

Original Research

Assessment of role of MRI in assessment of knee injuries

¹Reeta Das, ²Lovekesh¹Assistant Professor, Department of Community Medicine, K M Medical College, Mathura, Uttar Pradesh, India;²Assistant Professor, Department of Radio Diagnosis, K M Medical College, Mathura, Uttar Pradesh, India**ABSTRACT:**

Background: Knee is one of the largest and most complex joints in the body. Disease processes and injuries that disrupt ligaments, menisci, articular cartilage and other structures of the knee cause painful knee resulting in significant morbidity and disability. The present study was conducted to assess role of MRI in assessment of knee injuries. **Materials & Methods:** 84 patients with knee injury of both genders were enrolled. X-ray knee joint (AP and lateral view) and the MRI was done. Arthroscopy was done in all patients. MR scans were carried out on 1.5 tesla MR machine (Siemens) with sense extremity coil. Findings of arthroscopy were correlated with MRI findings. **Results:** Out of 84 patients, males were 54 and females were 30. On MRI, ACL, PCL, LM and MM was tear in 64, 12, 12 and 60 and normal in 20, 72, 72 and 24 respectively. The difference was significant ($P < 0.05$). MRI showed sensitivity of 94%, specificity of 78%, PPV of 95% and NPV of 50% in detection of Knee injuries. **Conclusion:** MRI is a useful non-invasive imaging aid having high diagnostic accuracy for diagnosis of knee joint injuries.

Key words: knee joint injuries, MRI, internal derangement

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Corresponding author: Lovekesh, Assistant Professor, Department of Radio Diagnosis, K M Medical College Mathura, Uttar Pradesh, India

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INTRODUCTION

Knee is one of the largest and most complex joints in the body. Disease processes and injuries that disrupt ligaments, menisci, articular cartilage and other structures of the knee cause painful knee resulting in significant morbidity and disability.¹ Prompt identification of surgically treatable traumatic injuries to the knee enables early intervention and prevents unnecessary diagnostic arthroscopic procedures.² However, initial clinical assessment often can be complicated by the presence of a hemarthrosis causing pain and spasm. The presence of multiple injuries may also complicate the clinical assessment.³ An early and accurate diagnosis can have a tremendous impact on treatment by identifying those injuries for which surgery will be beneficial. This serves to promote the healing response, and allows the patient's rapid return to activity.⁴

A superior soft tissue detail with multiplanar imaging capability provides a distant advantage for MRI over other imaging modalities in addition to its non-invasive, non-operator dependent and cost effective

in nature.⁵ MRI remains the modality of choice for imaging knee joint pathology. It is a non-invasive investigation of knee and provides complete information that cannot be obtained by physical examination.⁶ MRI demonstrates the sensitivity and specificity of 90% for detecting meniscal tear and its sensitivity and specificity approaches 100% in cruciate ligaments injury.⁷ The present study was conducted to assess role of MRI in assessment of knee injuries.

MATERIALS & METHODS

The present study comprised of 84 patients with knee injury of both genders. The consent was obtained from all enrolled patients.

Data such as name, age, gender etc. was recorded. A careful physical examination was carried out. Systemic examination was done. X-ray knee joint (AP and lateral view) and the MRI was done. Arthroscopy was done in all patients. MR scans were carried out on 1.5 tesla MR machine (Siemens) with sense extremity coil. Findings of arthroscopy were

correlated with MRI findings. Data thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

RESULTS

Table I Distribution of patients

Total- 84		
Gender	Males	Females
Number	54	30

Table I, graph I shows that out of 84 patients, males were 54 and females were 30.

