|| Print ISSN: 2589-7837 || Online ISSN: 2581-3935 ||
International Journal of Medical Science and Diagnosis Research (IJMSDR)
Available Online at www.ijmsdr.com
PubMed (National Library of Medicine ID: 101738825)
Volume 3, Issue 5; May: 2019; Page No. 12-15
Original Research Article
crossref DOI: https://dx.doi.org/10.32553/IJMSDR/v3i5.3

EVALUATION OF ANTERIOR CRUCIATE LIGAMENT TEARS BY MAGNETIC RESONANCE IMAGING (MRI) WITH ARTHROSCOPIC CORRELATION

Dr. Chandrasekhar Dhruwa[1], Dr. Sameer Kathale[1]

[1]Assistant Professor Dept. of Radiology Chandulal Chandrakar Memorial Medical College, Kachandur, Durg (CG).
Conflicts of Interest: Nil
Corresponding author: Dr. Sameer Kathale

Abstract:

Introduction: MRI is a noninvasive, radiation free modality with a good ability to evaluate soft tissues. About 28% of populations among all population visits in hospital have complained with knee pain. There may be many causes such as infections, trauma, degenerative joint conditions, inflammatory conditions, and congenital lesions. Commonly injured ligament in knee is Anterior cruciate ligament (ACL) which is usually associated with Meniscal injures. In the body knee is important weight bearing joint of the body that provides mobility and stability during physical activity as well as balance while standing. Knee injuries like Traumatic injuries are frequently encountered both in general practice and in the hospital setting. Knee injury is offen caused by sports activities and may lead to severe pain and disability.

Aim: The main aim of this study is to MRI evaluation in the knee injuries related to anterior cruciate ligament compared to arthroscopy.

Material and methods: In this study 40 patients were included who were visiting to CCM hospital with suspected ACL injury. From all the patients detail history and clinical provisional diagnosis were taken. All the patients were taken for MRI examination followed by arthroscopy. Patients with injury of ACL and meniscal injuries were included in this study. MRI was analysis with the standard imaging planes of the knee were evaluated with each ACL bundle being classified as intact, partially torn, or completely torn.

Result: In this study 40 patients were included with suspected ACL injuries, which are associated with pain, limitation of movement, and swelling of the knee joint. According to ACL tear seen in MRI 30 patients shows partial and 10 patients shows complete ACL tear whereas Arthroscopy shows 12 patients with partial and 28 patients shows complete tear. According to the associated injuries re-sampling the type of meniscal injuries,in comparing to MRI and Arthroscopy the incidence of medial meniscus tear was 26 and lateral meniscus tear was 14 in MRI and meniscus tear was 25 and lateral meniscus tear was 15 in Arthroscopy.

Conclusion: MRI is commonly used diagnostic arthroscopy in most settings, and is considered an effective screening tool in most patients. MRI findings before arthroscopy help in the management of meniscal and ligament injuries. MRI has also been proved as cost effective.

Keywords: Magnetic resonance imaging (MRI), anterior cruciate ligament (ACL), knee injury

Introduction

About 28% of populations among all population visits in hospital have complained with knee pain. There may be many causes such as infections, trauma, degenerative joint conditions, inflammatory conditions, and congenital lesions[i],[ii]&[iii]. MRI is a noninvasive, radiation free modality with a good ability to evaluate soft tissues[iv]. In the field of diagnostic Arthroscopy has accuracy of 64 to 94% though it is an invasive procedure and is associated with complications. Commonly injured ligament in knee is Anterior cruciate ligament (ACL) which is usually associated with Meniscal injures[v],[vi]. In 1980's, studied of Kean et al MRI is used in knee injury. In the accuracy of MRI is very high in diagnosing knee lesion and it has has a sensitivity of 80% to 100%[vii]. MRI has best soft tissue contrast and multiplanar slice capability which has revolutionized. It has become ideal modality for imaging the complexanatomy of the knee joint[viii]. In the body knee is important weight bearing joint of the body that provides mobility and stability during physical activity as well as balance while standing. Knee injuries like Traumatic injuries are frequently encountered both in general practice and in the hospital setting. Knee injury is offen caused

