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Arthroscopic versus conservative treatment of degenerative meniscal tear in middle aged patients

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Abstract

Background: Degenerative meniscal tear is a very common health issue in the middle age group population worldwide. A common cause of medial knee pain in this age group. Still debated what the treatment of choice is. This study compares the clinical outcomes of conservative versus arthroscopic partial meniscectomy patients with degenerative meniscal lesions.

Method: The prospective randomised experiment included 60 40–60-year-old individuals. MRI revealed degenerative medial meniscal tears in all. Thirty patients were conservatively and thirty arthroscopically treated. They were evaluated for knee function and discomfort using the Lysholm Knee Scoring Scale and VAS. After 8 weeks, 6 months, and 1 year of therapy, each group was tested again using the same approach. Then both groups' clinical results were statistically analyzed.

Results: Arthroscopic partial meniscectomy did not enhance clinical outcomes more than conservative therapy. After one year, conservative and meniscectomy groups had average Lysholm knee scores of 78.67 and 78.27, respectively ($P = 1.000$). Median VAS ratings were 2 in conservative and 1.5 in arthroscopic. Most patients in both groups reported significant pain alleviation and improved knee function after 8 weeks of therapy ($P < 0.0001$).

Conclusion: Conservative therapy and arthroscopic meniscectomy of degenerative meniscal tears did not significantly vary in knee pain alleviation or function until one-year follow-up.

Keywords: Degenerative meniscal tear, arthroscopic partial meniscectomy, conservative treatment and medial meniscal tear

Introduction

Arthroscopic knee surgery, particularly meniscectomy, is one of the most common orthopedic procedures worldwide. The evolution of arthroscopy began with the Danish surgeon Severin Nordentoft's 1912 presentation on endoscopy of closed cavities, which paved the way for advancements in arthroscopy [1]. In 1962, Masaki Watanabe performed the first arthroscopic meniscectomy, marking a significant milestone in orthopedic surgery [2]. Today, arthroscopic partial meniscectomy (APM) is performed at a high rate, especially in the West, where approximately 300 out of 100,000 people undergo this procedure annually [3-5]. In Denmark, the number of arthroscopic surgeries doubled between 2000 and 2011 due to population growth and increasing demand [6]. About three-fourths of these procedures are for degenerative meniscal tears, a common condition in middle-aged and older adults [6]. Degenerative meniscal tears typically involve a horizontal cleavage of the meniscus and are often associated with osteoarthritis [7-9]. These tears can cause knee pain, swelling, and mechanical symptoms such as clicking and locking, which may lead to repeated effusion and synovial irritation [10-12]. Patients with degenerative meniscal tears can be treated either conservatively or arthroscopically, but there is ongoing controversy regarding which approach is superior [13]. Conservative treatments include analgesics, non-steroidal anti-inflammatory drugs (NSAIDs), physiotherapy, weight reduction, and lifestyle modifications [14]. Despite this, many orthopedic surgeons continue to offer arthroscopic lavage and debridement. The goal of APM is to preserve a stable meniscal rim by resecting only the torn part of the meniscus [15]. Arthroscopic treatment theoretically relieves symptoms and may alter the disease's natural history by removing debris and inflammatory cytokines through lavage and debridement, thereby decreasing mechanical symptoms and equalizing weight distribution on the joint surfaces [16]. Epidemiologically, meniscal tears are prevalent in the

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middle-aged to elderly population, with the posterior horn of the medial meniscus being the most commonly affected area [17]. The prevalence of these tears increases with age and osteoarthritis [18]. It is important to note that many meniscal lesions do not cause symptoms, as over 60% of tears are asymptomatic [17]. Anatomically, the knee joint is a complex structure comprising the tibiofemoral and patellofemoral joints. The menisci are semilunar, wedge-shaped fibrocartilaginous structures that play a crucial role in load distribution, shock absorption, and joint stability [19]. The medial meniscus, U-shaped and covering 60% of the medial compartment, is less mobile and more prone to tears compared to the more mobile C-shaped lateral meniscus [20]. Meniscal tears are classified based on depth, location, tear pattern, and tissue quality, among other criteria [21]. Degenerative meniscal tears are often horizontal and located in the posterior horn of the medial meniscus [17]. Magnetic Resonance Imaging (MRI) is the diagnostic tool of choice for grading and diagnosing meniscal tears [22]. The purpose of this study is to compare the clinical outcomes of two groups of middle-aged patients with degenerative meniscal tears, treated either conservatively or arthroscopically. The study uses the Lysholm knee score and Visual Analog Scale (VAS) for periodic evaluations over a one-year follow-up. The Lysholm score assesses various aspects of knee function, including swelling, pain, and stability, providing a comprehensive measure of patient outcomes.

