



"COMPARISON OF CLINICAL EXAMINATION, MRI AND ARTHROSCOPY FINDINGS IN INTERNAL DERANGEMENT OF THE KNEE IN A TERTIARY CARE HOSPITAL"

Dr Lokesh Kumar*

Assistant Professor, Department of Radiology, Gouri Devi Institute of Medical Sciences and Hospital, Durgapur. *Corresponding Author

ABSTRACT **Background:** Walking is one of the prime actions carried out by our body and the knee joint plays a crucial role in its normal functioning. **Subjects and Methods:** All patients referred to MRI knee with clinically suspected meniscal injury attending department of Radiodiagnosis and Imaging, Gouri Devi Institute of Medical Sciences and Hospital. **Results:** MRI was done in 50 patients who were suspected to have meniscal injuries on clinical ground. Medial meniscus and lateral meniscus were considered separately. There were 45(90%) males and 05(10%) females. **Conclusion:** MRI is highly sensitive and accurate in the diagnosis of meniscal tears.

KEYWORDS : Arthroscopy, clinical, lateral meniscus, medial meniscus and magnetic resonance imaging.

INTRODUCTION:

Walking is one of the prime actions carried out by our body and the knee joint plays a crucial role in its normal functioning. Approximately 28% of patients were present in orthopedic outdoor with complaints of knee pain.[1] The cause ranges from trauma, degenerative joint conditions, infections, inflammatory conditions, and congenital lesions.[2] In the diagnosis of the lesion in the knee, the surgeon has to obtain a thorough clinical history, examine the patient, and do investigations as may be required. Arthroscopy is regarded as the gold standard among the investigative modalities.[3,4] Injury involving these structures can lead to failure of the normal functions of the knee joint such as stabilisation and weight bearing of the body, and will affect ones physical functioning which can lead to disruption of the daily activities affecting the patient both physically and economically. Thus it is of prime importance to diagnose the injury, which can involve the meniscus, cruciate ligament or both. Various imaging modalities used to evaluate the knee include radiography, CT scans for fractures [5] and MRI for soft tissue injuries in the knee joint. [6] Arthroscopy of the joint can be used for both diagnostic and therapeutic purposes. [7] Clinical examination of the patient is the initial assessment tool used for any patient. In acute cases examination may not be possible because of the pain and swelling involving the joint, MRI in the recent years has been reported to improve diagnostic precision without involvement of ionising radiation. It is non-invasive and has proved consistent and offers many benefits over invasive diagnostic arthroscopy. Thus, reducing the morbidity of the patient. But there has been many controversies surrounding the comparison of MRI and clinical examination with arthroscopy findings of the knee joint.

AIM AND OBJECTIVES:

- To determine the accuracy of MRI in diagnosing meniscal tears.
- To compare the efficacy of MRI with arthroscopy in diagnosing meniscal injuries and their correlation with clinical findings.
- To assess the impact of MRI in the selection of proper treatment option.

SUBJECTS AND METHODS:

This cross sectional study was carried out in the department of Radiology, Gouri Devi Institute of Medical Sciences and Hospital, Durgapur during the period from January, 2017 to December, 2019.

Source of data: - All patients referred to MRI knee with clinically suspected meniscal injury attending department of Radiodiagnosis and Imaging, Gouri Devi Institute of Medical Sciences and Hospital.

Sample size: - 50 patients of all ages and gender

INCLUSION CRITERIA: - Fifty patients of all age and gender with clinically suspected meniscal injury.

EXCLUSION CRITERIA

- (1) Those patients who underwent diagnostic arthroscopy previously by Orthopaedic Surgeon on clinical grounds.
- (2) Patients who are suspected to have pathology other than meniscal injury on clinical grounds.
- (3) Patient whose MRI finding is known to Orthopaedic Surgeon.

Equipment :

The patient was scanned using Philips 1.5T integra achieve MRI scanner.

Protocol: The knee joint was examined in TSET2W axial, TSE PD/T2 sagittal, SET1 fat saturated axial and coronal, TSEPD/T2 coronal and GRE axial sequences and planes

Positioning- Patients were placed in supine position and knee externally rotated 15-20° and flexed 5-10°.

Comparison: Those patients who showed significant injury on MRI underwent diagnostic arthroscopy & findings of MRI were compared with arthroscopy findings.

RESULTS:

MRI was done in 50 patients who were suspected to have meniscal injuries on clinical ground. Medial meniscus and lateral meniscus were considered separately. There were 45(90%) males and 05(10%) females. The age of patient ranged from 20-60 yrs. (36%) 18 patients were diagnosed to have MM tear on MRI while. 8 (16%) patient showed LM tears on MRI. 24 patient(48%) did not show any significant tear of the MM or LM on MRI. 20 out of these 24 patient who did not show any significant tear on MRI were excluded from arthroscopy and advised follow up. Most of them showed improvement with conservative therapy. 4 patient were taken for arthroscopy on high index of clinical suspicion. Arthroscopy of the knee joint confirmed our initial diagnosis of MM injuries in 13(72.22%), but did not show any tear in 5(27.78%). Arthroscopy confirmed our initial diagnosis of LM tear in 06 (75%) while did not show tear in 02(25%) patients.. Out of those 08 patients who did not show MM injury on MRI, 2 patient were found to have(25%) meniscal injury on arthroscopy. Out of those 18 patient who did not show LM injury on MRI, one patient (5.55%) was found to have grade III injury on arthroscopy.

