# MRI Evaluation of Internal Derangements of Knee Joints

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**Purpose** - The pattern of internal derangement of knee in non-traumatic patient found beneficial in MRI.
**Methodology**- 40 patient's data were collected prospectively and mean and percentage stats are used.
**Result**- out of 40 patients, the male population was 31 (77.5%) and female 9 (22.5%). The result shows findings are in 25 patients out of total 40 patients were diagnosis with ACL tear, 5 with PCL tear and 1 with MCL tear. 31 patients had meniscus tear out of 40 patients, 28 patient had joint effusion out of 40 patient, 2 patients were diagnosed with knee Barker's cyst.
**Conclusion**- The study concludes uses of MRI should not perform as a primary investigation for all patients. Duration of symptoms should also be taken into account as patients with longstanding symptoms are more likely to find pathology in MRI Knee. MRI has become the best imaging equipment for non-invasive review of knee injury.

**Keywords-** Non-traumatic, ACL tear, MRI, meniscus tear, Barker's cyst.
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## Introduction:

Internal derangement to the knee joint is particular cause of morbidity in the adult and old individuals especially among the workers, labour, sports person, etc. An exact diagnosis of injuries is important for early operative as well as non-operative treatment. It requires an accurate clinical history, a thorough physical examination and proper diagnostic tools. With the help of use of advanced imaging, perfect treatment of the knee becomes more helpful.[1]
Knee movements are:
• Extension.
• Flexion.
• Medial rotation.
• Lateral rotation.
Magnetic resonance imaging (MRI) has become the best imaging equipment for non-invasive review of knee injuries. It has a high diagnostic accuracy and does not involve the use of ionizing radiation. MRI is generally measured as a valuable diagnostic tool. MRI uses magnets and radio-frequency pulses for imaging of soft tissues.[2]

This study is performed to evaluate the types and incidences of injuries in internal derangements of the knee by MRI with no trauma in selected cases. In MRI knee protocol we have different kind of sequences that is evaluate the anatomy and pathology knee. The sequences as follow.
• Axial – proton density (PD)
• Coronal – proton density (PD) Short tau inversion recovery
• Sagittal – proton density (PD) T1 MFFE
• And T2 oblique Tissues and their appearances on different sequences:



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STIR - sequences with fat saturation are essential to demonstrate the bone marrow edema.

• Muscles is darker than fat signal and Fluids is very bright, Bone is dark, Fat is dark, Air is dark.

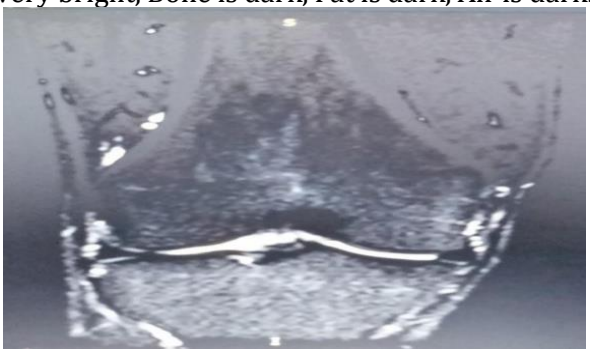

**Fig. 1.1.** Shows STIR, image in coronal

PD weighted sequences are most suitable for envision the ligamentous anatomy.

- Fluids is bright, darker than the T2 images and Bone is dark, Fat is bright, slightly darker thanT1 images. Air is dark, Muscles is gray, and Moving blood is dark.

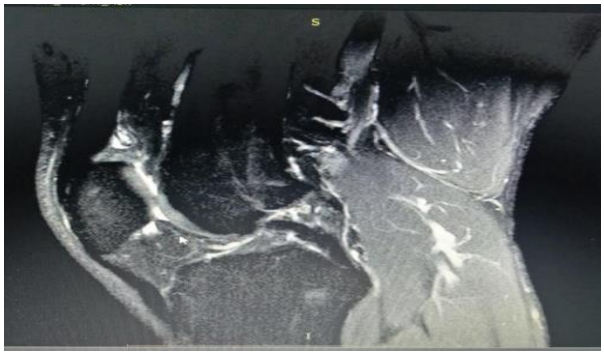

**Fig 1.2.** Shows in PD weighted in sagittal image

T1 sequences are demonstrate the soft tissue lesion.

- Fluid is dark and Fat is bright, Moving blood is dark, Muscles is grey, Air is dark.