Method

This study was a prospective randomized controlled trial conducted between August 2017 and September 2019 in the Orthopedic Department of Erbil City's Teaching Hospital. The trial aimed to compare the clinical outcomes of two groups of patients with knee pain associated with degenerative medial meniscal tears (DML), treated either conservatively or with arthroscopic partial meniscectomy (APM). Patients were randomized using odd and even numbers. Study Sample: The study included 60 middle-aged patients (age range 40-60 years, average age 49.5 years) with atraumatic medial knee pain and tenderness, confirmed to have grade 3 degenerative medial meniscal tears by MRI.

Inclusion criteria

- Middle age (40-60 years)
- Atraumatic continuous pain in the medial aspect of the knee affecting daily activities
- Grade 3 degenerative tear of the medial meniscus on MRI

Exclusion criteria

- Meniscal tear due to trauma
- Any rheumatologic knee disease
- MRI showing ligament injury, loose bodies, tumors, or osteochondral defects

- Previous knee or lower limb surgery within the last year
- Knee joints with osteoarthritis graded 2 or more according to the Kellgren-Lawrence scale
- Lateral meniscus tear

Data Collection: Participants provided verbal and written consent and completed a questionnaire covering demographic data, MRI findings, symptoms, and Lysholm and VAS scores before and after treatment. Evaluations were conducted before treatment, 8 weeks post-treatment, 6 months, and one year later.

Interventions: Patients were divided into two groups

1. **Conservative Treatment Group:** This group received medications (analgesics, muscle relaxants, NSAIDs, and local painkillers), physiotherapy, lifestyle and activity modifications, and patient education. A home exercise program aimed at decreasing pain and improving knee function was prescribed for 8 weeks.
2. **Arthroscopic Treatment Group:** Patients underwent standard arthroscopic surgery under general or spinal anesthesia. The procedure involved thorough examination and partial meniscectomy, retaining the stable peripheral meniscal edge.

Follow-Up: Postoperatively, patients were monitored for a few hours, then discharged with instructions for weight-bearing and home exercises. Both groups were reviewed at 8 weeks, 6 months, and one year.

Statistical Data Analysis: Using G*Power 3.1.9.2, a pilot study determined the required sample size. Data were analyzed using SPSS version 22. Descriptive statistics included frequencies, percentages, means, and standard deviations. Inferential analyses included: Chi-square tests for associations between categorical variables. Two independent sample T-tests for differences between groups. Repeated Measure One-Way ANOVA for differences between related means with Bonferroni post hoc test. Friedman Test for differences between related ranks with Dunn-Bonferroni post hoc test. Mann-Whitney U test for differences based on ranks between groups. The significance level was set at $P < 0.05$ for significant results and $P < 0.01$ for highly significant results.

Results

Sixty patients with medial knee pain included in the study. Thirty patients in each group. Group A Conservative, mean age \pm SD was 49.17 ± 5.59 , range (40 to 60) years, 53.33% were males. Group B Arthroscopic, mean age \pm SD was 49.83 ± 5.21 , range (40 to 60) years, 60% were males. Table 1.

