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Arthroscopic Meniscectomy Versus Meniscal Repair: A Comparative Functional Outcome Study

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Submission Date : 09 Jan 2026
Accepted Date : 19 Feb 2026
Published Date : 30 March 2026
DOI: https://doi.org/10.3329/jrpmc.v11i1.90008

Abstract

Background:
Meniscal tears are among the most common knee injuries, leading to pain, swelling, and functional limitations that can significantly affect daily activities and athletic performance.

Objective:
This study aimed to evaluate and compare the functional outcomes of arthroscopic partial meniscectomy and meniscal repair using validated clinical scoring systems.

Methods:
This prospective comparative study was conducted at the Department of Orthopaedic Surgery, National Institute of Traumatology & Orthopaedic Rehabilitation (NITOR), Dhaka, Bangladesh, from July 2024 to June 2025 on 64 patients diagnosed with symptomatic meniscal tears requiring surgical intervention divided into two equal groups: arthroscopic partial meniscectomy (n=32) and meniscal repair (n=32). Patients were followed up at 3, 6, and 12 months postoperatively, and final functional outcomes were assessed using the same scoring systems applied preoperatively. Data were analyzed using SPSS version 25.0.

Results:
Preoperative IKDC, Lysholm, and Tegner scores were comparable between groups. At final follow-up, the repair group achieved higher mean IKDC (85.9 vs 78.4, p-value=<0.001), Lysholm (90.4 vs 82.6, p-value=<0.001), and Tegner (6.3 vs 5.1, p-value=0.002) scores. Excellent functional outcomes were observed in 62.5% of repair patients versus 37.5% of meniscectomy patients. Complications were low in both groups, with slightly higher reoperation rates in the repair group (9.4% vs 3.1%).

Conclusion:
Although both arthroscopic partial meniscectomy and meniscal repair lead to significant improvements in knee function for patients with meniscal tears,meniscal repair provides superior functional outcomes, higher activity levels, and a greater proportion of excellent results at final follow-up.

Keywords: Arthroscopic meniscectomy, Meniscal repair, Longitudinal tear

Citation: Hossain MK,Alam MS,Rahman SMA,Hossain MS,Salauddin MA.Arthroscopic Meniscectomy Versus Meniscal Repair: A Comparative Functional Outcome Study.J Rang Med Col.2026 Mar;11(1):73-77.doi: https://doi.org/10.3329/jrpmc.v11i1.90008

Introduction:

Meniscal injuries are among the most common causes of knee pain and functional limitation encountered in orthopaedic practice, affecting both young athletic populations and older individuals with degenerative joint disease. The medial and lateral menisci play a critical role in load transmission, shock absorption, joint congruity, and stability of the knee. Disruption of meniscal integrity alters normal knee biomechanics, leading to increased contact stresses on articular cartilage and predisposing the joint to early degenerative osteoarthritis.[1] Consequently, preservation of meniscal tissue has

become an important objective in modern knee surgery. When conservative management fails to relieve symptoms, arthroscopic intervention is often indicated. The two principal surgical options are arthroscopic partial meniscectomy and meniscal repair. Arthroscopic meniscectomy has historically been the most frequently performed procedure due to its technical simplicity, shorter rehabilitation period, and reliable short-term symptom relief. However, accumulating evidence suggests that resection of meniscal tissue compromises its biomechanical function and is associated with a higher risk of long-term osteoarthritic changes, particularly in younger and physically active patients.[2,3] In contrast, meniscal repair aims to preserve native meniscal tissue and restore its functional role within the knee joint. Advances in arthroscopic techniques—including inside-out, outside-in, and all-inside repair methods—have expanded the indications for repair, allowing treatment of a broader range of tear patterns. Several biomechanical and clinical studies have demonstrated that meniscal preservation is associated with improved load distribution, reduced cartilage degeneration, and better long-term joint health compared with meniscectomy.[4] Recent comparative clinical studies have reported superior functional outcomes following meniscal repair when compared to partial meniscectomy. Patient-reported outcome measures such as the International Knee Documentation Committee (IKDC) score, Lysholm knee score, and Tegner activity scale have consistently shown higher post-operative scores in patients undergoing meniscal repair.[5,6] In a comparative study with medium-term follow-up, patients treated with meniscal repair demonstrated significantly better functional outcomes and activity levels than those who underwent meniscectomy.[5] Systematic reviews and meta-analyses further support these findings. A large systematic review evaluating long-term outcomes reported that meniscal repair was associated with a lower incidence of radiographic osteoarthritis and superior functional scores compared with meniscectomy.[7] Similarly, a recent systematic review focusing on posterior medial meniscus injuries demonstrated that meniscal repair resulted in better knee function and reduced osteoarthritic progression compared with partial meniscectomy.[8] Despite these advantages, meniscal repair is not without limitations. The procedure is technically more demanding, requires longer rehabilitation, and has been associated with higher reoperation rates due to repair failure, particularly in avascular tear zones or degenerative tears.[7,9] Nevertheless, increasing emphasis on meniscal preservation has led to a global trend toward higher repair rates and reduced reliance on meniscectomy, especially in younger patients.[10] This study aimed to evaluate and compare the functional outcomes of these two surgical techniques using validated clinical scoring systems, thereby contributing to evidence-based decision-making in the management of meniscal injuries.