by sports activities and may lead to severe pain and disability[ix]. MRI is commonly used in the evaluation knee trauma comparing to other modalities. It is best diagnostic tool which may also help in clinicians in the diagnosis of injuries to menisci and ligaments, osseous structures, articular surfaces, and tendon. Therefore it plays an important role in clinical diagnosis making[x]. Although Arthroscopy considered as gold standard for diagnosis of Anterior Cruciate Ligament and meniscal injuries still MRI is used as alternative to diagnostic arthroscopy as many researches detected high sensitivity and specificity MRI in assessment of knee joint injuries[xi]. The main aim of this study is to MRI evaluation in the knee injuries related to anterior cruciate ligament compared to arthroscopy.

Material and methods:

This study was carried out in Radiology Department at Chandulal Chandrakar Memorial Medical College at Durg, (CG) during the period of one year. In this study 40 patients were included who were visiting to this hospital with suspected ACL injury. From all the patients detail history and clinical provisional diagnosis were taken. All the patients were taken for MRI examination followed by arthroscopy. Patients with injury of ACL and meniscal injuries were included in this study. MR imaging was done on a 1.5 - T MR imaging unit (Achieva, Philips medical system). For all patients imaged in the supine position using phased - array knee coil. MRI was analysis with the standard imaging planes of the knee were evaluated with each ACL bundle being classified as intact, partially torn, or completely torn. Then MRI results were compared with arthroscopic findings. Arthroscopies were performed by orthopedic surgeons.

Result:

In this study 40 patients were included with suspected ACL injuries, which are associated with pain, limitation of movement, and swelling of the knee joint.

Table 1: sex distribution of patients

Gender	no	%
Male	35	87.5
Female	5	12.5
Total	40	100

Out of 40 patients 35 (87.5%) were males and 5(12.5%) were female Whereas the age group of 20 – 30 years old patients showed maximum and with 30 – 40 years old were least as shown in table 1 and 2.

Table 2: Age (years) distribution of the study group

Age(years)	No	%
10-20	10	25
20-30	23	57.5
30-40	7	17.5
	40	100

According to ACL tear seen in MRI 30 patients shows partial and 10 patients shows complete ACL tear whereas Arthroscopy shows 12 patients with partial and 28 patients shows complete tear as shown in table 3. In correlation between MRI and arthroscopy; the chi-square statistic is 16.2406. The p-value is 0.000056. This result is significant at $p < .05$.

Table 3: Comparison between MRI and arthroscopy according to type of injury

Type of tear	MRI	Arthroscopy	X2	p value
Partial ACL tear	30	12	16.24	0.0005
Complete ACL tear	10	28		

According to the associated injuries re-sampling the type of meniscal injuries,in comparing to MRI and Arthroscopy the incidence of medial meniscus tear was 26 and lateral meniscus tear was 14 in MRI and meniscus tear was 25 and lateral meniscus tear was 15 in Arthroscopy as shown in table 4.
The chi-square statistic is 0.0541. The p-value is 0.816092. This result is not significant at $p < .05$.

Table 4: Type of meniscal injury distribution according to MRI in correlation

Type	MRI	Arthroscopy	X2	p value
medial meniscus	26	25	0.054	0.816
laterial meniscus	14	15		

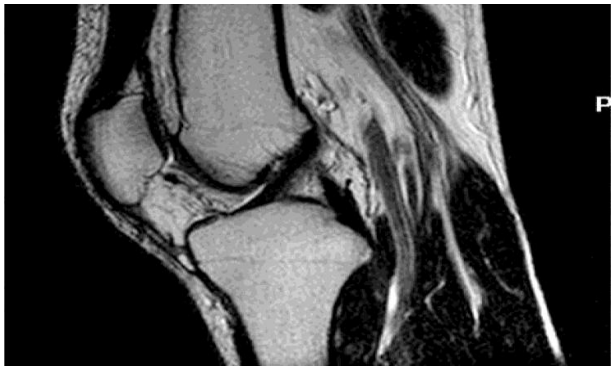

Figure 1: Anterior cruciate ligament (ACL) sagittal-oblique T2 FSE image.

