

ORIGINAL ARTICLE

To evaluate the correlation between MRI and arthroscopic findings in ACL and meniscal injuries of the knee joint

Shashi Pal Sadana

Associate Professor, Department of Orthopaedics, Major S D Singh Medical College & Hospital, Farrukhabad, Uttar Pradesh, India

ABSTRACT:

Aim: To evaluate the correlation between MRI and arthroscopic findings in ACL and meniscal injuries of the knee joint. **Methods:** 50 individuals with suspected traumatic ligament or meniscal knee joint damage. This research included patients with severe knee injuries aged 18 to 48 years. Patients with degenerative knee joint alterations, concomitant fractures around the knee joint, and patients who were contraindicated for an MRI scan were eliminated. **Results:** In our investigation, the sensitivity, PPV, and accuracy of MRI scan in diagnosing ACL damage were 97 percent, 100 percent, and 97 percent, respectively. The sensitivity, specificity, PPV, NPV, and accuracy of MRI scan in identifying medial meniscal injury were 79.6 percent, 83.7 percent, 83.7 percent, 79.6 percent, and 82.0 percent, respectively. The sensitivity, specificity, PPV, NPV, and accuracy of MRI scan in identifying lateral meniscal injury were 59.0 percent, 94.2 percent, 82.1 percent, 82.1 percent, and 82.1 percent, respectively. **Conclusion:** We found that arthroscopy is still the gold standard for detecting internal knee lesions and is very effective in individuals who have chronic symptoms or a strong clinical suspicion despite normal MRI.

Keywords: MRI, Arthroscopic, Anterior Cruciate ligament, Meniscal injuries

Corresponding author: Shashi Pal Sadana, Associate Professor, Department of Orthopaedics, Major S D Singh Medical College & Hospital, Farrukhabad, Uttar Pradesh, India

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INTRODUCTION

Because of its anatomical form, exposure to external pressures, and functional demands, the knee joint is one of the most often damaged joints. The occurrence of such injuries is unknown due to the difficulties of getting an adequate clinical evaluation in the emergency scenario.^{1,2} New diagnostic techniques for high-resolution magnetic resonance imaging (MRI) scans have recently been established to enhance the identification of knee injuries.³⁻⁵ These novel imaging procedures have been proved to be sensitive as well as specific for the majority of structures.³ Diagnosis arthroscopy is a significant advancement, increasing diagnostic accuracy from 64% to 94%. However, it is an invasive surgery with the risk of infection, hemarthrosis, adhesions, and reflex sympathetic dystrophy.⁶ MRI scanning of the knee joint has often been seen as a non-invasive alternative to diagnostic arthroscopy. Prior to proposing arthroscopic inspection and surgery, an MRI scan is now commonly performed to support the diagnosis of meniscal or cruciate ligament abnormalities.⁷ The comparison of MRI diagnosis with surgical/clinical results has long been a concern for the medical community. According to a review of the available literature, there are a lot of research looking at these diagnostic tools, but only a few studies putting them together are accessible.⁸

METHODS AND MATERIALS

After receiving clearance from the protocol review committee and the institutional ethics committee, this cross-sectional research was carried out at the Department of Orthopaedics. 50 individuals with suspected traumatic ligament or meniscal knee joint damage. This research included patients with severe knee injuries aged 18 to 48 years. Patients with degenerative knee joint alterations, concomitant fractures around the knee joint, and patients who were contraindicated for an MRI scan were eliminated. A trained orthopaedic surgeon first took a complete history of the patient and did a thorough clinical examination. To rule out degenerative changes, loose bodies, and fractures around the knee joint, plain radiographs of the affected knee joint were obtained. A 1.5 Tesla MRI was performed on the affected knee joint. An skilled and trained orthopaedic surgeon performed diagnostic arthroscopy of the affected knee after the pre-anesthetic check-up and consent. The MRI and arthroscopic findings are documented and compared.

RESULTS

This research comprised 50 patients ranging in age from 18 to 48 years old at the time of admission, with a mean age of 27.6 years. There were 33 (66%) men and 17 (34% girls) among them. All 50 patients had ACL tears on MRI. When MRI and arthroscopy results for ACL tears were compared, 47 patients were found to be true positive and three patients were

found to be false positive. In our investigation, the sensitivity, PPV, and accuracy of MRI scan in diagnosing ACL damage were 97 percent, 100 percent, and 97 percent, respectively. The Fisher

exact test was used to compute statistical significance and p value. The p value for ACL tear in this case is 1, which is statistically insignificant.

