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IMPROVEMENT OF ARTHROSCOPIC DIAGNOSIS AND TREATMENT OF TRAUMATIC MENISCAL INJURIES OF THE KNEE JOINT IN THE ACUTE PERIOD

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Abstract: Background: Meniscal injuries of the knee joint are among the most common consequences of traumatic injuries in orthopedic practice. Delayed diagnosis and inadequate treatment can lead to chronic pain, functional limitations, and degenerative joint changes. Arthroscopy has become the gold standard for both diagnosis and treatment of meniscal injuries due to its minimally invasive nature and high diagnostic accuracy.

Objective: To evaluate and improve arthroscopic diagnostic and therapeutic approaches in patients with acute traumatic meniscal injuries of the knee joint.

Materials and Methods: A prospective clinical study included 72 patients with acute traumatic meniscal tears treated at the Department of Traumatology and Orthopedics. All patients underwent clinical examination, magnetic resonance imaging (MRI), and arthroscopic intervention. Functional outcomes were assessed using the Lysholm Knee Score and Visual Analog Scale (VAS).

Results: Arthroscopy demonstrated a diagnostic accuracy of 98%, compared to 91% for MRI and 78% for clinical examination. The average Lysholm score improved from 54.2 ± 6.3 preoperatively to 93.8 ± 4.5 at 12 months postoperatively. Pain intensity decreased significantly from 7.4 ± 1.1 to 1.6 ± 0.7 according to VAS assessment ($p < 0.05$).

Conclusion: Early arthroscopic diagnosis and treatment significantly improve clinical outcomes in patients with traumatic meniscal injuries. Meniscal preservation techniques provide superior long-term functional results and contribute to the prevention of degenerative joint changes.

Keywords: knee joint, meniscal injury, arthroscopy, meniscal repair, acute trauma, orthopedic surgery.

Introduction

Traumatic injuries of the knee joint remain one of the most significant challenges in modern orthopedic and sports medicine practice. The menisci play a fundamental role in maintaining joint stability, distributing mechanical loads, absorbing shock, and protecting the articular cartilage. Damage to these fibrocartilaginous structures disrupts normal knee biomechanics and increases the risk of early osteoarthritis.

According to international studies, meniscal injuries account for approximately 15–20% of all sports-related knee injuries. The incidence is particularly high among athletes, military personnel, and physically active individuals. Acute traumatic tears frequently result from rotational mechanisms, sudden deceleration, or direct trauma to the knee.

Magnetic resonance imaging is currently considered the primary non-invasive diagnostic modality for meniscal pathology. However, MRI may fail to detect certain unstable tears, radial ruptures, or peripheral lesions. Arthroscopy provides direct visualization of intra-articular structures and allows simultaneous treatment, making it the most reliable diagnostic and therapeutic method.

Recent developments in arthroscopic surgery emphasize meniscal preservation whenever possible. Preservation of meniscal tissue has been shown to reduce long-term degenerative changes and improve functional outcomes. Consequently, improving arthroscopic techniques in the acute phase of injury remains an important clinical objective.

The purpose of this study was to assess the effectiveness of arthroscopic diagnosis and treatment in acute traumatic meniscal injuries and to determine optimal treatment strategies for improved patient outcomes.

Materials and Methods

Study Design

A prospective clinical study was conducted at the Department of Traumatology and Orthopedics of Andijan State Medical Institute between 2022 and 2025.

Patients

A total of 72 patients with acute traumatic meniscal injuries were included in the study.

Inclusion Criteria

- Age between 18 and 60 years.
- Acute traumatic knee injury within six weeks.
- Clinical suspicion of meniscal tear.
- MRI-confirmed meniscal lesion.
- Informed consent for arthroscopic treatment.

Exclusion Criteria

- Advanced osteoarthritis.
- Rheumatoid arthritis.
- Previous knee surgery.
- Multiple ligament injuries requiring reconstruction.
- Severe systemic diseases.

