IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 20, Issue 4 Ser.12 (April. 2021), PP 54-57
www.iosrjournals.org

A Hospital based cross sectional study on Comparison of Magnetic Resonance Imaging (MRI) & Arthroscopy findings in the Diagnosis of Meniscal and Cruciate Ligament Injuries of the Knee Joint.

[1] Dr. Pannuri Raja, M.S (Ortho), Assistant Professor, [2]Dr. Ananthula Ajay, M.S
(Ortho), Designated Associate Professor, Department of Orthopedics, Guntur Medical College, Guntur, Andhra Pradesh, India
***Corresponding author**: Dr. Ananthula Ajay*
Address: H.No: 8-6-28/1, Nehru Nagar 5th Lane, Guntur, Andhra Pradesh. Pin code: 522001

Abstract
***INTRODUCTION**: Owing to its anatomical structure and functional demands, injuries involving the menisci and cruciate ligaments of the knee joints are among the most frequently encountered problems by an orthopedic surgeon.*
***MATERIAL & METHODS**: A hospital-based cross-sectional study was conducted where all patients aged 18-60 years with a history of trauma involving the knee joint admitted and posted to undergo arthroscopic surgery of the knee for either meniscal or cruciate ligament injury based on clinical and MRI findings with no fresh injury after MRI and before arthroscopy were included. All the surgeries were performed in an operation theatre under antibiotic cover. MRI findings were compared with Arthroscopic findings and the analysis was done.*
***RESULTS&CONCLUSIONS**: In present study of 45 patients, the maximum number of patients was in between 20-40 years of age. Clinical examination is equal to or better than an MRI in injuries involving Anterior Cruciate Ligament. When it comes to injuries involving the meniscus, the MRI was better than the Clinical examination.With a high NPV, it is suggested that a negative result on MRI would most probably give a normal result on arthroscopy. However, a positive result should always be correlated with the clinical examination findings before arriving at any final diagnosis.In patients involving injury to only one structure, i.e., either ACL or MM or LM, Clinical examination had better results than MRI.However, in cases with multiple injuries, it was found that MRI had better results than the clinical examination alone.*
***Key Words**: Knee joint, meniscal injury, cruciate injury, MRI, Arthroscopy*

Date of Submission: 14-04-2021 Date of Acceptance: 28-04-2021

I. Introduction

Walking is one of our bodies' prime actions, and the KNEE joint plays a crucial role in its normal functioning. Owing to its anatomical structure and functional demands, injuries involving the menisci and the cruciate ligaments of the knee joints are among the most frequently encountered problems by an Orthopedic surgeon.

Injury involving these structures can lead to failure of the knee joint's everyday functions such as stabilization and weight-bearing of the body. It will affect one's physical functioning, leading to disruption of the daily activities affecting the patient both physically and economically. Thus it is of prime importance to diagnose the injury involving the meniscus, cruciate ligament or both.

Various imaging modalities used to evaluate the knee include Radiography, Computerized Tomography for fractures[1]and Magnetic Resonance Imaging for soft tissue injuries in the knee joint.[2] Arthroscopy of the joint can be used for both diagnostic and therapeutic purposes.[3]

Clinical examination of the patient is the initial assessment tool used for any patient. In acute cases, the examination may not be possible because of the joint's pain and swelling. MRI in recent years has shown to improve diagnostic precision without the involvement of ionizing radiation. It is non-invasive and has proved consistent and offers many benefits over Invasive diagnostic Arthroscopy. It is thus reducing the morbidity of the patient.

The Primary objective was to study and compare MRI and Arthroscopic findings of meniscal and cruciate ligament injuries.

II. Material & Methods

Study Design: A hospital-based cross-sectional study.

Sample Size: 45 cases

Selection Criteria:

(a) Inclusion criteria:

•All patients aged 18-60 years with a history of trauma involving the knee joint admitted in the Department of Orthopedics, Government General Hospital, Guntur Medical College, Guntur, posted to undergo arthroscopic surgery of the knee for either meniscal or cruciate injury or both based on clinical and MRI findings performed the period between February 2018 to January 2020.

•No fresh injury should occur after MRI and before arthroscopy.

(b) Exclusion criteria:

•Patients undergoing knee joint arthroscopy without an MRI scan.
•Patients with primary traumatic Hemarthrosis of the knee.
•Fractures around knee joint except for avulsion injuries of the ligaments around knee.
•Degenerative tears in the kneejoint.
•Patientswith an active infection in the kneejoint.

Procedure:

Once the participants' informed consent taken, history and examination were recorded and the study was conducted. MRI reporting was done by a radiologist, followed by Diagnostic Arthroscopy of the knee joint. All the surgeries were performed in an Operation theatre under antibiotic cover.