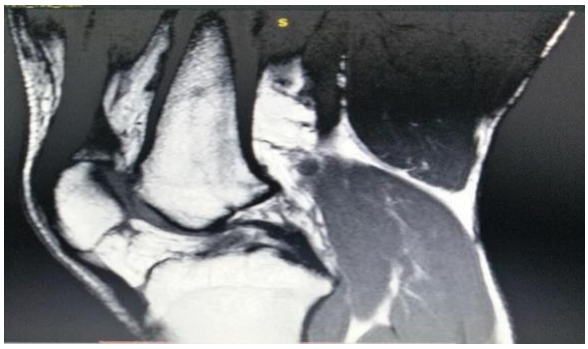

**Fig. 1.3.** Shows in T1 weighted image in sagittal

T2 sequences with fat saturation best for meniscal root tear.

- Fluids are bright and Fat is bright than T1, Moving blood is dark, Muscles is grey than T1,Air is dark.[3]

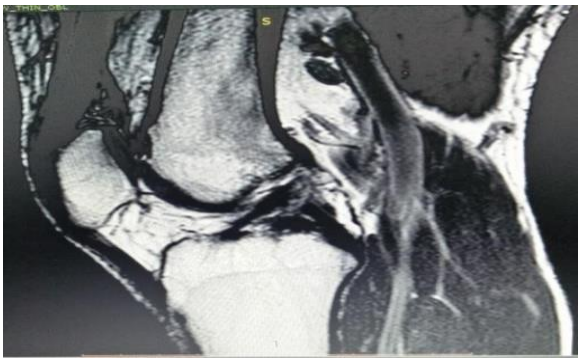

**Fig.1.4.** Shows in T2 weighted image in sagittal

## Justification

- To study the common modes of injury in knee during the physical activities.
- To study the evaluation of ligaments, menisci, cartilage and soft tissue injury in knee by theusing of the MRI.
- To study the age-related changes in different age group patients.
- To study the exact nature and extent of bony as well as soft tissue abnormalities of the kneejoint.

## Aim

The aim of this study is to diagnosis internal derangement in knee joint under Magnetic Resonance Imaging.

## Materials and Methods

A quantitative prospective study was performed on Non-trauma Knee Patient in the radiology department of SGT Hospital and Research Institute, Gurugram. Total study population consist of 40 patients with internal derangement of knee who undergone MR imaging of Knee in the radiology department. The study was conducted over a period of five month from October to February 2020. Patients will be signing consent before the investigation. History was taken from patients prior to investigation. This study was carried out between 1st October 2019 to 1st April 2020.

## Selection Criteria-

In this study following patients under inclusion and exclusion criteria, Data collected after completion of scan and reporting. The study included 40 patients, clinically suspected of

internal derangement of the knee joint, Non traumatic, internal derangement of knee joint, Pain in the knee with or without swelling. Any absolute contraindication for MRI, Traumatic internal derangement of knee joint, more than 75years patient not included in this study were taken under as exclusion criteria.

## Data Analysis:

The purpose of data analysis is to categorize, organize, manipulate, and summarize the data that have been collected. The current study used a quantitative design. In this context, quantitative data refer to numbers that are collected and then interpreted using statistics. Numerical data are described in a meaningful manner thereby enabling any researcher to understand interrelationships that exist. Data analysis aims to describe statistical analysis results but does not comment on them. In this study, an analysis was done on the basis of the Mode frequency of findings.

## Result:

A descriptive statistical analysis and correlation evaluation study is consisting of 40 patient with internal derangements of knee joint is undertaken to study the spectrum of MRI findingsin all cases from SGT hospital.

| Age of patient | Number of patient | % |
|---|---|---|
| 11-20 | 5 | 12.5 |
| 21-30 | 13 | 32.5 |
| 31-40 | 12 | 30 |
| 41-50 | 6 | 15 |
| 51-60 | 4 | 10 |
| Total | 40 | 100 |

