International Journal of Science and Research (IJSR)
ISSN: 2319-7064
SJIF (2022): 7.942

The Correlation between Clinical and MRI Diagnosis of Knee Pathology & Variants and Findings Atarthroscopy

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Abstract: ***In day-to-day clinical practice, the MRI is routinely used to support the diagnosis of pathologies and anatomical variants of knee prior to recommending arthroscopic examination and surgery. This single centre study primarily derived the correlation between clinical examination, magnetic resonance imaging and arthroscopy in diagnosis of pathologies and anatomical variants of knee joint. The secondary objectives were to assess the temporal variation between the MRI and arthroscopic findings as mentioned above, Comparison of results with that in the literature. MRI had high sensitivity and specificity in diagnosis of most pathologies, except patellar malalignment and complete PCL tear where clinical examination performed better. Comparisons with similar studies carried world over the results were comparable and showed minor differences.***

Keywords: MRI, arthroscopy, clinical examination, knee pathology

1. Introduction and Background

MRI of the knee joint has often been regarded as a non-invasive alternative to diagnostic arthroscopy. In day-to-day clinical practice, the MRI scan has been routinely used for preliminary diagnosis of meniscal or ligamentous injuries prior to arthroscopic surgery. However, rapidly progressing imaging modalities sometimes obscure the importance of history and clinical examination which is of utmost significance.1

Although valuable in demonstrating the presence of meniscal tears and ligamentous injuries, MRI can have a short fall in determining the type of the tear and grade of ligamentous injury.2

Arthroscopy is regarded as the gold standard for diagnosing Knee joint injuries. Some author seven indicate that the routine use of MRI is difficult and inadequate and that the arthroscopy should be used both for diagnostic and therapeutic purposes.3
For all practical purposes MRI scanning is considered the gold standard non-invasive method to diagnose meniscal tears and ligamentous injuries and may save an indication of arthroscopicsurgery.4

A well-trained qualified surgeon can safely rely on clinical examination for diagnosing meniscal and ACL injuries. Clinical examination is at least as accurate as MRI in the hands of a skilled orthopaedic surgeon. MRI should be reserved for more complicated and confusing cases. The routine ordering of an MRI scan of the knee before examination by a well-trained Orthopaedic surgeon may not be recommended.5

MRI is very helpful in diagnosing meniscal and cruciate ligament injuries. But in a significant percentage of reports with false positive results, its importance is still ambiguous. Arthroscopy still remains the gold standard for definitive diagnosis.6

Intra articular knee lesions are associated with significant morbidity and accurate diagnosis isa challenge. Clinical tests may not be conclusive and delay in diagnosis can result in socioeconomic problems and sometimes worsening of prognosis. Therefore, complimentary diagnostic tools like MRI and Arthroscopy are often necessary, especially in the presence of multiple lesions.7

Furthermore, methodological inconsistencies in imaging techniques, and lack of standard grading criteria used in existing literature contribute to a lack of clear correlation between clinical, imaging and arthroscopic modalities.8

This study evaluated the accuracy of clinical examination and MRI scanning in the diagnosis of knee injuries and its correlation with the arthroscopic findings

2. Material and Methods

Study Site: Department of Orthopaedics, Sri Sathya Sai Institute of Higher Medical Sciences, Prasanthigram, Anantapur district, Andhra Pradesh.

Study Design: A Prospective Observational Study

Study Period: 1year (June 2018 to May 2019)

Study Population: All patients who require arthroscopic surgery of knee will be selected based on the inclusion criteria mentioned below.

Sample Size: 100

Inclusion Criteria:
1) The target population consisting of patients undergoing arthroscopic procedures of knee unilateral or bilateral.
2) Knee pain persisting for 3weeks or more.
3) Patients belonging to both genders.

4) Patients of age group 18-60 years.
5) Patients giving a valid written/informed consent for the study.

