Introduction

The knee is one of the most frequently injured regions of the body. Knee injuries of both an acute and a chronic nature constitute a major cause of pain and disability among the athletic and non-athletic populations.

Over the last decade, advances have been made in the treatment of the knee disorders. Of equal importance have been improvements in the diagnosis of these disorders, especially using magnetic resonance imaging (MRI), since its initial application in 1984.

Early studies that first suggested possible roles for MRI in evaluating musculoskeletal diseases have been supplemented and confirmed by many evaluations of both intra-articular and extra-articular injuries of the knee. In addition, in the current climate of health care reform, MRI is a cost – effective means of diagnosing diseases of the knee and of guiding the orthopedic surgeon in selecting patients for arthroscopic procedures.

MRI is also highly efficacious in evaluating a large spectrum of other disorders, including congenital, neoplastic and inflammatory diseases of the joint and surrounding soft tissues.

To demonstrate the knee joint structures many MR techniques have been used to acquire images.

In addition to the many pulse sequences available, which support that the power of MRI is its ability to evaluate

a large spectrum of diseases. Because many diseases of the knee overlap in clinical presentations, the completeness of the examination may be MRI’s most important attribute.

Consequently the MR examination should be carefully designed to evaluate the maximal amount of potential clinically relevant pathology in the least amount of time.

Many MR imaging protocols have been designed for assessing the knee.

The ideal technique should yield images with good contrast and spatial resolution of the osseous and soft tissue structures of the knee in a reasonable time to maximize patient acceptability and throughput considerations.

The use of a dedicated knee coil is mandatory for a quality study because it improves the signal -to -noise ratio. Using small field of view in the range of 10 to 14 cm greatly improves the spatial resolution and facilitates optimal assessment of the anatomical structures of the knee.

Despite the wide spread use of mid-field strength MR units for imaging the knee, relatively little data are available on their accuracy compared with high field strength 1.5 Tesla units.

Acquisition of images in three orthogonal planes is very helpful in defining and characterizing abnormalities.

The knee is the largest and most complicated joint in the body. Basically, it consists of two condylar joints between the medial and lateral condyles of the femur and the corresponding condyles of the tibia, and gliding joints,

between the patella and the patellar surface of the femur. Note that the fibula is not directly involved in the joint.

Short-echo time (TE) conventional spin-echo (CSE) images generally provide the best contrast for anatomical evaluation.

Three dimensional Fourier transformation (3D-FT) imaging provides the highest spatial resolution with an acceptable signal-to-noise ratio, while allowing image reconstruction in any plane.

Fast spin echo (FSE) pulse sequences are less sensitive than CSE techniques for the assessment of mensical tears.

Bone contusion and other marrow abnormalities are best evaluated with short tau inversion recovery (STIR) and fat saturated FSE pulse sequences.

1.2. Hypothesis:

Demonstration of all knee joint structures by MRI with T1W sagittal, proton density, and coronal,T2W sagittal, and axial weighted images will be more informative.

1.3. Objectives:

1-To evaluate the applied protocols used in knee joint anatomical structures.

2-To find out the best protocol which will demonstrate all anatomical knee joint structures.

1.4. Methodology:

MRI will be performed for the knee joint structures, by applying the protocols including, sagittal T1 weighted images (SE), sagittal T2 weighted images (TSE), proton density (TSE) coronal T1weighted images (SE), axial T2 weighted images (TSE) and STIR (Inversion Recovery).

The protocols will be compared in order to choose which one(s) will be more informative.

1.4.1. Method of Data Collection:

50 patients will perform MR examinations to visualize all knee joint structures. Using the protocols for knee joint, sagittal T1W, sagittal T2W, sagittal proton density or STIR, coronal T1W, axial T2W.

1-4-2.The apparatus of Data Collection:

- MRI system of magnetic fields strength of 0.2 Tesla and 1.5 Tesla.
- Extremity knee coil.
- Information will be collected in a chart (attached)

1-4-3.The Study Area will be:

-Yastabshiroon Medical Centre

-Khartoum Advance Diagnostic Centre

-Saheroon Hospital

The Duration will be six months.

1-4-4.The Source of Data Collection:

1-Internet

2-Review of records (references).

3-Imaging

1-4-5.Data analysis:

The collected data will be statistically analyzed.

1-5. Importance of the Study.

Thesis Scope:

Chapter One: Introduction including:

Prelude, Hypothesis, Objectives,

Methodology, problems, Importanc of the study

Chapter Two: Theoretical Background.

Chapter Three: Literature Review

Chapter Four: Materials and Methods

Chapter Five: Results, Discussion, Conclusion & Recommendations.

Appendices

References.

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Chart for data collections

Demonstration of all knee joint structures by MRI:

Age: ..... Sex: .....

Clinical problem: .....

* Protocols (Techniques):

Part of the knee / Sequences	Menisci MM,LM	Cruciate ligaments ACL,PCL	Patella	Collateral ligaments MCL,PCL	Bones	Others
Sag T1W						
Sag T2W						
PD sag						
Coronal T1W						
Axial T2W						
Axial PD						
STIR sag						

* Clinical indications:

Trauma	Inflammatory	Congenital	Others

*Grades of evaluation:

1	Excellent
2	Very good
3	Good
4	Poor
5	Very poor