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Evaluation of Non-Traumatic Painful Knee on MRI

[1.] Dr. Priyanka Mattoo
Assistant Professor
Department of RadioDiagnosis
Hamdard Institute of Medical Sciences, New Delhi – 110062

[2.] Dr. Syed RuzinaFirdose
Assistant Professor
Department of RadioDiagnosis
Hamdard Institute of Medical Sciences, New Delhi – 110062

[3.] Dr.Prabhpreet Singh
PG Resident
Department of RadioDiagnosis
Hamdard Institute of Medical Sciences, New Delhi – 110062

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ABSTRACT –Painful knee is considered as one of the most common causes of morbidity and disability affecting all age group. It happens due to varied reasons ranged from injury to various disease processes. The present study documented the magnetic resonance imaging (MRI) findings in painful knee in non-traumatic patients.

Aim-: To identify common pathological features on MRI innon traumatic painful knee joint.

Material and methods - A hospital base retrospective study was conducted among 288 painful knee patients referred to the Radiodiagnosis department of the HamdardInstitute of Medical Sciences and Research, New Delhi for evaluation. MRI scans performed using MagnetomEssenza 1.5 Tesla MRI scanner.

Results: The sample population comprised of 288 outpatients with knee joint pain The peak age was 40 to 60 years representing Males (71%) while (29%) were females. Anterior cruciate ligament injury was partial in 61 patients(67%), complete in 20 patients (21%), posterior cruciate in 26(9%), collateral ligament in 34(12%) medial meniscal lesions was detected in 38 patients(49%), lateral meniscal lesions in 12 (16%), joint effusion in 20 (7%), bone fractures 25(8%), osteoarthritis 37(12%), bone contusions were seen in 65(22%), synovial pathologies 20(7%), neoplastic lesions 5(1%) patients.

Conclusions: MRI is an ideal, non-invasive and more preciseimaging technique for the radiological evaluate of the painful knee condition for better clinical management.

I. INTRODUCTION :

Traditionally plain x ray have been the first imaging modality for evaluation of painful knee, however over past 2 decades MRI has been the premier first line imaging study in the evaluation of knee because of its superior soft tissue details, multiplanar imaging capability. It is anon-invasive diagnostic modality that lacks the radiation issues associated with radiograph and CT and is non-operator dependent unlike ultrasound. Knee is one of the largest ,most complex joints in body and being one of the major joints involved in kinesis, bears the consequences of increased mobility and subsequent instability. MRI has emerged as an excellent modality for imaging of ligaments, cartilage, menisci and other structures around the knee joint . MRI has high diagnostic accuracy, sensitivity and negative predictive value. It's a very reliable screening test for diagnosis of internal derangements of knee joint. In the Current study we will review and describe the MRI features in various type of non traumaticetiologies causing painful knee joint.

II. MATERIAL AND METHODS :

This study was performed in the department of Radiology on patients referred from orthopaedic department over a period of 18 months .

Sample size: Two eighty eight cases

Type of study: retrospective study

Inclusion Criteria :1)Patients presenting with painful or unstable knee joint with or without other

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associated symptomatology. 2) Any age group3) Both male and female patients.
Exclusion Criteria :1)Patients who has been operated previously on the same knee. 2) Any absolute contraindication for MRI.3)Patients presenting with acute traumatic knee injury.
They were evaluated with clinical examinations and were subsequently subjected to imaging of knee using 1.5 T MRI MagnetomEssenzaMRI machine.

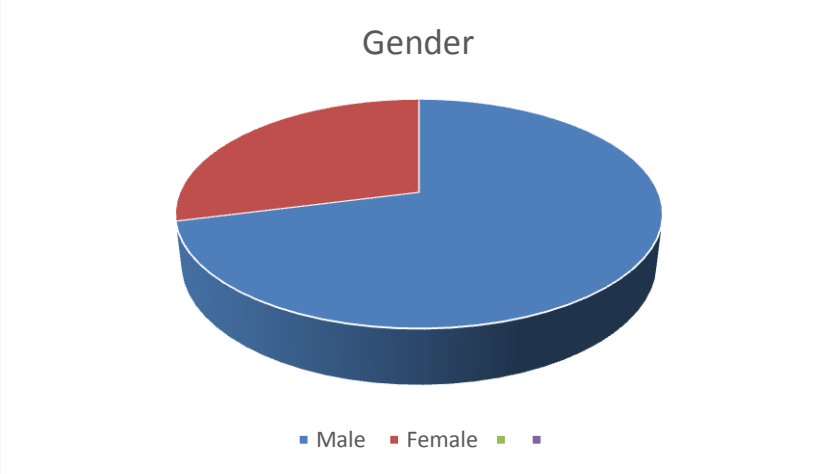
The knee joint was evaluated using MRI T1W and T2W axial, coronal and sagittal planes ,PD weighted sequences in axial, coronal and sagittal planes and fat sat T2Wor STIR sequences wherever indicated .Various pathologies of the knee joint involving different compartments were tabulated and analysis in the form of percentage was used to explain the result.

Written informed consents were taken before enrolling the patients. A pre-tested and pre-designed semi-structured questionnaire was used as the data collection tool. Basic socio-demographic information such as age, sex, caste etc. was taken. Detailed history was taken from each of the study participant. Relevant investigation reports were evaluated if available. The knee joint was evaluated using MRI and various pathologies of the knee joint involving different compartments were tabulated and descriptive analysis in the form of percentages was used to explain the results.