Exclusion Criteria:

1) In patients where MRI is contraindicated for example patients with a cardiac pacemaker, ferromagnetic foreign bodies, aneurysmal clips and cochlear implants.
2) Patients with history of surgery in the affected knee.
3) Patients with evidence of neurological deficit in the ipsilateral limb.
4) Patients with evidence of active infection in the ipsilateral limb.
5) Pregnant Patients.
6) Patients in whom General and Spinal anaesthesia is contraindicated.

Method of Data Collection

- The patients after registration were clinically evaluated to look for knee pathology by help of certain tests.
- Further radiological evaluation was done, comprising of radiographs and MRI, and the findings were obtained from the standard evaluation forms.
- Data on the arthroscopic findings after the procedure was documented in the surgical records.
- All patients were included only after obtaining a written informed consent.

3. Aim and Objectives

Aim of this Study

To correlate between clinical examination, MRI and Arthroscopy findings in diagnosis of pathologies and anatomical variants of knee joint.

Objectives of this Study

Primary Objective:

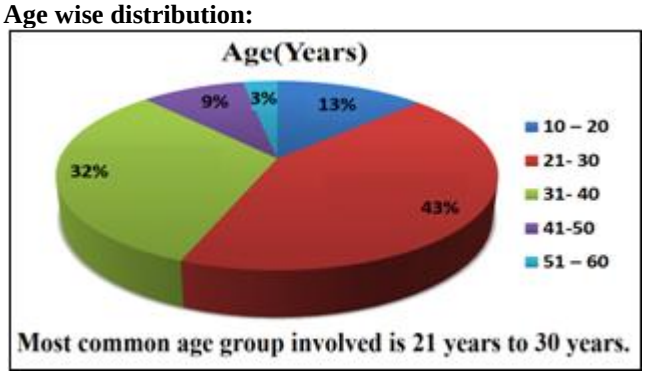
To derive the correlation between clinical examinations, preoperative MRI findings and intra operative arthroscopic findings in patients undergoing arthroscopic procedure of knee joint.

Secondary Objectives:

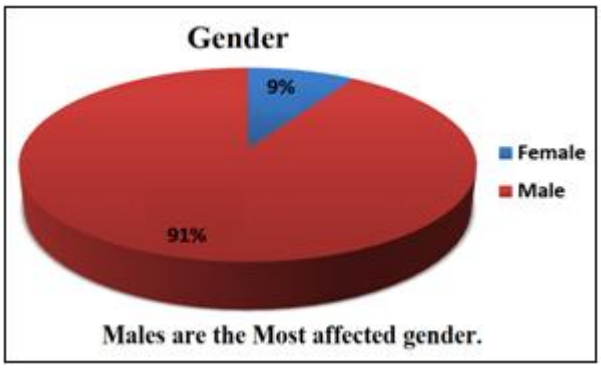
1) To assess the temporal variation between the clinical findings, MRI and arthroscopic findings as mentioned above.
2) Comparison of results with that in the literature.

4. Results and Observations

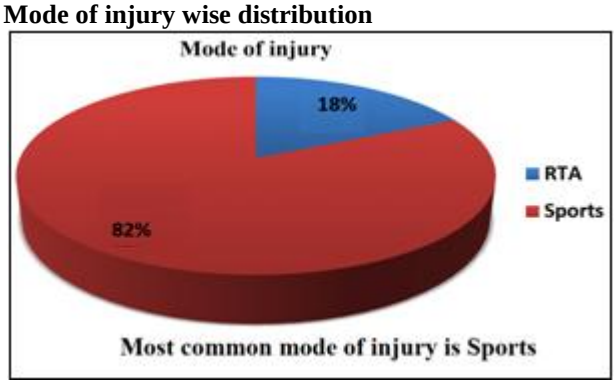
Age wise distribution:

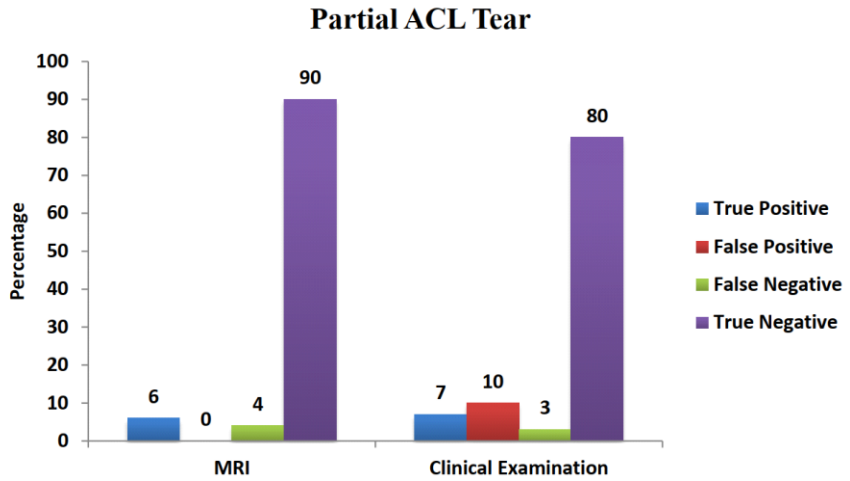


Gender wise distribution:

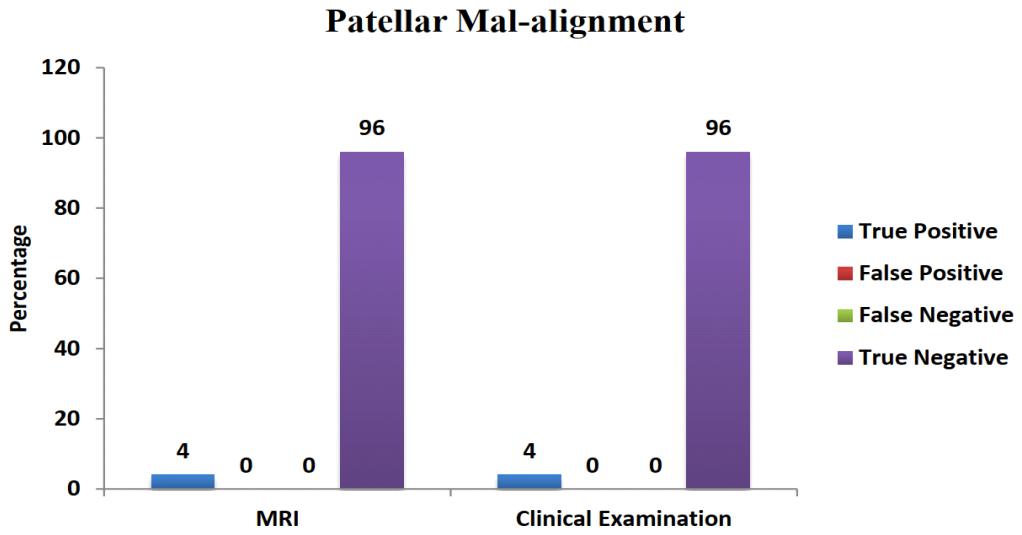


Mode of injury wise distribution

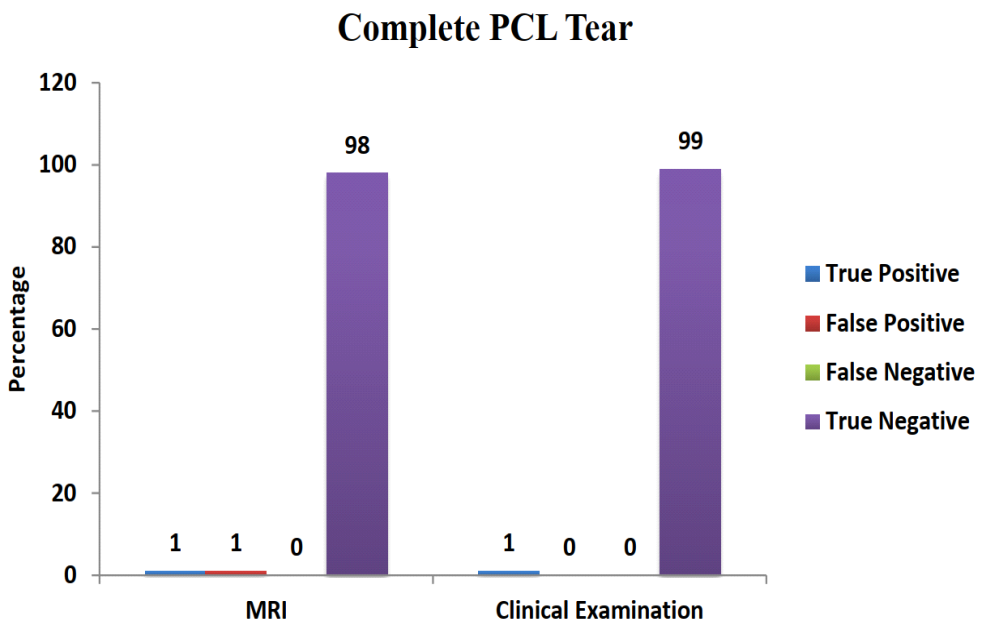




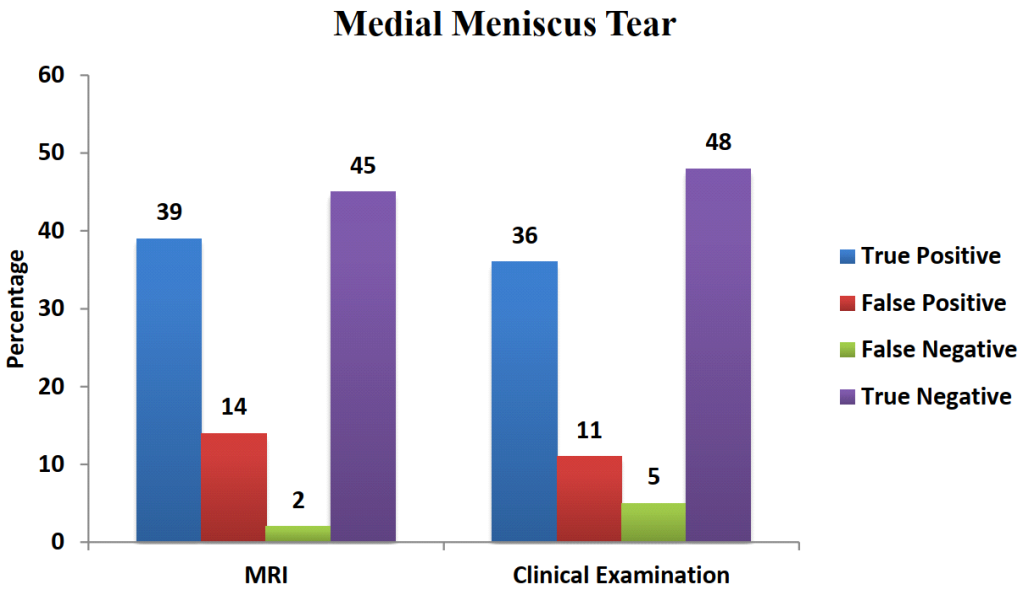
Correlation between MRI and Clinical examination against Arthroscopy in diagnosing Partial ACL tears