Arthroscopic surgeries were performed under spinal anesthesia. Operative findings were documented in the operation theatre which included the anatomical structure involved with the presence or absence of tear, its location and degree of tear.

Standard anterolateral and anteromedial portals were used for all the patients.

.

The knee was divided routinely into the following compartments for arthroscopic examination:
Supra-patellar pouch and patella-femoral joint, Medial gutter, Medial compartment, Intercondylar notch, Postero-medial compartment, Lateral compartment, Lateral gutter and postero-lateral compartment.

After performing a thorough Arthroscopy of the knee, the pathological structure was identified and further surgery was carried out accordingly.

Statistical analysis:

MRI findings were compared with Arthroscopyfindings and the analysis was done. Sensitivity, specificity, positive predictive value and the negative predictive value was calculated and compared. The level of correlation was assessed using kappa statistics with $p<0.05$ considered statistically significant.
The whole data obtained were analyzed using the SPSS, version 20.

III. Results:

Out of the total 45 patients who were part of the study, majority of them 45% (n=20) belonged to 20-30 years age group followed by 31-40 years age group (33%, n=15). Maximum number of patients were males (89%, n=40).
With regards to mode of injury, almost half the cases (n=22, 48.9%) had Road traffic accident followed by sports injuries (n=12, 26.7%), trivial trauma (n=7, 15.6%) and others (n=4, 8.9%).
Structures involved were ACL (n=22, 57.8%), Medial meniscus (n=17, 37.8%) and Lateral meniscus (n=18, 40%). The most common complaint was knee pain and instability.
Most Common injury was Radial tears. With regards to site of Medial meniscal tear, most common type was Posterior Horn (n=8, 47%), most Common injury in Lateral meniscal tear was Longitudinal tear (n=6, 33%) and most common type in lateral meniscal tear was Body of Lateral Meniscus (n=7, 35%).
Correlation between MRI and Arthroscopic Examination:

Lateral Meniscus

Table 1: MRI vs. Arthroscopy correlation for Lateral Meniscus

MRI	ARTHROSCOPY		
	Yes	No	Total
Yes	13	8	21
No	5	19	24
	18	27	45

Sensitivity-72%, Specificity-70%, PPV-62%, NPV-80%, Accuracy-71%
Kappa statistics = 0.414, Moderate agreement, P value = 0.005 - Significant..

Medial Meniscus

Table 3: MRI vs. Arthroscopy correlation for Medial Meniscus

MRI	ARTHROSCOPY		
	Yes	No	Total
Yes	12	6	18
No	5	22	27
	17	28	45

Sensitivity-70%, Specificity-78%, PPV-67%, NPV-81%, Accuracy-76%
Kappa statistics = 0.486, Moderate agreement, P value = 0.001 - Significant.

Anterior Cruciate Ligament(ACL)

Table 5: MRI vs. Arthroscopy correlation for ACL

MRI	ARTHROSCOPY		
	Yes	No	Total
Yes	26	2	28
No	0	17	17
	26	19	45

Sensitivity-100%, Specificity-90%, PPV-93%, NPV-100%, Accuracy-95%
Kappa statistics = 0.908, Almost perfect, P value = 0.001 - Significant.

.

IV. Discussion

In diagnosing injuries pertaining to the knee joint, clinical examination is the first possible modality. However, the pain and swelling around the joint do not permit correct examination.MRI of the knee joint is a non-invasive investigation and is routinely used for the knee joint's internal derangement. However, observer bias and the machine's power play a significant role in the final diagnosis given out.[4, 5]

Chang et al. studied the findings of 148 patients with figures of 92% for sensitivity and 87% for specificity for meniscal tears.[6] The conclusion was that MRI is a reliable diagnostic tool for displaced meniscal tears. Aydingoz et al. found sensitivity and positive predictive values of 90% in a series of 45 meniscal injuries. [7]

In our study, Medial meniscus tears were 17 compared to 18 of the lateral meniscus.

Data from various studies[8-12] showed that MRI specificity is higher than sensitivity, and NPV is higher than PPV. We found that the difference is not significant.

In a study conducted by Nikolaouetal.[12], they concluded that though MRI is useful, there have been countable numbers of false results. Thus correlation with clinical, MRI and arthroscopic findings are very important.

It is essential to note the efficacy of MRI because it will affect the treatment of the pathology. In a MacKenzieet al [13], only 38% of the clinically positive patients for Meniscus pathology finally underwent arthroscopy. Thus we must underline a need for MRI before Arthroscopy.

In a study conducted by Perera, Joel, and Bunola[14], they came to a conclusion that despite having the typical mechanism of injury of ACL, the diagnosis of ACL tear will be delayed up to 4-6 months, with the mean delay in consulting an orthopedic specialist being 165 days. In our study, the most prolonged delay has been three months.

