

Original Research Article

Comparison of arthroscopic partial meniscectomy with physical therapy alone co existing meniscal tear and knee osteoarthritis

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ABSTRACT

Background: In patients with a meniscal tear and mild-to moderate osteoarthritis, we analyzed whether arthroscopic partial meniscectomy improve physical and functional outcomes more than physical therapy does.

Methods: 52 patients had a meniscal tear as well as osteoarthritis confirmed by magnetic resonance imaging or radiography. Symptoms had persisted for more than 3 months despite conservative measures. Patients were allocated to Group A subjected to partial meniscectomy and postoperative physical therapy (n=26) or to Group B with physical therapy alone (n=26). The primary outcome measure was change on the physical-function scale of the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) during the 6 months after randomization. A 12-month assessment was added to determine the stability of the result. Secondary outcomes were the pain score on the Knee Injury and Osteoarthritis Outcome Score (KOOS).

Results: At 6 months, the 2 groups did not differ in mean improvement in the WOMAC physical-function score, in decreases on the KOOS pain score. The results were similar at 12 months.

Conclusions: In patients with a meniscal tear and mild-to-moderate osteoarthritis, both groups showed similar outcomes between arthroscopic meniscectomy and physical therapy.

Keywords: Meniscectomy, Knee injury and osteoarthritis outcome score, Western Ontario and McMaster universities osteoarthritis index, Osteoarthritis

INTRODUCTION

Meniscal tears are highly prevalent, with imaging evidence of a meniscal tear observed in 35% of persons older than 50 years of age; two thirds of these tears are asymptomatic.^{1,2} Meniscal damage is especially prevalent among persons with osteoarthritis and is frequently treated surgically with arthroscopic partial meniscectomy.^{3,4} The high prevalence of meniscal tears in patients with osteoarthritis of the knee and the observation that these lesions are often asymptomatic, challenge the ability of clinicians to determine whether symptoms are caused by the tear, osteoarthritis, or both.

The role of arthroscopic surgery in patients with osteoarthritis has been studied over the past decade. Studies have not shown a statistically significant or clinically important difference between the arthroscopic and non-operative groups with respect to functional improvement or pain relief over a follow up period.^{1,2} However, they did not focus on management of a symptomatic meniscal tear, which is a frequent indication for knee arthroscopy in patients with osteoarthritis of the knee. Therefore, we conducted this trial to assess the efficacy of arthroscopic partial meniscectomy as compared with a standardized physical-therapy regimen

for symptomatic patients with a meniscal tear and concomitant osteoarthritis.

METHODS

The study protocol was approved by our institutional review board. All patients provided written informed consent. Patients were then randomly assigned in a 1:1 ratio to the two groups and randomization was conducted in blocks of varying size within each site. Between 2015 and 2016, patients with meniscal tears who underwent arthroscopic partial meniscectomy (group M) or undertook physical therapy program alone (group PT) were recruited. In total, 52 patients (26 in group M and 26 in group PT) were included in the study. We enrolled symptomatic patients 35 years of age or older with a meniscal tear as well as osteoarthritis detected on magnetic resonance imaging (MRI) or radiography. We required that patients had symptoms persisted for at least 3 months despite pharmacologic treatment and limitation of activity. The inclusion criteria were (1) Meniscal tears patients who underwent partial meniscectomy or Physical therapy program, (2) modified Outerbridge classification of grade 3 or lower, and (3) Kellgren-Lawrence (K-L) grade 2 or lower. Subjects were excluded from the study if they had (1) cruciate ligament injury (2) Previous knee surgeries (2) significant history of hip or ankle pathology (3) both meniscus injury (4) neuromuscular or systemic disease (5) arthrosis with K-L grade 3 or 4.