Mean direct method 33.5Median 32.5

**Table 5.1:** Age distribution of patient studied

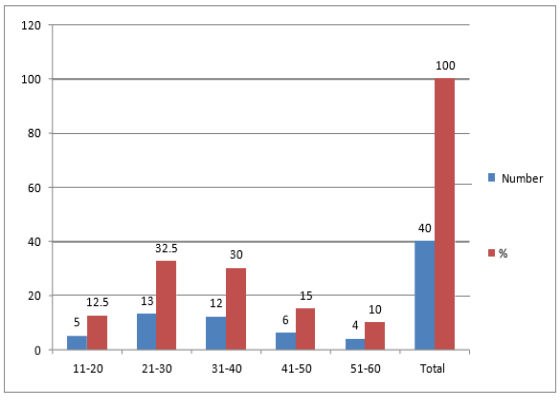


**Fig.5.2.** Bar diagram age distribution of patient studied

| Number of patient | Total patient | % |
|---|---|---|
| 25 | 40 | 62.5 |

**Table.5.3:** ACL tear

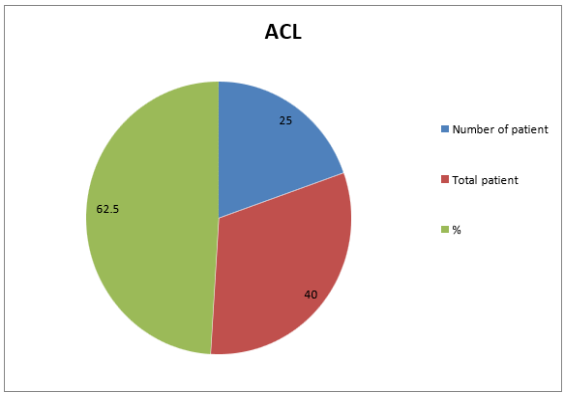


**Fig.5.4.** Pie diagram of ACL tear

| Number of patient | Total patient | % |
|---|---|---|
| 28 | 40 | 70 |

**Table.5.5:** Joint effusion

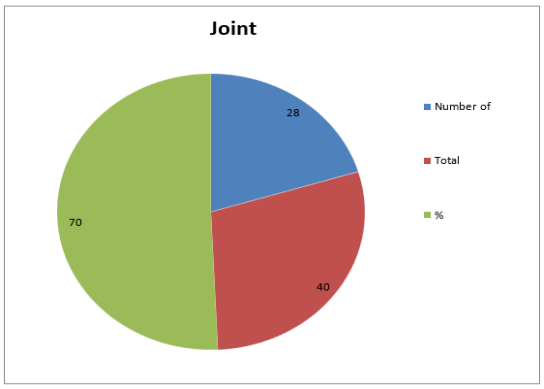


**Fig.5.6.** Pie diagram Joint effusion

| Number of patient | Total patient | % |
|---|---|---|
| 5 | 40 | 12.5 |

**Table.5.7**: PCL tear

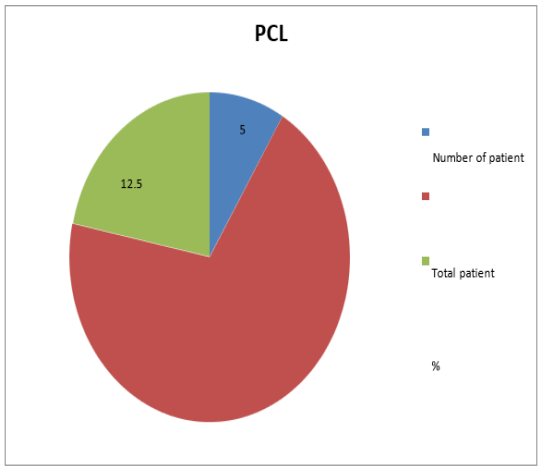


**Fig.5.8.** Pie diagram PCL tear

| Number of patient | Total patient | % |
|---|---|---|

| | | |
|---|---|---|
| 1 | 40 | 2.5 |

**Table.5.9:** MCL tear

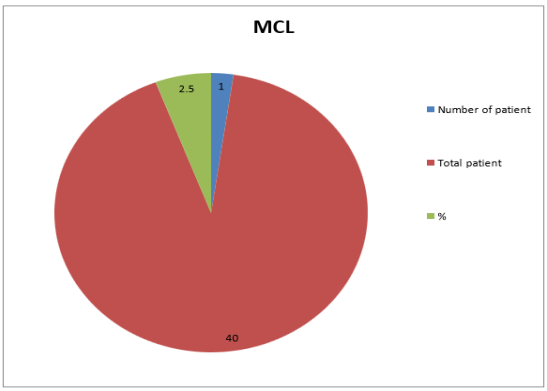


**Fig 5.10.** Pie diagram MCL

| Meniscus | Number | % |
|---|---|---|
| Medial | 2 | 5 |
| Lateral | 3 | 7.5 |
| Posterior horn medialmeniscus | 20 | 50 |
| Anterior horn medialmeniscus | 1 | 2.5 |
| Posterior horn lateralmeniscus | 5 | 12.5 |
| Total 40 patient | 31 | 77.5 |