In a study done by Barileet al [15], advocated that weight-bearing MRIs showed Unstable menisci lesions, which are helpful for diagnostic and therapeutic purposes.

V. Conclusions

Our study compared the efficacy of MRI and Clinical examination to arthroscopy of the knee to help in accurate diagnosis leading to early treatment.

With a high NPV, it is suggested that a negative result on MRI would most probably give a normal result on arthroscopy. However, a positive result should always be correlated with the clinical examination findings before arriving at any final diagnosis.

An MRI is more useful in detecting peripheral, inferior and intra-substance tears, which are not visualized on the arthroscopy. With the Arthroscopy findings turning out to be negative, suspecting these injuries from MRI helped direct the patient to specific management and early relief.

With a very low PPV for MRI and Clinical examination in injuries involving the meniscus, it is clear that arthroscopy should be done to rule out injury to these structures in those with suspicion.

References:

[1]. Gray SD, Kalpan PA, Dussalt RG. Imaging of Knee: current status .OCNA 1997; 28(4): 643-658.
[2]. Kaplan PA, Walker CW, Kilcoyne RF, Brown DE, Tusek D, Dussault RG. Occult fracture patterns of the knee associated with ACL tears. Assessment with MR imaging. Radiology 1992; 183:835-838.
[3]. Boden SD, Labropoulos PA, Vailas JC: MR Scanning of the acutely injured knee: sensitive, but is cost-effective? Arthroscopy 1990; 6:306-308.
[4]. Scott W, Lynne S, Jian Z, et al. Comparative study of imaging at 3.0 T versus1.5 T of the knee, Skeletal Radiol (2009) 38:761–769.
[5]. Justice WW1, Quinn SF. Error patterns in the MR imaging evaluation of menisci of the knee. Radiology. 1995 Sep; 196(3):617-21.
[6]. Chang CY, Wu HT, Huang TF, et al. Imaging evaluation of a meniscal injury of the knee joint: a comparative MR imaging and arthroscopic study. Clin Imaging. 2004;28(5):372–376.
[7]. Aydingoz U, Firat AK, Atay OA, et al. MR imaging of meniscal bucket- handle tears: a review of signs and their relation to arthroscopic classification. Eur Radiol. 2003;13(3):618–625.
[8]. Elevnes J, Jerome CP, Reikeras O, Johansen O. MRI as a screening procedure to avoid arthroscopy for meniscal tears. Arch Orthop Trauma Surg 2000; 120(1-2):14-16.
[9]. Dutka J, Skowronek M, Skowronek P, Dutka L. Arthroscopic verification of objectivity of the orthopedic examination and magnetic resonance imaging in an intra-articular knee injury. Retrospective study.Video surgery Minininv. 2012;7:13–8.
[10]. F.Rayan, SachinBhonsle, Divyang D. Shukla. Clinical, MRI and arthroscopic correlation in meniscal and ACL injuries, Int Orthop.2009;33(1):120-132.61
[11]. Navali AM, Bazavar M, Mohseni MA, Safari B, Tabrizi A. Arthroscopic Evaluation of the Accuracy of Clinical Examination versus MRI in Diagnosing Meniscus Tears Cruciate Ligament Ruptures. Archives of Iranian Medicine 2013;16(4):229.
[12]. Nikolaou. V.S, Chronopoulos. E, Savvidou.Cet al MRI efficacy in diagnosing internal lesions of the knee: a retrospective analysis, Journal of Trauma Management & Outcomes 2008, 2:4. doi:10.1186/1752-2897-2-4.
[13]. Mackenzie R, Dixon AK, Keene GS, Hollingworth W, Lomas DJ, Villar RN. Magnetic resonance imaging of the knee: assessment of effectiveness. Clin Radiol. 1996;51:245–250. doi: 10.1016/S0009- 9260(96)80340-0
[14]. Perera NS, Joel J, BunolaJAAnterior cruciate ligament rupture: Delay to diagnosis Injury. 2013Dec;44(12):1862-5.
[15]. Antonio Barile, Laura Conti, Giuseppe Lanni, Vittorio Calvisi, Carlo Masciocchi Evaluation of medial meniscus tears and meniscal stability: Weight-bearing MRI vs. Arthroscopy. European Journal of Radiology 82 (2013) 633–639.

Dr. Ananthula Ajay, et. al. "A Hospital based cross sectional study on Comparison of Magnetic Resonance Imaging (MRI) & Arthroscopy findings in the Diagnosis of Meniscal and Cruciate Ligament Injuries of the Knee Joint."*IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)*, 20(04), 2021, pp. 54-57.