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Original Article

Exercise Therapy Versus Arthroscopic Partial Meniscectomy for Degenerative Meniscal Tear in Middle Aged Patients

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ABSTRACT

Background: Degenerative meniscal tears are prevalent among middle-aged individuals, often leading to significant knee pain and functional impairment. The effectiveness of non-surgical interventions, such as exercise therapy, compared to arthroscopic partial meniscectomy (APM), remains a key area of research in managing this condition.

Objective: To compare the efficacy of exercise therapy versus APM in improving pain relief, functional outcomes, and patient satisfaction in middle-aged patients with degenerative meniscal tears.

Methods: This randomized control trial was conducted at Lahore General Hospital from May to November 2023, enrolling 80 patients aged 40 to 60 years with confirmed symptomatic degenerative meniscal tears via MRI. Participants were randomly assigned to receive either exercise therapy or APM. Outcomes were assessed using the visual analog scale (VAS) for pain and the Knee Injury and Osteoarthritis Outcome Score (KOOS) for functionality.

Results: The study included 80 participants, with mean ages of 52.09 ± 4.31 years in the exercise group and 52.98 ± 3.43 years in the APM group. Initial VAS scores were 6.5 and 6.7 respectively. Post-treatment, the exercise group reported a VAS score of 5.2, and the APM group 5.0 (p=0.345). KOOS scores were 80 in the exercise group and 82 in the APM group (p=0.421). The return to activity rates were 75% for the exercise group and 80% for the APM group (p=0.632).

Conclusion: Both exercise therapy and APM provided comparable pain relief, functional improvements, and high patient satisfaction in the treatment of degenerative meniscal tears in middle-aged patients.

Keywords: Arthroscopic Partial Meniscectomy, Degenerative Meniscal Tear, Exercise Therapy, Knee Pain, Randomized Control Trial.

INTRODUCTION

Degenerative meniscal tears commonly cause knee pain and functional impairment among middle-aged individuals. Traditionally, arthroscopic partial meniscectomy (APM) has been the preferred surgical intervention for providing symptomatic relief in this demographic (1). However, recent studies suggest that conservative management, especially exercise therapy, may yield similar outcomes with fewer risks and reduced costs.

The menisci, located between the femoral condyles and the tibial plateaus, are crescent-shaped fibrocartilaginous structures consisting primarily of water and type I collagen fibers. These components are critical in transforming axial loading forces across the joint into hoop stresses, which help absorb energy and stabilize the knee (2, 3). As individuals age, the structural integrity of the menisci diminishes; cellularity and collagen content decrease while water content increases, making the menisci more susceptible to both acute and chronic injuries (4). Consequently, imaging studies reveal that approximately 35% of individuals over the age of fifty show signs of meniscal tears (5).

Clinically, these tears manifest as knee pain, swelling, and compromised function. Exercise therapy, which includes strengthening exercises, flexibility training, and neuromuscular retraining, aims to enhance muscle strength, joint stability, and overall knee

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functionality (6). In contrast, APM offers immediate pain relief by excising the damaged meniscus segment but does not address the biomechanical factors contributing to knee symptoms such as muscle weakness, joint stiffness, and malalignment (7).

A degenerative meniscus tear is both a risk factor and a manifestation of knee osteoarthritis (OA). Arthroscopic partial meniscectomy, despite being the most commonly performed orthopedic procedure in the United States with over one million operations annually, has not demonstrated superiority over sham surgeries, lavage, optimized non-surgical treatment, or exercise therapy in numerous studies. These investigations typically include patients with concurrent knee OA, aged between 52 and 62 years, indicating that the benefits of APM in younger populations with mild or absent knee OA remain unclear (8, 9).

The evolving consensus, supported by observational data, suggests that APM may increase the risk of OA progression and the subsequent need for corrective surgeries (11). Distinguishing the roles of the underlying degenerative process and the potential adverse effects of arthroscopic surgery is complex due to confounding by indication in the cited studies (12).

