



ROLE OF MAGNETIC RESONANCE IMAGING IN EVALUATION OF ANTERIOR CRUCIATE LIGAMENT INJURIES

Thesis

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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

قالوا

لَسْبَدَّانُكَ لَا عِلْمَ لَنَا
إِلَّا مَا عَلَّمْتَنَا إِنَّكَ أَنْتَ
الْعَلِيمُ الْعَظِيمُ

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List of Contents

<i>Subject</i>	<i>Page No.</i>
List of Abbreviations.....	i
List of Tables	ii
List of Figures.....	iii
Introduction.....	1
Aim of study.....	2
Review of Literature	
Anatomy of the Knee Joint	3
MRI Anatomy of the Knee joint	11
Techniques of MRI of the knee joint	18
Pathological lesions of ACL	30
Patients and Methods.....	50
Results.....	55
Illustrative Cases	62
Discussion	68
Summary and conclusion.....	73
References.....	75
Arabic Summary	—

List of Abbreviations

<i>Abbrev.</i>	<i>Full-term</i>
ACL	: Anterior cruciate ligament
AHMM	: Anterior horn of medial meniscus
AM	: Anteromedial
AOB	: Anterior oblique band
CT	: Computed tomography
FOV	: Field of view
FSE	: Fast spin echo
LCL	: Lateral collateral ligament
LM	: Lateral meniscus
MCL	: Medial collateral ligament
MM	: Medial meniscus
MRI	: Magnetic resonance imaging
NPV	: Negative predictive value
PCL	: Posterior cruciate ligament
PDWI	: Proton density weighted image
PHMM	: Posterior horn of medial meniscus
PL	: Posterolateral
PP	: Proton density
PPV	: Positive predictive value
ROC	: Receiver operating characteristic
SD	: Standard deviation
SI	: Signal intensity
SPAIR	: Spectral attenuated inversion recovery
SPSS	: Statistical program for social science
TE	: Echo time
TR	: Repetition
TSE	: Turbo spin echo

List of Tables

Table No.	Title	Page No.
Table (1):	Gender distribution of the study group.	55
Table (2):	Age (years) distribution of the study group.....	56
Table (3):	Comparison between MRI and arthroscopy according to type of injury.....	57
Table (4):	Sensitivity, specificity, PPV, NPV and accuracy of MRI finding in partial ACL tears in correlation with arthroscopy.....	59
Table (5):	Type of meniscal injury distribution according to MRI in correlation with arthroscopy.....	59
Table (6):	The sensitivity, specificity, NPV, PPV Accuracy of MRI in correlation with arthroscopy diagnosing medial meniscus, lateral meniscus.....	61
Table (7):	Type of injury distribution of the study group.	61

List of Figures

<i>Figure No.</i>	<i>Title</i>	<i>Page No.</i>
Figure (1):	Diagrammatic illustration shows articular anatomy of knee joint	4
Figure (2):	Cruciate ligaments of knee joints ^[5]	5
Figure (3):	Gross specimen of the right knee showing the 2 bundles of ACL	6
Figure (4):	Ligaments of the knee joint ^[11]	7
Figure (5):	Menisci of the knee joint ^[5]	9
Figure (6):	Vascular supply of the knee joint ^[12]	10
Figure (7):	MRI of normal anterior cruciate ligament (ACL) shows	12
Figure (8):	Normal posterior cruciate ligament (PCL) in: (A) Sagittal proton-density (PD) FSE image. (B) Coronal (PD) FSE image (C) Axial (PD) FSE image	13
Figure (9):	Sagittal T1-weighted image shows: normal Posterior cruciate ligament and ligaments of Humphry & Wrisberg	14
Figure (10):	Sagittal T1-weighted image of Medial aspect of the knee through posterior horn of the medial meniscus	15
Figure (11):	(A) coronal proton density FSE Shows medial collateral ligament. (B) coronal proton density FSE Shows lateral collateral ligament.	17
Figure (12):	Extremity” or “knee” coil ^[21]	18
Figure (13):	The patient is positioned supine with the affected knee completely or nearly completely extended in the coil’	19