Graph I Distribution of patients

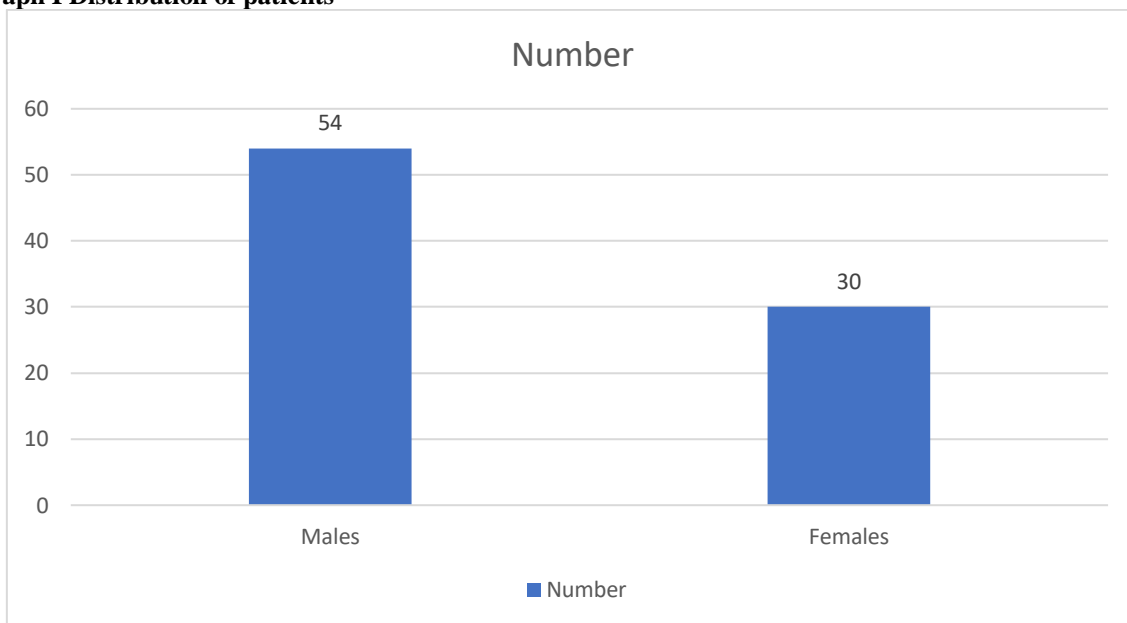


Table II MRI findings in patients

MRI	ACL	PCL	LM	MM	P value
Tear	64	12	12	60	0.05
Normal	20	72	72	24	0.02

Table II, graph II shows that on MRI, ACL, PCL, LM and MM was tear in 64, 12, 12 and 60 and normal in 20, 72, 72 and 24 respectively. The difference was significant (P< 0.05).

