

		Original Research Paper	Radiology
MRI IN ASSESSMENT OF KNEE INJURIES			
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ABSTRACT	<p>Introduction: The modalities for Imaging in knee trauma include Plain Radiography, Arthroscopy, USG, CT and MRI. MRI has assumed a major role and is routinely performed to evaluate complex knee injuries. It gives a precise diagnosis and provides a roadmap for the orthopedic surgeon to plan accordingly. Aim: To investigate knee trauma by using MRI. Materials and Methods: 40 adults between the ages of 20 to 70 years who presented with knee trauma to the Department of Radio-diagnosis, MGM Hospital,Kamothe for MRI, between Aug 2016 and Jan 2017. Results:Ligament tear was the most common abnormality. Other findings included- Bone contusions, meniscal tear, fracturesetc . Discussion: MRI has emerged as the study of choice to evaluate the status of ligaments, menisci and other related structures. Conclusion: Communication between Radiologists and Orthopedic surgeons is particularly important in planning the treatment.</p>		
KEYWORDS	Knee trauma, Magnetic resonance imaging, Meniscus, Ligament		
INTRODUCTION		<p>The knee is an intricate joint with numerous tendinous, ligamentous and meniscal attachments, which make it particularly vulnerable to complex injuries after trauma. A variety of injuries of the knee can occur, including tear of the anterior and posterior cruciate ligaments, meniscal tears, fractures, bone contusions, ilio-tibial band avulsion, tendon disruption, Osgood-Schlatter disease etc. These injuries often have a subtle appearance on plain film, which is the first Radiological investigation performed in a case of knee trauma. Advanced imaging modalities, particularly MRI, prove helpful and can provide valuable additional information for adequately defining the extent of damage. The onus is on the Radiologist to identify the pattern of injury and to understand the substantial underlying damage that it frequently represents. Conveying this information to the referring clinician is crucial and represents the first step toward additional evaluation and probable Orthopaedic referral. By recognizing the significance of these injuries at initial presentation, Radiologists can facilitate appropriate patient work-up and prevent the chronic morbidity associated with delayed treatment.¹</p> <p>Despite the improvement in the quality of knee MR images in the past 25 years, the two primary MR criteria for the diagnosis of meniscal tears have not changed since the late 1980s. These criteria are; first, contact of intra-meniscal signal with the superior or the inferior surface of a meniscus (or with both surfaces) and, second, distortion of the normal appearance of a meniscus.²</p> <p>The high cost of cross sectional imaging modalities such as CT and MRI is the main disadvantage as compared to Radiography. With its high contrast and spatial resolution and lack of ionizing radiation, MRI is considered to be the best imaging technique for the investigation of knee trauma.</p>	
Materials and methods:		<p>Source of data: 40 adult patients aged between 20 to 70 years with history of trauma to the knee, who were referred for Magnetic Resonance Imaging of the knee joint to MGM Hospital, Kamothe, Navi Mumbai, as part of their clinical work up were included in the study. The study was conducted between the months of August 2016 and January 2017. Informed consent had been obtained prior to the imaging study. No sedatives or intravenous contrast were used in the study.</p>	
		<p>Inclusion Criteria:</p> <ul style="list-style-type: none">- Patients with history of trauma to the knee- Adults aged between 20 and 70.- Both genders. <p>Exclusion Criteria:</p> <ul style="list-style-type: none">- Patients aged <20 and >70 years.- Patients with previous operative history.- Patients with contraindication to Magnetic Resonance Imaging- cochlear implant, pacemaker, claustrophobia.- Non-cooperative sick patients. <p>Patient Preparation:</p> <p>No specific preparation was required for the examination.</p> <p>Method:</p> <p>Clinical data was recorded which included- age, sex and detailed history of trauma.</p> <p>Imaging Protocol:</p> <p>MRI of the knee was performed using 0.3T Centurion Imaging System. The sequences used were- Axial T1W, T2W; Sagittal T2W, PD and Coronal T1, STIR.</p> <p>The imaging findings were categorized into the following groups:</p> <ol style="list-style-type: none">I. NormalII. Ligament injuries- (sprain / partial tear / full thickness tear)III. Meniscal injuriesIV. Bone contusionsV. FracturesVI. Others- Baker's cyst, meniscal cyst etc. <p>Results</p> <p>Among the 40 adults, 29(72.5%) were male and 11(27.5%) were female. MRI findings were reported as normal in 9 (male-7, female-2) cases (22.5%) and abnormal findings were seen in 31 (male-22, female-9) cases (77.5%). Most (23) of them had ligament injuries (Cruciate ligament tears, Collateral ligament tears etc). Many patients had multiple findings.</p> <p>MRI findings with gender distribution is tabulated below:</p>	
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TABLE 1: DISTRIBUTION OF MR FINDINGS IN THE SAMPLE.