Figure (14): Planning of the coronal and sagittal images on axial scout image	21
Figure (15): Example of prescribed coronal images on axial and sagittal scout images	22
Figure (16): Example of prescribed sagittal images on axial and coronal scout images.	22
Figure (17): Normal ACL. Sagittal fat suppressed proton density MRI. Oblique sagittal slice revealing both the AM and PL bundles	23
Figure (18): Normal ACL. Coronal fat suppressed proton density MR image (Oblique coronal slice).	24
Figure (19): Lateral meniscus located between thigh bone and shin bone.....	29
Figure (20): Sagittal T2-weighted FSE fat-suppressed image of Partial tear of the anterior cruciate ligament (ACL)	38
Figure (21): Sagittal intermediate-weighted images of three different patients with Primary signs of ACL tear.....	39
Figure (22): The empty notch sign on coronal imaging in complete ACL tear	40
Figure (23): Bone marrow contusions as a secondary sign of anterior cruciate ligament (ACL) tear in a 26 years old male.....	41
Figure (24): T2- weighted sagittal FSE fat suppressed view shows Altered angle (22°) between anterior cruciate ligament (ACL) and lateral tibial plateau (normal value 45° or more) as an indirect sign of complete ACL tear	42
Figure (25): Buckled course of the posterior cruciate ligament (PCL) as an indirect sign of complete	

anterior cruciate ligament (ACL) in a 25 years old male.	42
Figure (26): Proton density (PD) sagittal FSE views displays an increased distance between the tibial posterior margin (line 1) and femoral posterior margin (line 2).	43
Figure (27): Sagittal intermediate-weighted magnetic resonance knee image of a completely torn anterior cruciate ligament shows Posterior cruciate ligament line sign	43
Figure (28): Unilateral congenital absence of anterior cruciate ligament (ACL) in a 13-year-old female tennis player without trauma or clinical instability.	44
Figure (29): Ganglion cyst of anterior cruciate ligament (ACL) in a 51-year-old male with posterior knee pain.	45
Figure (30): Muroid degeneration of anterior cruciate ligament (ACL) in a 24-year-old female.	46
Figure (31): Avulsion fracture of tibial spine.	47
Figure (32): Segond fracture.	47
Figure (33): Osteochondral injury lateral femoral condyle. Lateral radiographs of two patients with complete anterior cruciate ligament tear.	48
Figure (34): CT arthrography of the knee showing moving of the contrast across the knee denoting ACL tear.	49
Figure (35): Pie chart gender distribution of the study group.	55
Figure (36): Pie chart age (years) distribution of the study group.	56

Figure (37): Bar chart shows the arthroscopic and MRI finding according to ACL tear.....	58
Figure (38): Bar chart shows the arthroscopic and MRI finding according to meniscal tears.	60
Figure (39): Sagittal T2 and PD SPIR MRI images displaying a Partial thickness tear of ACL and Tear of posterior horn of MM (PHMM) reaching the articular surface with mild joint effusion, but the arthroscopy showed us there is complete tear of ACL.....	62
Figure (40): Sagittal T2 WI and PDW SPIR display a completely torn ACL with a linear band of abnormal signal intensity is seen at the posterior horn of the medial meniscus(PHMM) reaching the superior and inferior articular surfaces representing complex tear. (arthroscopy also showed us there is complete tear of ACL and PHMM).	63
Figure (41): Sagittal T2 and PDW SPAIR MRI displayed Full thickness tear of the ACL and PHMM also arthroscopy revealed complete ACL tear.	64
Figure (42): Sagittal PDW SPAIR MRI shows a longitudinal bright SI on PDWIs reaching the inferior articular surface denoting grade III tear.....	65
Figure (43): Sagittal T2 and PDW SPAIR MRI showed The ACL is edematous, cloudy, thickened showing a high signal intensity, denoting high grade partial / total tear of ACL (but arthroscopy revealed complete tear).	66

- Figure (44):** Sagittal PDW SPAIR MRI displayed a radial tear in anterior horn of LM.....66
- Figure (45):** Sagittal T2 and PDW SPAIR MRI displayed Complete tear of ACL is seen through the femoral attachment with fluid at the tear site.....67
- Figure (46):** Coronal MRI shows LM tear which was the same in arthroscopy.67

ABSTRACT

Background: Magnetic resonance imaging (MRI) is used more commonly in evaluation of knee trauma compared to other modalities as it is an excellent diagnostic tool that may help clinicians in the evaluation of injuries to menisci and ligaments, osseous structures, articular surfaces, and tendon, it plays an important role in clinical decision-making.

