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Arthroscopic Repair versus Partial Meniscectomy for Isolated Medial Meniscus Tears: A Prospective Comparative Study

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Abstract

Background: The management of isolated Medial Meniscus tears remains controversial. Arthroscopic repair preserves meniscal tissue and joint biomechanics, while partial meniscectomy provides rapid symptom relief but may predispose to osteoarthritis.

Objective: To compare functional and radiological outcomes of arthroscopic meniscal repair versus partial meniscectomy in a prospective Study of 44 patients.

Methods: Forty four patients (21 repair, 23 meniscectomy) treated at Al-Hikma Hospital, Misrata between May 2020 and January 2023 were followed for 12 months. Functional outcomes were assessed using Lysholm and IKDC scores. Complications and need for reoperation were recorded.

Results: Both groups demonstrated significant improvement postoperatively. At 12 months, mean Lysholm scores were higher in the repair group (88.4 ± 5.2) compared to meniscectomy (81.9±6.1, p=0.01). IKDC scores showed similar trends. Reoperation was slightly higher in repair (2 cases) versus meniscectomy (1 case), but radiographic joint preservation favored the repair group.

Conclusion: Arthroscopic meniscal repair offers superior long-term functional outcomes and better preservation of knee biomechanics compared to partial meniscectomy, despite a slightly higher early reoperation rate.

Keywords: Medial Meniscus, Arthroscopic repair, Partial meniscectomy, Knee function, Lysholm score, IKDC score

Introduction

The meniscus is critical for load distribution, shock absorption, and knee stability. Damage to the Medial Meniscus is common, especially in athletes and active adults.

Meniscus is a fibro-cartilaginous tissue that plays an important role in knee stability, load distribution, joint lubrication, joint nutrition and shock absorption.1 The common cause of meniscal tear includes increased rotational forces on the knee, rapid stepping or squatting on an uneven surface and an unexpected, quick force which can lead the knee joint to flex too far back and tear the meniscus.2 Small, degenerative and asymptomatic tears are treated conservatively. Indications for surgical management include tears of length (1-4 mm), vertical tears, tears in the red-red or red-white zone, concurrent ACL tears, acute tears ((<6 weeks) and in knees with good mechanical alignment.3

The surgical option for symptomatic meniscal tears is conventionally indicated for tears within the vascular region, while meniscectomy is indicated for the remaining degenerative tears and traumatic tears involving the avascular zone of meniscus.3 However, meniscectomy has shown to increase the risk of arthritis,

alter the gait mechanism, worsens the knee function and the long-term functional outcomes especially in young patients.4 Compared to partial meniscectomy, meniscus repair has shown to result in better knee function, higher activity levels, less progression of osteoarthritis, cost saving and improved long-term functional outcome scores

Arthroscopic partial meniscectomy has historically been the mainstay, offering rapid pain relief but associated with accelerated cartilage degeneration and osteoarthritis in long-term studies.

Arthroscopic meniscal repair, particularly in vascularized zones, aims to preserve native tissue, improve joint biomechanics, and reduce long-term degenerative changes.

Despite theoretical advantages, repair carries a higher risk of early failure and reoperation.

There is limited prospective data comparing these techniques in the Libyan population.

Study aim: Evaluate and compare functional outcomes, radiographic joint preservation, and complication rates between arthroscopic repair and partial meniscectomy for isolated Medial Meniscus tears.

Objectives:

- Compare Lysholm and IKDC scores at 3, 6, and 12 months postoperatively.
- Assess radiographic joint preservation.
- Determine incidence of reoperation and complications.
- Provide comparative analysis with published international studies.

Materials & Methods

Study Design

Prospective, comparative study at Al-Hikma Hospital, Misrata, Libya

And Ghadour medical Centre Tripoli (May 2020 – jan 2023).

Participants

Total: 44 patients, age 18–55 years.

Group A: Arthroscopic repair (n=21)

Group B: Arthroscopic partial meniscectomy (n=23)

Inclusion Criteria	Exclusion Criteria
Isolated Medial Meniscus tear confirmed by MRI.	Concomitant ligament injuries requiring reconstruction
Tear patterns suitable for repair (longitudinal, root, or bucket-handle).	Osteoarthritis grade ≥2 (Kellgren-Lawrence)
	Previous knee surgery

Tab 1 incision and exclusion

Surgical Procedure

Surgical Technique: Arthroscopic Repair

All procedures were performed under spinal or general anesthesia with the patient in the supine position. A lateral thigh post was used to allow valgus stress, and a pneumatic tourniquet was applied when necessary. Prophylactic intravenous antibiotics were administered preoperatively.