Table 1: Comparison between MRI and arthroscopic findings for ACL tear

	Arthroscopically positive	Arthroscopically negative	Total
MRI positive	47	3	50
MRI negative	0	0	0

Table 2: ACL findings

Test	ACL (%)
Sensitivity	100
Specificity	-
Positive predictive value(PPV)	97
Negative predictive value(NPV)	-
Accuracy	97

All 33 patients had MRIs that revealed a medial meniscus injury. When MRI and arthroscopy results for ACL tears were compared, 17 patients were true positive, 5 patients were false positive, 5 patients were false negative, and 12 patients were true negative. In our investigation, the sensitivity,

specificity, PPV, NPV, and accuracy of MRI scan in identifying medial meniscal injury were 79.6 percent, 83.7 percent, 83.7 percent, 79.6 percent, and 82.0 percent, respectively. The p value for medial meniscal tear in this case is 0.021, which is significant.

Table 3: Comparison between MRI and arthroscopic findings for medial meniscus tear

	Arthroscopically positive	Arthroscopically negative	Total
MRI positive	28	5	33
MRI negative	5	12	17

Table 4 - Medial meniscus findings

Test	Medial meniscus (%)
Sensitivity	83.7%
Specificity	79.6%
Positive predictive value(PPV)	83.7%
Negative predictive value(NPV)	79.6%
Accuracy	82%

On MRI, 11 individuals had a lateral meniscus tear. When MRI and arthroscopy results for ACL tears were compared, 7 patients were true positive, 4 patients were false positive, 10 patients were false negative, and 29 patients were true negative. In our investigation, the sensitivity, specificity, PPV, NPV,

and accuracy of MRI scan in identifying lateral meniscal injury were 59.0 percent, 94.2 percent, 82.1 percent, 82.1 percent, and 82.1 percent, respectively. The p value for lateral meniscal tear is 0.028 in this case, indicating that it is statistically significant.

Table 5: Comparison between MRI and arthroscopy findings for lateral meniscus tear

	Arthroscopically positive	Arthroscopically negative	Total
MRI positive	7	4	11
MRI negative	10	29	39

Table 6: Lateral meniscus findings

Test	Lateral meniscus (%)
Sensitivity	59.0%
Specificity	94.2%
Positive predictive Value(PPV)	82.1%
Negative predictive value(NPV)	82.1%
Accuracy	82.1%

DISCUSSION

Our research was conducted over a 12-month period. A prospective MRI and arthroscopic examination of 50 patients with suspected internal knee derangements was performed. Both modalities were used to study the anterior cruciate ligament and menisci, and comparisons were made. The gold standard was arthroscopy, and the sensitivity, specificity, and accuracy of MRI were determined. On MRI, there were 50 ACL injuries, 33 medial meniscal tears, and 11 lateral meniscal tears in the 50 individuals investigated.

A significant portion of knee pain or impairment is caused by a pathological state of the menisci. According to one research, it is the cause of two-thirds of all internal knee joint derangements.⁹ Similarly, rupture of the anterior cruciate ligament, a primary stabiliser of the knee, results in loss of knee stability and possibly substantial impairment.¹⁰ Although the ACL is the most often injured ligament in the knee, it has remained clinically elusive. These injuries account for a significant number of hospitalizations. The diagnosis of these lesions is still a tough clinical challenge. Because it is non-invasive, painless, and has no radiation risk, MRI is the most often utilised diagnostic technique for these internal derangements.¹¹ In the literature, the accuracy, sensitivity, and specificity values for knee lesions vary greatly. Rubin et al.¹² found a sensitivity of 93% for identifying isolated ACL injuries. Similarly, multiple prospective investigations have indicated that MR imaging diagnosis of ACL injuries has a sensitivity of 92-100 percent and a specificity of 93-100 percent.¹²⁻¹⁴ Rubin's series had a sensitivity of 98 percent for identifying solitary meniscal tears, which dropped when additional structures were affected. The specificity in an isolated lesion was 90%. Fischer¹⁵ found an accuracy of 78-98 percent for the chronic anterior cruciate ligament and 64-95 percent for meniscal injuries in a multicentric study.

MRI has a sensitivity and specificity of more than 90% in identifying meniscal tears. In a prospective comparison of clinical examination, MRI, bone SPECT, and arthroscopy to identify meniscal tears, Ryan et al.¹⁶ found that MRI, along with bone SPECT, had a high diagnostic capacity to detect meniscal tears, with sensitivity and specificity of 80% and 91 percent, respectively.

The sensitivity and specificity of MR imaging for knee for medial meniscal lesion were 83.7 percent and 79.6 percent, respectively, in the current research. The sensitivity and specificity of MR imaging for knee for lateral meniscal lesion were respectively 59.0 and 94.2 percent. As a result, MRI has a higher accuracy in identifying ACL damage than lateral and medial meniscus injuries. In the current research, MRI is statistically significant in cases of meniscal tears but not in cases of ACL tears.

CONCLUSION

We found that arthroscopy is still the gold standard for detecting internal knee lesions and is very effective in individuals who have chronic symptoms or a strong clinical suspicion despite normal MRI.

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