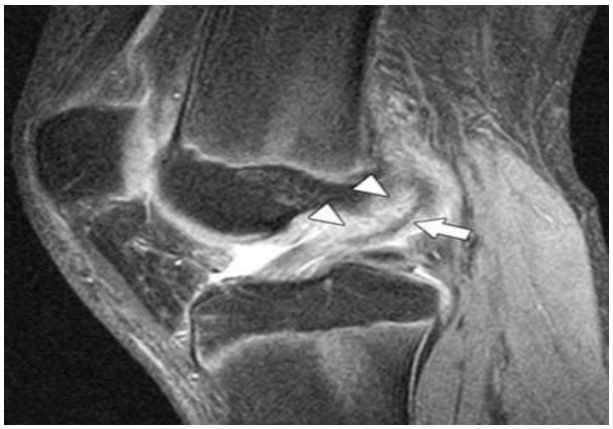

Figure 2: A fat-suppressed proton-density sagittal view of an acute partial ACL tear depicts focal increased signal of the ACL (arrowheads) and a wavy contour of posterior fibers, which remain in continuity (arrow).

Discussion:

Still MRI is increasing which becomes important investigation for most of the lesions of knee. This is non invasive technique that does not require contrast administration and is not operator dependent[xii]. Complete evaluation of all the internal structures of the knee is not possible with other methods like radiography, ultrasonography and arthrography. Peripheral meniscal tears, osteochondritis dessicans and inferior surface tears without articular cartilage damage are not detrected. In knee disfunction Meniscal injuries are a common cause which leads to two-third of all knee disturbances[xiii]. ACL tears also leads to significantly unstable knee joint being the most frequently injured ligament of the knee becomes difficult in diagnosis. Noninvasive and radiation free diagnostic modality is MRI which is commonly used[xiv].

In this study out of 40 patients maximum were males (87.5%) and with the age group 20-30 years (57.5%) which is almost similar to studied of Kostov et al[xv]. other studies also support this study and showed the age group of 21 – 30 years and were mostly males in studied done by Clayton et al[xvi]. Nasir[xvii] and Avcu et al[xviii].

In this study of Panigrahi et al[xix]. in 76 patients MRI of ACL tear against arthroscopy, the sensitivity, specificity 94.7% and 78.6% respectively and 4 cases with complete ACL tears were missed on MRI which is correlated to this study.

M.Schurz et al[xx]., studied shows that patients with the clinical diagnosis of meniscal tears and recommended MRI as a clarifying diagnostic tool for the investigating of meniscal tears, especially LM ruptures.

Hetta and Niazi[xxi] et al reported 28% of patients represent with isolated injury 72% of patients with combined injuries and the incidence of medial meniscal tear was more than lateral meniscal tear which is revealed to this study and also to other studied done by Lim and Peh[xxii].

Conclusion:

In this study evidence to conclude that MRI is highly accurate in diagnosing meniscal and ACL tears. MRI evaluates ligaments of the knee joint and surrounding soft tissue and also ligamentous and meniscal injuries can be diagnosed with high level of confidence. MRI is commonly used diagnostic arthroscopy in most settings, and is considered an effective screening tool in most patients. MRI findings before arthroscopy help in the management of meniscal and ligament injuries. MRI has also been proved as cost effective.

