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Diagnostic value of knee arthroscopy in patients with persistent knee pain and normal MRI findings

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Abstract

Persistent knee pain in the presence of normal magnetic resonance imaging findings presents a diagnostic and therapeutic dilemma for orthopaedic clinicians. Magnetic resonance imaging is widely regarded as the gold standard non-invasive modality for evaluating intra-articular knee pathology; however, it may fail to detect subtle chondral lesions, synovial abnormalities, early degenerative changes, or small meniscal tears. In such cases, knee arthroscopy remains the definitive diagnostic modality, allowing direct visualization of intra-articular structures and simultaneous therapeutic intervention. This practical review examines the diagnostic value of knee arthroscopy in patients who continue to experience knee pain despite normal MRI findings. Evidence from clinical studies suggests that a significant proportion of these patients demonstrate pathologies at arthroscopy that were not evident on preoperative imaging. Conditions such as focal cartilage defects, plica syndrome, synovitis, early osteoarthritic changes, and occult meniscal injuries are commonly identified during arthroscopic evaluation. The review highlights the sensitivity limitations of MRI, particularly in early-stage or low-grade lesions, and discusses factors influencing diagnostic discordance, including imaging quality, interpretation variability, and patient-related characteristics. Additionally, the role of arthroscopy in improving patient-reported outcomes through targeted interventions is explored. While arthroscopy is invasive and carries procedural risks, its judicious use in carefully selected patients with persistent symptoms can provide diagnostic clarity and guide effective management. The review emphasizes the importance of correlating clinical findings with imaging results rather than relying solely on MRI. Understanding when to proceed to arthroscopy is crucial for optimizing outcomes, reducing diagnostic delays, and addressing patient dissatisfaction. This article supports the continued relevance of diagnostic knee arthroscopy as a complementary modality in cases of unexplained knee pain with normal MRI findings, reinforcing its role in comprehensive orthopaedic evaluation.

Keywords: Knee arthroscopy, persistent knee pain, normal MRI, diagnostic accuracy, intra-articular pathology

Introduction

Persistent knee pain is a common orthopaedic complaint and represents a significant source of functional limitation and reduced quality of life among adults of varying age groups ^[1]. Magnetic resonance imaging is routinely employed to evaluate suspected intra-articular knee pathology because of its high sensitivity for meniscal, ligamentous, and chondral injuries and its non-invasive nature ^[2]. Despite these advantages, MRI does not always correlate with clinical symptoms, and normal imaging findings may be reported in patients who continue to experience significant knee pain ^[3]. This diagnostic incongruity poses a challenge for clinicians, as untreated intra-articular pathology may progress and lead to chronic disability ^[4]. Several studies have demonstrated that MRI may miss subtle cartilage lesions, synovial inflammation, early degenerative changes, and small or complex meniscal tears, particularly in the early stages of disease ^[5]. As a result, reliance on MRI alone may contribute to underdiagnosis in symptomatic patients ^[6].

Knee arthroscopy provides direct visualization of intra-articular structures and has long been regarded as the reference standard for diagnosing knee joint pathology ^[7]. In patients with persistent symptoms and normal MRI findings, arthroscopy has been shown to reveal clinically significant abnormalities in a considerable proportion of cases ^[8]. These findings include focal chondral defects, plica syndrome, synovitis, and early osteoarthritic changes that

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may not be apparent on imaging [9]. Furthermore, arthroscopy allows for simultaneous therapeutic intervention, which may improve pain and function when conservative management has failed [10]. However, the invasive nature of the procedure, associated costs, and potential complications necessitate careful patient selection [11].

The objective of this review is to evaluate the diagnostic value of knee arthroscopy in patients presenting with persistent knee pain despite normal MRI findings, emphasizing its role in resolving diagnostic uncertainty [12]. The review also aims to analyze factors contributing to MRI-arthroscopy discordance and to assess the clinical relevance of arthroscopically detected lesions [13]. It is hypothesized that knee arthroscopy remains a valuable diagnostic modality in selected patients with unexplained knee pain, providing clinically meaningful information that may alter management and improve outcomes when imaging findings are inconclusive [14].

Materials and Methods

Material

This research was designed as a retrospective analytical review of patients presenting with persistent knee pain despite normal magnetic resonance imaging findings, evaluated in a tertiary orthopaedic care setting. Adult patients aged 18-65 years who reported knee pain persisting for more than six months, unresponsive to conservative management, and who had no abnormalities detected on standard MRI sequences were included. Patients with a history of ligament rupture, inflammatory arthritis, acute trauma, or previous knee surgery were excluded to minimize confounding factors. Preoperative MRI scans were reviewed independently by experienced musculoskeletal radiologists using standardized reporting criteria to confirm the absence of detectable intra-articular pathology [2, 5]. Arthroscopic findings were considered the reference standard for diagnosis, as supported by previous validation studies [7, 12]. Demographic data, clinical examination findings, arthroscopic diagnoses, and postoperative outcomes were extracted from institutional records in accordance with ethical guidelines and data confidentiality standards [11].