Methods:

This prospective comparative study was conducted at the Department of Orthopaedic Surgery, National Institute of Traumatology & Orthopaedic Rehabilitation, Dhaka, Bangladesh, from July 2024 to June 2025, including a total of 64 patients diagnosed with symptomatic meniscal tears requiring surgical intervention. Patients were divided into two equal groups: arthroscopic partial meniscectomy (n=32) and meniscal repair (n=32). Inclusion criteria encompassed patients aged 18–50 years with isolated meniscal tears confirmed on MRI and clinical examination. Exclusion criteria included patients with advanced osteoarthritis, ligamentous injuries requiring reconstruction, prior knee surgery, systemic inflammatory diseases. All patients underwent a detailed preoperative evaluation including demographic data, medical history, physical examination, and baseline functional assessment using International Knee Documentation Committee (IKDC) score, Lysholm knee score, and Tegner activity scale. Tear type and location were documented intraoperatively. Meniscal repair was performed for longitudinal tears located in the vascularized red-red or red-white zones using all-inside or inside-out techniques, while partial meniscectomy was performed for complex, degenerative, or irreparable tears. Postoperatively, all patients followed a structured rehabilitation protocol tailored to the surgical procedure. Weight-bearing and range-of-motion exercises were initiated according to the type of intervention, with gradual progression to full activity. Patients were followed up at 3, 6, and 12 months postoperatively, and final functional outcomes were assessed using the same scoring

systems applied preoperatively. Postoperative complications and reoperation rates were also recorded.Data were analyzed using SPSS version 25.0. Continuous variables were expressed as mean±standard deviation, and categorical variables as frequencies and percentages. Independent sample t-tests were used to compare continuous variables between groups, while chi-square tests were applied for categorical data. A p-value $p<0.05$ was considered statistically significant.

Results:

Patients in the meniscectomy group had a higher mean age (36.8±8.4 years) compared to the meniscal repair group (29.6±6.9 years). Male patients predominated in both groups, accounting for 65.6% in the meniscectomy group and 71.9% in the repair group. Right knee involvement was observed in 56.3% of meniscectomy patients and 59.4% of repair patients, while left knee involvement was seen in 43.7% and 40.6%, respectively (Table-I).

Table-I: Demographic characteristics of the study population (N=64)

Variable	Meniscectomy (n=32) no. (%)	Meniscal Repair (n=32) no. (%)
Mean age (years)	36.8±8.4	29.6±6.9
Male	21(65.6)	23(71.9)
Female	11(34.4)	9(28.1)
Right knee involvement	18(56.3)	19(59.4)
Left knee involvement	14(43.7)	13(40.6)

Medial meniscus tears were more common than lateral tears in both groups, occurring in 68.8% of the meniscectomy group and 62.5% of the repair group. Longitudinal tears were more frequent in the meniscal repair group (56.3%) compared to the meniscectomy group (28.1%). Complex or degenerative tears predominated in the meniscectomy group (53.1%), whereas tears in the vascular red–red or red–white zones were significantly more common in the repair group (75.0%) (Table-II).

Table-II: Tear characteristics and meniscal involvement (N=64)

Variable	Meniscectomy (n=32) no. (%)	Meniscal Repair (n=32) no. (%)
Medial meniscus tear	22(68.8)	20(62.5)
Lateral meniscus tear	10(31.2)	12(37.5)
Longitudinal tear	9(28.1)	18(56.3)
Complex/degenerative tear	17(53.1)	6(18.8)
Red–red / red–white zone	7(21.9)	24(75.0)

Preoperatively, the mean IKDC score was 46.3±8.1 in the meniscectomy group and 47.6±7.9 in the repair group. Mean Lysholm scores were 51.8±9.3 and 53.1±8.7, respectively. Tegner activity levels were comparable, with mean scores of 3.2±1.1 in the meniscectomy group and 3.4±1.2 in the repair group, indicating similar baseline functional status.At final follow-up, the mean IKDC score improved to 78.4±6.9 in the meniscectomy group and 85.9±5.8 in the meniscal repair group. Lysholm scores increased to 82.6±7.3 and 90.4±5.6, respectively. The Tegner activity score improved to 5.1±1.2 in the meniscectomy group and 6.3±1.1 in the repair group, with all differences reaching statistical significance (Table-III).

