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ROLE OF MAGNETIC RESONANCE IMAGING IN THE EVALUATION OF POST TRAUMATIC PAINFUL KNEE JOINT

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Abstract:

Background: *MRI is suggested for the patients who have complained of painful knee after trauma or inflammation or due to infection. In the present study the post traumatic patients with painful knee were included. After clinical examinations the patients were referred to Radiology Department for diagnosis .MRI was performed on these patients.*

Methodology: *The study was conducted in the Radiology department of Lahore General Hospital from the period of January 2020 to October 2020.Total 100 patients were included in the study with painful knee who were referred for MRI to diagnose their problem accurately.*

Results: *Female participants were 30 and the male participants were 70. 38.38± 14.46 years was the mean age and SD of the participants. The patients were post traumatic. The most common issue identified was injury to ACL (anterior cruciate ligament).It is abnormality in soft tissues. Complete tears were not common. Partial tears were found in most cases. Tibial attachment was common as compared to the femoral attachment. Injury to medial collateral ligament and posterior horn of medical meniscus was found common.*

Conclusion: *MRI is an accurate non invasive diagnostic option for the patients of painful knee. It is helpful in diagnosis of nature and extent of soft tissues and bone abnormality.*

Keywords: *MRI, Painful Knee, Soft tissues, Antrior Cruciate ligament*

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INTRODUCTION:

Knee joint is the complex and largest joint in human body. Injuries and diseases can disturb the menisci, ligaments, cartilage, articular and structure of the knee which can hinders the movement and may result in the disability and morbidity. It is vital to diagnose the exact lesions which are the source of pain (1, 2).For treatment it is vital to identify the problem .MRI is non invasive and accurate diagnostic option which help to explore the pathology of the knee with minimum discomfort to the patients (3).The purpose of the study is to identify the role of MRI in evaluation of painful knee after trauma.

METHODOLOGY:

The present study was conducted in Radiology Department of Lahore General Hospital from time period of January 2020 to October 2020.Total participants in the study were 100 patients with knee pain complain. The inclusive criteria for the sample were patients with knee pain, from any gender and from all age groups having suffered trauma. Patients with prior surgeries and metallic implant were excluded from the study. The MRI scanner used for evaluation of patients was 1.5 Tesla high Gradient Philips Achieva.

RESULTS:

The participants were from both gender .Female participants were 30 and the male participants were 70 out of total 100 patients. The male were more in number because of their exposure to external environment and their travelling on motor bikes. Male are more expose to external risks of trauma than female. The age group of the patients was of wide range. Youngsters up to senior citizens came for MRI evaluation after trauma. The mean age and standard deviation calculated for the patients were 38.38± 14.46.

Table 1 Gender and age group distribution

Gender	**Number of cases**	**Percentage**
Male	70	70%
Female	30	30%
Age		
Less than 20 years	20	20%
21-30	22	22%
31-40	18	18%
41-50	20	20%
51-60	10	10%
61 and above	10	10%
Total	100	100%

From the above table 1 it is clear maximum patients were from the age group of less than 20 years to 40 years. The purpose of the MRI evaluation is to accurately identify the nature of problem in knee joint which is the cause of pain.

Table 2 Knee Pathology on MRI

Pathology of Knee	**Cases**	**Percentage**
Degeneration of meniscal	20	20%
Effusion of Joint	80	80%
Contusion of bone	32	32%
Osteoarthritis	30	30%
Fracture of bone	10	10%
ACL tear	34	34%
PCL tear	10	10%
Collateral ligament injury	20	20%
Meniscal tear	40	40%
Neoplastic lesions	9	9%
Edema and Muscular injury	4	4%
Cystic lesions	18	18%
Synovial pathology	4	4%

The percentage of knee pathology is exceeding 100 percent because pathology is not mutually exclusive.

