

Role of MRI Evaluation in Knee Injuries

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ABSTRACT

BACKGROUND

Knee is a major weight bearing and largest joint that provides mobility and stability during physical activities as well as balance while standing. Due to its wide range of functions it is exposed to forces beyond its physiological range, and thus bone and soft tissue of knee are at risk of injuries. We wanted to study MRI appearances of cruciate ligaments and meniscal tears in cases of knee injuries and correlate the MRI findings of knee injury with clinical observations/other radiological investigations/arthroscopic findings. We also wanted to evaluate the sensitivity, specificity, PPV, NPV and accuracy of MRI in detecting knee injuries taking arthroscopy as gold standard (wherever performed).

METHODS

This prospective diagnostic descriptive study was conducted in the Department of Radiodiagnosis of Maharishi Markandeshwar Institute of Medical Sciences and Research, MMDU, Mullana, among 100 patients presenting with knee injuries referred to Department of Radiodiagnosis for MR imaging. MR scans were carried out on 1.5 tesla MR machine Achieva (by Phillips Medical System) and studies were performed with the sense extremity coil. Arthroscopic knee surgery was performed in 39 patients. MR findings were correlated with clinical and arthroscopic findings wherever possible.

RESULTS

MR diagnosis of 100 cases was as follows: in ACL tear 50%; PCL tear 19%; MCL tear 17%; LCL tear 16%; MM tear 49%; LM tear 31%; Sensitivity, specificity, NPV, PPV and accuracy of MRI in detecting the knee injuries taking arthroscopy as gold standard are as follows ACL- 100%, 90.9%, 100%, 96.5% and 97.4 %; lateral meniscus-100%, 94.5%, 100%, 50% and 94.8%; medial meniscus 90.4%, 66.7%, 85.7%, 76% and 79.5% respectively. Correlation between MRI and arthroscopic findings regarding presence and absence of posterior cruciate ligament tear was highest with sensitivity -100%, specificity- 94.5%, NPV- 100% and accuracy-94.8%, There were 6 false positives for meniscus tear on MR examinations accounting for low positive predictive value (72%) of MR examination. Posterior horn tears of menisci are likely to be missed on arthroscopy. Out of 6 false positive cases of meniscus tear, 4 were located predominately in the posterior horn and 2 in the anterior horn. Thus, acceptance of MRI findings as false positive is controversial.

CONCLUSIONS

MRI is a useful non-invasive modality having high diagnostic accuracy, sensitivity and negative predictive value making it a very reliable screening test for diagnosis of internal derangements of knee joint. Thus, MRI saves many knees from unnecessary arthroscopies.

KEY WORDS

Arthroscopy, Knee Injury, MRI

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BACKGROUND

Knee is a major weight bearing and largest joint that provides mobility and stability during physical activity as well as balance while standing. It is also the main joint for sports that involve running, jumping, kicking and changing directions. Due to its wide range of function, the joint relies on multiple soft tissue structures to maintain bony alignment during weight bearing and movement. If the knee is exposed to forces beyond its physiological range, bone or soft tissue are at risk of injury. ⁽¹⁾ Knee injury represents roughly 6% of all acute injuries treated at emergency department. Knee pain is a complaint in 20% of the general adult population and trauma to the knee is 2nd most common occupational accident. 15% of all sports injuries involve the knee. 75% of the surgeries done on professional football players involve ligament tear and meniscal injuries. The knee injury risk is especially high in the age group of 15 to 25 years, especially in various team sports and ball games. ^(2,3)

Accurate and timely diagnosis increases the likelihood of fully restoring normal and pain free use of affected knee. Physical examination of painful knee in acute phase may be difficult and frequently imaging studies are required to aid in the assessment of these injuries. Plain radiography is the most readily available and least expensive imaging modality, but it lacks sensitivity for detection of meniscus, cartilage, bone marrow and ligamentous injuries. Use of arthrography and arthroscopy improves the accuracy of diagnosis but both are invasive and cause complications and moreover these techniques require a skilled person for reporting and interpreting the results. ^(4,5)