Statistical analysis:- The data obtained was coded and entered into Microsoft Excel Worksheet (Annexure III). The categorical variables were expressed in terms of numbers and percentages. Results were expressed by means of either tables or figures.

III. RESULTS

This was a retrospective study of 18 months duration, done at department of Radiodiagnosis, Hamdard Institute of Medical Sciences and Research , New Delhi ; aiming at evaluating the role of MRI in all types of knee pains. A total of 288 patients with history of non traumatic knee pain referred for MRI scan of knee joint were studied. Majority of the patients were male 204 (71%) and 84(29%) patients were female.. The commonest age group was 40 to 60 years for both males and females with mean age of 51.8 years for male and 55.9 years for females.



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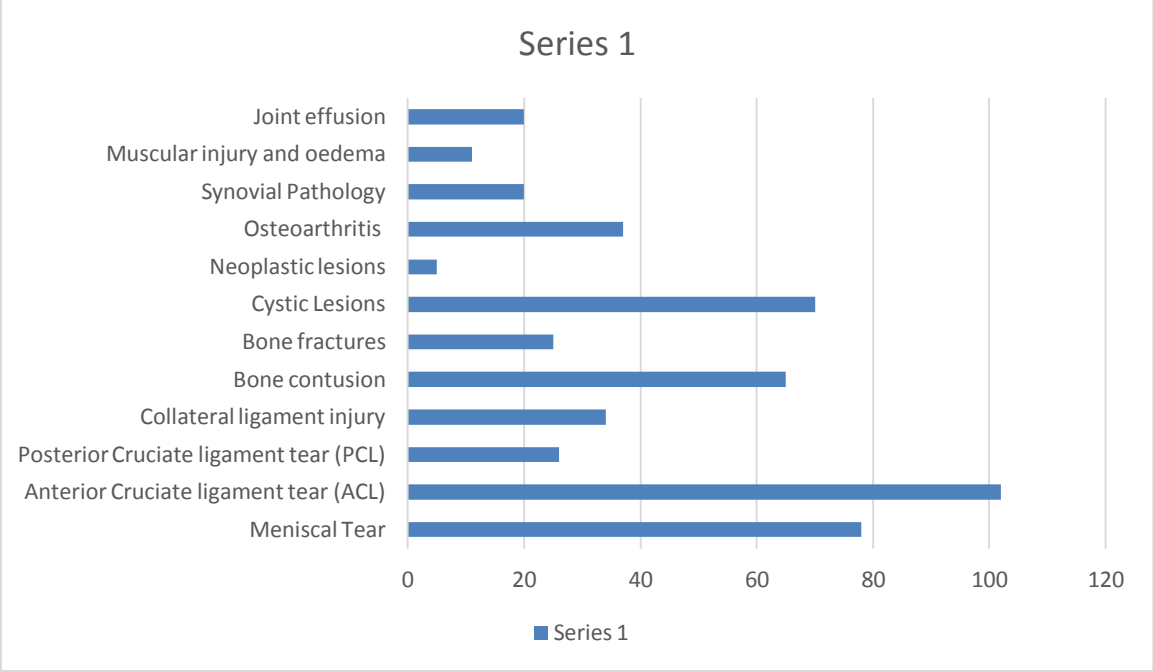

Table 1: Distribution of the study participants by different pathology of knee joint (n=288).

Different knee pathology	No. of patients	Percentage %
Meniscal Tear	78	27
Anterior cruciate ligament (ACL) tear	102	35
Posterior cruciate ligament (PCL) tear	26	9
Collateral ligament injury	34	12
Bone contusion	65	22
Bone fractures	25	8
Cystic lesions	70	24
Neoplastic lesions	5	1
Osteoarthritis	37	12
Synovial pathology	20	7
Muscular injury and oedema	11	4
Joint effusion	20	7

Table 2: Distribution of the different types of bone contusion in the knee joint (n=65).

Different bone contusions	Number of patients	Percentage %
Tibia	40	61
femur	15	23
Fibula	3	5
Patella	7	11
Total	65	

