



Evaluation of Traumatic Knee Joint Injuries by Magnetic Resonance Imaging in Rural Population.

Dr. B. Ooha¹, Dr.B.R. Nagaraj, MDRD, DMRD, FICR²

¹(Third year postgraduate, Dept of Radio-Diagnosis, GEMS and Hospital, Andhra Pradesh)

²(Professor and HOD, Dept of Radio-Diagnosis, GEMS and Hospital, Andhra Pradesh)

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ABSTRACT

Background: Knee joint is a major weight bearing and largest joint that provides mobility and stability as well as balance while standing. It is a biggest joint of the human body with complex articulation characterized by the presence of ligamentous and meniscal structures that play an important role in wide range of functions and thus bone and soft tissue of knee are at risk of injuries. Magnetic resonance imaging due to its excellent soft tissue contrast resolution provides significant advantages over other imaging techniques in the evaluation of traumatic injuries of knee joint.

Aim of the study: To evaluate the frequency and different types of ligament, meniscal injuries and other related findings associated with knee trauma using MRI.

Material and methods: It is an observational study with a total number of 100 patients referred with history of knee injury were imaged with 1.5 Tesla GE –Signa MRI machine in the Department of Radiology, GREAT EASTERN MEDICAL SCHOOL AND HOSPITAL, Srikakulam over a period of 18 months.

Results: Commonest injuries detected in the present study are meniscal tears, complete anterior cruciate ligament tears, bone contusions and partial cruciate ligament tears. Majority of the patients were male 80% and females 20%. Clinical presentation and radiographs of the patient did not help in diagnosis, especially in multiple ligament and bone injuries. Magnetic resonance imaging detected soft tissue injuries very well in addition to the bony injuries.

Conclusion: Magnetic resonance imaging of the knee is the excellent non-invasive investigation tool for knee injury due to excellent contrast resolution and multiplanar imaging capabilities which provide the detailed evaluation in cases of various soft tissue injuries of knee joint.

KEYWORDS- MRI, Anterior cruciate ligament, Posterior cruciate ligament, Medial and lateral collateral ligaments, Medial and lateral patellar retinaculum

I. INTRODUCTION

The knee joint is a biggest joint of the human body with complex articulation characterized by the presence of ligamentous and meniscal structures that play an important role in the stability and mobility. MRI due to its excellent soft tissue contrast resolution and multiplanar imaging capabilities provides significant advantages over other imaging techniques in the evaluation of traumatic injuries of knee joint. It represents a non-invasive and radiation-free technique. It plays a crucial role in the diagnosis and monitoring of traumatic knee injuries. MRI has also been demonstrated as a cost-effective technique by reducing unnecessary surgical and arthroscopic intervention. The frequency, diversity and severity of ligament and meniscus injuries occur especially in the young and sportsmen, associated with significant morbidity, frequently need surgical treatment and extensive rest. Joint injury has been recognized as a potent risk factor for the onset of osteoarthritis. Early detection of knee injuries is extremely important to prevent long-term consequences of delayed treatment. The effective tool for the definition, characterization, and evaluation of the pathology of knee injuries has been the magnetic resonance imaging.

II. MATERIALS AND METHODS

It is an observational study with a total number of 100 patients referred with history of knee injury were imaged with 1.5 Tesla GE-signa MRI machine in the Department of Radiology, Great Eastern Medical School and Hospital, Srikakulam over a period of 18 months.

Inclusion criteria

: Patients referred with history of knee injury.



Exclusion criteria :

1. All patients who did not give consent to be a part of the study.
2. Patients with ferromagnetic implants, pacemakers, cochlear implants and aneurismal clips.
3. Degenerative arthritis, infection, neoplasm and any previous surgery to the knee.

Examination technique : The examination was done using 1.5 Tesla GE-signa MRI machine using a dedicated knee coil. The imaging system is enclosed in a radio frequency room.