Magnetic Resonance Imaging [MRI], a non-invasive modality, is now routinely used to assess a wide spectrum of internal knee derangement. Potential of MRI in assessing the knee injuries were first reported in 1983 in literature. Since then it has changed the traditional algorithm for work up of knee joint pathology, particularly when meniscal and cruciate ligament injuries are suspected. Additional advantages of MRI are multiplanar and thin section capabilities. It does not utilise ionizing radiation therefore it is entirely safe. It is also non-invasive, painless and allows acquisition of images in multiple planes without repositioning the patient. In addition, MRI provides excellent spatial and contrast resolution of both intra and extra articular structure. Thus, MRI clearly emerged as primary imaging tool in work up of knee joint pathology. ⁽⁶⁾

We wanted to study MRI appearances of cruciate ligaments and meniscal tears in cases of knee injury, correlate the MRI findings of knee injury with clinical observations/other radiological investigations/ arthroscopic findings and determine the sensitivity, specificity, PPV, NPV and accuracy of MRI in detecting knee injuries taking arthroscopy as gold standard (wherever performed).

METHODS

This study was a prospective, diagnostic descriptive study conducted in the department of Radio diagnosis of Maharishi Markandeshwar, Institute of Medical Sciences and Research,

Mullana. This study was conducted between January 2013 to June 2014. 100 patients presenting with knee injury referred from OPD (outpatient Department) & IPD (inpatient Department) of Orthopaedics to the Department of Radio diagnosis for MR imaging were included in the study, Arthroscopy was done in 39 patients and findings of arthroscopy were correlated with MRI findings. Sensitivity, specificity NPV, PPV and accuracy of MRI were calculated.

Inclusion Criteria

All patients of knee injury to either one or both knees were undergone MR Imaging.

Exclusion Criteria

1. Patient with contraindications to MRI.
2. Patient with prior arthroscopy or surgical intervention.
3. Patient with known joint disease e.g.: Neoplasm, inflammatory or infectious disorder.
4. Patient with history of old significant trauma to the currently injured Knee

Once the patient satisfies the criteria for this study, a written informed consent was obtained from each patient and a detailed history was elicited from all the patients. Relevant Past history was also recorded. Findings of general physical and specific systemic examination were recorded in detail. X-ray knee joint (AP and lateral view) were done and findings were recorded. Any other view of knee joint e.g. oblique view etc., if done was documented. Then the MRI was done, and findings were also correlated with clinical diagnosis. MR findings were recorded in a Performa and correlated with clinical observations/ other radiological investigations/arthroscopic findings (wherever preformed)

MRI Protocol

MR scans were carried out on 1.5 tesla MR machine Achieva (by Phillips Medical System) with sense extremity coil (Philips Medical System). Patient was placed in supine position and feet first in MR imager, with knee to be imaged in approximately 15-20-degree external rotation to aid the imaging of anterior cruciate ligament in the sagittal plane. Knee was also flexed 5-10 degrees for assessing patellofemoral compartment... Knee to be imaged was centred with the 160 mm field of view, including in the image both the suprapatellar bursa and insertion of patellar ligament on the tibial tubercle. Localizer was taken in axial, sagittal and coronal planes after making proper positioning of the patient, The MRI protocol consisted of sagittal T2W, T2WFFE, PDSPiR sequences; coronal PD, T2W, STIR sequences; Axial T2 Sequences, T2FSE. Additional 3D sequences and higher sequences were done whenever required. 140 mm field of view and a 212 x 168 matrix were taken. The slice thickness was 4 mm with 0.4 mm gap.

Data Analysis

Data was analyzed using SPSS (Statistical Package for Social Sciences) version 20 (IBM Inc. Chicago). Data was entered in excel sheet was imported to SPSS for statistical analysis.

Variables were of qualitative nature and hence have been expressed as proportions in terms of percentages. Sensitivity, specificity and predictive values were calculated for MRI findings by comparing them with arthroscopic findings.

RESULTS

Age and Sex

There were 77 (77%) male and 23 (23%) female subjects out of the total 100 subjects. Right knee was injured in 55 (55%) patients (44 males; 11 females) While left knee injury occurred in 45 (45%) patients (33 males; 12 females). There were maximum numbers of patients in age group 21-30 years 39 (39%) patients followed by 20(20%) patients in age group 11-20 years and 18(18%) patients in age group of 31-40 years. No patient younger than 10 years was observed. Sports related injuries (32%) and roadside accident (30%) accounted for the highest number of the injuries (62%). It was followed by falls (23%). Least number of cases with slipping injuries (15%) was seen.