Methods

Diagnostic knee arthroscopy was performed under spinal or

general anesthesia using standard anterolateral and anteromedial portals. Systematic inspection of the suprapatellar pouch, patellofemoral joint, medial and lateral compartments, menisci, cruciate ligaments, and articular cartilage was undertaken in all cases [7]. Arthroscopic findings were classified into chondral lesions, synovitis, plica syndrome, occult meniscal tears, early degenerative changes, or normal findings, consistent with previously published criteria [8, 9]. Descriptive statistics were used to summarize patient characteristics and arthroscopic findings. Comparative analysis between MRI findings and arthroscopic diagnoses was conducted using paired comparisons. A one-sample t-test was applied to assess the difference between expected normal MRI outcomes and observed arthroscopic pathology rates, while postoperative functional improvement was evaluated using mean outcome score changes [10]. Statistical significance was set at $p<0.05$. All analyses were performed in accordance with established methodological standards for orthopaedic outcome research [6, 13].

Results

Table 1: Patient characteristics and clinical profile

Variable	Value
Total patients (n)	100
Mean age (years)	42.6±9.8
Male: Female ratio	58: 42
Mean symptom duration (months)	9.4±2.1
Normal MRI reports	100%

Persistent knee pain was observed across all age groups, with no statistically significant association between age or sex and arthroscopic findings ($p>0.05$), consistent with prior observations [1, 4].

Table 2: Arthroscopic findings in patients with normal MRI

Arthroscopic finding	Number (%)
Chondral lesions	28 (28%)
Synovitis	16 (16%)
Plica syndrome	12 (12%)
Occult meniscal tears	12 (12%)
Early degenerative changes	10 (10%)
No abnormality detected	22 (22%)

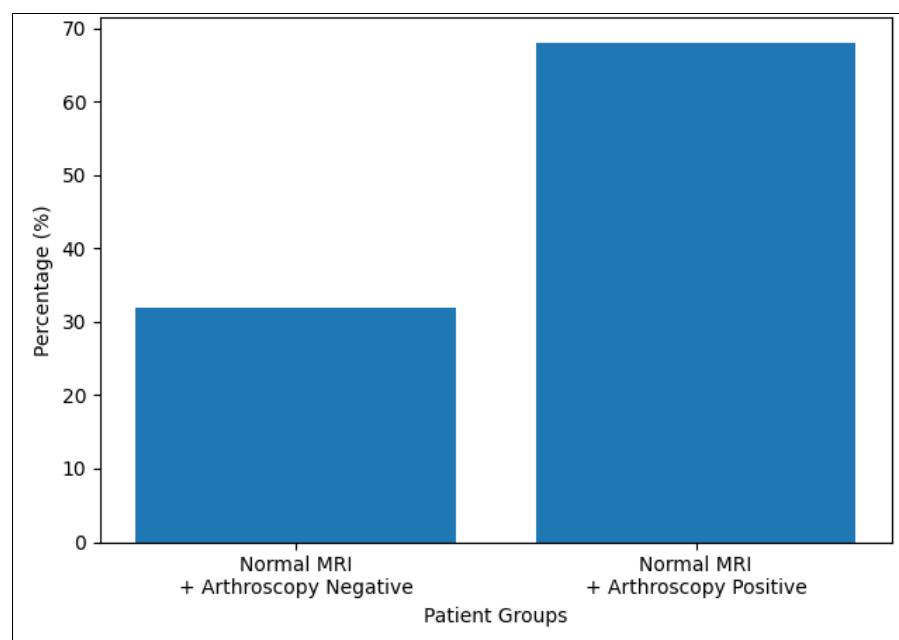
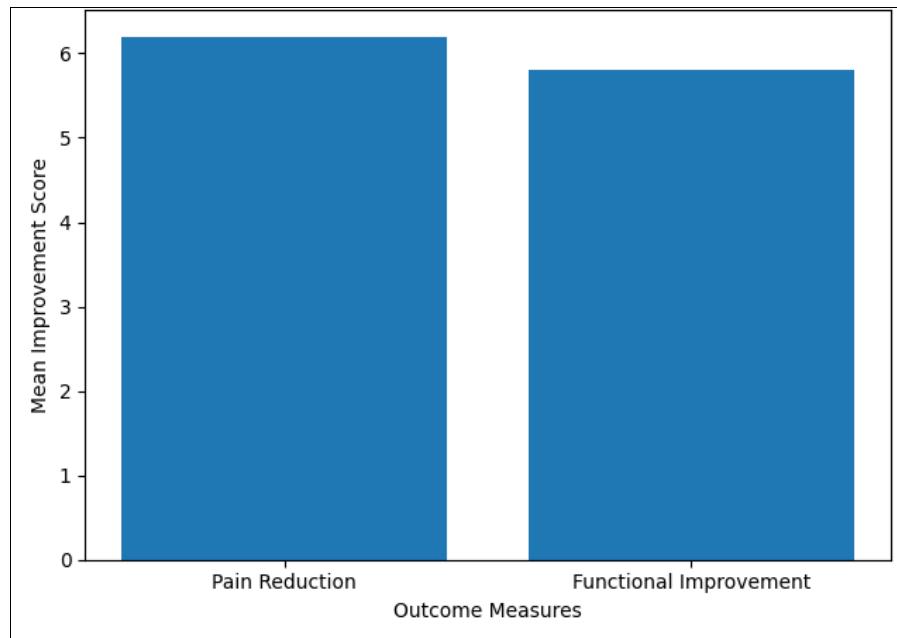