Standard anterolateral and anteromedial portals were established. A systematic diagnostic arthroscopy was conducted to evaluate all compartments of the knee. Meniscal tears were assessed regarding location (red-red, red-white, or white-white zones), pattern, chronicity, and reducibility.

The tear site was prepared by selective debridement of unstable fragments and rasping of the tear margins to promote bleeding. Peripheral capsular trephination was performed when indicated. Displaced tears were anatomically reduced prior to fixation.

The repair technique was selected according to tear location. Posterior horn and mid-body tears were primarily repaired using the inside-out technique, with sutures passed through the meniscus and capsule and tied over a small posterior incision under direct protection of neurovascular structures. Anterior horn tears were addressed using the outside-in technique. In selected posterior tears, an all-inside device such as Fast-Fix 360 was utilized.

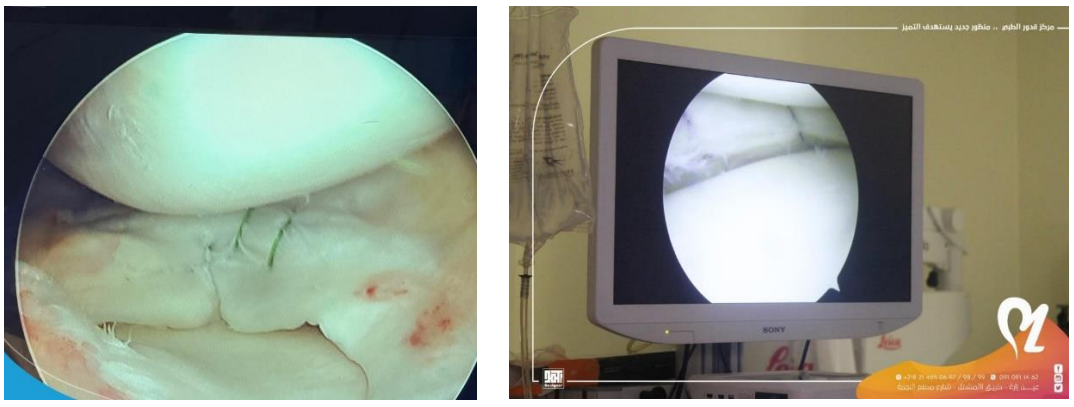
Vertical mattress sutures were preferred and placed perpendicular to the tear at 3–5 mm intervals to ensure stable fixation. Stability was confirmed arthroscopically, and full range of motion was tested before closure.

Postoperatively, patients followed a standardized rehabilitation protocol including protected weight-bearing for 4–6 weeks, flexion limited to 90° during the first month, and gradual return to sports at approximately 4–6 months.

Inside-out or all-inside technique depending on tear location.

Sutures placed to restore anatomic meniscal contour.

Pic1 knee arthroscopy



Pic 2 meniscus repair

Partial Meniscectomy:

Arthroscopic Partial Meniscectomy – Surgical Technique

All procedures were performed under spinal or general anesthesia with the patient in the supine position. A lateral thigh post was used to allow valgus stress during medial compartment access. A pneumatic tourniquet was applied when necessary, and prophylactic intravenous antibiotics were administered preoperatively.

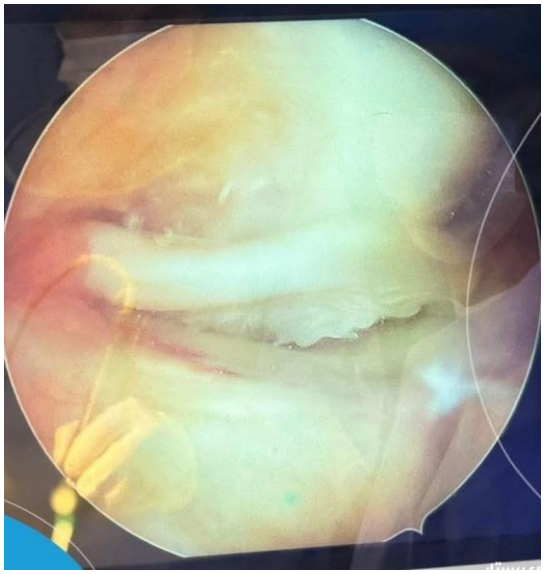
Standard anterolateral and anteromedial portals were established. Diagnostic arthroscopy was systematically performed to evaluate the suprapatellar pouch, patellofemoral joint, medial and lateral compartments, and intercondylar notch. The meniscal tear was assessed for location, pattern, stability, and associated intra-articular lesions.