**Table.5.11:** Meniscus

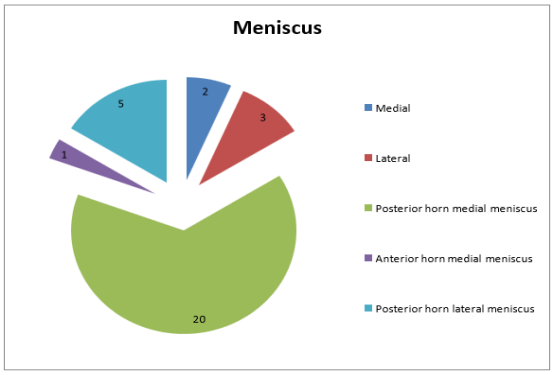


**Fig.5.12.** Pie diagram meniscus

| Number of patient | Total patient | % |
|---|---|---|
| 2 | 40 | 5 |

**Table.5.13:** Barker's cyst

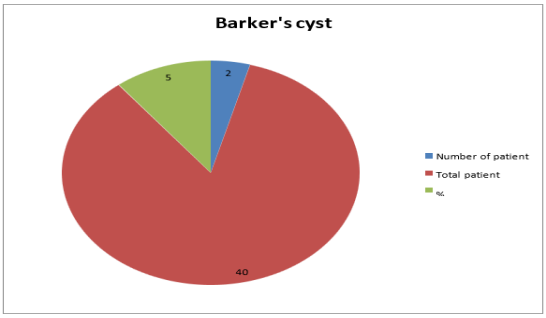


**Fig.5.14.** Pie diagram barker's cyst

| MRI findings | Number of patient | % |
|---|---|---|
| ACL tear | 25 | 62.5 |
| PCL tear | 5 | 12.5 |
| MCL tear | 1 | 2.5 |
| Joint effusion | 28 | 70 |
| Meniscus | 31 | 77.5 |
| Barker's cyst | 2 | 5 |

**Table.5.15:** MRI findings

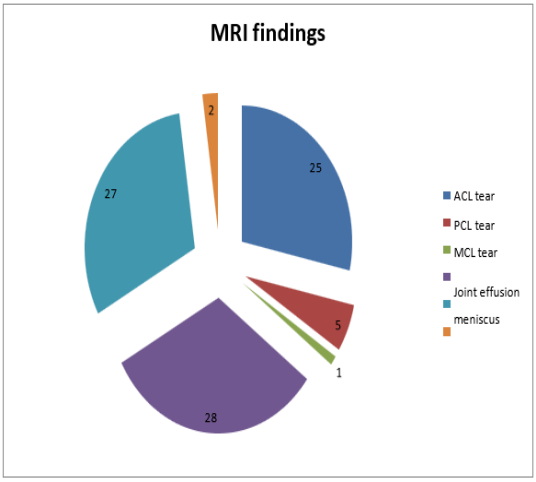


**Fig.5.16.** Pie diagram MRI findings

## Discussion

The role of MRI has steadily increased and now it has become the first time investigation for most of lesion of knee. Complete evaluation for all the internal structure of knee was not possible with other modalities like conventional radiography, ultra sonography, and computed tomography.

In our study joint effusion were the most common finding affecting 28 patient (70%). ACL tear most common seen 25 patients (62.5), to be followed by meniscus injury seen in 31 patients (77.5) with grade 1, 2, 3 types injury.

## Menisci lesions

In our study medial meniscus tear found in 2 (5%) with none tear in grade 1.2,3. Grade 1 tear are Lateral Meniscus 1(3.2%). Grade 2 tears were the common posterior horn of medial meniscus10 (32.2) and posterior horn of lateral meniscus 1 (3.2%). Total meniscus injury patient 31.

## Barker's cyst

In our study barker's cyst were seen in 2 patients (5%) baker's cyst with extensive subcutaneous edema.

## Ligament injuries

In our study, we found 31 (77.5%) cases of ligament injuries. ACL tears 25 (80.5%) and PCL tears 5 (16%) and MCL tears 1 (3.5%)

## Joint effusion

In our study, we found 28 (70%) cases of joint effusion.

## Conclusion

The study concludes uses of MRI should not perform as a primary investigation for all patients. Duration of symptoms should also be taken into account as patients with long-standing symptoms are more likely to find pathology in MRI Knee. MRI has become the best imaging equipment for non-invasive review of knee injury.

## Contributors

All authors contributed to the conception or design of the work,
the acquisition, analysis, or interpretation of the data. All authors
were involved in drafting and commenting on the paper and have
approved the final version.

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## Conflict of Interest

The author has no conflict of interest.

## Disclosure

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## Ethical approval &

Informed consent was obtained from all participants.

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