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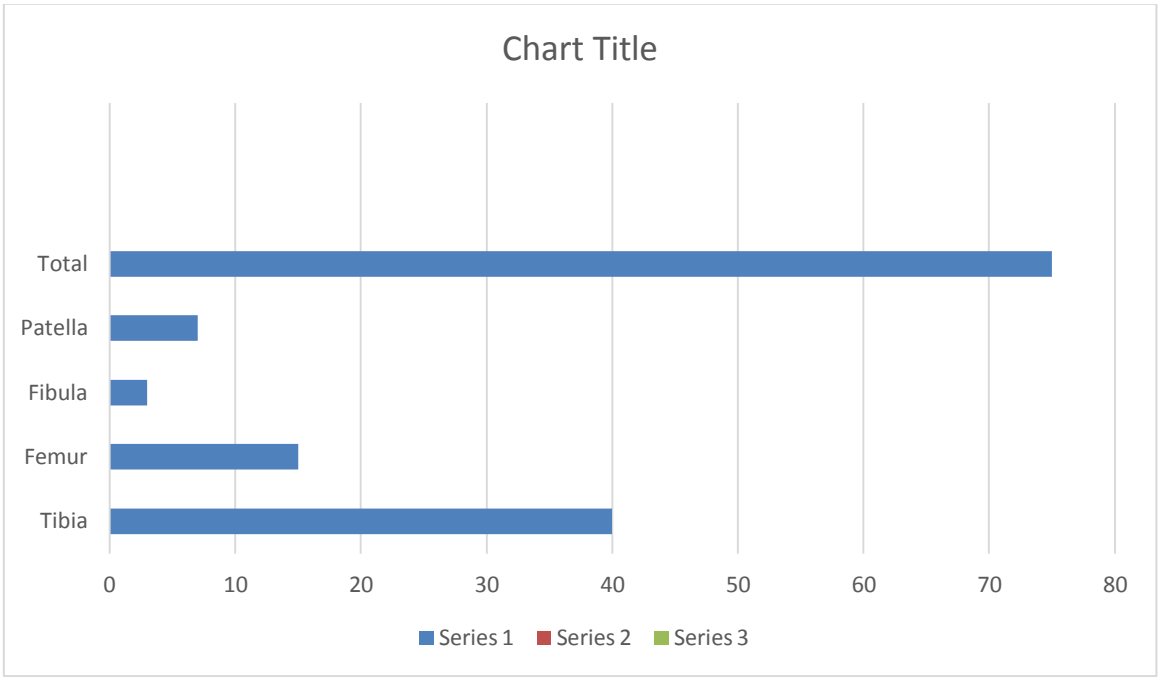
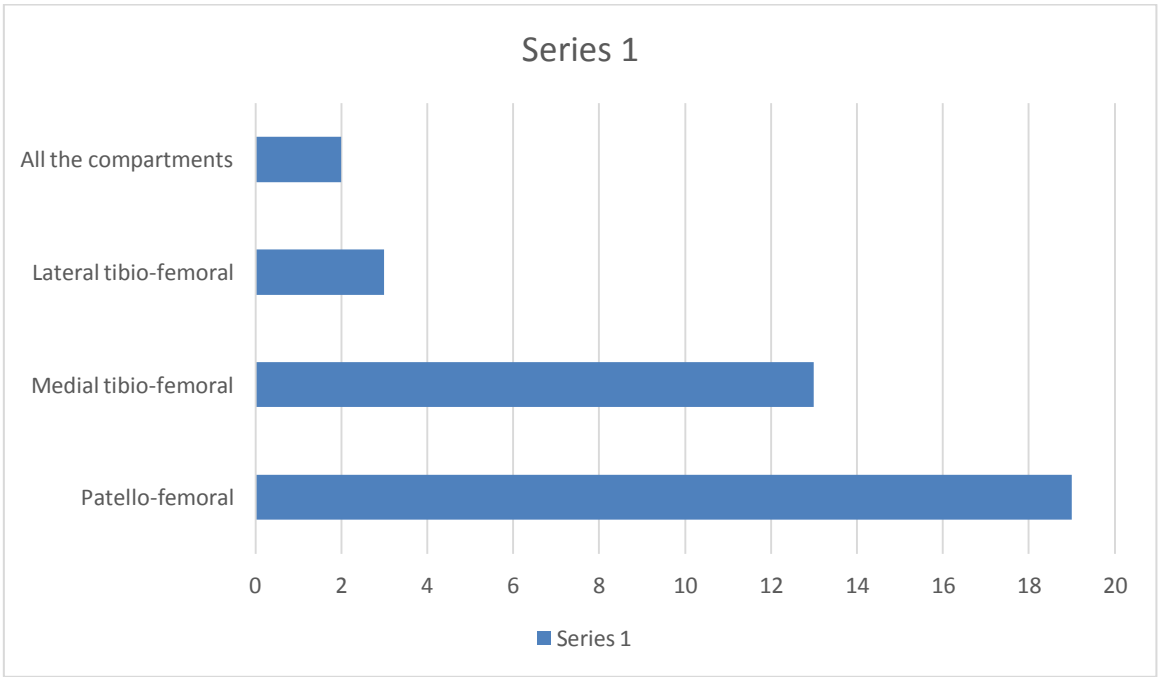


Table 3: Distribution of the different types of OA changes in the knee joint (n=37)

Different OA changes	Number of patients	Percentage %
Patellofemoral	19	51
Medial tibiofemoral	13	35
Lateral tibiofemoral	3	8
All the compartments	2	6
Total patients	37	



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Meniscal tear : Of patients 288 patients evaluated with MRI of the knee evaluating painful knee ,78 patients (27%) had meniscal tears.
Of 78 patients, 38(49%),involved the medial meniscus tear alone, 12(16%),had lateral meniscus tear alone and 27(35%) had the medial and lateral meniscus tears.
Of the 78 meniscal tears ,50(64%) had posterior horn, 21(27%) involved anterior horn and 7(9%) involved the body of meniscus.
Of the 38 medial meniscal tear 27(71%)involved posterior horn ,5((11%) involved body and 6(18%) involved anterior horn.
Of the 12(16%) lateral meniscal tear , 5(41%) involved anterior horn, 6(50%)involved posterior horn, 1(9%) involved the body.