Method

After obtaining informed consent, general data regarding age, sex, symptoms, history of present illness, past and personal history, etc. were noted. Patient was placed in supine position and feet first in

Imaging findings

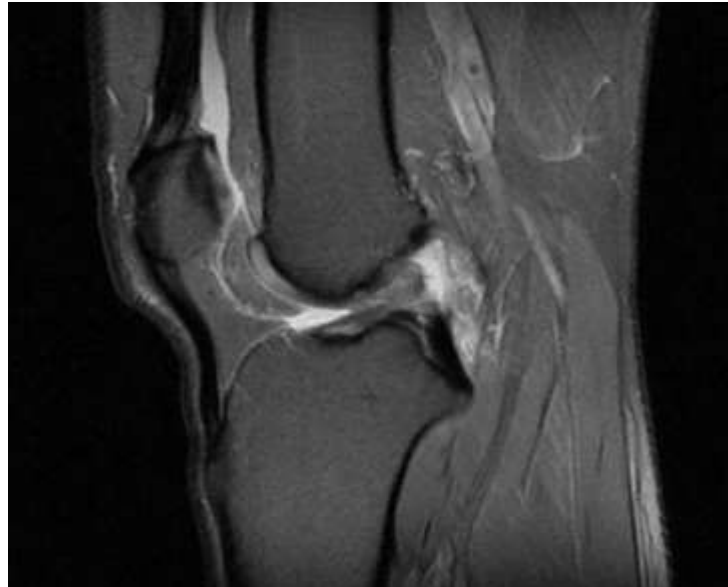


Sagittal PDFS image showing complete ACL tear

MR imager, with knee to be imaged in approximately 15-20-degree external rotation to aid the imaging of anterior cruciate ligament in the sagittal plane. With the knee coil and large field of view (FOV), T1, T2 & Proton density (PD)-weighted images acquired in axial, sagittal or coronal planes. Imaging protocols for evaluation of patients include: Axial & coronal T2 FRFSE, axial & coronal T1 FSE and PDFS/STIR-axial, coronal & sagittal images. Thin (3mm) sections obtained with a minimal interslice gap.

III. DATA ANALYSIS

Statistical analysis of the data was performed by using Microsoft Excel. Data was represented in the form of frequencies and percentages with the help of tables, bar diagrams.



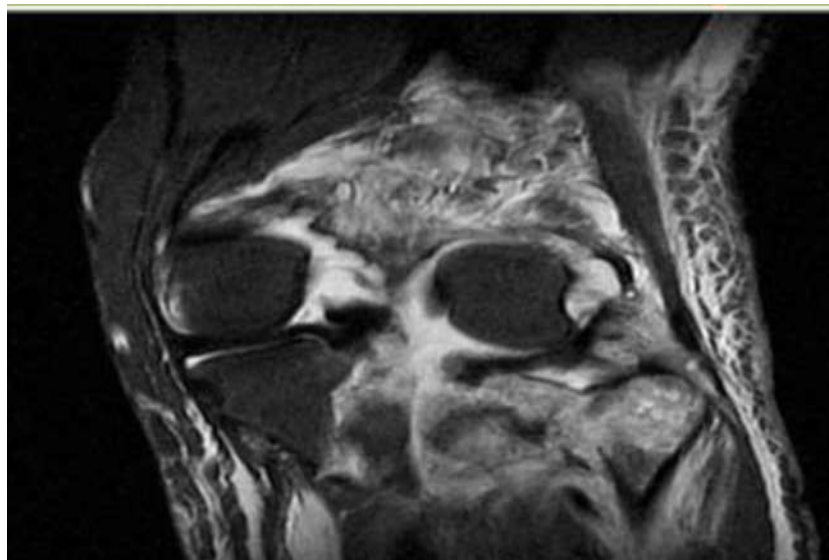
Sagittal PDFS image showing complete ACL tear with disruption of fibres



