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Original Research

Knee joint pathologies assessment with magnetic resonance imaging

Sandeep Kumar

Associate Professor, Department of Radio Diagnosis, Venkateshwara Institute of Medical Sciences, Gajraula, Uttar Pradesh, India

ABSTRACT:

Background: MRI is an accurate, non-invasive method to diagnose knee injuries, and gives sufficient information to support decisions for conservative treatment and save a patient from unnecessary arthroscopy. The present study was conducted to evaluate the efficacy of MRI in knee joint pathologies. **Materials & Methods:** 80 patients with painful knee joint of both genders underwent MRI of knee joint with 1.5 Tesla high gradient MRI scanner. T1 and T2 weighted sequences in sagittal planes, PD weighted sequences in axial, coronal and sagittal planes and fat suppressed T2 or STIR sequences were recorded. **Results:** Out of 80 patients, males were 46 and females were 34. Age group 11-20 years had 8, 21-30 years had 19, 31-40 years had 21, 41-50 years had 20, 51-60 years had 12 patients. The difference was significant (P< 0.05). Common knee pathologies were medial meniscal tears in 6, lateral meniscal tears in 7, chondromalacia patellae in 5, rheumatoid arthritis in 8, anterior cruciate ligament tear in 14, posterior cruciate ligament tear in 10, medial collateral ligament tears in 5, lateral collateral ligament tears in 7, osteochondritis dissecans in 8 and infection in 10 patients. The difference was significant (P< 0.05). **Conclusion:** Common knee pathologies were anterior cruciate ligament tear, posterior cruciate ligament tear, chondromalacia patellae, rheumatoid arthritis, medial collateral ligament tears, lateral collateral ligament tears, medial meniscal tears, lateral meniscal tears, osteochondritis dissecans and infection. MRI is an accurate and cost- effective radiographic aid useful in diagnosis of painful knee.

Key words: Anterior cruciate ligament tear, Knee, MRI

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Corresponding author: Sandeep Kumar, Associate Professor, Department of Radio Diagnosis, Venkateshwara Institute of Medical Sciences, Gajraula, Uttar Pradesh, India

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INTRODUCTION

Knee is one of the largest and most complex joints in the body. Disease processes and injuries that disrupt ligaments, menisci, articular cartilage and other structures of the knee cause painful knee resulting in significant morbidity and disability.[1] Osteoarthritis, a common cause of knee pain in this age group, is expected to continue to increase in incidence, especially as the overall population ages and becomes increasingly more overweight.[2]

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 a patient from unnecessary arthroscopy. The value of magnetic resonance imaging (MRI) for imaging the knee was apparent almost immediately after the introduction of this modality in the early 1980s.[3] With the introduction of special closely coupled extremity coils, high field systems, open systems, extremity units and other technical advances, the utility of MRI in the knee has expanded dramatically. MR examination, a non-invasive modality, is now routinely used to assess a wide spectrum of internal knee derangements and articular disorders and has virtually replaced conventional arthrography in the evaluation of menisci and cruciate ligaments, decreasing both morbidity and costs associated with negative arthroscopic examinations.[4] MR imaging has also proved valuable in the selection of surgical candidates and in preoperative planning.[5] The decrease in the cost of MR knee studies has also contributed to their acceptance by the orthopaedic community as a non-invasive replacement for arthrography and non-therapeutic arthroscopy.[5] The present study was conducted to evaluate the efficacy of MRI in knee joint pathologies.

MATERIALS & METHODS

The present study was comprised of 80 patients with painful knee joint of both genders. All were informed regarding the study and their written consent was obtained.

Data such as name, age, gender etc. was recorded. All underwent MRI of knee joint with 1.5 Tesla high gradient MRI scanner. T1 and T2 weighted sequences in sagittal planes, PD weighted sequences in axial, coronal and sagittal planes and fat suppressed T2 or STIR sequences were recorded. Results thus obtained were subjected to statistical analysis. P value less than 0.05 was considered significant.

RESULTS

Table I Distribution of patients based on gender

Total- 80		
Gender	**Males**	**Females**
Number	46	34

Table I shows that out of 80 patients, males were 46 and females were 34.

Table II Distribution of patients based on age group

Age group (Years)	Number	P value
11-20	8	0.01
21-30	19	
31-40	21	
41-50	20	
51-60	12	

Table II, graph I shows that age group 11-20 years had 8, 21-30 years had 19, 31-40 years had 21, 41-50 years had 20, 51-60 years had 12 patients. The difference was significant (P< 0.05).

