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

Thesis

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Dr. Raghad Mohammed Hatif

List of Contents

List of Abbreviations

Abbrev.	Full-term
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

List of Figures

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 ligamgent 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)**.