Pathologies of ACL- Out of 288 patients ,102(35%) patients had ACL pathologies. 91(90%) had ACL tears and 11(11%) had myxoid degenerations. 61(67%) had acute partial tear,20 (21%)had acute complete tear, and 10(12%) had chronic tear of ACL.
Pathologies of PCL - In our study of 288 patients , 26(9%) had PCL pathologies.18(70%) had tear and 8(30%) had degeneration. Out of patients having PCL tear 11 (62%) had partial tear and 7(38%) complete tear.
Collateral ligament injuries- Out of 288 patients34(12%) had collateral ligament tears. 26 (76%) had medial collateral ligament and 8(24%) had lateral collateral ligament tear.
Bone contusions- out of 288 patients , 65(22%) had bone contusion . Out of 65 patients ,40(61%) had tibial contuions,15(23%) femoral condyle, 3 (5%) fibula and 7 (11%) patella contusions.
Bone fractures-Out of 288 patients , 25(8%) had bone fractures . Out of 25 patients 17(68%) had tibial fractures, 5 (20%)had femoral and 3(12%)had fibular fractures.
Cystic lesion -Out of 288 patients , 70(24%) had cystic lesions in knee joint with 45(64%)had bakers cyst, 19(28%) had ganglion cyst and parameniscal cyst was seen in 6(8%) patients**.**
Neoplastic lesions- Out of 288 patients, 5(1%) patients neoplastic lesions.
Osteoarthritis - In our study of 288 patients, 37(12%) patients had OA changes. 19 (51%)patients had patellofemoral changes, 13(35%) medial compartment, 3(8%) patients lateral compartment and 2 (6%)patients had all the compartment involvement.
Synovial pathologies- In this study of 288 patients 20(7%) patients had synovial pathologies.

IV. DISCUSSION:

Imaging of the knee presents a special challenge because of its complex structure. A variety of imaging modalities are currently used to evaluate knee abnormalities. These modalities include standard radiography, scintigraphy, computed tomography, MRI, and arthrography. MRI has revolutionized knee imaging. It has been compared by various studies between MR and arthroscopic findings. These studies validate the role of MRI in the clinical arena, especially for the evaluation of nontraumatic knee pain

In Our study male outnumbered the female as 71% of the patients were male and 29% were female with the females with mean age of 51.8 years for male and 55.9 years for females.This is in accordance with theGimhavankar S etal, Neha bansal et al, Nandy D et al. 1% patients had normal MRI.

The commonest finding on mri scan was meniscal tear with most of the patients having involvement of posterior horn of medical meniscus, which corresponded to study by Kratiet al. Horizontal tear was seen in most of the patients followed by vertical tear in accordance with the Ali M. Naraghi et al.

Tears of anterior cruciate ligament (ACL)was the commonest pathology mostly in acute in nature followed by myxoid degeneration in accordance with Sultan AbdulwadoudAlshoabi et al. Discontinuity of fibres of ACL was the most common sign in our study, followed by hyperintensitywithin ACL fibres cases and non-visualization of ACL in accordance with the Kratikhandelwal et al .

Posterior cruciate ligament (PCL) pathology was seen in 26 (9%) patients out of 288 , with most of them having partial tear followed by degeneration. This is comparable to the study done by Pasupuleti B et al.

22% had bone contusion involving tibia, lateral which is in accordance with the study Sohail K et al.Tibia was more commonly involved , followed by lateral and femoral femoral condyles as comparable with Neha bansal et al and nandy D et al.

Bone fractures was seen in 8% of the patients , mostly involving the tibia , followed by femur ,patella and fibula in accordance with Nandy D et al, Sohail K et al.

Most common cystic lesion was the bakers cyst(65%) , followed by ganglion and parameniscal cyst in comparison to Neha bansal et al, Sohail K et al. Bakers cyst was associated with joint effusion, ACL tear and meniscal tear as comparable to Miller TT et al and Sansone V et al.