Table 1: Distribution of subjects among groups by demographic data

Variables	Categories	Groups				Statistics	P value	Total	
		Conservative		Arthroscopy					
Age (Years) ^	Mean \pm SD	49.17 \pm 5.59 (40-60)		49.83 \pm 5.21 (40-60)		0.477	0.635 [NS]	49.5 \pm 5.37 (40-60)	
Gender**	M	16	53.33	18	60.00	0.271	0.602	34	56.67
	F	14	46.67	12	40.00		[NS]	26	43.33
Side**	RT	16	53.33	18	60.00	0.271	0.602	34	56.67
	LT	14	46.67	12	40.00		[NS]	26	43.33

Chi-square, ^=T-test=**

Findings in Tables 2, 3 demonstrate that the highest scale found in the second period followed by in the last period while the lowest found in the preoperative in both two groups, in the conservative group, the scale change with fluctuation speed meaning that it increase then decrease till the last period, but in the Arthroscopy, it incline then decline the it re-incline in the last period (1 year) with highly significant change in time with more effect size to

Arthroscopy than that in Conservative. When comparing each period between two groups, the lysholm scale found statistically no significant difference between two groups. When compare each period with each other, findings in Table 6 show that only the pre-operative period found to be statistically highly significant difference between all other periods in both two groups, while each other periods with other no significant difference was found.

Table 2: Descriptive and statistical test of Lysholm scale of Inter and Intra group comparisons using Repeated Measure Analysis of Variance (ANOVA)

Conservative			Arthroscopy			F	P value [^]	ES
Visits	Mean	±SD	Visits	Mean	±SD			
Pre-operative (42-80)	59.833	11.139	Pre-operative (42-81)	56.867	11.243	1.054	0.309	0.018
8 weeks (66-98)	81.667	10.300	8weeks (65-98)	80.733	9.667	0.131	0.719	0.002
6 months (64-98)	79.600	9.658	6 months(65-91)	77.567	8.063	0.784	0.380	0.013
1 year(60-94)	78.667	8.911	1 year(61-92)	78.267	8.452	0.032	0.859	0.001
Repeated ANOVA F=20.919 P-value=0.000,ES=0.528 Sig (HS)			Repeated ANOVA F=24.797 P-value=0.000,ES=0.571 Sig (HS)					

Table 3: Multiple pairwise comparisons of Lyshlom scale change within time by groups using Bonferroni post hoc test.

Groups	(I) Time	(J) Time	Mean Difference (I-J)	P value
Conservative	Pre-Op.	8 weeks	-21.833	0.000**
		6 months	-19.767	0.000**
		1 Year	-18.833	0.000**
	8 weeks	6 months	2.067	1.000
		1 Year	3.000	0.859
		1 Year	.933	1.000
Arthroscopy	Pre-Op.	8 weeks	-23.867	0.000**
		6 months	-20.700	0.000**
		1 Year	-21.400	0.000**
	8 weeks	6 months	3.167	1.000
		1 Year	2.467	1.000
		1 Year	-.700	1.000

Results in Tables 4-7, illustrate that VAS in both found to be highest in the first period and fluctuate then with declination the increasing with slightly decrease with highly significant change within time, when compare each period with other, only the first period had highly significant result when

compare with other periods while no significant results recorded in other pairwise comparisons., the other results when compared between the groups in each period, the VAS was found to show statistically no significant difference between them.

Table 4: Descriptive and statistical test of Visual analogue scale (VAS) Of Inter and Intra group comparisons using Friedman test

Conservative			Arthroscopy		
Visits	Median	MR	Visits	Median	MR
Pre-operative (4-9)	6	4.00	Pre-operative (2-9)	6	3.95
8 weeks (0-3)	1	1.78	8 weeks (0-2)	1	1.72
6 months (0-4)	2	2.13	6 months (0-3)	2	2.25
1 year (0-4)	2	2.08	1 year (0-3)	1.5	2.08
Friedman test X ² =60.536 P-value=0.000,ES=0.673 Sig (HS)			Friedman test X ² =58.610 P-value=0.000,ES=0.651 Sig (HS)		

MR=mean rank, W effect = X²/N (K-1), K=Kendall's W test

Table 5: Multiple pairwise comparisons of (VAS) change within time by groups using Wilcoxon sign test corrected by Dunn-Bonferroni

Groups	(I) Time	(J) Time	P value
Conservative	Pre-Op.	8 weeks	0.000**
		6 months	0.000**
		1 Year	0.000**
	8 weeks	6 months	1
		1 Year	1
		1 Year	1

Arthroscopy	Pre-Op.	8 weeks	0.000**
		6 months	0.000**
		1 Year	0.000**
	8 weeks	6 months	0.658
		1 Year	1
	6 months	1 Year	1