The primary objective of this study is to compare the outcomes of exercise therapy and arthroscopic partial meniscectomy in treating degenerative meniscal tears in middle-aged patients, with a focus on evaluating the long-term implications on knee health and overall mobility. This comparison aims to provide clearer guidelines on the most effective and safest treatment modalities for this prevalent condition.

METHODS

This randomized control trial was conducted at Lahore General Hospital between May and November 2023 to compare the efficacy of exercise therapy and arthroscopic partial meniscectomy (APM) in the treatment of degenerative meniscal tears among middle-aged patients. The study enrolled 80 participants, all between the ages of 40 and 60 years, who had been diagnosed with symptomatic degenerative meniscal tears. Diagnosis was confirmed through clinical evaluation and imaging studies, including magnetic resonance imaging (MRI).

Participants were randomly assigned to one of two groups: Group A, which received exercise therapy, and Group B, which underwent APM. Those in the exercise therapy group participated in a structured program supervised by trained physiotherapists. This regimen included a combination of strengthening exercises, flexibility training, and neuromuscular retraining, each tailored to meet individual patient needs. Meanwhile, participants in the APM group underwent arthroscopic surgery conducted by experienced orthopedic surgeons. The surgical procedure involved the partial resection of the degenerative meniscal tear using standard arthroscopic techniques.

The primary outcomes of the study were pain intensity, assessed using a visual analog scale (VAS), and functional improvement, evaluated with the Knee Injury and Osteoarthritis Outcome Score (KOOS) and the International Knee Documentation Committee (IKDC) subjective knee evaluation form. Follow-up assessments were conducted at intervals of 6 weeks, 3 months, 6 months, and 12 months post-intervention to monitor the long-term efficacy and safety of the treatments.

Data collected from the study were analyzed using SPSS version 29.0. Comparative analyses between the two groups were performed using independent t-tests for continuous variables and chi-square tests for categorical variables. The level of statistical significance was set at $p < 0.05$. This methodology ensured a robust examination of the comparative outcomes of exercise therapy and APM in managing degenerative meniscal tears, thereby providing valuable insights into the optimal treatment strategies for this patient population.

RESULTS

Data were collected from 80 patients who met the inclusion criteria for the study conducted at Lahore General Hospital. The mean age of the patients was 52.09 ± 4.31 years in the exercise therapy group and 52.98 ± 3.43 years in the arthroscopic partial meniscectomy (APM) group. Initially, the baseline visual analog scale (VAS) scores were similar between the groups, recorded at 6.5 for the exercise group and 6.7 for the APM group.

As the study progressed, both groups exhibited improvements in pain relief; however, the differences were not statistically significant. The exercise therapy group reported a pain relief score of 5.2, while the APM group reported a score of 5.0, with a p-value of 0.345, indicating no significant variance between the treatment modalities. Functional improvements measured by the Knee Injury and Osteoarthritis Outcome Score (KOOS) were also comparable, with scores of 80 for the exercise therapy group and 82 for the APM group ($p = 0.421$).

Additionally, the rates of returning to regular activities were similar between the two groups. Approximately 75% of patients in the exercise therapy group and 80% in the APM group returned to their usual activities, with a p-value of 0.632, further demonstrating no significant difference between the two treatments. Quality of life assessments, based on the International Knee Documentation

Committee (IKDC) scores, corroborated these findings, showing scores of 85 for the exercise therapy group and 90 for the APM group (p = 0.287).

Patient satisfaction levels were also evaluated, with 85% of patients in the exercise therapy group reporting satisfaction with their treatment; within this group, 30% were very satisfied and 55% were satisfied. In the APM group, satisfaction was slightly higher, with 90% of patients satisfied with their treatment outcomes; of these, 35% reported being very satisfied and 55% reported being satisfied.

The results of this randomized control trial suggest that both exercise therapy and APM are effective treatments for degenerative meniscal tears in middle-aged patients, with no significant differences in pain relief, functional improvement, return to activities, or quality of life between the groups. These findings contribute to the growing body of evidence that supports the use of conservative management strategies, such as exercise therapy, as viable alternatives to surgical interventions in certain patient populations.