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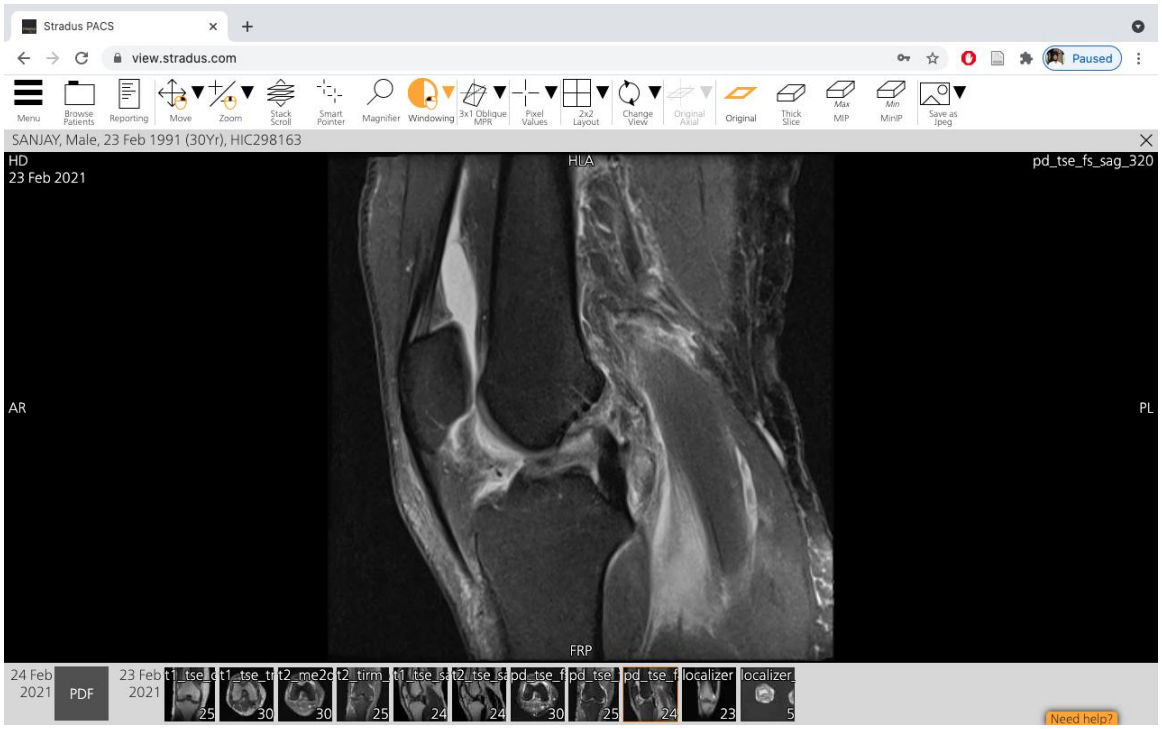
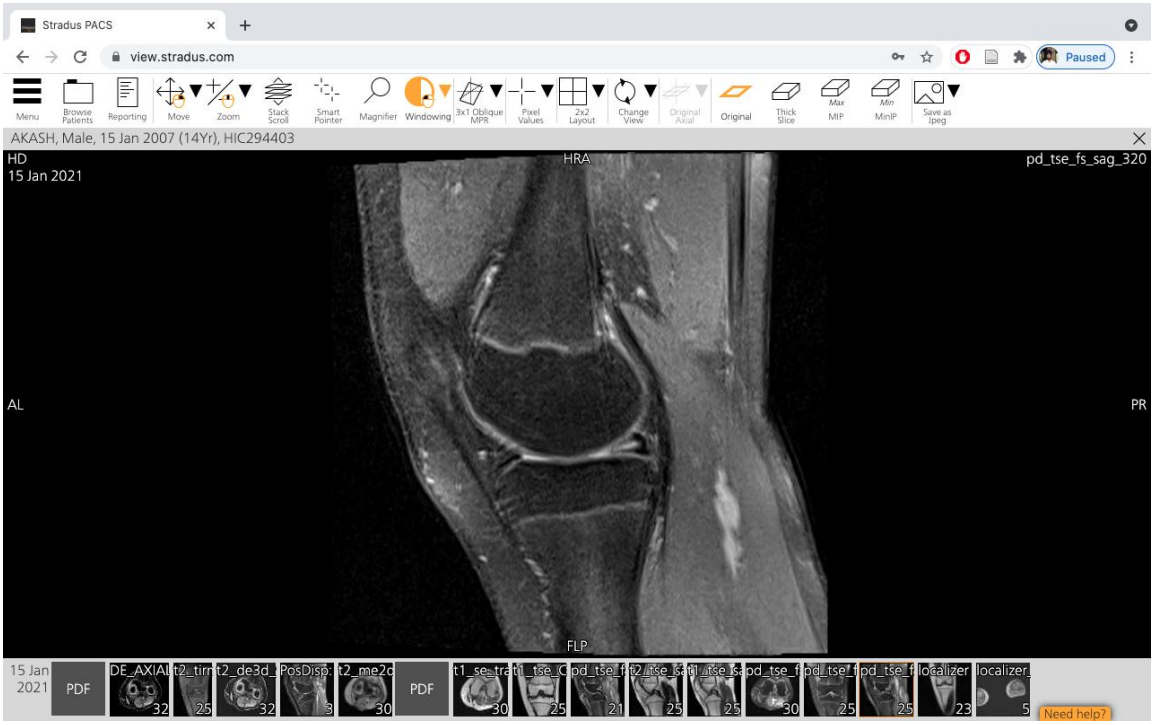
Osteoarthritic changes were most commonly seen in patellofemoral joint in accordance with Peterfy CG et al.

MR has been established as an effective non-invasive modality for identifying the knee pathology.



The PDFS Sagittal image shows indistinctly visualised ACL with loss of signal intensitysuggestive of full thickness ACL Tear.



The Saggital PDFS Section show hyperintense signal in the posterior horn of medial meniscus extending upto the articular surface suggestive of meniscal tear.