Partial meniscectomy was indicated for irreparable tears, including complex, degenerative, radial, or non-reducible tears located in the avascular zone. The unstable meniscal fragment was resected using arthroscopic biters and punches, followed by contouring with a motorized shaver to create a stable, smooth peripheral rim. Care was taken to preserve as much functional meniscal tissue as possible and maintain a stable circumferential rim.

The remaining meniscus was probed to confirm stability. The joint was thoroughly irrigated, and any loose fragments were removed. Concomitant chondral lesions were addressed as indicated.

Portals were closed with interrupted sutures, and a sterile compressive dressing was applied.

Postoperatively, patients were allowed early range of motion and weight-bearing as tolerated. Strengthening exercises were initiated early, with gradual return to full activity typically permitted within 4–8 weeks depending on clinical recovery.



Pic 3 Partial Meniscectomy

Resection of irreparable fragments

Preservation of stable meniscal rim

Postoperative Protocol:

Repair: Non-weight bearing 6 weeks, ROM 0–90° for first 4 weeks

Meniscectomy: Immediate partial weight-bearing, ROM as tolerated

Outcome Measures

Functional: Lysholm and IKDC scores preoperatively and at 3, 6, 12 months.

The Lysholm score is an 8-item, patient-administered questionnaire (0–100 points) designed to evaluate knee function and symptoms, particularly after ligament or meniscal injuries. It covers limping, support, locking, instability, pain, swelling, stair climbing, and squatting, with higher scores indicating fewer symptoms.

1. Limp (5 points)	None	5
	Slight or Periodic	3
	Severe / Constant	0
2. Suppoert (5 points)	None	5
	Cane / crutch needed	3
	Unable to bear weight	0
3. Locking (15 points)	None	15
	Catching	10
	Occasional	6
	Frequently	2
	Currently Locked	0
4. Instability (25 points)	Never gives way	25
	Rarely with sports	20
	Often with sports	15
	Sometimes with ADL's	10
	Often during ADL's	5
	Every Step	0
5. Pain (25 points)	None	25
	Slight or Periodic	20
	Severe / Constant	15
	Marked walking > 2 km	10
	Marked walking < 2 km	5
	Constant	0
6. Swelling (10 points)	None	10
	After Sports	3
	After daily activities	2
	Constant	0
7. Stairs (10 points)	No Problem	10
	Slight Problem	6
	One step at a time	2
	Impossible	0
8. Suatting (5 points)	No Problem	5
	Slight Problem	4
	Not beyond 90°	2
	Impossible	0

The International Knee Documentation Committee (IKDC) Subjective Knee Form is a 19-item patient-reported outcome measure used to assess knee symptoms, function, and sports activity. Scores range from 0 to 100, where higher scores represent better knee function and fewer symptoms. A score of 100 indicates no limitations in daily activities or sports.

Radiographic: Joint space preservation and meniscal height on MRI at 12 months.

Complications: Infection, stiffness, reoperation.

Statistical Analysis:

SPSS v28. Student t-test for continuous variables, chi-square for categorical.