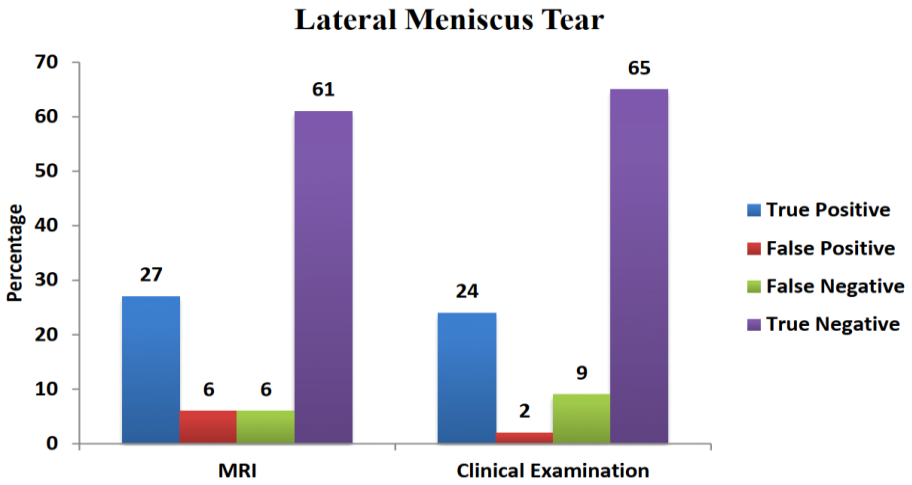
Correlation between MRI and Clinical examination against Arthroscopy in diagnosing Patellar Mal-alignment



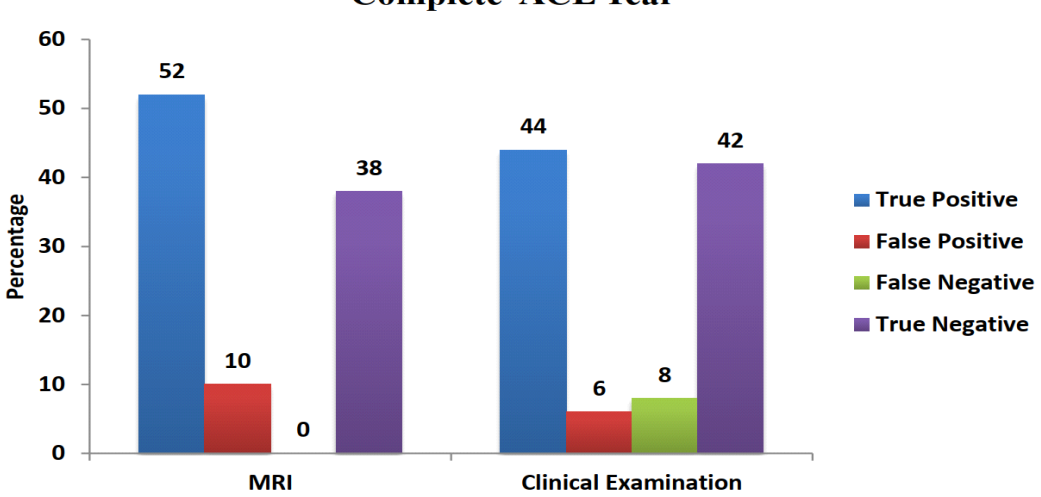
Correlation between MRI and Clinical examination against Arthroscopy in diagnosing complete PCL tear



Correlation between MRI and Clinical examination against Arthroscopy in diagnosing Medial Meniscus tear



Correlation between MRI and Clinical examination against Arthroscopy in diagnosing Lateral Meniscus tear



Correlation between MRI and Clinical examination against Arthroscopy in diagnosing Complete ACL tear

In 2015 A. Speziali et al.8 conducted a prospective study among 137 patients to study diagnostic value of clinical examination and MRI in meniscal injuries using Arthroscopic findings as Gold standard.

Table 55: Comparison of our study with similar study conducted by A. Speziali et al.

	Medial meniscus tear		Lateral meniscus tear	
	Speziali et al.	Our Study	Speziali et al.	Our Study
Specificity	63.50	81.36	46.00	97.01
Sensitivity	74.40	87.80	77.30	72.73
Accuracy	70.30	84.00	65.50	89.00
PPV	61.00	76.60	55.70	92.31
NPV	77.30	90.57	70.30	87.84

Diagnostic value of the clinical examination (%)

Table 56: Comparison of our study with similar study conducted by A. Speziali et al.