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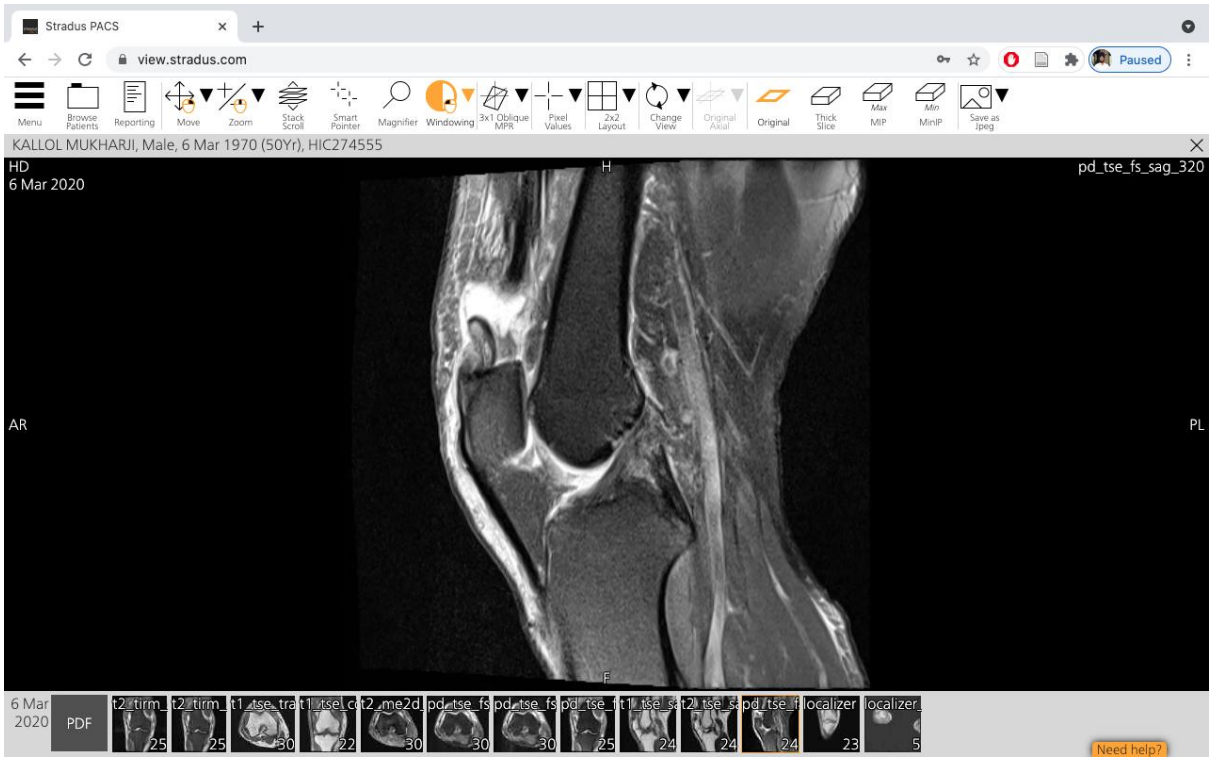
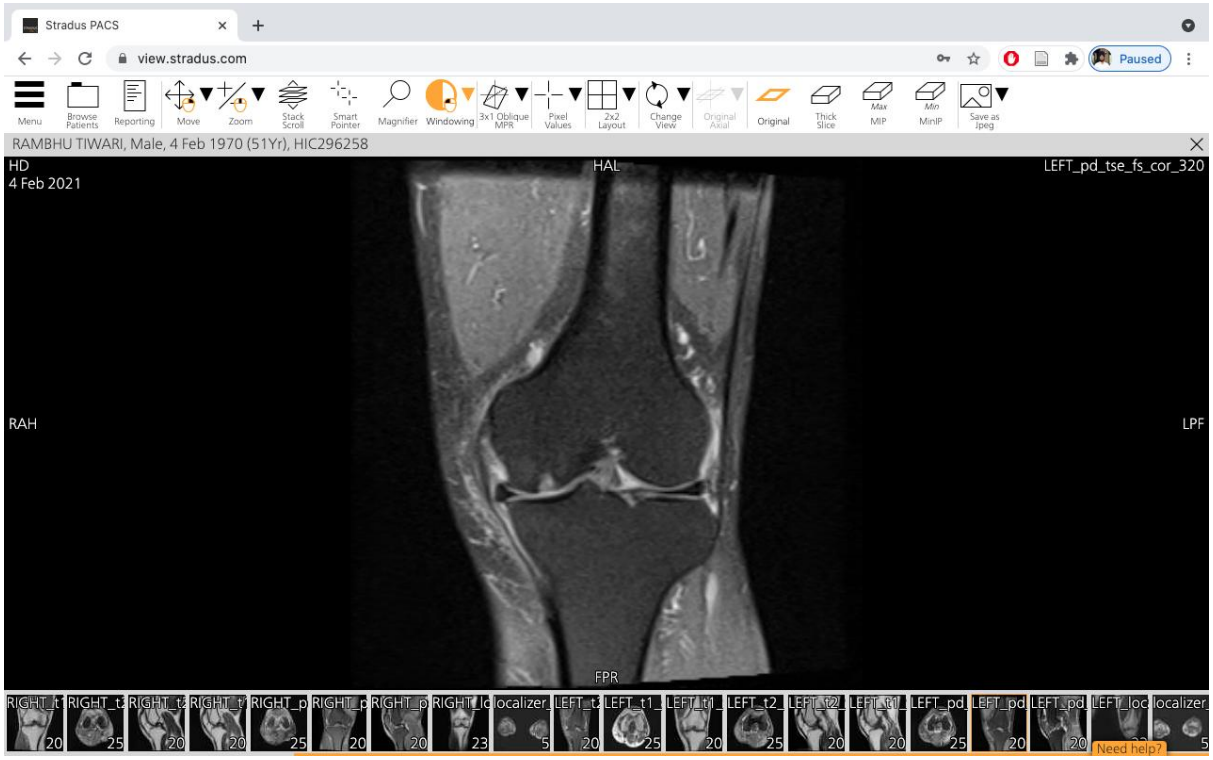


Hyperintense signal in a PDFS Sagittal image of a patient seen within the substance of PCL at the femoral attachment suggestive of PCL Tear.



