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Research article

ROLE OF MRI IN EVALUATION OF PAINFUL KNEE

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ABSTRACT

Introduction: Requests for knee Magnetic Resonance Imaging (MRI) are most often made when the patient presents with a painful knee. This pain might be due to trauma or infection or inflammation. Complete clinical examination is not possible in such situations as the patients cannot co-operate due to severe pain. There comes the role of noninvasive multiplanar imaging. Hence this study was undertaken to evaluate how MRI can evaluate painful knee. **Methods:** 50 consecutive patients who were referred for MRI evaluation of painful knee were included in this study. Specific findings that explained the cause of pain were compiled. **Results:** In this present study of 50 patients, and 17 were females (34%) and 33 were males (66%).The mean age was 36.70± 13.14 years. Traumatic causes outnumbered non traumatic etiologies of painful knee. Injury to the anterior cruciate ligament (ACL) was the commonest soft tissue abnormality encountered. Partial tears were more common than complete tears. Tibial attachment was commonly affected than femoral attachment. Injured posterior horn of the medial meniscus and medial collateral ligament, were the commonest associated findings. **Conclusion:** MRI evaluation in patients with painful knee is of vital importance, as MRI can demonstrate the exact nature and extent of bony as well as soft tissue abnormality. Multiplanar imaging capacity and noninvasive nature of MRI enable a satisfactory diagnosis in such patients in whom a complete clinical examination is almost impossible due to pain.

Keywords: Painful Knee; MRI; Ligaments, Imaging.

INTRODUCTION

Painful knees can bring tears to our eyes. It may either be of traumatic origin or non traumatic origin like infection or inflammation. Examination by a surgeon or orthopedician is usually not conclusive to pinpoint the exact lesion causing pain.[1, 2] Hence optimum treatment is hampered. Therefore non invasive imaging which can demonstrate the underlying pathology without any significant discomfort to the patient is needed.[3] This study was therefore undertaken to analyze the utility of magnetic resonance imaging (MRI) in pinpointing the cause of painful knee. The aim was to find common imaging findings in our setup.

MATERIALS AND METHODS

Inclusion criteria: Patients of either sex from >20years, having acute or chronic painful knee were included in this study, history of painful knee was noted but as such patients cannot be accurately evaluated clinically due to their pain. **Exclusion criteria**: Patients who could not co-cooperate for MRI examination, patients have undergone prior surgical procedures and who had metallic implants or metallic clips in situ were also excluded as these are contraindications for MRI evaluation. **Methodology:** Philips Achieva 1.5Tesla High Gradient MRI Scanner was used for evaluating 50 consecutive patients having

painful knee as the presenting complaint. The present study was approved by the Institutional Ethical and Research Cell and informed consent from all the patients was obtained for this study.

RESULTS

Analysis of demographic characteristics shows that in this present study of 50 patients, 17 were females (34%) and 33 were males (66%). This is because males are generally more active than females and travel a lot. Hence their knees are exposed to more wear and tear. Also they are at more risk of injury.

The following table shows the distribution of patients as per different age groups. The mean age of patients in this study was 36.70± 13.14. The maximum numbers of patients were seen in 40-50 years age group.

Table 1: Distribution of patients according to age

AGE (Years)	No. of Patients	%
<20	08	16%
20-30	10	20%
30-40	10	20%
40-50	14	28%
50-60	07	14%
>60	01	02%
TOTAL	50	100%
MEAN ± SD	**36.70±13.14**	

MRI could satisfactorily identify the exact nature of injury in all cases. Anterior cruciate ligament (ACL) was the most commonly injured ligament. Right sided injuries were more common than the left side. Partial thickness tears were more common. Tibial attachment was more involved than the femoral attachment.

Table 2: Distribution of MRI findings of ACL involvement

Findings	Number of Patients	%
Side		
Left	18	36%
Right	32	64%
ACL tear		
Compete	17	34%
Partial	27	54%
Location of ACL tear		
Midsubstance	14	28%
Femoral attachment	8	16%
Tibial attachment	27	54%

Involvement of medial as well as lateral meniscus was also seen satisfactorily on MRI. The distribution of findings of meniscal involvement is summarized in Table 3. Overall medial meniscus was more commonly involved rather than the lateral meniscus. Posterior horn was more involved in either of the cases than the anterior horn.

Table 3: Distribution of findings of meniscal involvement on MRI

Findings	**Medial Meniscus**	**Lateral Meniscus**
	No. of patients (%)	No. of patients (%)
Anterior Horn	7(14%)	8(16%)
Posterior Horn	35(70%)	21(42%)

Involvement of posterior cruciate ligament (PCL) was also satisfactorily demonstrated by MRI. The distribution of findings of PCL involvement is summarized in Table 4.

