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Original Research Article

A study on correlation between arthroscopy and MRI in internal derangement of knee

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ABSTRACT

Background: The knee joint is a common site of injury, mainly due to trauma, repetitive activities and sports activities. Multiple imaging modalities are currently used to evaluate pathologic conditions of the knee. Magnetic resonance imaging has a better soft tissue contrast and multi planar slice capability, which has revolutionized and has become the ideal modality for imaging complex anatomy of the knee joint. Another advanced modality in the management of IDK is arthroscopy, which can be used in its dual mode, either as diagnostic and/or as therapeutic tool.
Methods: Cases were taken according to inclusion and exclusion criteria i.e., patients with knee problems more than 6weeks old, with symptoms of locking of knee, patients with undiagnosed knee pain and knee injury. Only patients between 15-50 years are included in the study. Patients with signs of infection, with osteoarthritis, ankylosis, and patients on ATT were excluded from the study.
Results: In our study of 25 cases, there were 20 male and 5 female patients with age ranging from 15 years to 50 years with most patients in between 21-30 years. 11 cases admitted were sport injuries, 14 had motor vehicle accidents. Right side being more common side affected.
Conclusions: In conclusion the present study supports that clinical diagnosis is of primary necessity and MRI is additional diagnosing tool for IDK.

Keywords: Knee joint, MRI, IDK

INTRODUCTION

The knee is one of the most frequently injured joints because of its anatomical structure, its exposure to external forces and the functional demands placed on it. Multiple imaging modalities are currently used to evaluate pathologic conditions of the knee like conventional radiography, fluoroscopy, ultrasonography, nuclear medicine and MR imaging. The use of fluoroscopy and ultrasound guide interventional procedures and computerised tomography (CT) to evaluate complex fractures has become a routine practice.[1] Magnetic resonance imaging has a better soft tissue contrast and multi planar slice capability which has revolutionized and has become the ideal modality for imaging complex anatomy of the knee joint.[2,3] Another advanced modality in the management of internal derangement of knee joint is Arthroscopy, which can be used in its dual mode, either as diagnostic and/or as therapeutic tool.[4]

The term internal derangement is loosely applied clinically to describe a variety of intra-articular disturbances with or without extra articular disturbances, usually of traumatic origin. It comprises of injuries to

menisci, cruciate ligaments, collateral ligaments and other structures of the knee joint.

Clinical tests used in the diagnosis of meniscal and cruciate ligament damage have limitations and it may not be possible to elicit objective signs repeatedly, more so in a busy orthopedic clinic and being painful in acute and sub-acute presentation. An accurate clinical diagnosis requires experience although difficult to quantify.

Because the knee joint is only covered by skin and retinaculae on three of its four sides, the joint is ideal for arthroscopic approaches. Arthroscopy of the knee is also facilitated by the large size of the joint cavity. Arthroscopic approaches have largely replaced open surgical approaches for the treatment of meniscal pathology, anterior cruciate ligament reconstruction, and removal of loose bodies.[5] The anterolateral portal is the one most commonly used for diagnostic purposes; it is nearly always used in conjunction with the anteromedial portal. The combination of these approaches allows the use of the arthroscope along with arthroscopic instrumentation. Ten seconds of careless use of an arthroscope within the knee may create the equivalent of 10 years of wear in that joint.[6,7] The comparison of MRI findings, clinical findings and arthroscopic findings has always been a challenge for the health professionals

Hence a study was carried out to find Correlation between arthroscopy and MRI in Internal Derangement of Knee.

METHODS

This was a prospective study involving 25 patients with history of knee injuries who were admitted in the Department of Orthopedics, SVS medical college. MRI of the knee joint was done for all these patients either before or after admission. The patients were then subjected to diagnostic and therapeutic arthroscopy in the department of orthopedics, SVS Medical College from August 2015 to August 2017.

Sources of data

25 cases of knee trauma admitted in the department of Orthopedics. MRI of the knee joint was done after admission and clinical examination. However some patients who had been referred from outside or taken treatment and MRI being done prior to admission in our hospital are considered with same MRI report and not subjected to fresh MRI investigation. However all the patients were subjected to clinical examination followed by arthroscopy after required investigations and consent.

Study population

Patients who reported with knee symptoms suggestive of internal derangement and underwent arthroscopy following a thorough clinical and MRI evaluation were the subjects of the study

Inclusion criteria

Inclusion criteria were patients suffering from instability of knee for more than 6 weeks duration; patients with recent symptoms of locking of knee or effusion; patients with chronic knee pain and suspected ligament/meniscus injury; patients aged between 15-50 yrs.

Exclusion criteria

Exclusion criteria were patients with signs of acute infections; cases with severe osteoarthritis; cases with ankylosed knee; cases who have undergone previous arthroscopy; cases treated for chronic septic arthritis or TB knee; patients below the age of 15 yrs and above 50 yrs.

Methods of assessment

- Presenting complaints
- History of presenting complaints
- Any medical/surgical co-morbidities
- General physical examination

Statistical tests

Mean, percentage, sensitivity and specificity.

RESULTS

The study had 25 patients, of which 20 were males and 05 were females 80% of the patients were males.

Table 1: Distribution of patients based on gender.

