

Comparison Between Magnetic Resonance Imaging and Arthroscopy Findings in Medial Meniscal Injuries

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ABSTRACT

INTRODUCTION: Identification of deranged structure in the knee requires keen sense of clinical judgement, imaging modalities, arthroscopy and at times surgical exploration. Magnetic resonance imaging and arthroscopy have shown good diagnostic performance in detecting lesions of the menisci and hence this study was carried out to compare magnetic resonance imaging and arthroscopic findings in medial meniscus injury.

METHODS: The present study comprised of 30 male and 5 female patients, age ranging between 20 to 60 years. This prospective study was done over a period of two and half years in Kasturba Medical College, India. A total of 35 patients were included in this study. Cases suggestive of meniscal injury underwent both and their findings were compared. Statistical calculation was performed using Microsoft excel version 7 and SPSS 13 statistical program.

RESULT: The magnetic resonance imaging of 35 knees showed that there were tears in 31 patients, predominantly in the posterior horn (17). Tears in anterior horn and bucket handle tears were equal in number (7 each). The magnetic resonance imaging did not detect any tear in 4 patients. When the knees were subjected to arthroscopic examination tears were seen in 30 patients of which most were posterior horn tears (18), followed by bucket handle tears (7) and anterior horn tears (5). Arthroscopy detected no tear in 5 patients. Of the 4 patients having normal Magnetic Resonance imaging 1 patient showed tear on Arthroscopy. In the rest 3 patients Arthroscopy confirmed the normal finding of MRI.

CONCLUSION: Magnetic Resonance imaging is highly accurate in diagnosing medial meniscal injuries of the knee and can be used as a first line diagnostic tool in patients with suspected medial meniscal injuries. Magnetic Resonance imaging is the most appropriate screening tool for therapeutic arthroscopy.

KEYWORDS: arthroscopy, magnetic resonance imaging, medial meniscus

INTRODUCTION

The stability of the knee joint is provided by the soft tissue structures: the anterior and posterior cruciate ligaments, the medial and lateral collateral ligaments, the menisci, the capsule and muscles. The subcutaneous location in a weight bearing extremity combined with the relatively long lever arm exerting forces on the

joint render the knee susceptible to injury.

The term internal derangement is loosely applied to a variety of intra and extra articular disturbances of traumatic origin that interfere with the function of the knee joint¹. Identification of deranged structure requires keen sense of clinical judgement, imaging modalities, arthroscopy and at times surgical exploration.

Magnetic Resonance Imaging (MRI) has emerged as the main or often the only imaging tool for evaluation of suspected internal derangement of the knee.

Arthroscopy on the other hand has stood the test of time from diagnostic to therapeutic indications so much so that it is now considered the gold standard for many knee pathologies.

Magnetic resonance imaging is of great aid in the diagnosis of knee lesions². Most diagnostic studies comparing MRI and arthroscopy have shown good diagnostic performance in detecting lesions of the menisci and cruciate ligaments. Nevertheless, arthroscopy has remained the reference standard for the diagnosis of internal derangement of the knee, against which alternative diagnostic modalities may be compared.

The aim of the study was to compare MRI and arthroscopic findings in medial meniscus injury.

METHODS

It was a prospective study conducted in Kasturba Medical College Hospital over two and half years. Institute ethical committee clearance was taken for the study. All patients with clinically diagnosed meniscal injury underwent MRI and arthroscopy. Patients with infections, neoplasm and patients with associated bony injuries around the knee were excluded.

A thorough history was taken and clinical examination done. Patients were questioned regarding symptoms consistent with meniscal injury. After clinical examination, meniscal injury was diagnosed on the basis of joint line tenderness, McMurray's test³ and Apley's grinding test⁴. All findings were correlated and based on them a provisional diagnosis of medial meniscus injury was formulated. The patients were counselled regarding the condition and were advised an MR imaging of the knee to look for meniscal injury. In all the knees MR imaging was performed using a Sigma Contour (GE) MR machine with field strength of 0.5

T. Patients were placed in supine position. To evaluate the menisci on the sagittal view images were taken in a plane parallel to the course of Anterior Cruciate Ligament approximately 15° of internal rotation to the true sagittal plane. The MR image was reviewed and reported by a senior radiologist who was given access to each patient's clinical diagnosis. It was felt that blinding the radiologist by withholding the clinical diagnosis would possibly decrease their accuracy in interpreting the MRI and therefore would not be truly realistic of MRI accuracy. The criteria used for determining the presence of meniscal tear was the presence of high signal that extended to one of the articular borders of the meniscus.

