



MRI Evaluation of Meniscal and Ligamentous Injuries of Knee

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Abstract

Aim & Objectives: *To Study the spectrum of MRI findings in all consecutive cases of knee trauma and To evaluate the types and degree of various ligamentous and meniscal injuries by MRI.*

Result: *patient between 21-30 years are the most common group having knee injury and ACL is the most common ligaments to get injured.*

Conclusion: *MRI is usefull in knee joint injury and to avoid unnecessary interventions.*

Keywords: *knee injury, MRI of knee, ACL, PCL, MCL, LCL, meniscus.*

Introduction

Knee joint is the largest and complex joint of the body and also one of the most frequently injured joint. Important structures within the knee joint include the anterior cruciate ligament (ACL), posterior cruciate ligament (PCL), medial meniscus (MM) and the lateral meniscus (LM). The stability of the knee joint is highly dependent on its supporting ligamentous structures, on the other hand the ligaments and menisci of knee are very susceptible to injuries¹. The majority of knee joint injuries results from the direct trauma to the knee joint or is caused by torsional or angulatory forces. These injuries vary in severity from simple ligamentous strain to complex injuries involving ligamentous disruption with meniscal damage and associated fracture¹.

Arthroscopy and MRI are most commonly used for diagnosis of internal derangement of knee.

Demerits of arthroscopy is its invasive^{2,3}. But MRI is a excellent modality for diagnosis of ligamentous and meniscal injury of knee because it is a non invasive modality and it devoid of ionizing radiation⁴. MRI has superior soft tissue contrast and can detect very minor injury to intrarticular structures. MRI is helpful in avoiding unnecessary intervention in knee joint⁵.

Materials and Method

The study included patients who were clinically diagnosed to have ligamentous injuries of the knee, undergoing MRI scan in the department of Radio-Diagnosis and Imaging in VIMSAR. A total number of 113 patient of all the age and either sex were included in the study and the Period of study was 2 years (November 2017 – October 2019). Patients with ferromagnetic implants, pacemakers, aneurysm

clips, inflammatory /infectious/ neoplastic condition of knee and major injuries like liver / splenic rupture and flail chest and patients with unstable vital parameters especially in the setting of trauma were excluded from the study.

After thorough clinical history and clinical examination patient were subjected to 1.5 Tesla GE Signa MRI machine and Types and grading of meniscal and ligamentous injury of knee were studied.

Observation

Table No: 1 Age Distribution of the Patient Studied

AGE IN YEARS	Number	Percentage
10- 20	15	13.27
21-30	52	46.05
31-40	30	26.54
41-50	8	7.07
>50	8	7.07
TOTAL	113	100

Table No: 2 Gender Distribution of the Patient Studied

Gender	No Of Patient	Percentage
Male	102	90.26
Female	11	9.74
TOTAL	113	100

Table No 3: Distribution of the Involved Knee Joint

	No Of Patient	Percentage
RT KNEE	55	48.67
LT KNEE	58	51.33
TOTAL	113	100

Table: 4 Distribution of Clinical Presentation

Clinical presentation	Number	Percentage
Knee Pain	103	91.15
Knee Swelling	76	67.25
Knee Locking	20	17.69
Knee Instability	17	15.04
Knee Buckling	15	13.27

Table No: 5 Distribution of the Patients according to Duration of Injury

Duration of Injury	Number	Percentage
Upto 1 Week	39	34.51
1week To 2 Week	25	22.22
2 Week To 3 Week	10	8.84
3 Week To 4 Week	11	9.76

1 Month to 6 month	15	13.37
>6 Month	13	11.3
Total	113	100

Table No: 6 Distribution of Ligamentous and Meniscal Tear

Name of the ligament \ meniscus	Frequency	Percentage
ACL	78	69.02
PCL	5	4.42
MCL	15	11.5
LCL	3	2.65
MM	36	31.86
LM	25	20.31

Table No 7 Distribution of Different Types of Meniscal Tear

Meniscal Tear – Types	Number	Percentage
Bucket Handle	9	15.3
Horizontal	11	18.6
Longitudinal	30	50.8
Oblique	5	8.5
Radial	4	6.8
Total	59	100

Table No 8 Distribution of Single/Multiple Injuries

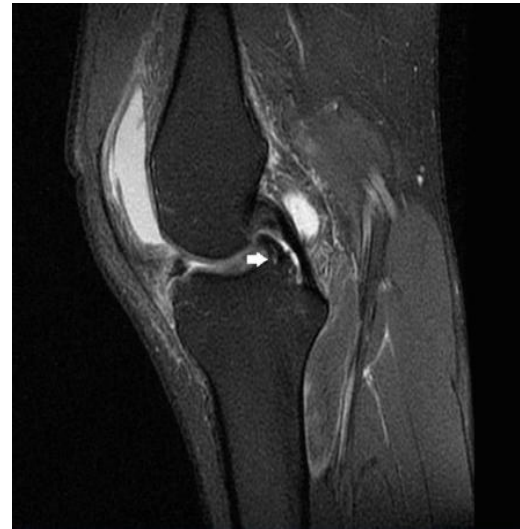
Combined/Multiple injuries	Number	Percentage
Isolated	41	38.3
Two injuries	42	39.3
Three injuries	18	16.8
Four injuries	5	4.7
Five injuries	1	0.9
Total	107	100