A coronal PDFS section reduced medial tibio-femoral joint space with subchondral cyst.

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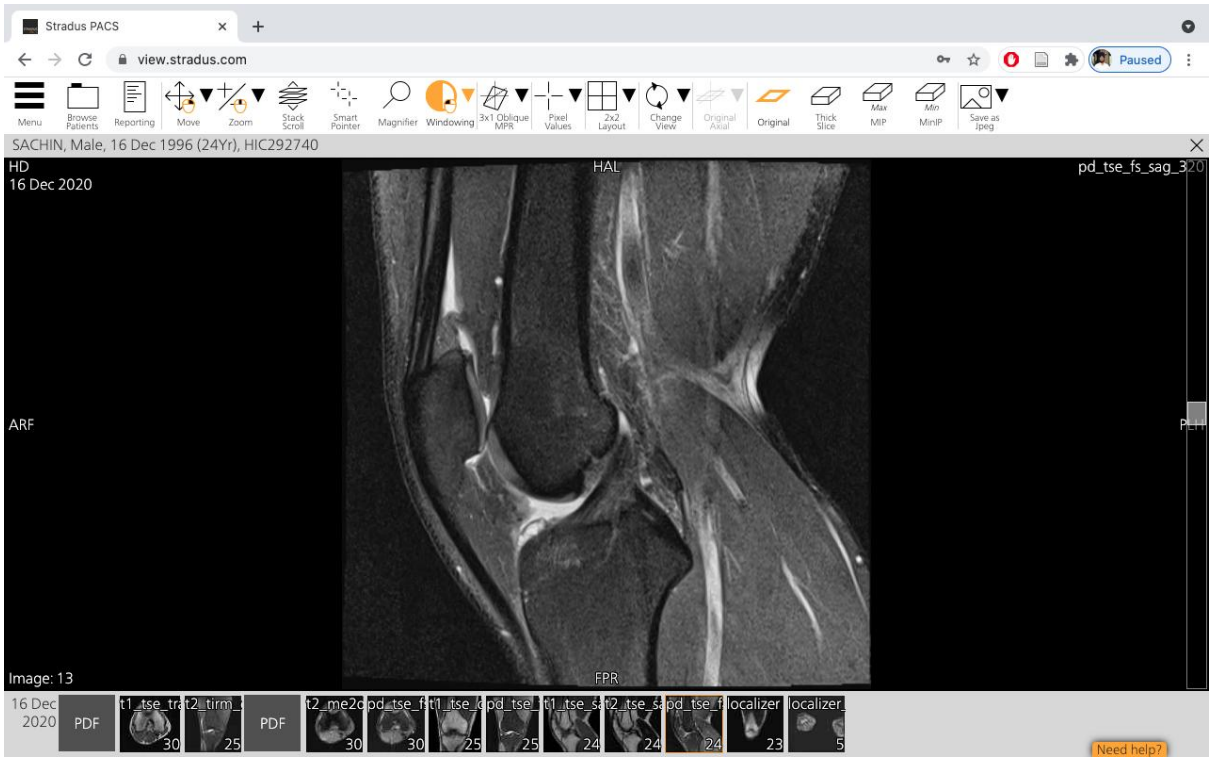

A sagittal T2WI showing hyperintense lesion seen at origin of ACL suggestive of ganglion cyst.

V. CONCLUSION

Currently, MR imaging has evolved as the most commonly performed radiologic test in the assessment of intra-articular knee abnormalities. MR imaging is an accurate, cost-effective and non-invasive technique for evaluation of knee pathologies . Although arthroscopy has revolutionized the diagnosis and treatment of knee disorders, most orthopaedists acknowledge the invasiveness of the procedure; limitations in evaluation of extra-articular pathology; cost and uncommon but potential complications associated with the procedure. MR imaging is an accurate diagnostic imaging complementing the clinical evaluation and providing a global intra-articular and extraarticular assessment of the knee.

REFERENCES

[1]. Prickett WD, Ward SI, Matava MJ. Magnetic resonance imaging of the knee. Sports Med. 2001;31(14):997-1019.

[2]. Sharma D, Sharma A, Talwar N, et al. Role of MRI Evaluation in Knee Injuries. J.Evolution Med. Dent. Sci. 2020-9 (17) : 1435-1441.

[3]. Kean DM, Worthington BS, Preston BJ, Roebuck EJ, McKim- Thomas H, Hawkes RC, et al. Nuclear magnetic resonance imaging of the knee: examples of normal anatomy and pathology. The British J Radiol. 1983;56(666):355-64.

[4]. Neha Bansal, Navkirankaur, Kuldeep Singh Sandhu et al. Role of MRI in the evaluation of painful knee joint. International journal Anatomy, Radiology and Surgery .2018 July vol-7.

[5]. Yadav R, Kachewar SG. Role of MRI in evaluation of painful knee. IJMRHS. 2014;3(1):84-7.