Graph II MRI findings in patients

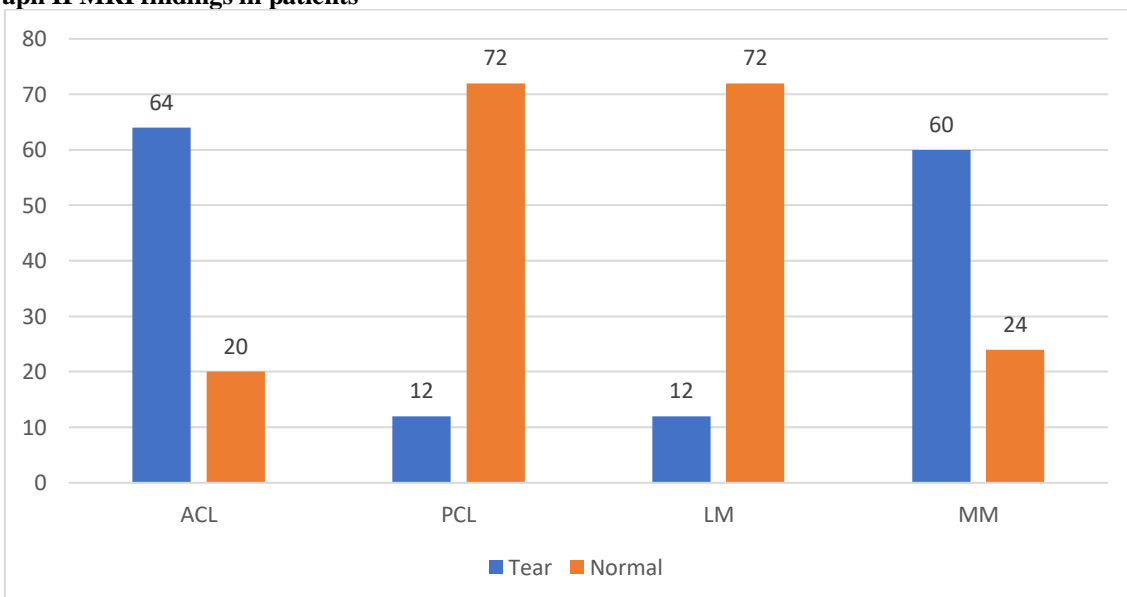


Table III Efficacy of MRI in detection of Knee injuries

Efficacy	Percentage
Sensitivity (%)	94%
Specificity (%)	78%
PPV (%)	95%
NPV (%)	50%

Table III shows that MRI showed sensitivity of 94%, specificity of 78%, PPV of 95% and NPV of 50% in detection of Knee injuries.

DISCUSSION

Knee injuries are among the most common injuries in the athletic population.^{8,9} In a study of 6.6 million knee injuries presenting to emergency departments during a 10-year period, approximately 50% of injuries were related to sporting or recreational activities, with soft-tissue injuries accounting for the majority of knee injuries.¹⁰ Magnetic resonance imaging (MRI) of the knee has been demonstrated to be a useful modality in assessment of internal derangement injuries of the knee.^{11,12} Previous investigators have examined the use of MRI in acute knee injuries, using arthroscopy as the gold standard and including all patients with clinical indications for arthroscopy.¹³ The present study was conducted to assess role of MRI in assessment of knee injuries.

We found that out of 84 patients, males were 54 and females were 30. Munshiet al¹⁴ evaluated the clinical efficacy of magnetic resonance imaging (MRI) of the knee in acute injuries with indeterminate clinical findings, using arthroscopy as a gold standard. All patients underwent MRI on a 1.5 T magnet using dual spin echo pulse sequences. The respective sensitivity and specificity for MRI of the knee were 90% (18/20) and 67% (2/3) for detecting any anterior cruciate ligament injury, 50% (1/2) and 86% (18/21) for detecting medial meniscal tears, and 88% (7/8) and 73% (11/15) for detecting lateral meniscal tears. MRI also identified injuries that could not be assessed on arthroscopy, including 14 bone bruises, five posterior cruciate ligament tears, nine medial collateral ligament tears, and one lateral collateral ligament tear. The detection of composite injury requiring surgical intervention yielded a sensitivity of 100% (16/16) and a specificity of 71% (5/7). Prospective use of MRI evaluation of the knee could have prevented 22% (5/23) of diagnostic arthroscopic procedures. Equivocal clinical findings in patients with acute knee injury should lead to use of MRI in an appropriate clinical setting.

We observed that on MRI, ACL, PCL, LM and MM was tear in 64, 12, 12 and 60 and normal in 20, 72, 72 and 24 respectively. We found that MRI showed sensitivity of 94%, specificity of 78%, PPV of 95% and NPV of 50% in detection of Knee injuries. Hettaet al¹⁵ investigated the accuracy of MRI in assessment of sports related knee injuries. The study included thirty patients complaining of sports related knee pain, only 5 patients (16.6%) were with normal MRI findings and 25 patients (83.4%) were with abnormal MRI findings. Among the 25 patients who

had injuries of their knees, 15 patients (60%) had ACL injuries, 2 patients (8%) had PCL injuries, 10 patients (40%) had meniscal injuries, 8 patients (32%) had collateral ligament injuries, 5 patients (20%) had bone injuries and 2 patients (8%) had muscular injuries. Only 7 patients (28%) were represented with isolated injury and 18 patients (72%) were represented with combined injuries. In correlation with arthroscopies and surgeries, morphological analysis was true-positive in 23 (92%) patients of the 25 injured patients, and true-negative in 3 (60%) patients of the 5 normal patients. Morphological analysis revealed overall 92% sensitivity and 60% specificity. Regarding the 15 patients who had ACL injuries, 13 patients (86.6%) were true-positive and 8 patients (80%) of the 10 patients who had meniscal injuries were true-positive.