MRI Analysis of Ligament Injury Patterns

(complete and partial) in 100 patients is as follows: ACL tear: 50 tears; PCL Tears: 19; MCL tears: 17; LCL tears-16. Hence amongst the 102 ligamentous injuries in 100 subjects, ACL tears (complete/ partial) was the most commonly encountered pathology in this series (50%) followed by PCL, MCL and LCL tears which did not show significant variation with each other. Site of ligament tear was most commonly encountered at femoral attachment (28 cases) followed by mid substance site (15 cases). Least common site was fibular/tibial attachment with 7 cases.

Analysis of Meniscal Injury Patterns Identified on MRI

Some patients had both medial and lateral meniscus tear. 49 cases were having abnormal signal intensity in medial meniscus tears. Incidence of grade III signal intensity (medial meniscal tears) were seen in 30 cases, grade II signal intensity were seen in 10 cases followed by grade 1 signal intensity seen in 9 cases. There were 31 cases having abnormal signal intensity in lateral meniscus tears. Grade III signal intensity (tear) was seen in 17 cases followed by grade II signal intensity and grade 1 signal intensity 7 cases each.

Type and Location of Grade III Meniscus Tears (LM + MM) on MRI

Total No. of Grade III Medial meniscal tears observed on MRI were 30 (30%) cases. Most common Type of tear was Bucket handle tear which comprised of 10 cases, followed by oblique meniscal tears and complex meniscal tears 7 cases each. Peripheral and radial tears constituted 4 cases and 2 cases respectively. Most common location of medial meniscal tear was in posterior horn, (19 cases), 11 of the cases showed tears in anterior horn which was second most common location. No tear was noted in the body of medial meniscus. Grade III Lateral meniscal tear seen in MRI were 17 cases and most common location was in posterior horn which was found in 11 cases followed by location in anterior horn seen

in 6 cases. Most common type of tear was oblique tear seen in 7 cases followed bucket handle tear and complex tear seen in 4 cases each. Peripheral type of tear was seen 2 cases of lateral meniscus tears. No tear was noted in the body of lateral meniscus.

Correlation of Clinical and MR Findings

Correlation between Clinical and MR findings regarding presence or absence of ACL tear was - 80/100 (80%), PCL tear: 93/100 (93%), MCL tear: 84/100 (84%), LCL tear: 90/100 (90%), medial meniscal tear: - 70/100 (70%), lateral meniscal tear: - 82/100 (82%)

Arthroscopy

Arthroscopic knee surgery was performed in 39 subjects out of the total 100 subjects. Rest of the patients were managed conservatively. Correlation of MRI findings and arthroscopy findings in 39 patients are listed below

Correlation of MRI Findings and Arthroscopic Findings N=39.

MRI	ACL	PCL	MM	LM
Tear	29	4	25	4
Normal	10	35	14	35
Total	39	39	39	39
Findings on arthroscopy	ACL	PCL	MM	LM
Tear	28	2	21	2
Normal	11	37	18	37
Total	39	39	39	39

Table 1. Findings on MRI

ACL Tear on MRI	
Anterior Cruciate Ligament (ACL)	No. of Subjects
Tear on MR	29
Tear on Arthroscopy (TP)	28
Normal on Arthroscopy (FP)	1
ACL Normal on MRI	
Anterior Cruciate Ligament (ACL)	No. of Subjects
Normal on MR	10
Tear on Arthroscopy (FN)	0
Normal on Arthroscopy (TN)	10
PCL Tear on MRI	
Posterior Cruciate Ligament (PCL)	No. of Subjects
Tear on MR	4
Tear on Arthroscopy (TP)	2
Normal on Arthroscopy (FP)	2
PCL Normal on MRI	
Posterior Cruciate Ligament (PCL)	No. of Subjects
Normal on MR	35
Tear on Arthroscopy (FN)	0
Normal on Arthroscopy (TN)	35

Table 2. Correlation of MRI and Arthroscopic Findings in ACL & PCL Tears

Agreement between MRI and arthroscopic findings regarding presence or absence of anterior cruciate ligament tears: sensitivity- 100%, specificity-90.9%, NPV- 100%, PPV-96.5% and accuracy- 97.4%. Correlation between MRI and arthroscopic findings regarding presence or absence of posterior cruciate ligament tears: sensitivity-100% specificity-94.5%, NPV- 100% PPV-50% and accuracy-94.8%.