Arthroscopy was also performed by Orthopaedic Surgeon in 4 cases on high clinical suspicion in whom MRI was normal. Arthroscopy showed grade III tear of medial meniscus in 01 patient (25%).

Distribution of tears in the different parts of menisci

Tears at the anterior horn of MM: In 02 patients tears of anterior horn were seen on MRI, while arthroscopy found only one tear. This false positive tear was characterized as flap tear on MRI.

Tears at the body of medial meniscus: In 05 patients meniscal tear were found in the body on MRI, while arthroscopy reveals tear in 03 patients only. Those two false positive results were characterized as horizontal tears on MRI.

Tears at the posterior horn of medial meniscus: Out of 11 patients who were diagnosed to have tears in the posterior horn, arthroscopy revealed tear in 09 patients. These 02 false positive results were characterized as horizontal and flap tear respectively on MRI.

Tears of the anterior horn of lateral meniscus: MRI revealed tear in 02 patients. While arthroscopy found tear in 01 patient only. This false positive result was characterized as vertical longitudinal tear on MRI.

Tears of the body of lateral meniscus: MRI and arthroscopy revealed tear in 01 patient.

Tears of the posterior horn of lateral meniscus: MRI found tears in 05 patients while arthroscopy revealed tear in 04 patient only. One false positive result was characterized as oblique tear on MRI.

Total no of patients who showed tears in MM on MRI=18
Out of those 18 patients who were diagnosed to have tears in MM on arthroscopy-13

Total no of patients who showed LM tear on MRI=08

Out of those 08 patients who were diagnosed to have LM tear on arthroscopy-06

Total no of patients who did not show MM tear on MRI=12
Total no of patients who did not show tear of LM on MRI=22

Those patients who did not show tear of meniscus on MRI, arthroscopy revealed tears in 04 patients. These false negative tears were characterized as small tears in the anterior horn of MM in two patients, one small tear in the body of MM and one small tear in the anterior horn of lateral meniscus.

Associated other meniscal pathology; In our study. Two cases of discoid meniscus were seen associated with meniscal tears. Both these two cases were found in lateral meniscus. One case of meniscal cyst is seen in MM associated with tear. Two cases of displaced meniscal tear were seen. Both were characterized as bucket handle tear one in LM and other in MM.

Table No. 01 Tear In specific location of Medial Meniscus

	Tears on MRI	Tears on Arthroscopy	False positive result	False negative results
Tears of Anterior horn	02	01	01	0
Tears of body	05	03	02	0
Tears of post horn	11	09	02	0
Total No. of patient	18	13	05	0

Table No. 02 Tear In specific location of Lateral Meniscus

	Tears on MRI	Tears on Arthroscopy	False positive result	False negative results
Tears of Anterior horn	02	01	01	0
Tears of body	01	01	00	0
Tears of post horn	05	04	01	0
Total No. of patient	08	06	02	0

Table No. 03 General statistical analysis of tears in Medial and Lateral menisci.

	Medial Meniscus	Lateral Meniscus
Sensitivity	81.25%	85.71%
Specificity	64.28%	89.48%
PPP	72.22%	75%
NPV	75%	94.44%
Diagnostic accuracy	72.22%	75%

Table no. 05 Statistical analysis of tear in specific locations of meniscus

MM	Sensitivity	Specificity	PPV	NPV
Ant. Horn	33%	90.90%	50%	83.33%
Body	75%	84.6%	60%	91.66%
Post Horn	100%	85.71%	81.81%	100%

Table No. 06 Statistical Analysis Of Tear In Specific Locations Of Meniscus

LM	Sensitivity	Specificity	PPV	NPV
Ant. Horn	50%	95.45%	50%	95.45%
Body	100%	100%	100%	100%
Post Horn	100%	95.65%	80%	100%



Fig.1: Grade III vertical longitudinal tear of body and posterior horn of LM.

Fig.2:Complex tear of the posterior horn of medial meniscus with both horizontal and vertical components

Fig.3: Ligament of wrisberg.

DISCUSSION:

Until the last decade, diagnostic arthroscopy was the only possible way to clarify a clinical diagnosis of meniscal tear. Unfortunately it is an invasive and expansive procedure and its overuse has produced unnecessary complication. MRI being non invasive has become an important tool in the assessment or meniscal injuries of knee joint.[8,9] My study showed that patients having meniscal injuries were mostly males with majority of them ranging between age of 21-40. The preponderance of this injury among young males is understandable as the study was conducted in a armed forces service hospital. This is also in accordance with international studies done by Thornton DD, Ahmed M, Shetty DS which favour young male predilection for meniscal injuries. Other studies have shown that MM injury to be more common than LM injury. This study also showed MM injury to be more than LM injury; thus favouring other studies.