Table 4: Distribution of findings of meniscal involvement on MRI

Findings	No. of patients	(%)
Complete Tear	04	08%
Partial Tear	02	04%
BUCKLING	21	42%

DISCUSSION

A plethora of pathologies can present as painful knee. Imaging is useful to identify and confirm the clinically suspected pathologies and also to assessing its extent and gravity.[3-6]

Clinical examination in such cases usually suggests internal derangement. So correct diagnosis is needed to perform or to avoid invasive procedures like Arthroscopy.

A host of imaging modalities is available for evaluation of the knee joint. Plain radiographs demonstrate bone pathologies clearly. Soft tissue and cystic lesions may be missed. Only a focal bulge on overlying soft tissues may be noticed. Computerized tomography (CT scan) may show the lesions, but the exact tissue characterization may be limited. In experienced hands, musculoskeletal ultrasound can very well depict the soft tissue pathology. The biggest advantage of MRI is that it shows the entire lesion in multiple planes so that correct diagnosis and management strategy can be planned. The MRI

appearance of various soft tissue lesions has been studied and mentioned in literature. [4-16]

On MRI ACL and PCL are seen as hypo intense bands on T1W, T2W as well as STIR (Short Tau Inversion Recovery) images. Any injury to them manifests as a hyperintense appearance on T2W and STIR images. This injury may result in partial or full thickness tear of these structures.

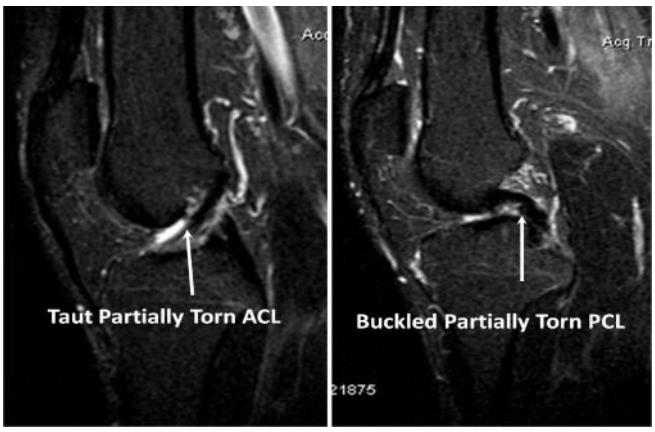

Fig 1: STIR sagittal images showing pathologies of ACL and PCL

Similarly, the meniscus of knee too is seen as a hypo intense structure on T1W, T2W as well as STIR images. Any injury to them manifests as a hyperintense appearance on T2W and STIR images. This injury may result in partial or full thickness tear of these structures.

MRI is used to obtain the sections of these regions of interest in different planes. Standard planes are the axial, coronal and sagittal planes. Sometimes oblique images too may be required. The representative MRI appearance of soft tissue injury presenting as painful knee is shown in following image.

It has been found that the disruption of a knee ligament is commonest pathology in patients having post traumatic knee pain. It is important to develop a mechanistic approach to associate the imaging findings with their anatomic relevance.[17]

Substantial pain and disability caused in Osteoarthritis of the knee shows a poor correlation with plain radiographs. Pain receptors have been found in joint capsule, ligaments, synovium as well as in the subchondral bone. It has now been understood that no definitive treatment modality can relieve the pain and knee surgery does not necessarily guarantee improvement. Hence a proper clinical assessment of knee and appropriate MRI examination can permit proper treatment.[18]

Not only adults, but children and adolescents too, commonly present with knee pain. Again the commonet performed a pediatric cross-sectional imaging study is the MRI of the knee. Differences between adult and pediatric knee imaging exist and in younger age group one has to remember normal developmental variants, injury and disease patterns unique to children and adolescents.[19]

MRI has revolutionized diagnostic imaging of the knee as this innovative technology allows superior soft tissue details with multiplanar imaging capability that provide accurate evaluation of the intra and extra articular structure of the knee which are demonstrated with other imaging modalities.MRI is accurate, non invasive technique for evaluating the structures of the knee, marrow space, synovium and periarticular soft tissue concerning the knee.[20, 21] It has great capacity in diagnosing meniscal tear and classifying them into grade and type which would avoid unnecessary arthroscopic examination. It is a very good modality to diagnose a complete tear of the ACL.

New discoveries in the field of computer science and telecommunications have reduced the cost of MRI knee studies. This too has increased the acceptance of MRI imaging by the orthopedic community with quote results almost same and satisfactory as a non invasive replacement for arthrography and non therapeutic Arthroscopy. [22]

CONCLUSION

Plethora of causes can cause painful knee. It is a common symptom in all age groups. Correct treatment necessitates accurate noninvasive diagnosis. Imaging of the knee joint by MRI can satisfactorily provide the correct diagnosis. This has led to the increase use as well as the increased acceptance of MRI in the imaging evaluation of painful knee.

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