We performed an arthroscopic partial meniscectomy by trimming the damaged meniscus back to a stable rim. Loose fragments of cartilage and bone were removed, but this procedure did not involve penetration of the subchondral bone. Preoperative antibiotics were used routinely. Postoperatively, patients were allowed to bear weight as they were able. Bracing was not used. Patients were put on a postoperative standardized physical-therapy program with the use of the same protocol as that used in the PT group. We recommended lifestyle modifications to all patients to avoid deep flexion of the knee. Rehabilitation started 3-7 days after surgery. The program was divided into 6 weeks. Goals in the 1st week of rehabilitation were to reduce swelling and inflammation, restore range of motion and reestablish quadriceps muscle activity. Goals in the second week were to regain active non-painful range of motion (ROM) and to restore muscle strength. In the third week the exercise program is directed toward the improvement of muscle strength in order to return to normal functional activities through the use of closed kinetic chain exercises and elastic tubing. The rest of the weeks, exercises was designed to increase endurance through increasing the number of repetitions. The protocol was based on literature supporting the effectiveness of land-based, individualized physical therapy with progressive home exercise for patients with knee osteoarthritis.³⁻⁵ The program was designed to address inflammation, range of motion, concentric and eccentric muscle strength, muscle-length restrictions, aerobic conditioning (e.g., with the use of a bicycle, elliptical machine, or treadmill),

functional mobility, and proprioception and balance. Patients progressed at their own pace; the duration of participation varied depending on the pace of improvement. Generally, the program lasted about 6 weeks. In both the arthroscopic-M and PT groups, patients were permitted to receive acetaminophen and non-steroidal anti-inflammatory agents as needed. No intra articular injections were given to any of the patients. Questionnaires were administered at baseline, 6, and 12 months. The outcome measures were the difference between the groups with respect to the change in the score on the physical-function scale of the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) from baseline to 6 months and 12 months after randomization.⁶ WOMAC scores range from 0 to 100, with higher scores indicating worse physical function. Also, we noted pain component of The Knee injury and Osteoarthritis Outcome Score (KOOS) which is a patient-reported outcome measurement instrument, developed to assess the patient's opinion about their knee and associated problems.⁷ The KOOS evaluates both short-term and long-term consequences of knee injury and also consequences of primary osteoarthritis (OA). It holds 42 items in five separately scored subscales: KOOS pain, KOOS symptoms, function in daily living (KOOS ADL), function in sport and recreation (KOOS Sport/Rec), and knee-related Quality of Life (KOOS QOL).

To determine similarity between the groups at baseline, basic demographic parameters were compared using independent t tests. The two groups were compared for the outcome measures using separate 2 factor mixed model analysis of variance (ANOVA). Statistical significance was defined as $p < 0.05$. For statistical analysis SPSS version 18.0 software was used.

RESULTS

The study group comprised 52 patients divided into Meniscectomy (M) group and Physical therapy (PT) group (M group=26; PT group=26). The final population comprised 24 men (M group=16; PT group=8) and 28 women (PT group=10; F group=18) with a mean age of 47.44 ± 5.8 years (M group= 46.54 ± 7.34 ; PT group= 48.34 ± 4.31). The mean body mass index was $25.26 \pm 2.9 \text{ kg/m}^2$ (NF group= 25.5 ± 4.8 ; F group= 24.98 ± 2.8) (Table 1). Compared with pre-operative values, all clinical scoring systems (KOOS- Pain score, WOMAC) revealed significant improvements over the post-operative period ($p < 0.001$ for all comparisons) in both the M and PT group. At the last follow-up visit at 12 months (Figure 1 and 2), these scores had significantly improved ($p < 0.01$). Significant correlations were evident between the preoperative and final scores ($p < 0.01$), and between changes in the scores ($p < 0.001$) over time in both the groups. Comparison of KOOS-Pain (Table 2) score ($p > 0.05$) and WOMAC (Table 2) scores ($p > 0.05$) between the M and PT group at the end of 6 months and at 1 year didn't show statistically significant difference.

Table 1: Demographic factors of different groups.

No. of patients	M group	PT group
Age	46.54±7.34	48.34±4.31
F:M	10:16	18:08
BMI	25.55±3.03	24.98±2.84
OA Grade-0	2	3
OA Grade-1	7	10
OA Grade-2	17	13
Knee R:L	11:15	17:09

Table 2: Clinical outcomes of meniscectomy (M) and physical therapy (PT) groups.