Agreement between MRI and arthroscopic findings regarding presence or absence of lateral meniscus tears: sensitivity- 100%, specificity-94.5%, NPV- 100%, PPV-50% and accuracy- (94.8%) Agreement between MRI and arthroscopic findings regarding presence or absence of medial meniscal tears: sensitivity- 90.4%, specificity-66.7%,

NPV- 85.7%, PPV-76% and accuracy- 79.5%. Agreement between MRI and arthroscopic findings regarding presence or absence of meniscal tears (combined MM and LM): sensitivity- 91.3%, specificity-85.7%, NPV- 96%, PPV-72.4% and accuracy- 87.3%.

Lateral Meniscus Tears on MRI	
Lateral Meniscus	No. of Subjects
Tear on MR	4
Tear on Arthroscopy (TP)	2
Normal on Arthroscopy (FP)	2
Lateral Meniscus Normal on MRI	
Lateral Meniscus	No. of Subjects
Normal on MR	35
Tear on Arthroscopy (FN)	0
Normal on Arthroscopy (TN)	35
Medial Meniscus Tears on MRI	
Medial Meniscus	No. of Subjects
Tear on MR	25
Tear on Arthroscopy (TP)	21
Normal on Arthroscopy (FP)	4
Medial Meniscus Normal on MRI	
Medial Meniscus	No. of Subjects
Normal on MR	14
Tear on Arthroscopy (FN)	0
Normal on Arthroscopy (TN)	14

Table 3. Correlation of MRI and Arthroscopic Findings In Meniscal Tears

DISCUSSION

100 patients of knee injuries had undergone MR imaging. Arthroscopic knee surgery was performed in 39 out of the total 100 subjects. Rest of the 61 subjects underwent conservative management. Incidence of knee injuries was much more common in younger generation with peak incidence of 39% occurring in age group 21- 30 years in present study. Similar results have been shown by Clayton et al,⁽⁷⁾ La Prade et al⁽⁸⁾ and Incesu et al⁽⁹⁾ with mean age varying from 24 - 36 years.

Aetiology of Knee Injury

There was almost equal incidence of knee injuries occurring due to sports (32%) and roadside accidents (30%) followed by falls (23%) and slipping injuries (15%). This is due to the fact present is a multi-specialty hospital with tertiary trauma care centre, so all kinds of patient referrals come to us thus almost equally distributing the subjects in above categories. In literature between 27% to 48% have been reported to be sports related (Kannus & Jarvinen,⁽¹⁰⁾ Nielsen & Yde,⁽¹¹⁾ Ansari et al.⁽¹²⁾ So incidence of sports related knee injuries of present study matches the incidence shown in these studies.

Comparison of Correlation of Clinical and MRI Finding

Correlation between Clinical and MR findings regarding presence or absence of ACL tear was - 80/100 (80%), PCL tear: 93/100 (93%), MCL tear: 84/100 (84%), LCL tear: 90/100 (90%), Medial meniscal tear: 70/100 (70%), Lateral meniscal tear: 82/100 (82%). Odgaard et al⁽¹³⁾ observed correlation between clinical MR findings regarding presence or absence of ACL tears in 74% cases, PCL tear- 98% cases, MCL tear- 66% cases, LCL tear- 88% cases, Medial meniscus tear-62% cases and LCL tear in 81% cases.

Analysis of Ligament and Meniscal Injury Pattern on MRI Examination

In present study out of 100 patients 50% showed ACL tears, 19% showed PCL tears, (30%) showed MM tears (GRADE III), 17% (grade III) showed LM-tears. Findings of present study matches with the study of Singh et al⁽¹⁴⁾ and in variance with study of Ranjan and Mohammad.⁽¹⁵⁾

Injured Ligament	Present Study N=100 Percentage	Singh et al Study ⁽¹⁴⁾ N=173 Percentage	Ranjan and Mohamad ⁽¹⁵⁾ N=50 Percentage
ACL	50%	45.09%	76%
PCL	19%	5.78%	6%
MM (Grade III)	30%	32.95%	34%
LM (Grade III)	17%	16.18%	22%
MCL	17%		28%
LCL	16%		18%

