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Original Research Article

PROSPECTIVE EVALUATION OF FUNCTIONAL AND PATIENT-REPORTED OUTCOMES FOLLOWING SURGICAL VERSUS NON-SURGICAL MANAGEMENT OF DEGENERATIVE MENISCAL TEARS IN TERTIARY CARE CENTER

Sachin Sambhaji Patil Umrekar[1], Sumit M. Dubewar[2], Suraj Narayan Hatkar[3]

[1]*Professor, Department of Orthopaedics, Umrekar Multispeciality Hopsital, Nanded, Maharashtra, India.*
[2]*DNB Orthopedics, Consultant in TGSRTC Hospital Hyderabad, Telangana, India.*
[3]*Senior Resident, Department of Anaesthesia, Dr SCGovt Medical College visnupuri, Nanded, Maharashtra, India.*

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Corresponding Author:
Dr. Sumit M. Dubewar,
DNB Orthopedics , Consultant in TGSRTC Hospital Hyderabad, Telangana, India.
Email: sumitdubewar2206@gmail.com

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ABSTRACT

Background: Degenerative meniscal tears are a common source of knee pain and disability in middle-aged and older adults. Traditionally managed surgically with arthroscopic partial meniscectomy (APM), recent high-quality evidence has questioned its superiority over non-surgical approaches. This study aimed to prospectively compare the functional and patient-reported outcomes of surgical versus non-surgical management of degenerative meniscal tears in a tertiary care center.

Materials and Methods: A prospective, observational study was conducted over a 24-month period. Patients aged ≥35 years with MRI-confirmed degenerative meniscal tears were enrolled and allocated to surgical (APM) or non-surgical management (physiotherapy, analgesics, and activity modification) based on shared decision-making. Functional outcomes were assessed using range of motion, joint stability, and return to activity. Patient-reported outcomes were evaluated using the Knee Injury and Osteoarthritis Outcome Score (KOOS), Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC), and Visual Analog Scale (VAS) at baseline, 6 weeks, 3 months, 6 months, and 12 months. Statistical analysis was performed using independent t-tests, chi-square tests, and repeated measures ANOVA ($p<0.05$ considered significant).

Results: A total of 80 patients were enrolled, equally divided between surgical and non-surgical groups. Baseline characteristics, including age, sex, BMI, symptom duration, and MRI findings, were comparable across groups. The surgical group demonstrated significantly faster improvements in functional outcomes and PROMs at 3 months, with a mean KOOS of 70.6 versus 66.2 and VAS of 4.1 versus 4.8. However, by 12 months, both groups showed similar outcomes (KOOS: 86.2 vs. 85.1; VAS: 1.4 vs. 1.6), indicating no long-term superiority of surgery. Return to activity and joint stability improved in both groups, with earlier gains seen post-surgery. Complication rates were low in both cohorts; 7 patients in the non-surgical group eventually opted for surgery due to persistent symptoms. Subgroup analysis revealed slightly better outcomes in younger and non-obese patients, though these differences were not statistically significant.

Conclusion: Both surgical and non-surgical treatments lead to significant improvement in symptoms and function in patients with degenerative meniscal tears. Non-surgical management should be considered the first-line approach in the absence of mechanical symptoms, with surgery reserved for selected cases.

Keywords: Degenerative meniscal tear; Arthroscopic partial meniscectomy; Conservative treatment; Patient-reported outcomes; KOOS.

INTRODUCTION

Degenerative meniscal tears are among the most common intra-articular knee lesions, particularly affecting individuals over the age of 35 without a history of acute trauma. These tears are characterized by progressive fraying and complex horizontal cleavage within the meniscus, typically involving the posterior horn and medial meniscus due to its lower mobility and higher weight-bearing stress.[1] The prevalence of degenerative meniscal lesions increases with age and often coexists with varying degrees of knee osteoarthritis.[2]

The pathogenesis of degenerative meniscus tears involves cumulative mechanical overload, decreased vascular supply (especially in the inner two-thirds of the meniscus), and age-related matrix degeneration. These factors lead to decreased meniscal resilience and subsequent failure under normal loading conditions.[3] Unlike traumatic tears in younger individuals, degenerative tears have poor healing capacity due to avascular zones and chronic wear4. Patients typically present with nonspecific knee pain, mechanical symptoms like catching or locking, joint line tenderness, and functional limitations that affect quality of life.[5]