CONCLUSION

Authors found that MRI is a useful non-invasive imaging aid having high diagnostic accuracy for diagnosis of knee joint injuries.

REFERENCES

1. Bui-Mansfield LT, Youngberg RA, Warne W, Pitcher JD, Nguyen PL. Potential cost savings of MR imaging obtained before arthroscopy of the knee. *AJR Am J Roentgenol* 1997;168:912–918.
2. Tung GA, Davis LM, Wiggins ME, Fadale PD. Tears of the anterior cruciate ligament: primary and secondary signs at MR imaging. *Radiology* 1993;188:661–667.
3. Robertson PL, Schweitzer ME, Bartolozzi AR, Ugoni A. Anterior cruciate ligament tears: evaluation of multiple signs with MR imaging. *Radiology* 1994;193:829–834.
4. Gentili A, Seeger LL, Yao L, Do HM. Anterior cruciate ligament tear: indirect signs at MR imaging. *Radiology* 1994;193:835–840.
5. Brandser EA, Riley MA, Berbaum KS, El-Khoury GY, Bennett DL. MR imaging of anterior cruciate ligament injury: independent value of primary and secondary signs. *AJR Am J Roentgenol* 1996; 167:121–126.
6. Noyes FR, Moar LA, Moorman CT, McGinniss GH. Partial tears of the anterior cruciate ligament. *J Bone Joint Surg [Br]* 1989;71: 825–832.
7. Lee JK, Yao L, Phelps CT, Wirth CR, Czajka J, Lozman J. Anterior cruciate ligament tears: MR imaging compared with arthroscopy and clinical tests. *Radiology* 1988;166:861–864.
8. Mink JH, Levy BA, Crues JV III. Tears of the anterior cruciate ligament and menisci of the knee: MR imaging evaluation. *Radiology* 1988;167:769–774.

9. Barry KP, Mesgarzadeh M, Triolo J, Moyer R, Tehranzadeh J, Bonakdarpour A. Accuracy of MRI patterns in evaluating anterior cruciate ligament tears. *SkelRadiol* 1991;25:365–370.
10. Yao L, Gentili A, Petrus L, Lee JK. Partial ACL rupture: an MR diagnosis? *SkelRadiol* 1995;24:247–251.
11. Umans H, Wimpfheimer O, Haramati N, Applbaum YH, Adler M, Bosco J. Diagnosis of partial tears of the anterior cruciate ligament of the knee: value of MR imaging. *AJR Am J Roentgenol* 1995; 165:893–897.
12. Fitzgerald SW, Remer EM, Friedman H, et al. MR evaluation of the anterior cruciate ligament: value of supplementing sagittal images with coronal and axial images. *AJR Am J Roentgenol* 1993; 160:1233–1237.
13. Rowchowdhury S, Fitzgerald SW, Sonin AH, et al. Using MR imaging to diagnose partial tears of the anterior cruciate ligament: value of axial images. *AJR Am J Roentgenol* 1997;168:1487–1491.
14. Munshi M, Davidson M, MacDonald PB, Froese W, Sutherland K. The efficacy of magnetic resonance imaging in acute knee injuries. *Clinical Journal of Sport Medicine*. 2000 Jan 1;10(1):34-9.
15. Hetta W, Niazi G. MRI in assessment of sports related knee injuries. *The Egyptian Journal of Radiology and Nuclear Medicine* 2014; 45(3): 1153-1161