Table 4. Comparison of Ligament and Meniscal Tear with Other Studies

Comparison of Grading of Meniscal Tears with Other Studies

Some patients had both medial and lateral meniscus tear. 49 cases were having abnormal signal intensity in medial meniscus. Incidence of grade III signal intensity (medial meniscal tears) were seen in 30% cases, grade II signal intensity were seen in 10% cases followed by grade 1 signal intensity seen in 9% cases. There were 31% cases having abnormal signal intensity in lateral meniscus. Grade III signal intensity (tear) was seen in 17 %cases followed by grade II signal intensity and grade 1 signal intensity 7% cases each. Singh et al⁽¹⁴⁾ observed Grade III signal intensity in 32.9 % cases, Grade II signal intensity in 9.2% cases, and Grade I signal intensity in 11.3% cases in Medial Meniscus tears. Signal intensity in lateral meniscus tears observed was Grade III 16.18%, Grade II 6.9% and Grade I 8%. Also, La Prada et al⁽⁸⁾ reported that medial meniscal tears are twice as common as lateral meniscal tears which are in accordance with results of present study.

Other Important Trauma Findings

In present study 24 cases (24%) cases bony contusions were seen out of 100 cases knee injuries. Most common site for bony contusion was femoral condyle and these findings are in agreement with Terzidis I P et al⁽¹⁶⁾ study in which 27.8% of cases were seen with bony contusion and most common site for bony contusion was femoral condyle. Avulsion fracture was seen in 7 patients. One patient was seen with Second fracture. There were 9 (9%) patient with subluxation/translation of tibia and patella (6 cases of translation of tibia and 3 patients with subluxation of patella). One patient had osteochondritis dissecans and 3 (3%) patients showed grade III iliotibial band injury Mansoor⁽¹⁷⁾ et al reported 2.5% cases with grade 3 iliotibial band injury. Joint effusion was seen in 70 (70%) cases on MRI in present study. Guler et al⁽¹⁸⁾ did a study on 42 knees and observed that 81% cases showed joint effusion (mild to moderate level).

Arthroscopy

In present study, 39 subjects underwent arthroscopic surgery.

ACL	Present Study	Boeve B F et al ⁽¹⁹⁾	Chen MC et al ⁽²⁰⁾	Winter et al ⁽²¹⁾	Barronian et al ⁽²²⁾
Sensitivity	100%	100%	95%	-	-
Specificity	90.9%	96%	89%	-	-
PPV	96.5%	80%	88.5%	-	-
Accuracy	97.4%	-	92%	90%	82%

Table 5. Comparison of MRI and Arthroscopic Findings in ACL Injuries with Other Studies

These findings were in agreement with Boeve et study,⁽¹⁹⁾ Chen MC et al⁽²⁰⁾ and in variance with Winter et al⁽²¹⁾ and Barronian et al.⁽²²⁾

Comparison of MRI and Arthroscopic Findings in PCL Injuries with Other Studies

In case of PCL tears diagnostic accuracy for MR examination came out to be 94.8%. Sensitivity and specificity for diagnosing PCL tear by MR was 100% and 94.5%, Negative predictive value (NPV) was 100% making it a very good screening test. These findings match the results published by Laoruengthana et al⁽²³⁾ in 2012 which showed sensitivity 100%, specificity of 97.1%, accuracy 97.5% and negative predictive value 100%.

Accuracy of MRI in Meniscal Injuries and Its Comparison with Other Studies

Diagnostic accuracy of MRI was 79.5% for medial meniscus and 94.8% for lateral meniscus in present study which corresponds to studies done I by Glashow et al⁽²⁴⁾ (74% for medial meniscus and 94% for lateral meniscus), Rappeport et al⁽²⁵⁾ (77% for medial meniscus and 91% for lateral meniscus), Sharifah MI et al⁽²⁶⁾ (88 for medial menisci and 92% for lateral menisci) Sensitivity and Specificity for meniscal tears (both lateral and medial) were 91.3% and 85.7%, respectively who present study. These values are similar to the study done by Chang et al.⁽²⁷⁾ Who reported the sensitivity and Specificity of 92% and 87% in diagnosis of meniscal tears respectively. Naranje S et al⁽²⁸⁾ also shared same findings and observed sensitivity of 90% and specificity of 89%.

