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Clinical, MRI and arthroscopic correlation in menisci injuries

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Abstract

Medical technology sometimes obscures the importance of history taking and clinical examination, though in reality history and clinical methods are indispensable part of any patient management. In this prospective cohort study in age group between 15 and 65 years, we have compared between clinical, MRI, and arthroscopic findings in respect to menisci injuries and searched whether negative MRI findings can lead to denial of arthroscopy in suspected menisci injuries. All the patients undergone a clinical battery of tests. Subsequently MRI has been done on all the 40 subjects, and finally arthroscopy has been done. Sensitivity, specificity, positive predictive value, negative predictive value of each individual test were calculated and compared with the results of MRI. For medial meniscus injury clinical diagnostic accuracy-80% and MRI diagnostic accuracy is 82.5%. For lateral meniscus injury clinical diagnosis has diagnostic accuracy 75% and MRI has got diagnostic accuracy of 82.5%. Level of evidence-Level-IV.

Keywords: meniscus injury, correlation, clinical; MRI, arthroscopy

Introduction

In present day orthopaedic practice improved medical technology sometimes obscures the importance of history taking and clinical examination. But in reality history and clinical methods are indispensable part of any orthopaedic patient management. Knee joint is one of the most commonly injured joint because of the anatomical complexity it has; it's exposures to external forces and the functional demand imposed upon it. Knee joint contain many intra articular structures.

In this present study we have compared between clinical, MRI, and arthroscopic findings in respect to menisci injuries and searched whether negative MRI findings can lead to denial of arthroscopy in suspected menisci injuries. In the present study diagnostic accuracy of clinical examination is compared against MRI findings.

In general menisci injuries are much more common in the young individuals ^[1, 2] with medial meniscus being more commonly injured than lateral meniscus ^[2-4] Clinical examinations give observer dependant variable results in many occasions dependant on clinical accuracy of the examiner. Though MRI gives very good soft tissue image with minimum artefacts with no radiation to the patient ^[5, 6] still it has observer and scanner dependant variability in results. Although menisci with internal signal in contact with surface are usually torn, a tear is less likely if such signal is present on only one image ^[7]. Majority of the false positive images in MRI involve posterior horn of the menisci ^[8]

Tear of one meniscus can produce pain in the opposite compartment of the knee. This is most commonly seen with posterior tears of lateral meniscus. MRI has helped to prevent exploration of wrong compartment of the knee. Arthroscopic findings are considered as gold standard in this study against which all comparisons are being made.

Materials and Methods

This is a prospective cohort study without any control. All patients are between 15 and 65 years of age. All are chronic patients with history of antecedent trauma. To be declared as suspect atleast 1 of the 3 clinical tests has to be positive naming- tenderness of joint line;

McMurray test; Apley compression test. To be declared as clinically positive cases at least 2 of the above mentioned 3 tests are to be positive. Patients with previous history of osteoarthritic change of the same knee, infective pathology, ankylotic change of the same knee, tubercular change of the knee or prior operative intervention in the same knee has been excluded from the study. Among all patients attended with knee injuries 241 has been accepted as suspects and 40 accepted as cases.

At first detailed history is taken with consideration of history of locking, giving way, snaps, clicks, catches, local pain, etc. Next few tests are performed for meniscus, cruciate ligaments, collateral ligament injuries as various combinations among them have been found. For meniscus injuries Apley compression test, McMurray test, tenderness of joint line test has been performed. For anterior cruciate ligament injury Lachman test and Anterior drawer test has been done, Posterior drawer test has been done for posterior cruciate ligament injury, Varus and valgus stress test and Apley distraction test has been done for collateral ligament injuries. All the 40 patients has undergone all the above mentioned clinical battery of tests. Subsequently MRI has been done on all the 40 subjects, and finally arthroscopy has been done on all of them under spinal anaesthesia the results of which has been taken as gold standard. Sensitivity, specificity, positive predictive value, negative predictive value of each individual test and collectively as clinically positive cases are calculated and compared with the results of MRI. Diagnostic accuracy of clinical methods has been compared with MRI. All the values are calculated for both medial and lateral meniscus.

Results

This study has been conducted on 40 patients out of which 35 were male and 5 females showing males are outnumbering females. Right side affected more commonly (60:40). Maximum conglomeration of cases are between 21 to 30 years of age (45%), the most dynamic age group. Medial meniscus affected more commonly than lateral meniscus in this series (66.7%: 33.3%). For medial meniscus injury McMurray test has sensitivity-73.08%, specificity 64.28%, positive predictive value 79.17%, negative predictive value 56.25%. For medial meniscus injury Apley compression test has sensitivity-53.85%, specificity 71.43%, positive predictive value-77.78%, negative predictive value-45.45%. For medial meniscus injury joint line tenderness test has sensitivity-88.46%, specificity-64.29%, positive predictive value-82.14% and negative predictive value-75%. For medial meniscus injury clinical diagnosis has sensitivity 80.77%, specificity-78.57%, positive predictive value-87.5%, negative predictive value 68.75%. For medial meniscus injury MRI has got sensitivity-80.77%, specificity-85.71%, positive predictive value-91.3% and negative predictive value-70.59%. For medial meniscus injury clinical diagnostic accuracy-80% and MRI diagnostic accuracy is 82.5%.