Patients with MRI suggestive of meniscal injury and those patients with MRI not suggestive of meniscal tear but with a strong clinical suspicion of meniscal tear were taken up for arthroscopy and further evaluation. The patients were given spinal anaesthesia and positioned supine on the operating table. Pneumatic tourniquet was applied in the proximal thigh in each case. A lateral post was used, which allowed the limb to be free during the arthroscopy. Normal saline was used as a distention media. With a 30° arthroscope, the knee was entered through the antero-lateral portal. The knee was examined for tears in the menisci and other ligaments. The probe was inserted thorough the antero-medial portal. With the probe the ligaments were palpated for any defects. If a tear was found in the medial meniscus it was contoured and trimmed with the help of biters, punches and suction shaver. The knee was lavaged with saline to remove off any debris. The portals were sutured with ethilon. Sterile dressing was applied following which compression bandage was applied. Tourniquet was deflated and removed. Drapes were removed and the patient was shifted out of operation theatre. The findings of MRI was compared to arthroscopy findings.

The data was statistically described in terms of frequencies and percentages where appropriate. For comparing categorical data, chi-square test

was used. A probability value (p-value) less than 0.05 was considered statistically significant. All statistical calculations were performed using Microsoft excel version 7 and SPSS 13 statistical program.

RESULT

The study comprised of 30 male and 5 female patients. The age of the patients ranged between 20 to 60 years. The magnetic resonance imaging of 35 knees showed tears in 31 patients, 17 of which most tears were in the posterior horn. Tears in anterior horn and bucket handle tears were equal in number (7 each). The MRI did not detect any tear in 4 patients. When the knees were subjected to arthroscopic examination tears were seen in 30 patients, 18 of which were in the posterior horn, followed by 7 bucket handle tears and anterior horn tears in 5 patients. Arthroscopy detected no tear in 5 patients. Of the 4 patients having normal MRI, 1 patient showed tear on arthroscopy. In the rest 3 patients arthroscopy confirmed the normal finding of MRI. Thus according to this study, 29 patients were true positive, 2 patients were false positive, one was false negative, and three were true negative.

In this study the sensitivity of MRI was 96.7%. This study shows that the ability of MRI to correctly identify tear in medial meniscus when compared to arthroscopy is 96.7%. This is similar with the study of Runkel et al⁵, Polly et al⁶, Raunest et al⁷, Fischer et al⁸ and Nancy M et al⁹. Studies done by Lee et al¹⁰ and Rappeport et al¹¹ also show high sensitivity. Study of Glashow et al¹² showed sensitivity of 77%.

The specificity of MRI in this study was 60%. This implies that the ability of MRI to correctly identify that there is no tear in medial meniscus when compared to arthroscopy was 60%. The study of Runkel et al, Lee et al and Patrice et al¹³ showed high specificity of 96%, 94% and 94.2% respectively. Low specificity was seen in the study of Raunest et al which was 37%. Rappeport et al and Glashow et al also showed lower specificity of 56% and 71%.

Positive predictive value in this study was 93.5% whereas Glashow et al reported 68% and Fischer et al reported 86% in their studies.

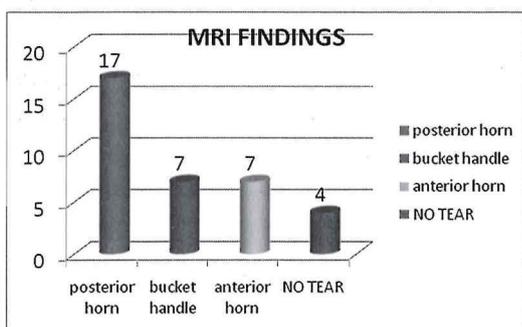
Negative predictive value in this study was 75% which is similar to Glashow et al 79%. Fischer et al reported a higher negative predictive value of 92%.

The overall accuracy of MRI in detecting tears of medial meniscus in this study is 91%. Polly et al showed an accuracy of 98%. Studies of Lee et al, Runkel et al and Fischer et al had value similar to this study. Silva et al¹⁴ and Crawford et al¹⁵ showed lower accuracy than that shown in this study.

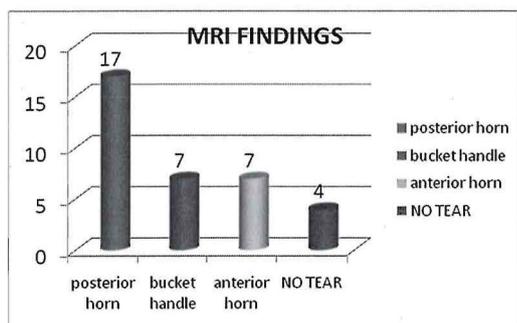
The limitations of this study was that the sample size was small and it was a unicentric study.

CONCLUSION

Magnetic Resonance Imaging is highly accurate in diagnosing medial meniscal injuries of the knee. It is the most appropriate screening tool for therapeutic arthroscopy and is preferable to



MRI Findings



Arthroscopy Findings

diagnostic arthroscopy in patients because it is faster and avoids the risks of anaesthesia and surgery.

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