MRI scan for the selected sample showed that 40 out of 100 patients were found 68% of the meniscal tears and from the 40 patients with meniscal tears 27(67.5%) were found with medial meniscus tear and 8(20%)were found lateral meniscus tear and 14(35%) have both lateral and medial meniscus tears. From 68 meniscal tear found on MRI.44 (64.2%) found medial meniscus and 23(33.8%) found lateral meniscus. From the medial meniscus found 2(4.5%) were grade I tear and 28(63.6%) were grade II tears and remaining 13(29.5%) were grade III tears. Medial meniscus tears (44), posterior horn was involved in 29(65.9%), anterior horn was involved by 6(13.6%) and body of meniscus was found in 9(20.4%) tears. From 34 lateral meniscal tears the interior horn was involved in 15(44.1%) and posterior horn was involved in 17(50%) and the body of meniscus was found in 2(4.5%).

Table 3 type of Meniscal Tears on MRI

Meniscal tears types	**Number of cases**	**Percentage**
Complex tear	19	27.9%
Horizontal tear	12	17.6%
Vertical tear	34	50%
Bucket Handle tear	3	4.5%
Total	68	100%

In knee pain the most common cause identified was the injury of ligament. Anterior cruciate ligament was observed commonly. Injury on right knee 64% was common as compared to left knee 36%.Femoral attachment was not common while tibial attachment was commonly observed.

Table 4 ACL findings on MRI

Findings	**Number of cases**	**Percentage**
Side of Knee		
Right knee	64	64%
Left knee	36	36%
ACL tear location		
Tibial attachment	18	52.9%
Femoral attachment	10	29.4%
Midsubstance	6	17.4%

MRI has accurately diagnosed the involvement of lateral and medial meniscus in knee pain. From the table 3 it is clear that the medial meniscal was involved in the knee pain and posterior horn was commonly observed in lateral and medial meniscus. Anterior horn involvement was not commonly observed. Posterior cruciate ligament was also accurately diagnosed by MRI.

DISCUSSION:

The purpose of the study is to diagnose the painful knee pathology by using MRI. The images help to assess the gravity and extent of the knee problem. (4.5).The clinical examination suspects internal derangements. The accurate diagnosis of knee problem helps to avoid the invasive procedures and arthroscopy. Different kind of imaging modalities are widely available and used for knee joints. Simple radiographs can illustrate the bone pathology clearly but they don't provide information about the cystic lesions and soft tissues. A focal bulge was noticed on the soft tissue. CT scan images can illustrate the lesions but still the limited characteristics of soft tissues can be identified. Ultrasound can also help to diagnose the soft tissues pathology depending upon the experience of the radiologist.MRI has advantages on all the imaging modalities as the complete lesion can be viewed with the help of multiple planes which accurately diagnose the problem and the treatment plan can be managed according to accurate diagnosis.MRI is widely used in post traumatic patients for diagnostic purpose and to manage the treatment plan. MRI images illustrate posterior cruciate ligament and anterior cruciate ligament as hypo intense bands in T1 and T weighted images and also hypo intense image in Short Tau Inversion recovery(STIR).If any injury take place the knee area can be observed as hyper intense appearance in T1 and T2 weighted images and also hyper intense in STIR images. These injuries can result in complete or partial tear.T1, T2 weighted images and STIR images shows the meniscus of knee structure as hypo intense. The damage or injury to meniscus can be viewed as hyper intense in STIR images and in T1, T2 images. Injuries show either partial thickness or complete thickness depending upon the nature of tear.MRI different planes can help to identify the problematic

areas in knee. Sagittal planes, standard planes, coronal planes and axial planes are used. Oblique images are sometime also obtained .Post traumatic knee pain is a common cause of disruption of pathology in the knee ligament. Images can help to identify the anatomic relevance of pain for better treat planning. The pain receptors are found in ligaments, joint capsules, synovium and in the subchondral bone. It is possible that treatment plan including surgeries may sometime be not able to manage the pain completely. But it can improve the quality of life by reducing knee pain considerably.MRI advancement has revolutionized the diagnostic radiology. MRI images provide detail information about soft tissues, extra and intra articular structure of knee. MRI diagnosis is accurate and it is a non invasive technique with minimum discomfort. It accurately diagnosis the meniscal tears and help in grading and classification of tears according to their appearance.

CONCLUSION:

Knee pain is commonly observed in old age group but due to trauma or any other medical issue it can happen to any age group. For good treatment it is necessary to identify the problem area and the nature of issue. MRI is a best diagnostic option for painful knee management.

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