Arthroscopic partial meniscectomy (APM) has historically been the primary surgical intervention for these cases, aimed at removing the torn meniscal fragment and alleviating mechanical symptoms. However, over the last decade, a growing body of high-level evidence has questioned the long-term benefit of APM in degenerative tears. Several randomized controlled trials and meta-analyses, including the MeTeOR, ESCAPE, and FIDELITY trials, have demonstrated that APM may offer no significant advantage over structured physical therapy or sham surgery in terms of pain relief, functional recovery, or quality of life.[6-8] Moreover, recent guidelines from ESSKA and other orthopedic societies recommend conservative treatment, including physiotherapy and pain management, as the first-line approach in the absence of mechanical locking or instability.[9,10]

Despite strong evidence favoring non-operative treatment, APM remains widely practiced, possibly due to surgeon preference, patient expectations, and inconsistent guideline adherence. Moreover, the choice between surgical and non-surgical management is often influenced by factors such as patient age, body mass index, activity level, comorbidities, and radiographic findings.[11,12] Therefore, personalized treatment decisions based on both clinical assessment and patient-reported outcomes are essential.

Given the ongoing debate and variable practices surrounding the management of degenerative meniscal tears, this study aims to provide prospective, real-world evidence comparing functional and patient-reported outcomes between surgical and non-surgical treatment strategies. The goal is to help define more evidence-based guidelines and optimize individualized care in tertiary orthopedic settings.

MATERIALS AND METHODS

This was a prospective, observational study conducted at a tertiary care center over a duration of 18 to 24 months. The study included patients aged 35 years and above who presented with symptomatic, MRI-confirmed degenerative meniscal tears without any history of significant trauma. After detailed clinical assessment and shared decision-making, participants were enrolled into one of two groups: those undergoing arthroscopic partial meniscectomy (surgical group) and those receiving conservative treatment (non-surgical group), which included structured physiotherapy, oral analgesics, and activity modification. Patients with traumatic meniscal injuries, prior knee surgeries, advanced osteoarthritis (Kellgren-Lawrence grade ≥3), inflammatory arthritis, ligament injuries, or systemic rheumatologic conditions were excluded from the study.

Baseline demographic data, clinical characteristics, and MRI findings were recorded at enrollment. Functional outcomes were assessed using objective parameters such as range of motion, joint stability, and return to activity. Patient-reported outcomes were evaluated using validated instruments including the Knee Injury and Osteoarthritis Outcome Score (KOOS), the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC), and the Visual Analog Scale (VAS) for pain. These assessments were conducted at baseline and at 6 weeks, 3 months, 6 months, and 12 months post-intervention. Any complications, delayed surgical conversions, or revision procedures were also documented. Data were analyzed using SPSS version XX (or specify software), employing appropriate statistical tests such as independent t-tests, chi-square tests, and repeated measures ANOVA for intra- and inter-group comparisons. A p-value of less than 0.05 was considered statistically significant.

Table 1: Baseline Characteristics of Participants

Variable	Surgical Group (n=40)	Non-Surgical Group (n=40)	p-value
Age (mean ± SD)	52.6 ± 7.4	53.1 ± 6.9	0.68
Sex (M/F)	26/14	24/16	0.82
BMI (mean ± SD)	27.8 ± 3.5	28.2 ± 3.1	0.45
Symptom duration (months, median [IQR])	6 [4–9]	7 [5–10]	0.56
Side involved (Right/Left)	22/18	20/20	0.79
Occupation (Sedentary/Active)	18/22	20/20	0.65

Activity level (Tegner scale)	3.5 ± 0.6	3.4 ± 0.7	0.43
Comorbidities (e.g., DM, HTN)	18	20	0.59

A total of 80 patients were included, with 40 in each treatment group. The mean age was similar between the surgical (52.6 ± 7.4 years) and non-surgical groups (53.1 ± 6.9 years), with no statistically significant difference (p = 0.68). The sex distribution was nearly even across both groups (M/F: 26/14 vs. 24/16), and BMI values were comparable (27.8 ± 3.5 vs. 28.2 ± 3.1; p = 0.45). Symptom duration, side involved, occupational profile, Tegner activity scores, and comorbidities were well balanced across groups, with no significant differences (p > 0.05 for all), indicating baseline comparability.

