ORIGINAL RESEARCH

Role of Magnetic resonance imaging in assessment of knee joint pathologies

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Received: 22 March, 2019 Accepted: 26 April, 2019

ABSTRACT
Background: One of the biggest and most intricate joints in the body is the knee. Injuries and disease processes that damage the knee's ligaments, menisci, articular cartilage, and other components can cause painful knees that lead to serious morbidity and disability. The present study was conducted to assess the efficacy of MRI in evaluation of knee joint pathologies.**Materials & Methods:**80 patients with painful knee joint scheduled for MRI of both genders were selected. Using MRI scans conducted using a Siemens 1.5 Tesla High gradient MRI scanner, the knee joint was assessed, and different knee joint pathologies were noted. T1 and T2 weighted sequences in sagittal planes, PD weighted sequences in axial, coronal, and sagittal planes, and fat suppressed T2 or STIR sequences where specified were all part of the MRI protocol.**Results:** Age group 10-30 years had 32, 30-50 years had 30 and 50-70 31-40 years had 18 patients. The difference was non- significant (P> 0.05). Common knee pathologies were medial collateral ligament tears in 10, lateral collateral ligament tears in 18, chondromalacia patellae in 9, osteochondritisdissecans in 6, rheumatoid arthritis in 4, infection in 2, anterior cruciate ligament tear in 10, posterior cruciate ligament tear in 7, medial meniscal tears in 8, and lateral meniscal tears in 6 patients. The difference was significant (P< 0.05).**Conclusion:**An accurate, non-invasive, and reasonably priced way to assess a sore knee is with magnetic resonance imaging (MRI).
Key words: Spin echo, Knee, MRI

INTRODUCTION

One of the biggest and most intricate joints in the body is the knee. Injuries and disease processes that damage the knee's ligaments, menisci, articular cartilage, and other components can cause painful knees that lead to serious morbidity and disability.When magnetic resonance imaging (MRI) was first developed in the early 1980s, its usefulness for imaging the knee became evident almost immediately.[1] The use of MRI in the knee has significantly increased with the advent of high field systems, open systems, extremity units, and specific closely connected extremity coils, among other technological advancements.[2] In order to evaluate menisci and cruciate ligaments, MR examination, a non-invasive modality, has essentially replaced conventional arthrography. This has reduced the morbidity and expenses associated with negative arthroscopic examinations and are now routinely used to assess a wide range of internal knee derangements and articular disorders.[3]

Preoperative planning and the selection of surgical candidates have both benefited from the use of MR imaging.[4] The orthopaedic profession has accepted MR knee studies as a non-invasive

alternative to arthrography and non-therapeutic arthroscopy, in part because of their declining cost.[5] To provide diagnostic-quality pictures, a large range of MRI pulse sequences can be used. These have all been shown to be appropriate for knee imaging and include T1, proton density, T2, STIR, spin echo, rapid (turbo) spin-echo, and gradient-echo sequences.[6]

AIM AND OBJECTIVES

- The present study was conducted to assess the efficacy of MRI in evaluation of knee joint pathologies.
- To identify the various ligament and meniscal injuries.
- To describe the MRI features of the ligament and meniscal injuries.
- To identify common lesions seen in the knee joint and describe the MRI features in various types of traumatic and non-traumatic lesions causing knee join.

MATERIALS & METHODS

This study was conducted on 80 patients with painful knee joint scheduled for MRI of both gendersat the Department of Radiology, Gouri Devi Institute of Medical Science and Hospital, Rajbandh, Durgapur, West Bengalin collaboration with Department of Psychiatry, Major SD Singh Medical college, farukkhabad Uttar Pradesh, India, from January 2018 to February 2019 after obtaining ethical clearance from the Institutional Ethical Clearance Committee. All were well informed the study and their written consent was obtained.Data such as name, age, gender etc. was recorded.

Inclusion Criteria

- Patients who provided informed consent and were willing to participate in follow-up assessments.
- Patients who undergo MR imaging of the knee joint pathologies

Exclusion Criteria

- Patients who not provided informed consent and were not willing to participate in follow-up assessments
- Patients with cardiac pacemakers and metallic implants were not subjected to MRI

Using MRI scans conducted using a Siemens 1.5 Tesla High gradient MRI scanner, the knee joint was assessed, and different knee joint pathologies were noted. T1 and T2 weighted sequences in sagittal planes, PD weighted sequences in axial, coronal, and sagittal planes, and fat suppressed T2 or STIR sequences where specified were all part of the MRI protocol.