	Medial meniscus tear		Lateral meniscus tear	
	Speziali et al.	Our Study	Speziali et al.	Our Study
Specificity	79.60	76.27	78.80	91.04
Sensitivity	72.00	75.12	70.40	81.82
Accuracy	76.40	84.00	69.50	88.00
PPV	84.20	73.58	80.70	81.82
NPV	74.50	95.74	71.40	91.04

Diagnostic value of MRI (%)

In 2011 Ersin Ercin et al.9 conducted a prospective study among 30 patients to study the correlation between history, clinical examination, MRI and arthroscopy in meniscal lesions.

Table 57: Comparison of our study with similar study conducted by Ersin Ercin et al.

	Medial meniscus tear		Lateral meniscus tear	
	Ersin et al.	Our Study	Ersin et al.	Our Study
Sensitivity	95	87.80	33	72.73
Specificity	90	81.36	92	97.01
PPV	95	76.60	50	92.31
NPV	90	90.57	85	87.84
Accuracy	93	84.00	80	89.00

Diagnostic value of the clinical examination (%)

Table 58: Comparison of our study with similar study conducted by Ersin Ercin et al.

	Medial meniscus tear		Lateral meniscus tear	
	Ersin et al.	Our Study	Ersin et al.	Our Study
Sensitivity	95	95.12	67	81.82
Specificity	60	76.27	88	91.04
PPV	83	73.58	57	81.82
NPV	86	95.74	91	91.04
Accuracy	83	84.00	83	88.00

Diagnostic value of MRI (%)

Comparison of this study with similar study conducted by F. Rayan et al

In 2008 F. Rayan et al.1[0]conducted a prospective study among 131 patients to study correlation between clinical, MRI and arthroscopy in diagnosing meniscal and ACL injuries.

	Medial meniscus tear		Lateral meniscus tear		ACL tear	
	Rayan et al.	Our Study	Rayan et al.	Our Study	Rayan et al.	Our Study
Sensitivity	86	87.80	56	72.73	77	84.62
Specificity	73	81.36	95	97.01	100	87.50
Accuracy	79	84.00	85	89.00	96	86.00
PPV	76	76.60	78	92.31	100	88.00
NPV	83	90.57	87	87.84	95	84.00

Diagnostic value of the clinical examination (%)

	Medial meniscus tear		Lateral meniscus tear		ACL tear	
	Rayan et al.	Our Study	Rayan et al.	Our Study	Rayan et al.	Our Study
Sensitivity	76	95.12	61	81.82	81	100
Specificity	52	76.27	92	91.04	96	79.17
Accuracy	63	84.00	85	88.00	93	90.00
PPV	57	73.58	74	81.82	81	83.87
NPV	73	95.74	88	91.04	95	100

Diagnostic value of MRI (%)

5. Observations

a) Males (91%) were affected more than Females (9%).
b) Both Right and left sides were equally affected (50%). Sports were the most common mode of injury (82%).
c) Mostcommon age group involved was 21-30 years (43%).
d) In our study P value is statistically significant in diagnosing complete ACL tear (0.002),
e) Medial meniscus tear (0.004) and chondral defects (<0.001) by MRI.
f) MRI had high sensitivity in diagnosing Cysts, Loose bodies, Complete ACL tear, Trochlear dysplasia, Intra synovial tumors, Fractures, Synovial thickening, Patellar mal alignment, ACL avulsion, Complete PCL tear, Medial meniscus tear and Lateral meniscus tear.

Clinical examination had high sensitivity in diagnosing Patellar mal alignment and Complete PCL tear.

6. Conclusion

1) Clinical examination by an experienced surgeon can predict knee pathologies with a significantly good positive predictive value.
2) An MRI though expensive and even with occasional discrepancies remains the non- invasive investigation of choice for intra articular Knee pathologies and anatomical variations, with a significant positive predictive value.
3) MRI also serves as a guide to the operating surgeon during diagnostic arthroscopy and helps to locate and delineate certain hidden pathologies.
4) Diagnostic arthroscopy remains the gold standard for precise diagnosis of intra articular knee pathologies and anatomical variations.
5) In an experienced team, the correlation of clinical examination, MRI and arthroscopic evaluation is more obvious.

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