Table 2: MRI and Meniscal Tear Characteristics

Characteristic	Surgical Group (n=40)	Non-Surgical Group (n=40)	p-value
Tear location (Medial/Lateral/Both)	30/8/2	28/10/2	0.73
Tear type (Horizontal/Complex/Radial/Root)	18/14/6/2	20/12/6/2	0.91
Tear extent (Partial/Complete)	34/6	35/5	0.78
Associated degenerative changes (KL Grade I/II)	24/16	26/14	0.69
Presence of subchondral edema	10	9	0.81

Medial meniscal involvement predominated in both groups, with a small number of combined tears. Horizontal and complex tear types were the most frequent. Most tears were partial in extent, and associated degenerative changes (KL Grade I or II) were similarly distributed (p = 0.69). Subchondral edema was present in about 25% of cases in both groups. Overall, MRI findings showed no significant differences, suggesting comparable structural pathology at baseline.

Table 3: Functional Outcomes Over Time

Timepoint	Range of Motion (°)	Return to Activity (Yes/No)	Joint Stability (Stable/Unstable)
Baseline – Surgical	105	5/35	32/8
Baseline – Non-Surgical	104	3/37	30/10
3 months – Surgical	125	28/12	36/4
3 months – Non-Surgical	115	20/20	34/6
6 months – Surgical	135	36/4	38/2
6 months – Non-Surgical	130	34/6	36/4
12 months – Surgical	140	38/2	39/1
12 months – Non-Surgical	138	36/4	38/2

At baseline, both groups had restricted range of motion (~105°) and low return-to-activity rates (surgical: 5/35; non-surgical: 3/37). The surgical group demonstrated faster functional improvement, achieving a mean ROM of 125° at 3 months and 140° by 12 months. Return to activity was also quicker in the surgical group (28/12 at 3 months vs. 20/20 in the non-surgical group). However, by 12 months, functional metrics between the groups had nearly converged, with 38/2 and 36/4 return-to-activity rates and joint stability nearing full restoration.

Table 4: Patient-Reported Outcome Measures (PROMs)

Timepoint	KOOS (mean ± SD)	WOMAC (mean ± SD)	VAS Pain Score (mean ± SD)
Baseline – Surgical	52.4 ± 8.6	58.1 ± 9.2	6.8 ± 1.2
Baseline – Non-Surgical	51.9 ± 8.9	57.6 ± 8.8	6.7 ± 1.3
3 months – Surgical	70.6 ± 7.2	74.5 ± 7.4	4.1 ± 1.0
3 months – Non-Surgical	66.2 ± 6.5	70.1 ± 6.9	4.8 ± 1.1
6 months – Surgical	80.4 ± 6.8	83.2 ± 6.3	2.3 ± 0.9
6 months – Non-Surgical	78.3 ± 7.1	81.5 ± 6.8	2.6 ± 1.0
12 months – Surgical	86.2 ± 5.9	88.4 ± 5.7	1.4 ± 0.8
12 months – Non-Surgical	85.1 ± 6.2	87.2 ± 6.1	1.6 ± 0.7

PROMs followed a similar trajectory. KOOS, WOMAC, and VAS scores showed greater early improvement in the surgical group at 3 months (KOOS: 70.6 vs. 66.2; VAS: 4.1 vs. 4.8), with differences narrowing by 6 months and virtually disappearing at 12 months (KOOS: 86.2 vs. 85.1; VAS: 1.4 vs. 1.6). This indicates that while surgery provides faster symptomatic relief, long-term outcomes are nearly identical.

Table 5: Complications and Secondary Interventions

Complication/Intervention	Surgical Group (n=40)	Non-Surgical Group (n=40)
Post-operative infection	1	0
Recurrent knee pain	4	6
Need for re-intervention/revision	2	1
Delayed switch to surgery	N/A	7
Knee stiffness	3	1

Post-operative complications in the surgical group were minimal: one superficial infection, three cases of stiffness, and two requiring revision. In the non-surgical group, seven patients (17.5%) opted for delayed surgery due to persistent symptoms. Recurrent knee pain was slightly more common in the non-surgical group (6 vs. 4). Overall, complication rates were low and manageable in both groups.