Aim of the Work: The aim of the current study is to determine the role of magnetic resonance imaging (MRI) in the assessment of injuries related to anterior cruciate ligament compared to arthroscopy.

Patients and Methods: This study includes (20) ACL injury patients referred to the Radiology Department from the Orthopedics outpatient clinic department, Al-Demerdash Hospital, Faculty of Medicine, Ain Shams University from December of 2016 to August of 2017.

Results: eighteen (90%) male and 2 (10%) female patients were enrolled in this study. We found that sensitivity, specificity, PPV, NPV and accuracy were (90%, 70%, 71.4% 100%, 80 %) respectively in partial ACL injury. And the sensitivity, specificity, PPV, NPV and accuracy in complete ACL injury were (78.4%, 100%, 100%, 71.4%, 82 %) respectively. And the sensitivity, specificity, NPV, PPV and accuracy of medial meniscal tear were (99.8 %, 91.7%, 92.3%, 100%, 94%) respectively and the sensitivity, specificity, NPV, PPV of lateral meniscal tear were (95.4 %, 97.3%, 99%,100%, 98%) respectively.

Conclusion: MRI is now commonly used before diagnostic arthroscopy in most settings as an effective screening tool in most patients because it is faster, non-invasive and does not involve morbidity associated with arthroscopy. MRI findings before arthroscopy help in the management of meniscal and ligament injuries, ultimately improving patient outcome.

Key words: magnetic resonance image, anterior cruciate ligament injuries, arthroscopy

Introduction

The knee is a major weight bearing joint that provides mobility and stability during physical activity as well as balance while standing. Traumatic knee injuries are frequently encountered both in general practice and in the hospital setting. These injuries are often caused by sports activities and may lead to severe pain and disability ^[1].

The anterior cruciate ligament (ACL) is a dense fibrous band composed of collagen fibrils. It is approximately 3.5-3.8 cm long and 1 cm in transverse diameter. The ligament originates from the posteromedial aspect of the lateral femoral condyle in the intercondylar notch. It courses through the notch in an anterior, inferior, and medial direction ^[2].

Magnetic resonance imaging (MRI) is used more commonly in the assessment of knee trauma comparing to other modalities as it is an excellent diagnostic tool that may help clinicians in the evaluation of injuries to menisci and ligaments, osseous structures, articular surfaces, and tendon, it plays an important role in clinical decision-making ^[3].

Arthroscopy considered the gold standard for diagnosis of Anterior Cruciate Ligament and Meniscal injuries yet, MRI considered an alternative to diagnostic arthroscopy as many articles detected high sensitivity and specificity of MRI in assessment of knee joint injuries ^[4].

Aim of study

The aim of the current study is to determine the role of magnetic resonance imaging (MRI) in the assessment of injuries related to anterior cruciate ligament compared to arthroscopy.

Anatomy of the Knee Joint

The knee joint is the largest and most superficial joint. It is primarily a hinge type of synovial joint, allowing flexion and extension; however, the hinge movements are combined with gliding and rolling, and with rotation about a vertical axis ^[5].

Bony Anatomy

The knee is composed of 4 bones: the femur, tibia, fibula and patella. All these bones are functional in the knee joint, except for the fibula. The proximal end forms the head of the femur, which projects antero-superomedially to articulate with the acetabulum. The distal end is wider and forms a double condyle that articulates with the tibia and patella. The tibia articulates with the distal lateral and medial femoral condyles. The patella articulates anteriorly to the femoral condyles in the region of the intercondylar fossa, the tibia lies distal to the femur and medial to the fibula. The proximal end consists of medial and lateral condyles, an intercondylar area, and the tibial tuberosity that articulates with the medial and lateral condyles of the femur ^[6].

The patella is the largest sesamoid bone in the body and is part of the extensor mechanism of the knee together with the quadriceps muscle and tendon, patellar tendon, and patellar retinaculum, the bone has two surfaces, three borders, a base, and an apex; (**Fig. 1**).