In this study Negative Predictive Value of MRI is 75% for MM and 94.44% for LM tears respectively. This shows the effective role of MRI in selecting patients for arthroscopy. In this study MRI ruled out arthroscopy in 20 out of 50 patient only 04 patients with normal MRI were subjected to arthroscopy on clinical ground. This shows that a preoperative MRI scan can prevent unnecessary diagnostic arthroscopy in a significant number of patients.

The result of the present study demonstrates that meniscal injuries can be accurately diagnosed by MRI and support the findings of other studies. Williams performed a study in which 69 patients had a clinical diagnosis of intraarticular knee lesion.MRI ruled out lesion in 24 Patients. After 09 months only one of them underwent therapeutic arthroscopy because of continued symptoms.[10]

Vincken PWJ et al also conducted a study to see the effectiveness of MRI in selection of patients for arthroscopy of the knee and concluded that MRI is an effective tool in the selection of patients for arthroscopy amongst the general population.[11]

MRI system used in this study had 1.5 T field strength which was sufficient for producing accurate diagnostic images for identifying meniscal abnormality. Magee and colleagues concluded that MRI of the knee performed at 3.0 T compares favourably in the sensitivity and specificity with studies performed at 1.5 T field strength or lower.[12] Helms et al postulated that with fat suppression the dynamic range signal of the menisci is increased, making meniscal tear more conspicuous. In this study meniscal tears were more conspicuous on STIR sequences; favouring Helms postulates. Rubin et al have stated that virtually all meniscal tears are detected and characterized on sagittal plane imaging only.[13] Magee et al concluded that coronal MR images of the knee allowed better detection and characterization of some meniscal tears than sagittal images alone.[14] We did coronal imaging in all patients and found them necessary in accurately diagnosing meniscal tears. In this study MRI results were comparable to arthroscopy in a significant number of patients and MRI also ruled out significant number of cases having clinical suspicion of meniscal injury from diagnostic arthroscopy.

Most common location of meniscal tear was the posterior horn of the medial meniscus. The second most common location was the body of medial meniscus. Most common location in the lateral meniscus was body and posterior horn.

ade III tears were the most common subset of meniscal tears. We found two cases of discoid meniscus; both in the lateral meniscus associated with tears. This is corroborating to the report by Berquist who found discoid meniscus to be more common in the lateral meniscus, compared to the medial meniscus. Our finding also corresponds to the earlier report which suggests 5% incidence of discoid meniscus. We also found two cases of displaced meniscal tears; both were bucket handle tear .One in MM and another in the LM. Finding is comparable to the incidence of 10% in study done by Helms CA and Laorr.A.[15]

According to quin and brown MRI can miss small meniscal tears.[16] In our study there were two false negative tears at anterior horn of medial meniscus, one at body of medial meniscus and one false negative tear at anterior horn of lateral meniscus. We claim that these false negative tears were caused by limitation of MRI in the detection of small meniscal tears similar to the study by Qwin and Brown. Low sensitivity of anterior horn of meniscus may due to these small meniscal tears which tend to occur on anterior horn more than other location.

False positive results

Most of the false positive results came in our study were located at body and posterior horns of medial meniscus, anterior and posterior horns of lateral meniscus

Studies done by De Smet AA, Crues JV 3rd, Mink J, Justice WW and Quinn SF [17] found that possible causes for false positive findings;

- (a) Chondrocalcinosis in the meniscus mimicking a tear.
- (b) Healed meniscal tear that often continues to show increased signal intensity which contacts the meniscal surface.
- (c) Tear location on the undersurface of the posterior horn (arthroscopic blind spot)
- (d) Quin and Brown noted that arthroscopist often were unable to directly visualize areas of menisci that appear to be torn on MRI. These areas of the menisci could be evaluated only indirectly with a probe. Thus the tears that were present and seen on MRI images may not have been detected by Arthroscopist.

In our study one flap tear in anterior horn, two horizontal tears in the body and one horizontal and one flap tear in posterior horn constitute false positive results in medial meniscus.

False positive tear in LM

According to study done by GY Blankenbaker DG most of the false positive tears involve the vertical or horizontal degenerative tear in the posterior horn (51). In our study a vertical longitudinal tear in the anterior horn and an oblique tear in the posterior horn constitute the false positive results in LM.

CONCLUSION:

We conclude that,

- (a) MRI is highly sensitive and accurate in the diagnosis of meniscal tears.
- (b) MRI in clinically suspected cases of meniscal injuries can reduce the number of unnecessary arthroscopies.
- (c) It can also help Orthopedic Surgeon in selecting proper therapy for the patients.

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