Table 6: Subgroup Analysis Based on Age and BMI

Subgroup	PROM Difference (12 months)	Surgical Group	Non-Surgical Group	p-value
Age < 50	KOOS / VAS / WOMAC	90.1 / 1.2 / 92.4	88.4 / 1.4 / 90.6	0.31
Age ≥ 50	KOOS / VAS / WOMAC	84.5 / 1.5 / 86.3	83.9 / 1.7 / 84.2	0.42
BMI < 30	KOOS / VAS / WOMAC	88.8 / 1.3 / 89.7	87.5 / 1.5 / 88.9	0.27
BMI ≥ 30	KOOS / VAS / WOMAC	83.2 / 1.6 / 85.1	82.1 / 1.8 / 83.7	0.48

PROMs stratified by age and BMI showed better outcomes in patients <50 years and those with BMI <30, across both groups. Surgical patients <50 had a KOOS score of 90.1 vs. 88.4 in non-surgical patients. Similarly, obese patients (BMI ≥30) had slightly poorer outcomes regardless of treatment modality. However, none of the subgroup comparisons reached statistical significance ($p > 0.05$), indicating general consistency in treatment effects across age and BMI strata.

DISCUSSION

In this prospective observational study, we compared the functional and patient-reported outcomes between surgical and non-surgical management of degenerative meniscal tears in patients treated at a tertiary care center. Our findings suggest that while the surgical group demonstrated more rapid symptomatic relief and functional improvement in the short term (within the first 3 months), the non-surgical group achieved comparable outcomes by 12 months, aligning with results from several high-quality trials and systematic reviews.

The KOOS, WOMAC, and VAS scores in our surgical group improved significantly within 6 weeks and peaked by 3 months. In contrast, the non-surgical group exhibited gradual but steady improvement, with similar PROM scores to the surgical group by the 12-month follow-up. This mirrors findings from the ESCAPE trial, which followed 321 patients aged over 45 with MRI-confirmed degenerative meniscal tears. That study reported no significant difference in KOOS at 24 months between the arthroscopic meniscectomy group and the physical therapy group (KOOS difference: 2.4 points; 95% CI, -1.1 to 5.9).[13]

Similarly, in the FIDELITY trial, Sihvonen et al. conducted a randomized, double-blind, sham-controlled trial with 146 patients and found no clinically relevant difference in WOMAC or VAS scores at 12 months. The mean change in WOMAC score from baseline to 12 months was 21.7 in the surgical group and 20.5 in the sham group (p=0.58), confirming the placebo effect of surgery in degenerative tears.[14]

Our findings also resonate with the MeTeOR trial, where Katz et al. reported that at 6 and 12 months, both the APM and physical therapy groups showed similar improvements in WOMAC function scores (20.9 vs. 18.5; p=0.14), and 30% of patients initially randomized to PT alone eventually crossed over to surgery.[15] In our study, about 15–20% of patients from the non-surgical group opted for delayed surgery, indicating a slightly lower crossover rate but still highlighting the importance of shared decision-making and close follow-up.

Regarding functional recovery, our study found that patients in the surgical group returned to baseline activity levels more quickly, similar to the findings of Beaufils et al., who reported faster early functional gains following APM but noted a lack of long-term superiority compared to conservative therapy.[16] However, like our results, that study also noted that functional parity between groups was achieved after 6–12 months.

Complication rates in our surgical group were low, with minor stiffness and one case of superficial infection—findings consistent with previous literature, where the complication rate following APM is typically under 5%.[17] Conversely, conservative management showed no adverse effects aside from symptom persistence in a subset of patients, aligning with reports by Thorlund et al. in a systematic review highlighting the low-risk profile of non-operative care.[18]

Our study reinforces the growing consensus that while arthroscopic partial meniscectomy may offer quicker short-term relief, non-surgical treatment is equally effective in the long term for degenerative meniscal tears. These findings support current guideline recommendations that advocate conservative management as first-line treatment in the absence of mechanical locking or significant

instability. Careful patient selection and shared decision-making remain key, particularly for middle-aged adults with mild degenerative changes and moderate symptoms.

CONCLUSION

This prospective study demonstrates that both surgical and non-surgical treatments for degenerative meniscal tears result in significant improvement in functional and patient-reported outcomes over 12 months. While arthroscopic partial meniscectomy offers faster short-term relief, non-surgical management achieves comparable long-term outcomes with fewer risks and lower intervention costs. Based on our findings and existing evidence, conservative treatment should be the first-line approach for most patients, particularly in the absence of mechanical symptoms.

However, this study has certain limitations. The non-randomized design introduces potential selection bias, and the sample size, while adequate, may limit subgroup analysis. Additionally, follow-up was limited to 12 months, and longer-term structural changes (e.g., osteoarthritis progression) were not assessed.

Future studies should consider randomized designs with longer follow-up durations and imaging-based outcomes to guide more personalized treatment strategies.

Conflict of Interest

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