[6]. Gimhavankar S, Suryavanshi K, Kaginalkar J, Rote Kaginalkar V. Magnetic Resonance Imaging of Knee Joint: Diagnosis and Pitfalls UsingArthroscopy as Gold Standard. Int J Sci Stud. 2016;4(1):110-6.

[7]. Mansour MAM, Ahmed RM, Alaaibrahim, Elhussein N, Aljuaid SA. Magnetic resonance imaging diagnostic procedures for knee joint injuries. IOSR J Nursing Health Scie. 2015;4(2):37- 46.

[8]. Singh JP, Garg L, Shrimali R, Setia V, Gupta V. MR Imaging of knee with arthroscopic correlation in twisting injuries. Indian journal of radiology and imaging. 2004;14(1):33-40.

[9]. Hetta W, Niazi G. MRI in assessment of sports related knee injuries. The Egyptian Society of Radiology and Nuclear Medicine. 2014;45(4):1153- 61.

[10]. Pasupuleti B, Kosti SK, Narra R, Jukuri N. MRI evaluation of painful knee. J of Evidence Based Med and Health Care. 2015;2(7):888-97.
[11]. Kelly EA. Berquist MRI of the musculoskeletal system: Knee. 5 th ed. Lippincott, Williams and Wilkins: 2006;307-21.
[12]. Crues JV, Richard R, Morgan FW. Meniscal pathology: The expanding role of magnetic resonance imaging. ClinOrthopae Related Research. 1990;252:80-6.
[13]. Pamrika M, Gayan M, Hazarika K, Roy DKR. MRI evaluation of painful knee joint-the correlation of multiple coexisting pathologies, age and sex. J Evid Based Med Health. 2017;4(18):1019-27.
[14]. Arumugam V, Ganesan GR, Natarajan P. MRI Evaluation of Acute Internal Derangement of Knee. Open J Radiol. 2015;5(02):66-71.
[15]. Wright DH, De Smet AA, Norris M. Bucket-handle tears of the medial and lateral menisci of the knee: value of MR imaging in detecting displaced fragments. AJR Am J Roentgenol. 1995;165 (3):621-5.
[16]. Sohail K, Ayesha H, Shireen K, Zahir S, Ambreen S, Rehana B. Role of MRI in painful knee. Ann Pak Inst Med Sci. 2015;11(3):137-41.
[17]. Mathis CE, Noonan K, Kayes K. Bone bruises of the knee: a review. The Iowa Orthopaedic Journal. 1998;18:112-7.
[18]. Mc Cauley TR, Moses M, Kier R, Lynch JK, Barton JW, Jokl P. MR diagnosis of tears of anterior cruciate ligament of the knee: importance of ancillary findings. Am J Roentgenol. 1994; 162(1):115-7.
[19]. Spindler KP, Schils JP, Bergfeld JA, Andrish JT, Weiker GG, Anderson TE, et al. Prospective study of osseous, articular, and meniscal lesions in recent anterior cruciate ligament tears by magnetic resonance imaging and arthroscopy. Am J Sports Medicine. 1993;21(4):551-7.
[20]. Miller TT, Staron RB, Koenigsberg T, Levin TL, Feldman F. MR imaging of Baker cysts: association with internal derangement, effusion and degenerative arthropathy. Radiol. 1996;201(1):275-9.
[21]. Sansone V, de Ponti A, Paluello GM, del Maschio A. Popliteal cysts and associated disorders of the knee: critical review with MR imaging. IntOrthop. 1995;19(5):275-9.
[22]. Campbell SE, Sanders TG, Morrison WB. MR imaging of meniscal cysts: incidence, location, and clinical significance. Am J Roentgenol. 2001; 177(2):409-13.
[23]. Peterfy CG, Guermazi A, Zaim S, Tirman PF, Miaux Y, White D, et al. Whole-organ magnetic resonance imaging score (WORMS) of the knee in osteoarthritis. Osteoarthritis and Cartilage. 2004;12 (3):177-90.
[24]. Pompan DC. Reassessing the role of MRI in the evaluation of knee pain. Am Fam Physician. 2012;8593):221-4.
[25]. Shah D, Naware S, Bhatnagar S, Kulkarni VM. Role of magnetic resonance imaging in the evaluation of articular cartilage in painful knee joint. Med J DY Patil Univ. 2014; 7(2):160-5.
[26]. DebrataNandy, Nirmalya Sinha. Magnetic Resonance imaging evaluation of painful knee joint : an experience from a rural medical college of West Bengal, India. Int J Res Med Sci 2019;7(9):3352-3356.
[27]. Ali M. Naraghi, Lawrence M. white.Imaging of Athletic Injuries of Knee Ligaments and Menisci: Sports Imaging Series: Volume 281: Number 1—October 2016 n radiology.rsna.org.
[28]. Krati khandelwal, V C Chaturvedi ,Vineet Mishra et al.Diagnostic accuracy of MRI knee in reference to arthoscopy in meniscal and anterior cruciate ligament injuries -The Egyptian Journal of Radiology and Nuclear medicine 49 (2018) 138-145.
[29]. Sultan AbdulwadoudAlshoabi , Mohammed G. Atassi et al . Descriptive study of knee lesions using magnetic resonance imaging and correlation between medical imaging diagnosis and suspected clinical diagnosis, original article ,@ 2020 journal of family medicine and primary care