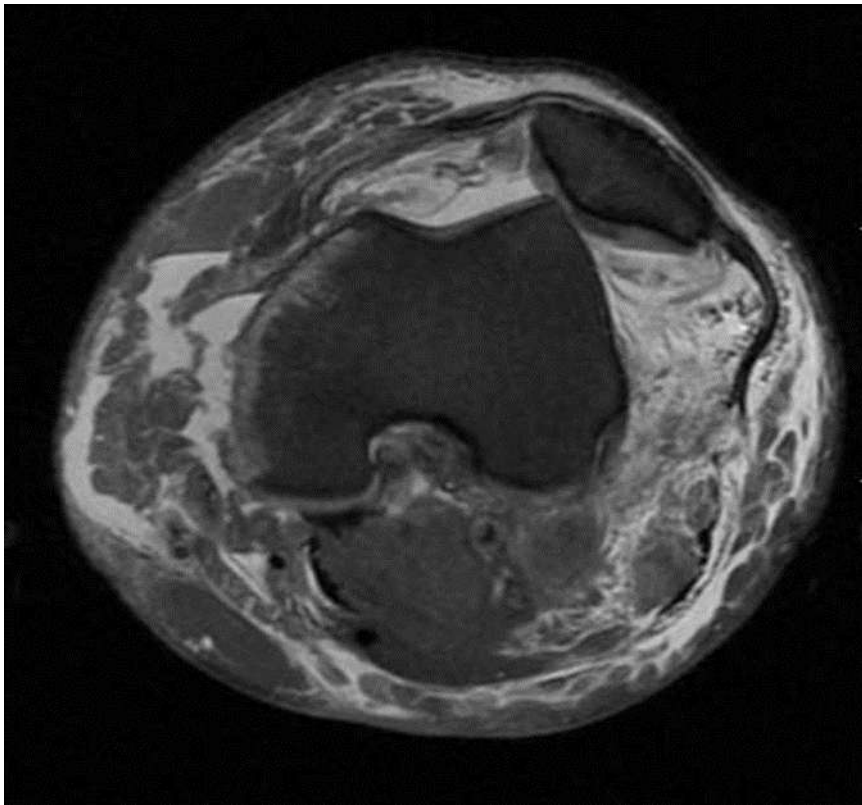
Coronal STIR and sagittal PDFS images showing partial tear of ACL.