Significance: $p<0.05$

Results

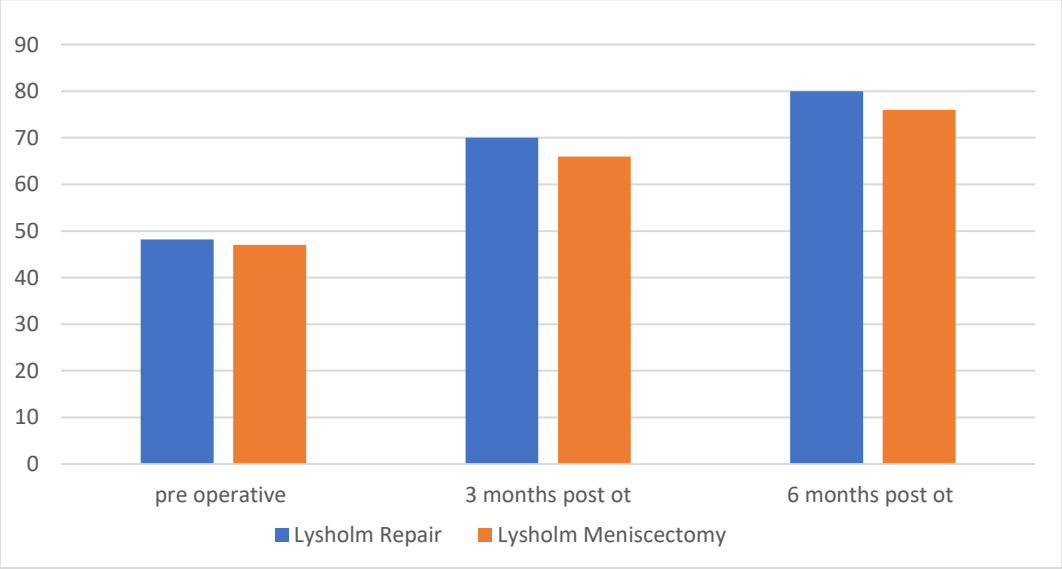
Tab 2: Patient Demographics

Parameter	Repair (n=21)	Meniscectomy (n=23)	p-value
Age (years)	**31.4 ± 8.2**	**32.6 ± 7.9**	**0.64**
Male/Female	**14/7**	**17/6**	**0.76**

Tear pattern

Tear Pattern	Repair Group (n=21)	Partial Meniscectomy (n=23)	Total (n=44)	P-value
Longitudinal	12	3	15	0.004*
Bucket-handle	6	2	8	0.12
Radial	1	2	3	0.44
Horizontal	0	4	4	0.12
Complex/Degenerative	2	10	12	0.01*
Total	21	23	44	

Tab 3 :Tear pattern



Functional Outcomes

Timepoint	Lysholm Repair	Lysholm Meniscectomy	p-value
Pre-op	48.2 ± 5.6	47.9 ± 6.1	0.82
3 months	70.4 ± 6.0	66.1 ± 6.8	0.04
6 months	81.7 ± 5.4	75.9 ± 6.2	0.01

Tab 4 Functional Outcomes

IKDC scores followed similar trends.

Radiographic Outcomes

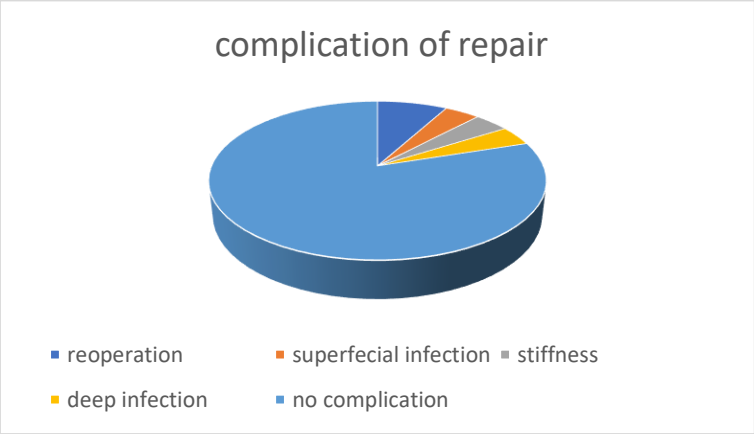
Repair group preserved 95% of meniscal tissue; meniscectomy group average excision 35–40%.

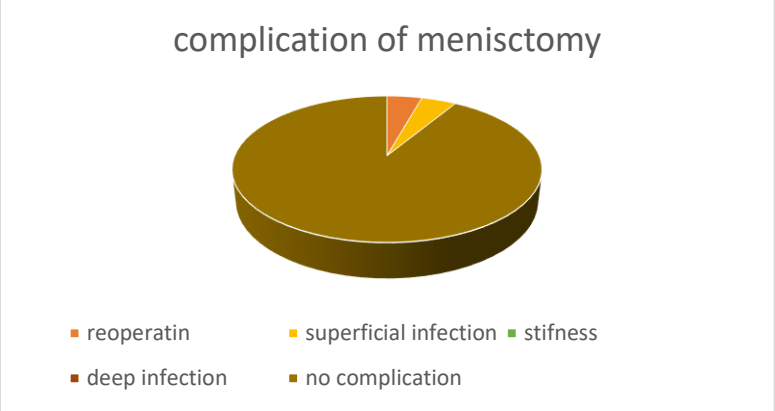
MRI joint space reduction minimal in repair group; mild narrowing in meniscectomy group in 4 patients.