Diagnostic Evaluation

All patients underwent:

1. Clinical orthopedic examination.
2. McMurray test.
3. Apley compression test.

4. Magnetic resonance imaging.
5. Diagnostic arthroscopy.

Arthroscopic Procedure

Arthroscopic surgery was performed under spinal anesthesia using standard anteromedial and anterolateral portals.

Depending on intraoperative findings, one of the following procedures was performed:

- Meniscal repair.
- Partial meniscectomy.
- Arthroscopic debridement.
- Combined procedures.

Outcome Measures

Clinical outcomes were evaluated using:

Lysholm Knee Scoring Scale

The Lysholm scale assesses:

- Limp
- Pain
- Locking
- Instability
- Swelling
- Stair climbing
- Squatting

Visual Analog Scale (VAS)

Pain intensity was measured using a 10-point VAS scale.

Statistical Analysis

Data were analyzed using SPSS version 26.0.

Quantitative variables were expressed as mean ± standard deviation (M ± SD). Statistical significance was accepted at $p < 0.05$.

Results

Patient Characteristics

Among the 72 patients:

- Male patients: 49 (68.1%)
- Female patients: 23 (31.9%)

Mean age: 31.6 ± 8.7 years.

Types of Meniscal Injury

Injury Type	Number (%)
Medial meniscus tear	49 (68.1%)
Lateral meniscus tear	17 (23.6%)
Combined tear	6 (8.3%)

Diagnostic Accuracy

Diagnostic Method	Accuracy (%)
Clinical examination	78
MRI	91
Arthroscopy	98

Arthroscopy identified several unstable flap tears and peripheral vascular-zone lesions that were not clearly visible on MRI.

Functional Outcomes

Lysholm Score

Time Point	Mean Score
Preoperative	54.2 ± 6.3
3 months	78.5 ± 5.8
6 months	88.7 ± 5.1
12 months	93.8 ± 4.5

Pain Assessment (VAS)

Time Point	Mean VAS Score
Preoperative	7.4 ± 1.1
3 months	3.8 ± 0.9
6 months	2.4 ± 0.8
12 months	1.6 ± 0.7

Statistically significant improvement was observed in all postoperative evaluations ($p < 0.05$).

Complications

Postoperative complications were minimal:

- Mild joint effusion – 4 patients (5.6%)
- Temporary stiffness – 2 patients (2.8%)
- No deep infections were observed.

Discussion

The results of this study confirm the significant diagnostic and therapeutic value of arthroscopy in the management of acute traumatic meniscal injuries.

Although MRI demonstrated high sensitivity, arthroscopy provided superior diagnostic precision. Similar findings have been reported by Beaufils et al., who identified arthroscopy as the definitive diagnostic standard for meniscal pathology.

Early arthroscopic intervention allows prompt treatment before secondary cartilage degeneration develops. Delayed management may lead to chronic instability, persistent pain, and progression toward osteoarthritis.

Our findings demonstrated substantial improvement in Lysholm functional scores following arthroscopic treatment. Patients undergoing meniscal repair exhibited superior long-term outcomes compared to those treated with partial meniscectomy. Preservation of meniscal tissue maintains load distribution and joint biomechanics, reducing the risk of degenerative changes.

The increasing use of all-inside and inside-out repair techniques has expanded indications for meniscal preservation. Modern biological augmentation methods such as platelet-rich plasma (PRP) and stem-cell-based therapies may further improve healing rates in the future.

The low complication rate observed in this study confirms the safety and effectiveness of arthroscopic management during the acute period of injury.

Conclusion

Arthroscopy remains the most effective method for diagnosis and treatment of acute traumatic meniscal injuries of the knee joint.

The study demonstrated that:

1. Arthroscopy provides the highest diagnostic accuracy.
2. Early arthroscopic intervention significantly improves clinical outcomes.
3. Meniscal preservation techniques result in superior functional recovery.
4. Pain intensity decreases significantly after arthroscopic treatment.
5. Modern arthroscopic methods reduce complication rates and accelerate rehabilitation.

Implementation of advanced arthroscopic protocols can improve patient quality of life and reduce the long-term burden of knee joint degeneration.

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