The Sagittal PD Fat Suppressed image shows ACL Tear



MRI Knee PD Fat Suppressed sagittal MRI shows PCL tear



1Double PCL Sign- medial meniscus tear



MRI Knee PD Coronal image shows MCL tear



MRI Knee PD Fat Suppressed sagittal plane showing vertical meniscus tear

Discussion

This study included 113 patients who were clinically suspected, underwent MRI of the knee joint. The study population consisted patients in the age group of 10 years to above 50 years. Maximum number of patients who underwent MRI of the knee belonged to the age group of 21 to 30 years. The mean age of study population was 29.92 years (range 21-30 year). **Arom et al⁶** reported a mean age of 35 years when using a large national insurance database with 8050 knee dislocations which is near to our study.

Madurwar et al⁷ where authors noted, out of 50 patients of knee trauma examined, 42 patients (76%) were males and 8 of them were females and **Singh et al⁸** where authors noted 113 men (65.31%) and 60 women (34.69%) out of the 173 patients with history of knee injuries. The study by **Jeevika Mu et al⁹** in 2017 found that out of 43 patients the males (90%) are commonly affected than females (10%). In our study of 113 patients, 90.26% were male and 9.74% were female patients. Percentage distribution of male to female is 9:1 in our study. From above table sex distribution in our study closely matches with **Jeevika Mu et al⁹**

In our study of 113 patient 55 (48.6%) had injury in the right knee while 58 (51.3%) had left sided injury which is similar to the study conducted by **Mandelbaum et al¹⁰**.

In our study most common clinical presentation was knee joint pain seen in 103 cases (91.15%) followed by knee joint swelling seen in 76 patient (67.25%) and the least common symptoms was knee joint bucking. Study conducted by **Bui Mansfield et al**¹¹ shows knee joint pain is the most common symptoms similar to our study. Out of 113 patient 76 cases (67.25 %) shows knee joint effusion which correlate with the study conducted by **milller et al**¹² in which 79% of the subject shows effusion.

Out of the 113 cases 85 cases underwent MRI within one month with an average of 1.9 weeks (range: 1 to 30 days) after trauma and 28 cases underwent MRI after one month with an average of 7.3 week (range: 4 week to 1 years) after trauma. . Study conducted by **Bix Xu et al**¹³ on 377 patient ,160 cases underwent MRI within 4 weeks with an average of 1.6 weeks after tear and 217 cases underwent MRI after one month with an average of 9 week similar to our study.

Singh JP et al¹⁴ al in their series of 173 patients, 78 patients (45.08%) showed ACL tears, among these 52 (66.67%), are partial, 16(20.51%) are complete and 10 (12.82%) cases showed non visualization of ACL. However In our study of 113 patients ACL tear was found in 78 patients (69.02 %) among these 37(47.43%) were partial tears and 41(52.56%) were complete. PCL and LCL are least commonly involved.

In our study out of the 59 meniscal tears, 30 were longitudinal tears, 11 were horizontal tears, 5 were oblique ,4 were radial and 9 were of the bucket handle type of tear. Study conducted by **Berquist et al**¹⁵ shows Longitudinal tears were the commonest type of meniscal tear. But according to **Pasupuleti B et al**¹⁶ horizontal tear was the most common meniscal tear type.

In our study, we found 66 cases of combined injuries and 41 cases of isolated injuries. The predominant pattern is ACL tear and MM tears; followed by ACL tear and LM tear, which is well correlated with a study by **Ali Akbar Esmaili Jah et al**¹⁷, in a series of 71 cases of concomitant injuries by MRI.

Summary & Conclusion

The present study was conducted in 113 cases using 1.5T GE Signa MRI Machine in the department of radio-diagnosis, VIMSAR , Burla aimed to evaluate the role of MRI to detect Meniscal and ligamentous injuries of the knee. Majority no of patients are between 21-30 year and most are males. Most common presenting symptoms were knee joint pain and Right knee joint is most commonly involved. Most common injury was ACL tear and least common was LCL tear. Among the Meniscal tear longitudinal tear was the most common type.

MRI is the examination of choice in the evaluation of internal joint structures injuries of the knee like menisci, cruciate ligaments. It can accurately detect, localize and characterize various internal derangements of the knee joint and help in arriving at a correct anatomical diagnosis thereby guiding further management of the patient. MRI also help in benefits obviating invasive procedure like athroscopy in those patient it's not beneficial. This study reconfirms the usefulness of MR imaging of the knee in a large, prospective, consecutive group of patients with various degrees of injury.

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