Sex	Number of cases	Percentage (%)
Male	20	80
Female	05	20
Total	25	100

Table 2: Distribution of patients based on structure injured.

	Arthroscopy		MRI	
Structure injured	**No. of cases**	**%**	**No. of cases**	**%**
ACL	16	64	18	72
PCL	2	8	1	4
Medial meniscus	8	32	8	32
Lateral meniscus	4	16	1	4

From the study we extracted the relevant data, we calculated true positive, true negative, false positive and false negatives values. The accuracy, sensitivity, specificity, negative predictive value (NPV), and positive

predictive value (PPV) were calculated using the following equations:

- PPV=TP/(TP+FP),
- NPV=TN/(TN+FN),
- Sensitivity=TP/(TP+FN),
- Specificity=TN/(FP+TN)
- Accuracy=(TP+TN)/(TP+TN+FP +FN).

Table 3: Accuracy of MRI.

Structure	Sensitivity (%)	Specificity (%)	Accuracy (%)
ACL	93.75	66.7	84
PCL	50	100	96
Medial	62.5	82.3	76
Lateral	25	100	88

It was observed that sensitivity of MRI in diagnosing lateral meniscus was 25%, specificity was 100%, PPV was 100%, NPV was 87.5% and accuracy was 88%.

DISCUSSION

The purpose of this study was to compare the accuracy of MRI in diagnosing the IDK. This is a prospective study involving 25 patients with history of knee injuries, who were admitted in the Department of Orthopaedics, SVS Medical College. MRI of the knee joint was done for all these patients and then these patients underwent diagnostic and therapeutic arthroscopy in the department of Orthopaedics, SVS Medical College.

MRI images are studied for evidence of injuries to menisci, cruciate ligaments, collateral ligaments, articular cartilage, loose bodies, meniscal cysts and bony contusions, evidence of soft tissue injuries around the knee joint. Arthroscopy was performed to confirm the findings given in MRI.

In the present study of 25 patients, 20 were males and 05 were females. The age groups were ranging from 15 to 50 years. The youngest male patient was aged 16 years and the oldest male was 49 years and the youngest female was aged 17 years and the oldest female was aged 45 years. This showed that there was a tendency of males being injured and getting operated at the earlier age.

A study done by Huegli et al showed males are most likely to suffer knee injuries since they are active in sports and the right knee was are more frequently injured than left.[8]

In the present study males comprise the predominant number of patients who suffered knee injuries. In our study more number of patients had road traffic accidents as the cause rather than sports injury. This might be because of small study group and rural patients. Young patients of age group 20–30 yrs are the maximum who suffered knee injuries.

In our study 12 patients were falling in this age group comprising 48% of the patients.

Right knee was involved in 16 cases and left was involved in 09 cases and no bilateral involvement.

Meniscal tears were classed as torn or not torn. Anterior cruciate ligaments (ACL) and posterior cruciate ligaments were either completely torn or not.

MRI studies have higher false positive than false negative results. We also found this to be true when examining the combined results from meniscal lesions and ACL tears.

In our study MRI detected 8 cases of medial menisci injury, arthroscopy confirmed only 8 cases. Sensitivity and specificity of MRI with respect to Arthroscopy is 62.5% and 82.3% showing an average correlation with arthroscopy in diagnosing medial meniscal injuries.

A study by Ruwe et al showed accuracy rate of 90% for MRI in the detection of Meniscal tears compared with the arthroscopy.[9]

Elvenes et al in their study found the sensitivity, specificity, positive and negative predictive value of MRI for medial meniscus tears were 100%, 77%, 71% and 100% respectively.[10]

In the present study sensitivity, specificity, positive and negative predictive value are 62.5%, 82.3%, 62.5% and 82.3% respectively and did not correlate with the findings of above mentioned studies.

In our study we found that sensitivity, positive and negative predictive value of MRI compared to arthroscopy was less compared to the other studies.

In our study MRI detected 04 cases of lateral meniscal injury and arthroscopy positive cases are 01 out of 25 cases.

Sensitivity and specificity of MRI in relation to Arthroscopy is 25% and 100%. Positive predictive value of MRI in detecting lateral meniscus injuries is 100% with negative predictive value of 87.5%.

Overall, MRI has a higher specificity (100%) than sensitivity (25%), and a higher NPV (100%) than the PPV (100%).

Elvenes et al in their study found that sensitivity, specificity, positive and negative predictive value of MRI for MM were 100%, 77%, 71% & 100% respectively, while values for LM were 40%, 89%, 33%, & 91% respectively.[10] Overall accuracy of MRI for MM & LM

combined was 84%. On basis of high negative predictive value, they concluded that MRI is useful to exclude patients from unnecessary arthroscopy.

The reason for high specificity is there was only one case identified. The study population being very small the results cannot be compared with other studies. If MRI is used as the only form of pre-operative screening for this condition, then there may well be unnecessary arthroscopies performed.

CONCLUSION

Knee joint injuries are common. The need to accurately evaluate the knee injuries is very crucial for the proper management and outcome; otherwise it will lead to chronic debility to the patient.

Magnetic resonance imaging (MRI) is of great aid in the diagnosis of knee lesions. 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 derangements of the knee, against which alternative diagnostic modalities should be compared.

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