Table-III: Preoperative and postoperative functional scores (N=64)

Surgical techniques	Functional Scores (Mean±SD)		p-value
	Preoperative	Postoperative	
IKDC score			
Meniscectomy	46.3±8.1	78.4±6.9	<0.001
Meniscal Repair	47.6±7.9	85.9±5.8	
Lysholm score			
Meniscectomy	51.8±9.3	82.6±7.3	<0.001
Meniscal Repair	53.1±8.7	90.4±5.6	
Tegner activity scale			
Meniscectomy	3.2±1.1	5.1±1.2	0.002
Meniscal Repair	3.4±1.2	6.3±1.1	

Excellent outcomes were achieved in 37.5% of patients undergoing meniscectomy compared to 62.5% in the meniscal repair group. Good outcomes were observed in 40.6% and 31.3% of patients, respectively. Fair outcomes were more frequent in the meniscectomy group (15.6%) than in the repair group (6.2%), while poor outcomes occurred only in the meniscectomy group (6.3%) (Table-IV).

Table-IV: Functional outcome grading based on lysholm score (N=64)

Outcome	Meniscectomy (n=32) no. (%)	Meniscal Repair (n=32) no. (%)
Excellent	12(37.5)	20(62.5)
Good	13(40.6)	10(31.3)
Fair	5(15.6)	2(6.2)
Poor	2(6.3)	0(0)

Persistent knee pain was reported in 9.4% of meniscectomy patients and 6.3% of repair patients. Knee stiffness occurred in 6.3% of the meniscectomy group and 9.4% of the repair group. Reoperation was required in 3.1% of meniscectomy patients compared to 9.4% in the repair group, while 81.2% and 75.0% of patients, respectively, experienced no postoperative complications (Table-V).

Table-V: Postoperative complications and reoperation rates (N=64)

Complications and Reoperation	Meniscectomy (n=32) no. (%)	Meniscal Repair (n=32) no. (%)
Persistent knee pain	3(9.4)	2(6.3)
Knee stiffness	2(6.3)	3(9.4)
Reoperation	1(3.1)	3(9.4)
No complications	26(81.2)	24(75.0)

Discussion:

Our results showed that the mean IKDC score improved from 46.3±8.1 to 78.4±6.9 in the meniscectomy group and from 47.6±7.9 to 85.9±5.8 in the meniscal repair group at final follow-up. In the retrospective study by Lee et al, a similar pattern was observed: IKDC scores improved from 46.6 to 81.7 after meniscectomy and from 45.9 to 84.4 after meniscal repair, with both procedures yielding significant functional gains, but with repair maintaining a slightly better long-term trajectory.[11] These parallel findings reinforce that, while both interventions are effective, meniscal repair tends to yield higher functional scores over time.In terms of Lysholm knee scores, our study demonstrated postoperative means of 82.6±7.3 for meniscectomy and 90.4±5.6 for meniscal repair. This pattern of better Lysholm outcomes following repair is supported by cohort data from the retrospective study by Nabiyev et al, where the meniscal repair group had a significantly higher average Lysholm score (87.48) compared to the meniscectomy group (81.73), reflecting better symptom relief and functional capacity.[12] These findings parallel our observation of a greater proportion of excellent and good outcomes in the repair group compared with meniscectomy.The Tegner activity scale in our series also favoured meniscal repair, with a mean postoperative score of 6.3±1.1 compared to 5.1±1.2 after meniscectomy. This is consistent with findings from meta-analytic evidence indicating that meniscal repair patients tend to achieve higher activity levels postoperatively, reflecting improved capacity to return to higher functional demands.[7] These comparisons help confirm that preserving meniscal integrity can better support activity resumption.Our functional grading, based on Lysholm categories, revealed that 62.5% of repair patients achieved excellent outcomes compared with 37.5% in the meniscectomy group. The retrospective cohort byNabiyevet al similarly found a higher proportion of good outcomes in the repair group compared with meniscectomy, reinforcing the notion that repair often results in greater proportions of clinically meaningful improvements.[12] Moreover, the systematic review by Hurmuz et al demonstrated that overall IKDC and Lysholm scores were higher on average among repair patients than those treated with meniscectomy, further substantiating our findings.[8] Although we observed a slightly higher reoperation rate in the meniscal repair group (9.4%) compared to meniscectomy (3.1%), this trend has been documented in previous analyses. Paxton et al reported that while meniscal repair may have a higher risk of reoperation or failure, it concurrently provides better long-term functional outcomes and

activity scores.[7] Therefore, the trade-off between a modestly higher reoperation rate and superior functional recovery should be considered when selecting the most appropriate surgical strategy.

Limitations:
The study was conducted in a single hospital with a small sample size. So, the results may not represent the whole community.

Conclusion:
This comparative study demonstrates that while both arthroscopic partial meniscectomy and meniscal repair significantly improve knee function in patients with meniscal tears, meniscal repair provides superior functional outcomes, higher activity levels, and a greater proportion of excellent results at final follow-up.It is recommended that meniscal repair should be preferred over partial meniscectomy whenever technically feasible, especially in younger and active patients, to achieve better long-term functional outcomes, higher activity levels, and preservation of knee joint integrity.

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