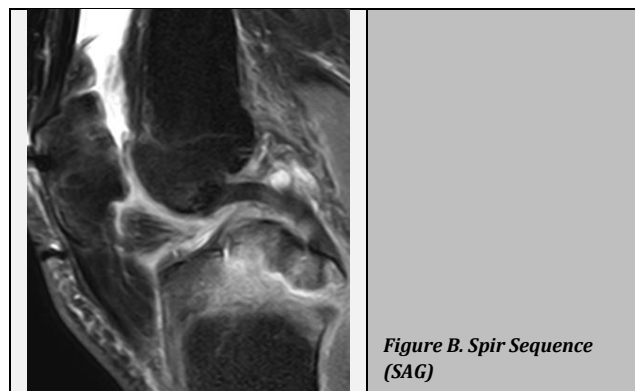
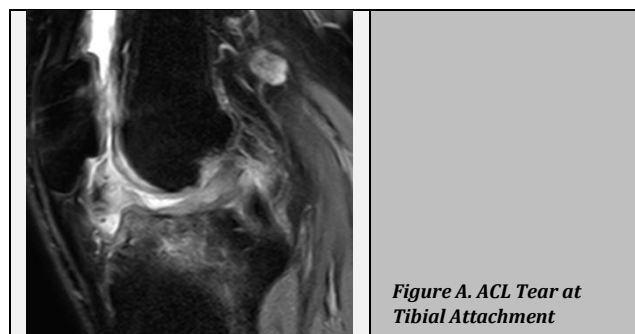
Predictive Value of MRI in Knee Injuries

There was high negative predictive value (NPV) of MR examination (MM + LM) (96%) in diagnosing meniscal tear as was in the case of ACL and PCL(100% each) while the positive predictive value of MR examination was low in meniscal tears (MM + LM) (72.4%). However positive predictive value of MR was 96.5% in diagnosing ACL tears. In the study by Barronian et al⁽²²⁾ the negative predictive value was 91% for menisci, whereas the positive predictive value was 65%. Thus, it is evident again that MRI's negative predictive value makes it the investigation of choice in evaluation of knee injuries.

False Positive and False Negative Cases

There were 3 false positive cases of ligament tear ACL 1 cases and PCL 2 cases. This may be due to suboptimal selection imaging plan and partial volume averaging effect. Ranjan and Mohamad⁽¹⁵⁾ also attributed low specificity of ACL tears due to above reason only. PPV of lateral meniscus tear was 50% and medial meniscus tear was 76%. There were 6 false positive cases of meniscal tear on MR examinations in present study accounting for low positive predictive value of MR examination in meniscus tear diagnosed on arthroscopy. Out of these 6 false positive examinations, site of the 4 tears were located predominantly in the posterior horn and 2 was in the anterior horn. Posterior horn tears of menisci are likely to be missed on arthroscopy especially if anterior approach is used and if the menisci are not probed. Inferior surface of the meniscus is in particular vulnerable to this flaw in arthroscopy. Thus, acceptance of MRI findings as false positive is controversial. It is suggested that the reason of false positive and false negative meniscal lesion diagnosis was related to diagnostic errors in MRI as well as faults in arthroscopic evaluation. Levinsohn et al⁽²⁹⁾ from their study found that the accuracy of arthroscopy in identification of inferior surface tears of posterior horn of Medial Meniscus is as low as 45-65%.

So present prospective study we found that Sensitivity and negative predictive value of MR examination for diagnosing ACL (sensitivity- 100%, NPV- 100%), PCL (sensitivity-100%, NPV- 100%) and meniscal tears (sensitivity- 91.3%, NPV- 96%) are quite high. So "one can rely on MRI to avoid diagnostic arthroscopy since MRI has a high sensitivity and high negative predictive value". The high sensitivity and negative predictive value of MR in this study makes it investigation of choice.



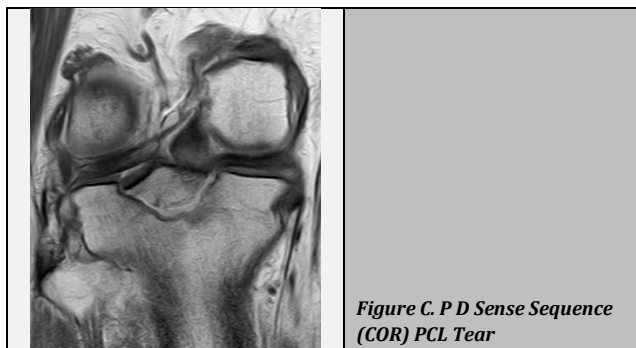


Figure C. P D Sense Sequence (COR) PCL Tear

Hyperintense signal is seen in the fibres of ACL T2W sequence with avulsion fracture of tibia (second fracture – secondary sign) which can be seen on Dual sense sequence. There is associated joint effusion with bony contusion on tibial condyle seen in PD SPIR Sequence (sag). Hyperintense signal is seen in the fibres of PCL with loss of integrity of fibres seen on T2W ffe sequences. There is associated fracture of intercondylar region of tibia seen on P D spir sequences.