For lateral menisci injuries McMurray test has got sensitivity-69.23%, specificity-74.07%, positive predictive value 56.25% and negative predictive value 83.33%. For lateral meniscus injury Apley compression test has sensitivity-38.46%, specificity-74.07%, positive predictive value-41.67% and negative predictive value-71.43%. For lateral meniscus injury tenderness of joint line test has sensitivity-84.62%, specificity-92.59%, positive predictive value-84.62% and negative predictive value-92.59%. For lateral meniscus injury clinical diagnosis has sensitivity-61.54%, specificity-81.48%,

positive predictive value-61.54% and negative predictive value-81.48%. For lateral meniscus injury MRI has sensitivity-84.62%, specificity-81.48%, positive predictive value-68.75% and negative predictive value-91.67%. For lateral meniscus injury clinical diagnosis has diagnostic accuracy 75% and MRI has got diagnostic accuracy of 82.5%.

The various combination of cases what has been observed in this series have been shown in Table -1

Table 1: The various combination of cases what has been observed in this series

Type of Injury	Number of cases	Descriptive statistics (%)
MM	7	17.5
MM+ACL	7	17.5
MM+ACL+PCL	1	2.5
MM+ACL+MCL	2	5
LM	2	5
MM+LM	3	7.5
MM+LM+ACL	1	2.5
MM+LM+PCL	2	5
MM+LM+ACL+PCL	1	2.5
MM+LM+ACL+PCL+MCL+LCL	2	5
LM+ACL	2	5
ACL	7	17.5
PCL	2	5
MCL+LCL	1	2.5

Discussion

In the present series 60% of cases are found in right knee and 40% cases are confined to the left knee. Among the above mentioned subjects 90% are right dominant. In this series 66.7% cases are having medial meniscus injury and 33.3% cases are having lateral meniscus injury when a ratio of involvement has been sought for between involvement of the two menisci. Kamini Gupta *et al.* [9] had also much higher involvement of medial meniscus.

When clinical examinations are used in isolation it has been found that- McMurray test has much lower sensitivity, specificity, positive and negative predictive value in comparison to MRI for medial meniscus injury. In medial meniscus injury Apley compression test has low negative predictive value in this series. Karachalios *et al.* [10] has got sensitivity lower and specificity much higher than this study. In medial meniscus injury tenderness of joint line test has high sensitivity and positive predictive value. D Akseki *et al.* [11] has got sensitivity almost equal and specificity much lower.

But when clinical battery of tests are used as per our set criteria it has been found that the results are very close to that we got from MRI. In respect to MRI findings Amir Mohammad Navali *et al.* [12] has got sensitivity close to this study. In our study clinical diagnostic accuracy is close to diagnostic accuracy of MRI, a much costly investigation. Though Ali Akbar Esmaili Jah [13] has got clinical diagnostic accuracy much higher but MRI diagnostic accuracy much closer to us.

In lateral meniscus injury- McMurray test has much low sensitivity, specificity, positive and negative predictive value when compared with MRI in this series of cases. Apley compression test when used in isolation has got low sensitivity and positive predictive value but sensitivity is very close to findings of Karachalios *et al.* [10] Tenderness of joint line test has high specificity and negative predictive value in lateral menisci injuries in this series. Rose [14] found much higher sensitivity and rest pretty close to our observation.

When battery of clinical tests are used as per our set criteria it has been found that clinical diagnosis has equal specificity, slight low positive and negative predictive value but low sensitivity in comparison MRI findings. Asif *et al.* [15] has got sensitivity, specificity, positive and negative value of MRI in lateral meniscus injury very close to this series. Diagnostic accuracy of clinical diagnosis is slightly less in comparison to MRI in this series but still within comparable range. Medial meniscus with anterior cruciate ligament injury much more common than lateral meniscus with anterior cruciate ligament injury. Sometime other structure injury may mimic meniscus injury.



Fig 1: MRI shows Tear of medial meniscus in a clinically intact medial meniscus

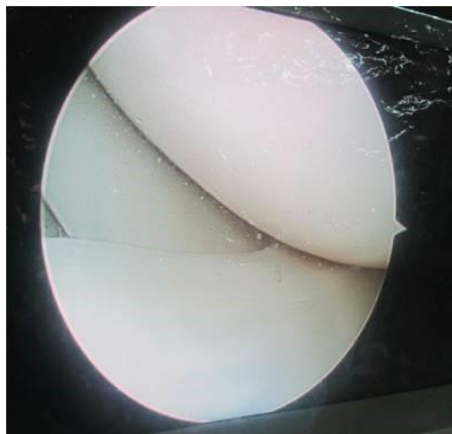


Fig 2: Arthroscopy confirms intact medial meniscus

Conclusion

When used as isolated clinical test findings we got is inferior to MRI other than tenderness of joint line test. But when battery of clinical tests has been used on same patient values we got are close to MRI. In some cases clinical examination gave the correct finding though MRI failed to detect as MRI has got some scanner and interpreter dependant variation (Fig 1 & 2). So it can be clearly said that in a background of clinically positive case negative MRI can't deny an arthroscopy. By doing an early arthroscopy depending on highly suggestive clinical findings much valuable time and

money can be saved. Although it has to be admitted that modern imaging like MRI has revolutionized the domain of knee injuries but still carefully performed clinical examination by a skilled examiner give very important value.

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