References:

1. CAlindon TE. The knee. Best Pract Res Clin Rheumatol 1999;13:329-44
2. Peat G, McCarney R, Croft P. Knee pain and osteoarthritis in older adults: A review of community burden and current use of primary health care. Ann Rheum Dis 2001;60:91-7
3. Calmbach WL, Hutchens M. Evaluation of patients presenting with knee pain: Part II. Differential Diagnosis. Am Fam Phys 2003;68:917-22.
4. Remer EM, Fitzgerald SW, Friedman H, Rogers LF, Hendrix RW, Schafer MF. Anterior cruciate ligament injury: MR imaging diagnosis and patterns of injury. Radiographics. 1992;12 (5): 901-11.
5. Barber-Westin SD, Noyes FR. Objective criteria for return to athletics after anterior cruciate ligament reconstruction and subsequent reinjury rates: a systematic review. Phys Sports Med. 2011;39(3):100-10.
6. Claus Muhle, Joong Mo Ahn and Constanze Dieke. Diagnosis of ACL and meniscal injuries: MR imaging of knee flexion versus extension compared to arthroscopy. Springer Plus. 2013;2:213.
7. DeSmet AA, Tuite MJ and Norris MA. MR diagnosis of meniscal tears: analysis of causes of errors. AJR. 1994;163:1419–23.
8. Kaplan PA, Walker CW, Kilcoyne RF, et al. Occult fracture patterns of the kneeassociated with ACL tears: assessment with MR imaging.Radiology1992;183:835-8
9. Standaert CJ and Herring SA (2009): Expert opinion and controversies in musculoskeletal and

sports medicine: stingers. Arch Phys Med Rehabil ., 90:402 – 6.

10. Espeland A, Natvig NL, Løge I. et al (2007): Magnetic resonance imaging of the knee in Norway 2002 – 2004 (national survey): rapid increase, older patients, large geographic differences. BMC Health Serv Res.,7:115.

11. Major MM, Beard LN, Helms CA (2003): Accuracy of MRI of knee in adolescent.Am J Roentgenol., 180:17 - 19.

12. Abdul Bari A, Shivali V, Bhushan N, Mohammad S(2014): Evaluation of MRI Versus Arthroscopy in Anterior Cruciate Ligament and Meniscal Injuries. Journal of Clinical and Diagnostic Research, 8(12): RC14 - RC18.

13. Bui-Mansfield LT, Youngberg RA, Warme W, Pitcher JD, Nguyen PL. Potential cost saving of MR imaging obtained before arthroscopy of the knee. Evaluation of 50 consecutive cases. AJR. 1997;168:913-18.

14. Shahriaree, Heshmat (Editor): O'Connor's Text book of arthroscopic surgery. Philadelphia: J.B Lippincot; 1984.

15. Kostov H, Stojmenski S and Kostova E (2014): Reliability Assessment of Arthroscopic Findings Versus MRI in ACL Injuries of the Knee. Acta Inform Med., 22(2):111 – 114.

16. Clayton RA and Brown CM (2008): The epidemiology of musculoskeletal tendinous and ligamentous injuries. Pub med., 39(12):1338 - 44.

17. Nasir A et al. (2013): The role of magnetic resonance imaging in the knee joint injuries, International Research Journal of Medical Sciences, 1(5):1-7.

18. Avcu S, Altun E, Akpinar I, Eresov K (2010): Knee joint examination by MRI: the correlation of pathology, age and sex N Am J Med Sci., 2(4): 202 – 204.

19. Panigrahi R, Priyadarshi A, Palo N et al. (2017): Correlation of Clinical Examination, MRI and Arthroscopy Findings in Menisci and Cruciate Injuries of the Knee. Arch Trauma Res. ,6(1):e30364

20. Schurz M, Erdoes JT, Platzer P, Petras N, Hausmann JT. The value of clinical examination and mri versus intraoperative findings in the diagnosis of meniscal tears. Scripta Medica (BRNO). 2008;81(1):3-12

21. Hetta W and Niazi G (2014): MRI in assessment of sports related knee injuries. The Egyptian Journal of Radiology and Nuclear Medicine, 45:1152 - 1165

22. Lim SY and Peh W C (2008): Magnetic Resonance Imaging of Sports Injuries of the Knee. Annals Academy of Medicine, 37:4.