Graph I Distribution of patients based on age group

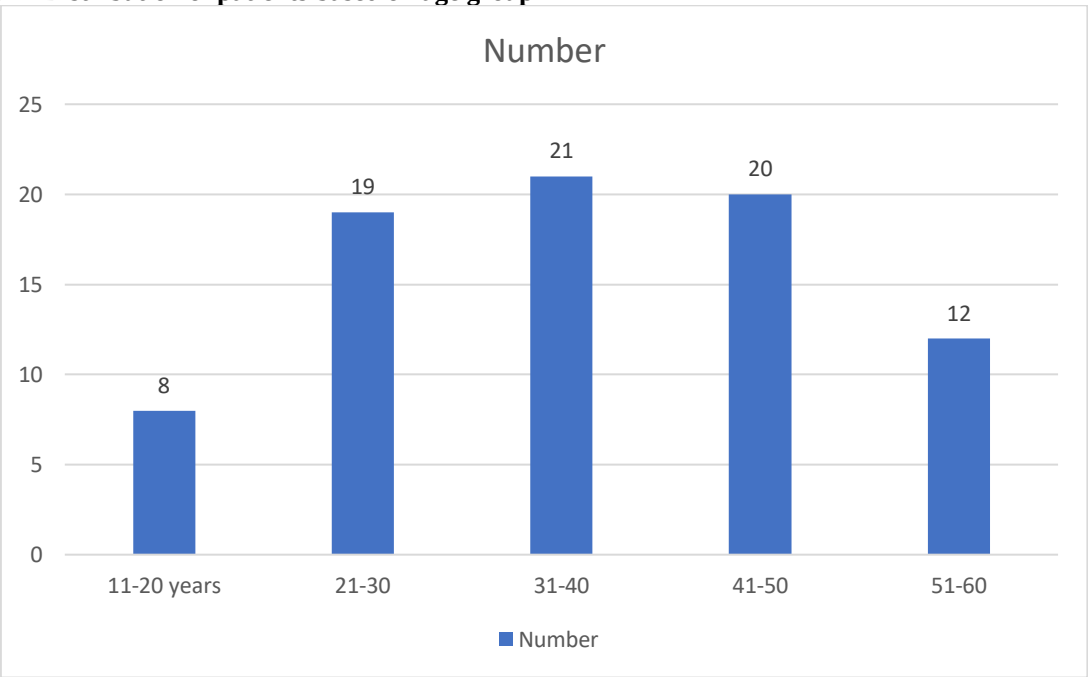


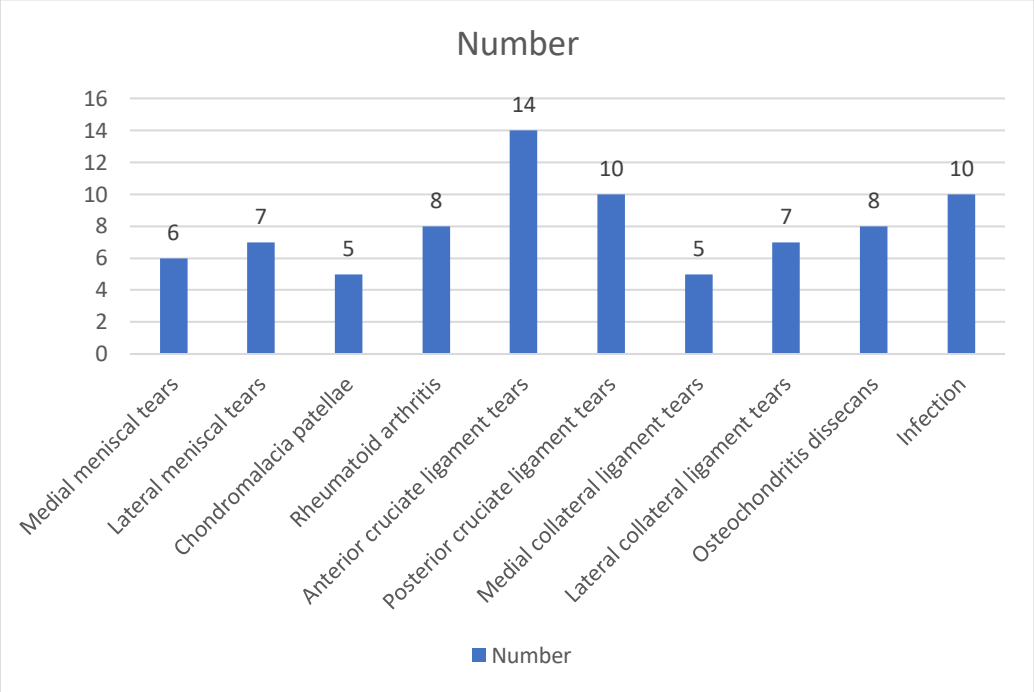
Table III Assessment of knee pathologies with MRI

Knee pathologies	Number	P value
Medial meniscal tears	6	0.05
Lateral meniscal tears	7	
Chondromalacia patellae	5	
Rheumatoid arthritis	8	
Anterior cruciate ligament tears	14	
Posterior cruciate ligament tears	10	
Medial collateral ligament tears	5	
Lateral collateral ligament tears	7	

Osteochondritis dissecans	8	
Infection	10	

Table III, graph II shows that common knee pathologies were medial meniscal tears in 6, lateral meniscal tears in 7, chondromalacia patellae in 5, rheumatoid arthritis in 8, anterior cruciate ligament tear in 14, posterior cruciate ligament tear in 10, medial collateral ligament tears in 5, lateral collateral ligament tears in 7, osteochondritis dissecans in 8 and infection in 10 patients. The difference was significant (P< 0.05).