	M group	PT group	p value ^a
Womac			
Pre-op	43.1±16.5	38.42±14.3	n. s
6m	13.9±7.9	14.3±14.5	n. s
1y	6.2±6.1	8.9±5	n. s
p value ^b	<0.05	<0.05	
KOOS pain			
Pre-Op	71±16	62±11	<0.05
6m	33±7	38±11	n. s
1 y	24±6	28±13	n. s
p value ^b	<0.05	<0.05	

^a: Significant difference comparison between M and PT groups.

^b: Repeated-measures analysis of variance (ANOVA) within the each evaluation parameter.

DISCUSSION

The gold standard treatment in symptomatic torn meniscus has been arthroscopic partial meniscectomy, followed by supervised physical therapy protocol.⁸ Recovery of the knee toward its pre injury level is one of the goals to be assessed after arthroscopic meniscectomy.⁹ Although meniscectomy appears to be effective, patients who have had an arthroscopic partial meniscectomy often initially experience knee swelling, pain, muscle atrophy, decrease in muscle tone and strength and loss of range of motion (ROM). They may have increased joint laxity and osteoarthritis in the long term.⁹⁻¹¹ Many studies have investigated the effect of arthroscopic partial meniscectomy on knee proprioception and found deficit that may persist 1-2 year postoperatively. Al-Dadah, Donell, et al. and Malliou et al. found that non athletic patients who underwent arthroscopic partial meniscectomy have a significant proprioceptive deficit as measured by single leg dynamic postural stabilometry (Biodex Balance SD System) when compared to their uninjured contra-lateral knee and to a control group thus concluding that even a partial absence of menisci cause a deterioration of proprioceptive functions of the knee.^{12,13} Literature on rehabilitation after meniscectomy has focused on a structured rehabilitation combining home exercises, minimizing early postoperative complications by early supervised physical therapy program.^{8,14} In a prior small, single-center, randomized, controlled trial comparing arthroscopic

partial meniscectomy with standardized physical therapy for symptomatic patients with a meniscal tear and knee osteoarthritis, the two groups had similar functional outcomes at 6 months, and the similarity between the groups persisted through 5 years of follow-up.^{15,16} Similarly, a large, multicenter, randomized, controlled trial was carried out to examine the efficacy of arthroscopic partial meniscectomy as compared to physiotherapy regimens and found out no significant differences between two groups in all indices at all levels measured.¹⁷ Analysis of our results showed that there were In this randomized, controlled trial involving symptomatic patients 35 years of age or older with a meniscal tear and imaging evidence of mild-to-moderate knee osteoarthritis, there were no significant differences in the magnitude of improvement in functional status and pain after 6 and 12 months between patients assigned to arthroscopic partial meniscectomy with postoperative physical therapy and patients assigned to a standardized physical-therapy regimen. As the trial was conducted in academic referral center, the findings should be generalized carefully to community settings. Also, our study was not blinded. Also, it is uncertain whether patients who undergo arthroscopic partial meniscectomy are at greater risk for progression of underlying osteoarthritis than patients treated non-operatively. Longitudinal assessment of imaging studies in our trial is planned to address this question. These limitations notwithstanding, the results of our trial may help guide management in the care of patients with knee symptoms, a meniscal tear, and imaging evidence of osteoarthritis. Given that improvements in functional status and pain at 6 months did not differ significantly between the two groups, these data provide considerable reassurance regarding an initial non-operative Physical therapy regimen to be given a fair trial.

CONCLUSION

In summary, symptomatic patients with a meniscal tear and imaging evidence of mild-to-moderate osteoarthritis who were randomly assigned to arthroscopic partial meniscectomy with postoperative physical therapy had improvements in functional status and pain at 6 months that did not differ significantly from the improvements in patients randomly assigned to a standardized physical-therapy regimen alone. Thus, these findings should help in decision making by the treating surgeon.

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Ethical approval: The study was approved by the institutional ethics committee

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