Coronal STIR image showing sprain of medial collateral ligament

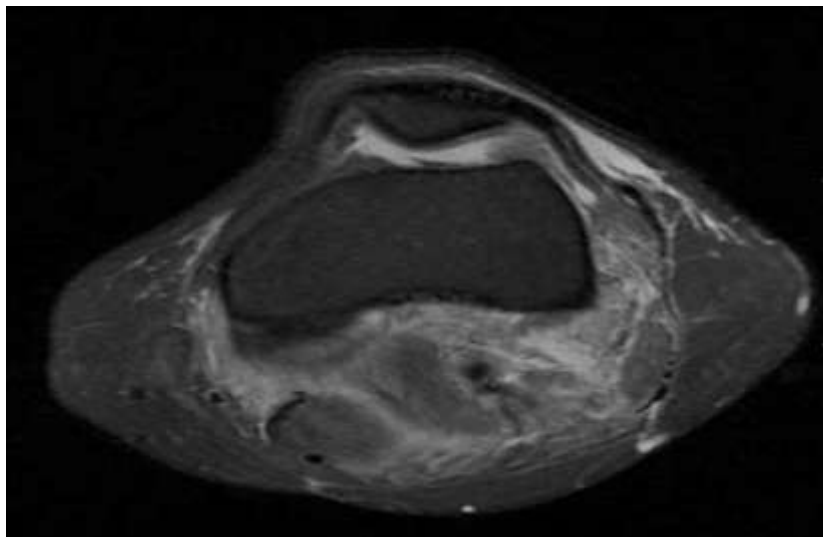


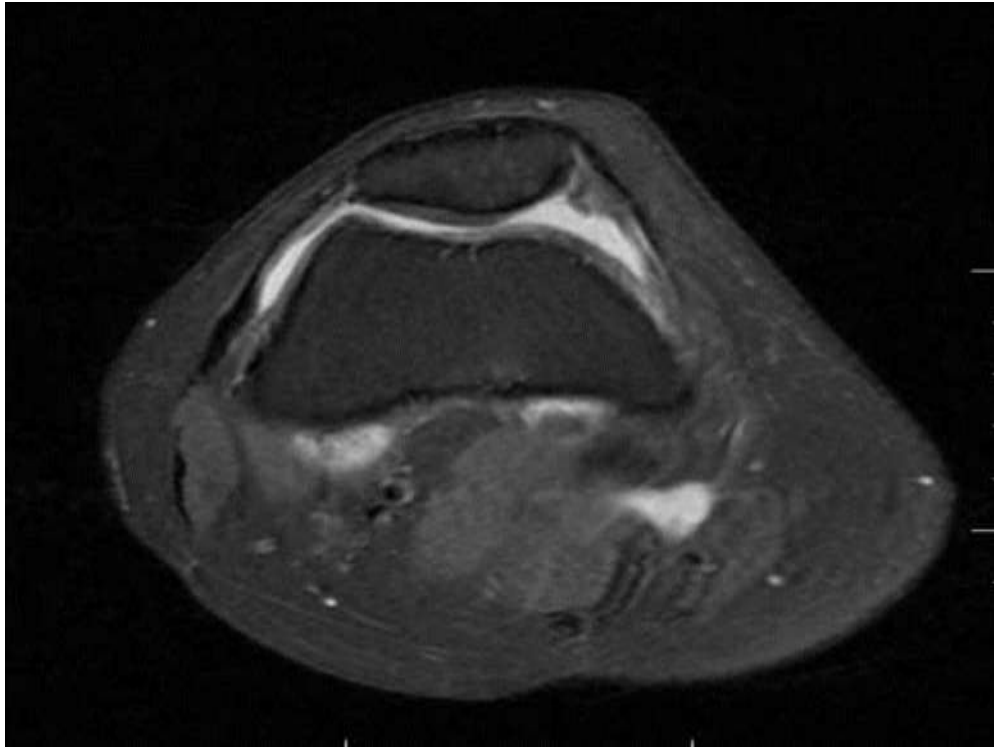
Coronal STIR image showing rupture of lateral collateral ligament



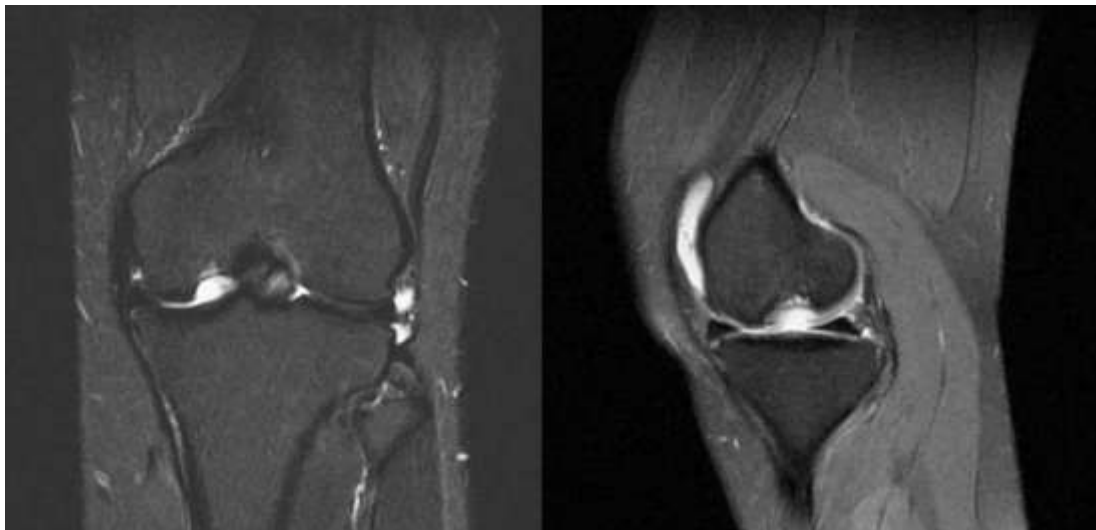
Axial PDFS image showing lateral patellar retinaculum tear