Statistical Analysis

The data obtained was subjected to statistical analysis using a Microsoft Excel spreadsheet and analysed using software Statistical Package for the Social Sciences (SPSS) 22.0 version. The data were represented in tables and graphs. Categorical variables were summarised in frequency and percent distribution, and a chi-square test was performed by a statistician. P value less than 0.05 was considered significant.

RESULTS

Table I: Age wise distribution of patients

Age group (Years)	Number (N=80)	P value
10-30	32 (40%)	0.75
30-50	30(37.5%)	
50-70	18(22.5%)	

Figure 1: Age group wise distribution of the patients

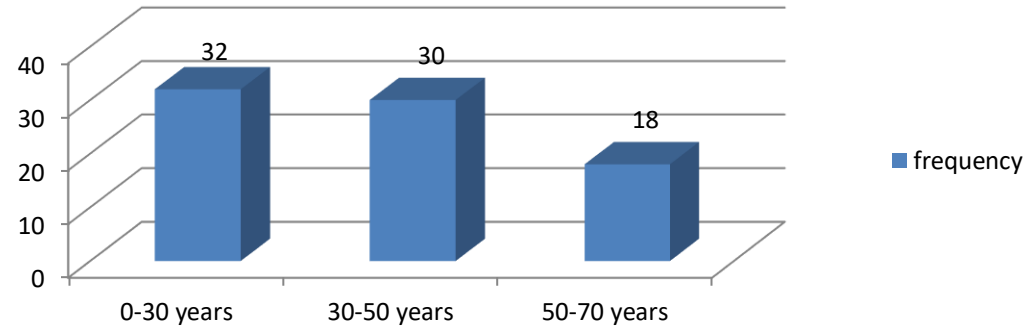


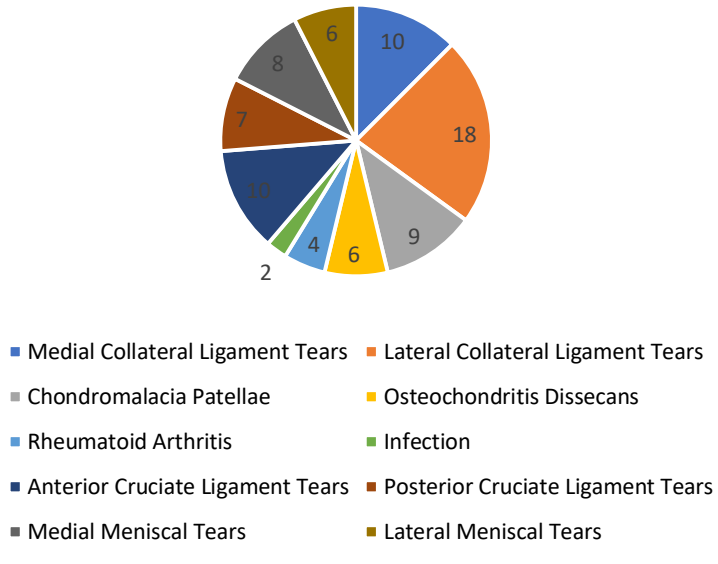
Table I , figure1 shows that age group 10-30 years had 32, 30-50 years had 30 and 50-70 31-40 years had 18 patients. The difference was non- significant (P> 0.05).

Table II: Differentknee pathologies

Knee pathologies	Number	P value
Medial Collateral Ligament Tears	10	0.04
Lateral Collateral Ligament Tears	18	
Chondromalacia Patellae	9	
OsteochondritisDissecans	6	
Rheumatoid Arthritis	4	
Infection	2	
Anterior Cruciate Ligament Tears	10	
Posterior Cruciate Ligament Tears	7	
Medial Meniscal Tears	8	
Lateral Meniscal Tears	6	

Table II, Figure 2 shows that common knee pathologies were medial collateral ligament tearsin10, lateral collateral ligament tears in 18, chondromalaciapatellae in 9, osteochondritisdissecans in 6, rheumatoid arthritisin4, infection in 2, anterior cruciate ligament tear in 10, posterior cruciate ligament tear in 7, medial meniscal tears in 8, and lateral meniscal tears in 6 patients. The difference was significant (P< 0.05).