Graph II Assessment of knee pathologies with MRI



DISCUSSION

Arthroscopy is considered “the gold standard” for the diagnosis of traumatic intraarticular knee lesions. However, arthroscopy is an invasive procedure that requires hospitalization and anesthesia, thus presenting all the potential complications of a surgical procedure.[6] Since its introduction in the 1980s, magnetic resonance imaging (MRI) has gained in popularity as a diagnostic tool for musculoskeletal disorders. Magnetic resonance imaging (MRI) has become the most important modality for assessment of pathologic changes in knee cartilage, in both clinical and research environments.[7] One of the major advantages of MRI is that it allows the manipulation of contrast to highlight different tissue types.[8] The new surgical and pharmacologic options available to treat damaged cartilage and the need to monitor the effects of treatment, have led to the development of various MRI techniques that allow morphologic assessment of cartilage, quantification of its volume and evaluation of its biochemical composition.[9] MRI, by virtue of its superior soft-tissue contrast, lack of ionizing radiation and multiplanar capabilities, is superior to more conventional techniques for the evaluation of articular cartilage.[10] The present study was conducted to evaluate the efficacy of MRI in knee joint pathologies.

We found that out of 80 patients, males were 46 and females were 34. Avcu et al[11] examined the relationship between the pathological findings and the age and sex of the patients. The ages of the patients ranged between 1 and 74 years. Age was significantly correlated with meniscal degeneration and tears, medial collateral ligament degeneration, parameniscal cyst, and chondromalacia patellae. There was a significant correlation between male gender and anterior cruciate ligament injury. Meniscal injury was significantly correlated with bursitis, as well as medial collateral ligament injury. Bone bruise was significantly correlated with medial collateral ligament injury, lateral collateral ligament injury, Baker's cyst, and anterior cruciate ligament injury. Chondromalacia patellae was significantly correlated with anterior cruciate ligament injury, patellae alta and osteochondral lesion. Bursitis (in 53.2% of the patients) followed by grade-II meniscal degeneration (in 43% of the patients) were the most common knee pathologies observed by MRI.

We found that age group 11-20 years had 8, 21-30 years had 19, 31-40 years had 21, 41-50 years had 20, 51-60 years had 12 patients. Shah et al[12] conducted a study on 150 patients. Out of 90 patients with articular cartilage defect, 30 patients (20%) had full thickness cartilage defects. Subchondral marrow edema was seen beneath 30 patients (20%) with articular cartilage

defects. 32 patients (21.1%) had a complex or macerated meniscal tear. Complete anterior cruciate ligament tear was found in seven patients. Joint effusions were detected in 70% (105) of the knees. Large Baker cysts were observed in 6.1% of the knees.

We observed that common knee pathologies were medial meniscal tears in 6, lateral meniscal tears in 7, chondromalacia patellae in 5, rheumatoid arthritis in 8, anterior cruciate ligament tear in 14, posterior cruciate ligament tear in 10, medial collateral ligament tears in 5, lateral collateral ligament tears in 7, osteochondritis dissecans in 8 and infection in 10 patients. Bansal et al[13] evaluated knee MRI and found that meniscal tears were the commonest soft tissue abnormality found in our study. Tears involved posterior horn of the medial meniscus more commonly and were mostly grade 2. Vertical tears were the commonest type of meniscal tear and were associated with a history of trauma. Tear was the commonest pathology affecting the ACL, most being acute in nature. Partial PCL tear was the commonest PCL pathology. 1/3rd of the patients had bone contusion and tibia was more commonly involved followed by lateral femoral condyle. Acute ACL tears were usually associated with bone contusions. Popliteal cyst was the commonest cystic lesion and was associated with effusions and meniscal tears.

CONCLUSION

Authors found that common knee pathologies were anterior cruciate ligament tear, posterior cruciate ligament tear, chondromalacia patellae, rheumatoid arthritis, medial collateral ligament tears, lateral collateral ligament tears, medial meniscal tears, lateral meniscal tears, osteochondritis dissecans and infection. MRI is an accurate and cost- effective radiographic aid useful in diagnosis of painful knee.

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