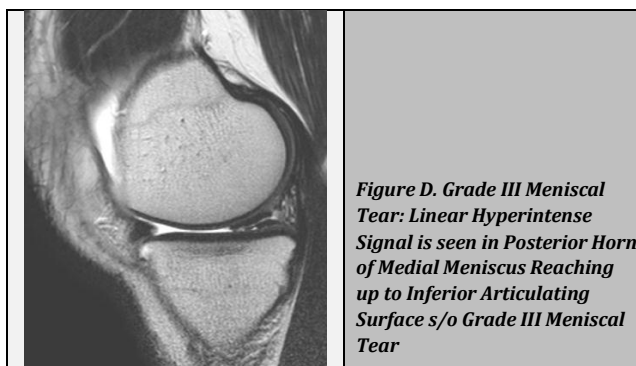


Figure D. Grade III Meniscal Tear: Linear Hyperintense Signal is seen in Posterior Horn of Medial Meniscus Reaching up to Inferior Articulating Surface s/o Grade III Meniscal Tear

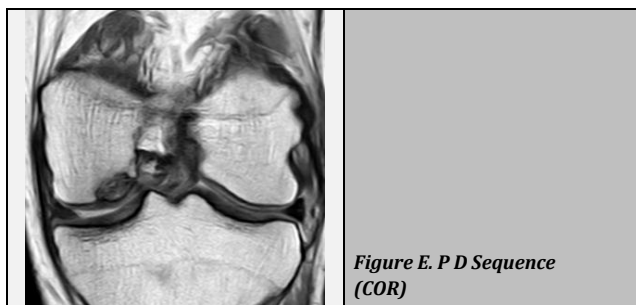


Figure E. P D Sequence (COR)

Osteochondritis Dessicans

Subchondral defect is seen along medial femoral condyle with fractured segment is lying along the medial femoral chondyle which can be seen in above figure.

CONCLUSIONS

100 cases of knee injury were evaluated with MRI examination. There was 77% males and 23% females. Massive number of patients were present in the age group of 21 to 30 years 39% followed by 20% in the age group of 11 – 20 year and 18% in age group of 31- 40 year. A good Correlation between MR findings and clinical findings was observed. MR diagnosis of 100 cases was as follows: in ACL

tear 50%; PCL tear 19%; MCL tear 17%; LCL tear 16%; MM tear 49%; LM tear 31%; Sensitivity, specificity, NPV, PPV and accuracy of MRI in detecting the knee injuries taking arthroscopy as gold standard are as follows ACL- 100%, 90.9%, 100%, 96.5% and 97.4 %; lateral meniscus-100%, 94.5%, 100%, 50% and 94.8%; medial meniscus 90.4%, 66.7%, 85.7%, 76% and 79.5% respectively. Correlation between MRI and arthroscopic findings regarding presence and absence of posterior cruciate ligament tear was highest with sensitivity -100%, specificity- 94.5%, NPV- 100% and accuracy-94.8%, There were 6 false positives for meniscus tear MR examinations in present study accounting for low positive predictive value (72%) of MR examination. Posterior horn tears of menisci are likely to be missed on arthroscopy. Thus, acceptance of MRI findings as false positive is controversial. Out of 6 false positive cases of meniscus tear 4 were located in the posterior horn and 2 in the anterior horn.

MRI is a useful non-invasive modality having high diagnostic accuracy, sensitivity and negative predictive value making it a very reliable screening test for diagnosis internal derangements of knee joints. Hence MRI should be done in evaluation of patients with knee injuries saving them from unnecessary arthroscopies.

Abbreviation

MRI	Magnetic Resonance Imaging.
ACL	Anterior Cruciate Ligament.
MM	Medial meniscus.
LM	Lateral Meniscus.
LCL	Lateral Collateral Ligament
PCL	Posterior cruciate ligament.
MCL	Medial collateral ligament.
T1W	T1 weighted images.
T2W	T2 weighted images.
PD	Proton density.
FSE	Fast Spin Echo.
FFE	Fast Field echo.
SE	Spin Echo.
SPIR	Spectral Presaturation by Inversion Recovery.
STIR	Short Tau Inversion Recovery.
NPV	Negative Predictive Value.
PPV	Positive Predictive Value.

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