Figure 2: Different knee pathologies



DISCUSSION

Standard radiography, scintigraphy, computed tomography (CT), planar tomography, and arthrography are among the imaging modalities currently utilized to assess knee problems. Imaging of the knee has been transformed by magnetic resonance (MR).[7]The relevance of MRI in the assessment of meniscal and ligamentous injuries has been validated by a substantial body of research comparing MRI with arthroscopic findings. In addition to being non-invasive, operator-independent, and economical, MRI has a significant advantage over other imaging modalities due to its greater soft tissue detail and multiplanar imaging capability.[8]MRI has revolutionized the knee imaging in the present era. Substantial evidence exists in the literature comparing MRI with arthroscopic findings which has helped in validating the role of MRI for the evaluation of meniscal and ligamentous injuries.[9]Multiplanar imaging capability and superior soft tissue detail provides a distant advantage for MRI over other imaging modalities in addition to its non-invasive, non-

operator dependent, and cost-effective nature.[10,11]The present study was conducted to assess the efficacy of MRI in evaluation of knee joint pathologies.

We observed that age group 10-30 years had 32, 30-50 years had 30 and 50-70 31-40 years had 18 patients. Singh et al[12] discovered that internal abnormalities of the patella and quadriceps mechanism, cartilage, and synovium, as well as those of the cruciate ligaments and menisci, were the knee illnesses that could be assessed by MRI the best. Bone anomalies such tumors and osteonecrosis, as well as fractures and contusions, can also be found. Sonography is typically used in conjunction with indirect or dynamic techniques to identify anterior cruciate ligament injuries (ACL). Sonography makes the posterior cruciate ligament very visible. Joint effusion was the most common knee finding, occurring in 44 cases (88%) and followed by ligament 33 cases (66%), 11 osseous cases (22%), and 1 muscle case (2%). There was no discernible sex bias. There was no discernible sex bias. The second decade was the age group most frequently impacted in this study. Only two cases of meniscal degeneration and one case of meniscal cysts were found; the majority of cases were meniscal tears.

We found that common knee pathologies were medial collateral ligament tears in 10, lateral collateral ligament tears in 18, chondromalaciapatellae in 9, osteochondritisdissecans in 6, rheumatoid arthritis in 4, infection in 2, anterior cruciate ligament tear in 10, posterior cruciate ligament tear in 7, medial meniscal tears in 8, and lateral meniscal tears in 6 patients. Sansone et al[13]studied retrospectively the epidemiological features of popliteal cysts in adults and the incidence of associated intra-articular disorders in a series of 1001 patients undergoing magnetic resonance imaging. Images of popliteal cysts were seen in 4.7% of this group which is lower than in other studies with different imaging techniques. A communication with the joint was invariably found. The cysts were associated with one, or more, disorders detected by MRI in 94%. The commonest lesions were meniscal (83%), frequently involving the posterior horn of the medial meniscus, chondral (43%), and anterior cruciate ligament tears. The data suggested that intra-articular disorders may play an important role in the pathogenesis of popliteal cysts in adults.

Meniscal tears were the most prevalent soft tissue anomaly in our sample, according to Bansal et al.'s[14] evaluation of knee MRI. The majority of tears were Grade 2 and more frequently affected the posterior horn of the medial meniscus. The most prevalent kind of meniscal tear was vertical, and it was linked to a history of trauma. The most frequent condition affecting the ACL was tear, with the majority of these being acute in nature. The most prevalent PCL pathology was a partial tear. The tibia was most frequently affected, followed by the lateral femoral condyle, and one-third of the patients had bone contusions. Bone contusions were typically linked to acute ACL rupture. The most prevalent cystic lesion was a popliteal cyst, which was linked to meniscal tears and effusions. Osteoarthritis most frequently affected the patello-femoral compartment.

LIMITATION OF THE STUDY: The shortcoming of the study is small sample size.

CONCLUSION

Authors found that an accurate, non-invasive, and reasonably priced way to assess a sore knee is with magnetic resonance imaging (MRI).

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