MR Findings	No. of Males	No. of Females	Total(%)
Normal	7	2	9 (22.5%)
Ligament injuries	16	7	23 (57.5%)
Meniscal injuries	9	4	13 (32.5%)
Bone contusions	13	5	18 (45%)
Fractures	6	1	7 (17.5%)
Others	5	2	7 (17.5%)

ILLUSTRATIVE IMAGES:



Fig. 1: Bucket handle tear of medial meniscus



Fig. 2: Bone contusions involving femoral and tibial condyles

Discussion:

Arthroscopy is considered 'the gold standard' for the diagnosis of traumatic intra-articular knee injuries. However, arthroscopy is an invasive procedure that requires hospitalization and anaesthesia, thus presenting all the potential complications of a surgical procedure. Since its introduction in the 1980s, MRI has gained in popularity as a diagnostic tool for knee injuries. Many surgeons believe that MRI is an accurate, non-invasive method to diagnose knee injuries, and gives sufficient information to support decisions for conservative treatment and save the patient from unnecessary arthroscopy.³

Rayan et al. presented similar results, as they report 81% sensitivity of the ACL MRI.⁴

Regarding the PCL, Witonski and Vaz et al. reported that both the sensitivity and specificity of MRI in making the diagnosis of PCL

tears are 100%.^{5,6}

It is well established that meniscal damage predisposes the adjacent articular cartilage to increased axial and shear stress, resulting in early degenerative osteoarthritis.⁷ Signal changes occur early in the development of the pathology, when no other image modality shows early lesions.

Nikolaou et al. studied 46 patients and concluded that the diagnostic power of MRI in knee injuries was substantially more than physical examinations.⁸

However, in other studies there were contradictory findings. Madhusudhan et al. in the UK studied 109 injured knees. In their study, the physical examinations, with the exception of meniscal tears, were superior to MRI results.⁹

In a study in Mashhad University on 92 patients with knee injuries, Mazlomy et al. noted similar results and reported a high accuracy for clinical examinations.¹⁰

Behairy et al. is an Egyptian study of 70 patients that noted high diagnostic accuracy of both physical examination and MRI, and in most cases, only slight differences existed between the two methods, which was also confirmed in a study by Thomaset al.^{11,12}

Major causes for the differences in the results were related to different skill levels of personnel involved in MRI interpretation, arthroscopy and clinical examination. The difference in technique used for the MRI is of importance. Studies have shown that if the examination is performed by a skilled technician, the results will be accurate.¹³

A correlation between MRI findings for a given case of knee trauma and clinical data, improved communication between Surgeons and Radiologists, should allow for optimal management of the patient's clinical issues.

Conclusion:

MRI provides valuable information in the assessment of knee injuries. The communication between Radiologists and their Orthopedic colleagues is particularly important in a case of knee trauma. A Radiologist should also provide imaging details as per the needs of the operating Orthopedic surgeon which is vital for patient management and effective treatment.

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