**Axial PDFS image showing
medial patellar retinaculum
tear with dislocated patella**





Axial PDFS image showing chondromalacia patella changes

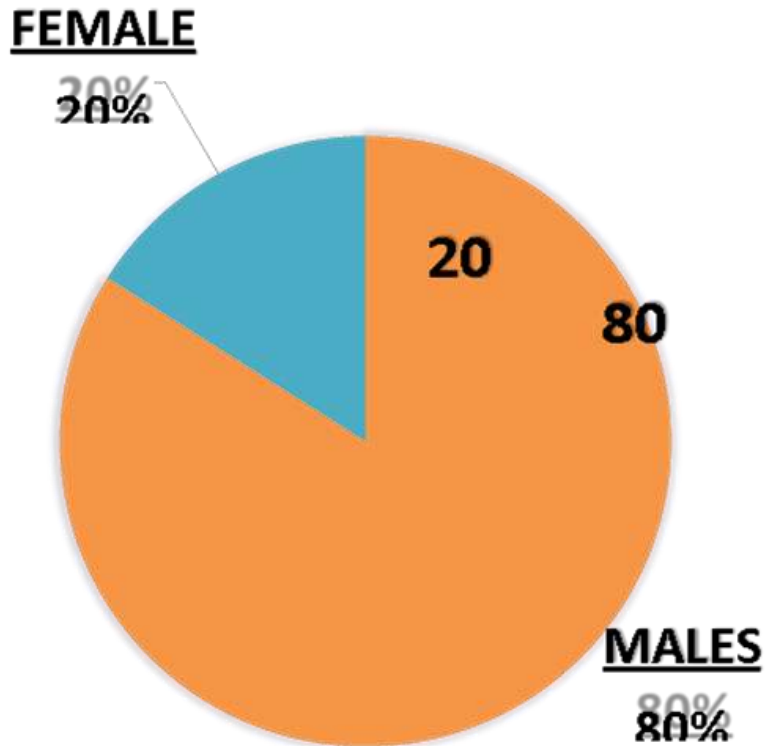


Coronal STIR and Sagittal PDFS images showing the osteochondral defect in medial femoral condyle in a patient with knee trauma.



IV. RESULTS:

GENDER DISTRIBUTION





0-20 years	18
21-40 years	55
41-60 years	26
>60 years	1

Number of cases according to age distribution.

Various findings in 100 patients.

PartialACLtear	46
CompleteACLtear	50
PartialPCLtear	12
CompletePCLtear	3
Medialcollateralligamentsprain	6
Lateralcollateralligamentsprain	5
Medialpatellarligamentsprain	6
Lateralpatellarligamentsprain	1
Patellartendoninjury	1
Meniscaltears	74
Bonecontusions	32
Osteochondraldefect	2



Chondromalacia patellae changes	3
Fractures	11
Hemarthrosis	4

V. DISCUSSION:

The knee is an anatomically and biomechanically complex joint. The single most common indication of performing a knee MRI is to diagnose internal derangements in an injured knee. In the present study, male outnumbered female, as 80% of the patients were male and 20% were female with male to female with most commonly involved age group being 20-40 years. Less commonly involved age group is above 60 years. In both males and females, partial anterior cruciate ligament tear being more common. Meniscal tears are most commonly associated as it involves 74% of total cases. Joint effusions and bony contusions are next commonly associated findings with 44% and 32% respectively. Overall the present study showed that, MRI of the knee joint has wide approach for the diagnosis of traumatic knee injuries. This makes it a practical, well accepted and accurate noninvasive imaging technique in patients presenting with injury to knee joint and is the modality of choice in clinically suspected cases of soft tissue injury where plain radiographs are normal.

VI. CONCLUSION

Magnetic resonance imaging of the knee is the excellent noninvasive investigation tool for knee injury due to excellent contrast resolution and multiplanar imaging capabilities which provides the most detailed evaluation in cases of various soft tissue injuries of knee joint. MRI is unique in its ability to evaluate the ligaments, menisci, articular cartilage,

articular capsule and bone marrow. MRI provides important clinical information that guides patient management and treatment planning.

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