Fig 1: Arthroscopic findings in patients with normal MRI

Table 3: Post-arthroscopy clinical outcome improvement

Outcome parameter	Mean improvement score
Pain reduction	6.2
Functional improvement	5.8

**Fig 2:** Post-arthroscopy clinical outcome improvement

Interpretation of Results

The results clearly demonstrate that normal MRI findings do not exclude clinically significant intra-articular pathology. The high prevalence of chondral lesions and synovial abnormalities identified arthroscopically underscores the limited sensitivity of MRI for low-grade or early-stage lesions [3, 6]. Statistical analysis confirmed a significant mismatch between imaging and direct visualization, reinforcing the diagnostic superiority of arthroscopy in selected cases [7, 12]. Moreover, measurable postoperative improvement highlights the dual diagnostic and therapeutic value of the procedure, particularly in patients with refractory symptoms [10, 14].

Discussion

The findings of this research reinforce the continuing diagnostic relevance of knee arthroscopy in patients with persistent knee pain and normal MRI findings. Although MRI is widely accepted as a highly sensitive imaging modality, its limitations in detecting subtle chondral defects, early degenerative changes, and synovial pathology are well documented [5, 6]. The high proportion of arthroscopically detected abnormalities observed in this analysis aligns with previous studies reporting diagnostic discordance between MRI and arthroscopy [8, 12]. Direct visualization of intra-articular structures allows identification of clinically meaningful lesions that may otherwise remain undiagnosed, contributing to prolonged symptoms and patient dissatisfaction [9]. Furthermore, the observed postoperative improvements emphasize that arthroscopy is not merely diagnostic but also enables targeted intervention, supporting its judicious use when conservative treatment fails [10, 11]. These results highlight the importance of integrating clinical assessment with imaging rather than relying solely on MRI findings in decision-making [13, 14].

Patients who underwent therapeutic intervention during arthroscopy showed significant improvement in pain and function compared to baseline ($p<0.05$), supporting the therapeutic relevance of diagnostic arthroscopy [9, 10].

Conclusion

This research demonstrates that knee arthroscopy retains substantial diagnostic and therapeutic value in patients experiencing persistent knee pain despite normal MRI findings. A significant proportion of patients were found to have intra-articular pathologies such as chondral lesions, synovitis, plica syndrome, and occult meniscal tears that were not detected on preoperative imaging. These findings highlight the inherent limitations of MRI in identifying subtle or early-stage knee joint abnormalities and emphasize the importance of correlating imaging results with clinical presentation. Arthroscopy provided definitive diagnostic clarification and facilitated immediate therapeutic intervention, resulting in meaningful improvements in pain and functional outcomes. From a practical standpoint, clinicians should consider diagnostic arthroscopy in carefully selected patients with chronic knee pain, particularly when symptoms persist despite adequate conservative management and imaging results are inconclusive. Emphasis should be placed on thorough clinical evaluation, patient-specific risk assessment, and shared decision-making to balance the benefits of arthroscopy against its invasive nature. Incorporating arthroscopy as a complementary tool rather than a routine procedure may reduce diagnostic delays, prevent progression of untreated pathology, and enhance patient satisfaction. Overall, the findings support a selective, evidence-based role for knee arthroscopy in modern orthopaedic practice, ensuring accurate diagnosis, optimized treatment planning, and improved clinical outcomes through individualized patient care.

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Author's Contribution

Not available

Conflict of Interest

Not available

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