Table 6: Descriptive and statistical test of Visual analogue scale (VAS) of Inter group comparisons using Mann-Whitney U test

Conservative			Arthroscopy			Mann-Whitney U test	
Visits	Median	MR	Visits	Median	MR	Z	P ^value
Pre-operative	6	31.67	Pre-operative	6	29.33	0.524	0.600
8 weeks	1	31.33	8 weeks	1	29.67	0.390	0.697
6 months	2	30.60	6 months	2	30.40	0.046	0.963
1 year	2	31.45	1 year	1.5	29.55	0.437	0.662

Table 7: Lysholm categories within each time point along the study

Index	Groups				Total		
	Conservative		Arthroscopy		N.	%	
	N.	%	N.	%			
Pre-OP.	Poor"<=64"	18	60.00	22	73.33	40	66.67
	Fair"65-83"	12	40.00	8	26.67	20	33.33
8 weeks	Fair"65-83"	16	53.33	17	56.67	33	55.00
	Good"84-94"	10	33.33	11	36.67	21	35.00
	Excellent"95-100"	4	13.33	2	6.67	6	10.00
6 months	Poor"<=64"	1	3.33	0	.00	1	1.67
	Fair"65-83"	18	60.00	21	70.00	39	65.00
	Good"84-94"	9	30.00	9	30.00	18	30.00
	Excellent"95-100"	2	6.67	0	.00	2	3.33
1 year	Poor"<=64"	1	3.33	1	3.33	2	3.33
	Fair"65-83"	20	66.67	22	73.33	42	70.00
	Good"84-94"	9	30.00	7	23.33	16	26.67

Discussion

Arthroscopic partial meniscectomy (APM) for degenerative meniscal tears (DML) is a widely performed orthopedic procedure, though its efficacy lacks robust scientific support [23, 24]. This study aimed to compare the outcomes of APM with conservative non-operative treatment in patients with medial DML. Previous studies, such as that by Yim *et al.* [25], reported no significant differences in pain relief or knee function between the two treatment groups after a two-year follow-up. The present study evaluated middle-aged patients with medial DML, comparing the results of APM and conservative treatment using the Lysholm knee score and Visual Analog Scale (VAS). The Lysholm scale, sensitive for assessing meniscal injuries, showed no significant difference between the two groups at any time point [26]. Both groups experienced significant improvement at 8 weeks, as indicated by both Lysholm and VAS scores, but no long-term superiority of APM over conservative treatment was observed. This aligns with findings from Herrlin *et al.* [13], who also reported no advantage of APM over conservative treatment. The study found that both treatments resulted in similar outcomes, suggesting that symptoms of DML, particularly pain, tend to improve over time regardless of the treatment method. After 8 weeks, both groups showed significant improvement, which slightly decreased at 6 months, likely due to reduced adherence to regular exercises. In the conservative group, patients received analgesics based on pain severity and followed an 8-week home exercise program. Most previous studies have focused on post-meniscectomy exercises, with mixed results regarding the efficacy of supervised physical therapy versus home exercise programs. Herrlin *et al.* [13] and Goodwin and Morrissey [38] found no substantial evidence supporting the

superiority of physical therapy over home exercises in improving functional outcomes. Similarly, Goodyear-Smith and Arroll [28] recommended home exercise programs over supervised physiotherapy, a finding supported by Joki *et al.* [24], who reported comparable outcomes between supervised and unsupervised home exercise programs. Given the increased risk of osteoarthritis post-meniscectomy in patients over 40 [29], exercises are recommended initially. If clinical examination suggests degenerative knee issues, conservative treatment should be considered before opting for expensive investigations. The study's sample size and follow-up period may have been insufficient to detect potential differences in osteoarthritis progression and knee function between the two groups. Future research with larger sample sizes and longer follow-up periods may be necessary to identify any significant differences.

Conclusion

Medial meniscal tears are mostly due to degeneration, and as it is clear in our study, both arthroscopic partial meniscectomy and conservative treatment for degenerative meniscal tears in middle aged group, provide highly comparable clinical results. So we conclude that meniscectomy has no superiority over conservative treatment in treating DML, in regard to pain relief and knee function improvement until one year of follow up.

Conflict of Interest

Not available

Financial Support

Not available

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