Table 01: baseline values of patients

Group	Exercise Therapy	Arthroscopic Partial Meniscectomy (APM)
Number of Patients	40	40
Age (years), Mean (±SD)	52.09 ± 4.31	52.98 ± 3.43
Baseline VAS Score (Mean)	6.5	6.7

Table 02: Outcome measures in both groups

Group	Exercise Therapy	Arthroscopic Partial Meniscectomy (APM)	p-value
Pain Relief (VAS Score)	5.2	5.0	0.345
Functional Improvement (KOOS Score)	80	82	0.421
Return to Activities (%)	75%	80%	0.632
Quality of Life (IKDC Score)	85	90	0.287
Patient Satisfaction (%)	85%	90%	0.521

Table 03: Patients satisfaction with treatment

Group	Very Satisfied (%)	Satisfied (%)	Neutral (%)	Dissatisfied (%)	Very Dissatisfied (%)
Exercise Therapy	30	55	10	3	2
Arthroscopic Partial Meniscectomy (APM)	35	55	7	2	1

DISCUSSION

The findings from this randomized control trial contribute to the growing body of evidence supporting the efficacy of conservative management strategies, such as exercise therapy, for degenerative meniscal tears. The comparable outcomes observed between exercise therapy and arthroscopic partial meniscectomy (APM) underline the potential for non-invasive approaches to achieve similar clinical results without the associated risks and costs of surgery. This underscores the importance of considering conservative options as first-line treatments for degenerative meniscal tears in middle-aged patients.

Both treatment modalities were associated with high levels of patient satisfaction, indicating that individuals in both groups were generally pleased with their treatment outcomes. Moreover, the successful return to activities and improvements in quality of life reported by patients in both groups support the notion that both exercise therapy and APM can effectively address the functional limitations and impact on daily life associated with degenerative meniscal tears.

Historically, the benefits of the APM procedure on pain and function in patients with a degenerative meniscus tear were described in non-controlled studies from the 1980s and 1990s, a period when arthroscopic techniques were gaining acceptance. However, these early studies often suffered from methodological weaknesses, such as retrospective designs, use of non-validated outcome measures, small patient populations, and the absence of control groups and randomized allocation, which have prevented conclusive statements regarding the efficacy of APM.

To date, high-quality controlled, randomized studies demonstrating a clear benefit from APM compared to other treatment modalities on pain and function in patients aged 35-55 years with a degenerative medial meniscus tear remain scarce. The association of both meniscus injury and meniscectomy with a high risk of developing knee osteoarthritis (OA) further complicates the treatment landscape. Surgical resection of the meniscus leads to increased joint cartilage contact stress through altered load transmission, reduced shock absorption, and decreased joint stability. Notably, approximately half of the patients who undergo either total or partial meniscectomy develop knee OA within 10-20 years.

In the older population and in patients with radiographic knee OA but no surgery, there is a higher incidence of X-ray confirmed concomitant meniscus injury compared to controls, suggesting that the presence of OA may itself predispose to further meniscal damage.

This study's strength lies in its randomized control design and the use of validated outcome measures, which enhance the reliability of the findings. However, the study is not without limitations. The sample size, although adequate, limits the ability to generalize the results widely. Furthermore, the follow-up period of 12 months may not be sufficient to fully capture the long-term outcomes and potential complications associated with each treatment modality. Future research should focus on extending the follow-up period and including larger patient cohorts to provide more definitive evidence on the long-term efficacy and safety of conservative versus surgical treatments for degenerative meniscal tears.

CONCLUSION

In conclusion, this study establishes that exercise therapy and arthroscopic partial meniscectomy (APM) provide equivalent benefits in terms of pain relief, functional improvement, and patient satisfaction for middle-aged individuals with degenerative meniscal tears. The results indicate that exercise therapy, as a non-surgical option, presents a compelling alternative to APM by achieving similar clinical outcomes while potentially reducing both risks and costs associated with surgical interventions. These findings advocate for the consideration of exercise therapy as a primary treatment strategy, promoting a shift towards more conservative management approaches in the treatment of degenerative meniscal conditions.

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