

MRI And Clinical Findings In The Diagnosis Of Soft tissue Injuries of the Knee

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Correspondence to Mahfoodh.Abbas@cddft.nhs.uk**Abstract**

This comparative study looks at the reliability and efficacy of both clinical findings and MRI against the gold standard of arthroscopic diagnosis in soft tissue injuries of the knee. 102 patients were recruited over a two-year period with ages ranging from 18-67 years. Using statistical analysis, the sensitivity, specificity and the positive and negative predictive values of MRI and clinical diagnosis were obtained. This study demonstrates the importance of a robust clinical diagnosis and the reliability of a high negative predictive value of MRI in the diagnosis of soft tissue injuries of the knee.

Introduction

Internal derangement of the knee is a common presenting clinical condition to the orthopaedic practitioner. They account for a large number of referrals to hospitals, both from the accident and emergency department and from the general practitioner. Other than being very troublesome for the patient's day-to-day activities, they may have significant financial and medico-legal implications. The clinical evaluation of knee injuries remains a difficult problem. The accuracy of a clinical diagnosis reported in different series varies between 64-85 percent. Magnetic resonance imaging (MRI) is a diagnostic method frequently used in the diagnosis of internal derangements of the knee, its advantages being that it is non-invasive, painless and there is no risk of radiation. However it is an expensive investigation and like all investigations, has a tendency to be misused to confirm diagnosis before proceeding with surgical intervention. The accuracy rates of MRI scans also vary. Given that knee disorders are so common and that there are varied accuracy rates of scans, it is useful to know the accuracy of the MRI findings in this trust and correlate them with clinical diagnosis and arthroscopic findings.

Arthroscopy has been used for many years as a diagnostic and therapeutic tool in knee disorders. It is considered a gold standard for the same as it allows direct visualization of the interior of the knee. Although there have been studies in the literature comparing MRI with arthroscopy, there has been no published study comparing MRI with clinical diagnosis, in relation to the gold standard of arthroscopy.

The aim of this study was to find out the diagnostic accuracy of MRI scans as compared to the clinical diagnosis, by correlating them with the gold standard of arthroscopy.

Methodology

This retrospective study involved the case details of patients with soft tissue injuries of the knee that had undergone both knee arthroscopy

and a MRI scan prior to it. The study included patients of all ages either with acute or chronic injuries, operated under the care of two senior consultants in our trust and report of MRI by one consultant radiologist with special interest in musculoskeletal radiology. The period of study was 2 years. Data were obtained from the databases of the theatre case notes and from the PACS system of radiology department.

There were 102 patients (n=102), who formed the basis for the study.

The pertinent data for each patient were entered into a proforma sheet. In addition to arthroscopy findings obtained from the case-notes, the MRI findings and clinical impression submitted by the consultant for MRI at the outpatient appointment were also documented. The core data were then analysed as true positives and negatives and false positives and negatives. Using these, the sensitivity, specificity, negative and positive predictive values were calculated, with arthroscopy as the standard for comparison.

Results

Age distribution

- ◆ Range: 18-67 years
- ◆ <20 years - 6
- ◆ 20-40 years - 54
- ◆ >40 years - 42

Comparison of Sensitivity of the MRI scan and clinical diagnosis

This is the probability that a diseased individual will have a positive result,

	MRI	Clinical Diagnosis
Medial meniscus	96.4% (C.I 89-100)*	85.4% (C.I 70-99)
Lateral meniscus	81.8% (C.I 59-100)	90.1% (C.I 81-98)
ACL tears	87.5% (C.I 64-100)	72.1% (C.I 59-89)

* Represents statistically significant results, p<0.05

Comparison of Specificity of the MRI scan and Clinical Diagnosis.

This is the probability that a disease free individual will have a negative result,

	MRI	Clinical Diagnosis
Medial meniscus	91.2%	74.1%
Lateral meniscus	90.2%	81.7%
ACL tears	94.3%	91.6%

Negative predictive value of the MRI

This is the percentage of patients who were diagnosed as having no tear on MRI and were subsequently found to have no tear at arthroscopy,

Medial meniscus	96.6%
Lateral meniscus	95.4%
ACL tears	97.9%

Positive predictive value of the MRI

This is the percentage of patients who were diagnosed as having a tear on MRI and were subsequently found to have a tear on arthroscopy,

Medial meniscus	88.0%
Lateral meniscus	74.2%
ACL tears	70.0%

The sensitivity and specificity values of MRI for knee injuries vary widely in literature. In a multicentre analysis published by Fisher et al¹, the sensitivity ranged from 64-95% for medial meniscus injuries, from 83-94% for lateral meniscus injuries, and 78-97% for the anterior cruciate ligament. Because of this wide range of reported values, it was thought necessary to find out the accuracy rates in our series. The sensitivity in our series was found to be around 91% for medial meniscus injuries, 90% for lateral meniscus and 94% for ACL tears.

In a prospective study reported by Imhoff et al², the negative predictive value was reported at 94% but with a positive predictive value of only 54%. They concluded that due to the high negative predictive value, a normal MRI scan allows elimination of a meniscal lesion precluding the need for a diagnostic arthroscopy. MRI can also reduce the requirement for a diagnostic arthroscopy³. Only patients with definite clinical signs merit early therapeutic arthroscopy; all other knees should be investigated with MRI. This policy spares patients from unnecessary and expensive surgery⁴. These findings were identical to those found in our study which demonstrated a high negative predictive value for MRI scans which could thus be used to exclude pathology in doubtful or uncertain cases.

Our study also revealed that the sensitivity of clinical diagnosis is relatively high, especially for medial and lateral meniscal lesions. A

Discussion

prospective study conducted by Terry et al., showed the sensitivity/specificity for ACL injuries clinically to be 89%/94%. In the current study, the sensitivity/specificity of clinical findings for injuries of the medial meniscus, lateral meniscus and ACL is 85.4/74.1, 90.1/81.7, 72.1/97.9 respectively. These results are on par or superior to those found in the literature.

Conclusion

Our study found that the sensitivity of the MRI scan for medial meniscal lesions is higher than for other structures of the knee joint. We do not recommend the routine use of MRI scan to confirm diagnosis in the absence of strong positive clinical findings, as the positive predictive value of the scan is low for all lesions. In the presence of positive clinical signs, we would recommend proceeding to arthroscopy. The negative predictive value of a scan was found to be high for all structures of the knee joint and hence, a 'normal' scan can be used to exclude pathology, thus sparing patients from expensive and unnecessary surgery and freeing up valuable theatre time. In the current setting of ease of availability of expensive diagnostic investigations, we reiterate the importance of a robust clinical diagnosis which in experienced hands has a similar sensitivity and specificity for knee injuries (at least for ACL injuries) as MRI.

References:

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