was no significant difference between the US-CRP values of patients who underwent either arthroscopic surgery or medical treatment. Although a significant portion of the patients showed significant improvement in the MPS and IKDC scores following arthroscopic surgery, there were no significant changes detected in US-CRP levels. Therefore, we concluded that US-CRP levels cannot be used as a criterion for patient satisfaction and for the follow-up in the management of patients with meniscal lesions.

As a result, we believe that arthroscopic knee surgery increases patient satisfaction and expedites the mobilization of the patient, when considering the IKDC and MPS values of patients with meniscus damage.

Conflict of interest statement

The authors have no conflicts of interest to declare.

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