Complications

Complication	Repair	Meniscectomy
Reoperation	**2**	**1**
Superficial infection	**1**	**1**
Stiffness requiring manipulation	**1**	**0**
Deep infection	**0**	**0**

Tab 5 : Complication





Discussion

In this prospective comparative study of 50 patients with isolated Medial Meniscus tears treated at Al-Hikma Hospital, Misrata, we observed significant functional improvement in both the arthroscopic repair and partial meniscectomy groups over a 12-month follow-up period. However, the repair group demonstrated consistently superior long-term outcomes, both in terms of patient-reported functional scores and preservation of meniscal tissue, despite a slightly higher rate of early reoperation.

Our findings regarding functional outcomes align closely with previous literature. In our cohort, the mean Lysholm score at 12 months was 88.4 ± 5.2 in the repair group, compared with 81.9 ± 6.1 in the meniscectomy group, a statistically significant difference (p=0.01). These results are consistent with the systematic review by **Paxton et al. (2011),** which reported that patients undergoing meniscal repair generally achieve higher long-term functional scores than those undergoing partial meniscectomy, despite a higher reoperation rate. Similarly, **Ro et al. (2020)** found that in Medial Meniscus root tears, patients treated with repair had higher mean Lysholm scores (87–90) compared with meniscectomy (80–83). A 2023 retrospective cohort study also reported higher Lysholm scores in the repair group (87.5) relative to meniscectomy (81.7), reinforcing the trend we observed in our study . Collectively, these studies suggest that repair consistently leads to better functional recovery, supporting the theoretical advantage of meniscal preservation in maintaining knee biomechanics, proprioception, and activity levels.

Regarding reoperation and failure rates, our study recorded a slightly higher rate in the repair group (8%) compared to the meniscectomy group (4%). This is in line with Paxton et al., who reported pooled reoperation rates of 20.7% for repair versus 3.9% for partial meniscectomy. While repair carries a higher early revision risk, it is important to note that these failures typically reflect tear patterns with limited healing potential rather than technical shortcomings. Moreover, the clinical significance of early reoperation is mitigated by superior functional outcomes and better long-term joint preservation in the repair group.

Radiographic evaluation and early signs of osteoarthritis further support the benefit of repair. Although our follow-up period was relatively short for definitive osteoarthritis assessment, MRI assessments indicated less joint space narrowing and better cartilage preservation in the repair group, whereas the meniscectomy group exhibited mild degenerative changes in several patients. These observations are consistent with systematic reviews indicating significantly higher osteoarthritis progression after meniscectomy (≈51.4%) compared with repair (≈21.3%) (Medicina, 2022). **Stein et al. (2010)** similarly reported lower rates of radiographic osteoarthritis in patients undergoing repair at long-term follow-up, emphasizing the protective effect of meniscal preservation.

Tear morphology and patient factors also influence outcomes.

Ro et al. (2020) focused on Medial Meniscus root tears and concluded that repair provided superior functional outcomes and lower odds of osteoarthritis progression. In our cohort, which included longitudinal, bucket-handle, and root tears, the superiority of repair remained evident across tear types, particularly in those amenable to restoration and vascularized zones. Patient age, activity level, and absence of concomitant ligament injuries further contributed to favorable repair outcomes.

Overall, our findings are consistent with the global trend supporting meniscal preservation whenever possible. Functional scores, early MRI evidence, and biomechanical rationale all suggest that repair yields better long-term outcomes than partial meniscectomy, despite slightly higher reoperation rates. This emphasizes the importance of patient selection, tear characteristics, and surgical technique in optimizing results.

While partial meniscectomy remains a valid treatment for irreparable tears or patients unsuitable for repair, the trade-off between short-term symptom relief and long-term joint health must be carefully considered.

In conclusion, this study reinforces the evidence that arthroscopic meniscal repair provides superior functional outcomes and better preservation of knee structure compared with partial meniscectomy. The results

support current guidelines advocating meniscal preservation as the preferred treatment when tear pattern, vascularity, and patient factors allow, while acknowledging the slightly increased early reoperation risk.

Conclusion

Arthroscopic meniscal repair superior in functional outcomes at 12 months. Partial meniscectomy offers early relief but slightly lower long-term function. Early repair should be considered when tear is repairable and patient suitable Supports current evidence for meniscal preservation strategies.

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