Knee pain:
Ultrasound and MRI correlation

Thesis

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List of abbreviations:

ACL	Anterior Cruciate Ligament
AHLM	Anterior Horn of Lateral Meniscus
AHMM	Anterior Horn of Medial Meniscus
CT	Computed Tomography
ESSR	European Society of Skeletal Radiology
Fig.	Figure
FSE	Fast Spin Echo
Int FS	Intermediate Fat Suppressed
LCL	Lateral Collateral Ligament
MCL	Medial Collateral Ligament
MRI	Magentic Resonance Imaging
PCL	Posterior Cruciate Ligament
PD	Proton Density
PHLM	Posterior Horn of Lateral Meniscus
PHMM	Posterior Horn of Medial Meniscus
US	UltraSonography
SPIR	Spectral Presaturation by Inversion Recovery
TE	Time to Echo

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Introduction

One of the frequent musculoskeletal problems is knee pain. Its prevalence is increasing in the population. If we take aging and obesity out of the equation, still we will note the trend of increasing knee pain among the populations. **(Nguyen et al, 2011)**

As it is a frequently encountered complaint, choosing a screening imaging modality is important. Apart from fractures radiologically screened by plain X-rays and confirmed by computed tomography (CT), MRI is currently widely chosen as the modality of choice to image soft tissue injuries and pathologies. This choice comes usually behind the clinical evaluation by the physician as the primary method of imaging. **(Koplas et al, 2008)**

US is an established effective modality of imaging knee soft tissues like the tendons, ligaments, vascular structures, bursae and the synovium.Some limitations of US in imaging some of the knee soft tissues (cruciate ligaments and menisci) are known . **(Alves et al, 2016)**

Aim of the study

Our aim is to detect the reliability of US in diagnosing cases with knee pain as compared to MRI.

Chapter 1

Radiological Anatomy

1.Bones:

The articulating bones of the knee are the femur with its two, medial and lateral condyles, tibia with its articulating flat surface, the tibial plateau and patella which articulates with its inner surface. The fibula doesn't participate in the articulation of the knee joint.

Like any bone, each has outer cortex and inner marrow.(Bolog et al, 2015)

MRI appearance: MRI gives a lot of information about bone marrow (little information about the cortex) which appears with signal intensity slightly higher than the muscles on T1 weighted images.

Bones appear with lower signal on fat suppressed images helping in delineating lesions with high sensitivity as shown in Fig. 1(Bolog et al, 2015)

Fig.1. Fat suppressed sagittal view MRI delineating bone contusions as pointed by the arrows. (quoted from Forster, 2015)

US appearance:

As the bone is a concealing factor in US examination (Fig. 2). No information about the bone marrow could be gotten.

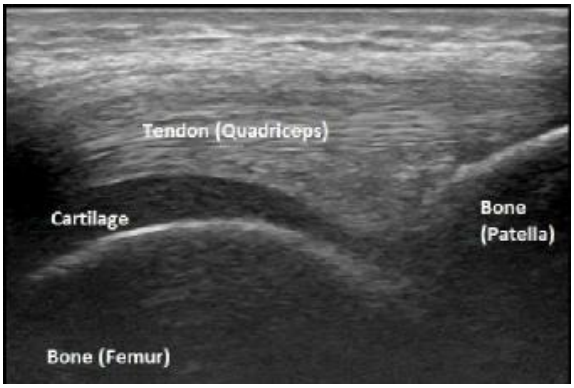

Fig.2.US picture demonstrating echogenic bone cortex concealing inner parts of the bone. (quoted from Bhargava, 2019)

Yet, the regularity of the bony cortex and if an exophytic lesion is present could be assessed. An example of irregular bony surface is shown in Fig. 3. (Friedman et al, 2001)

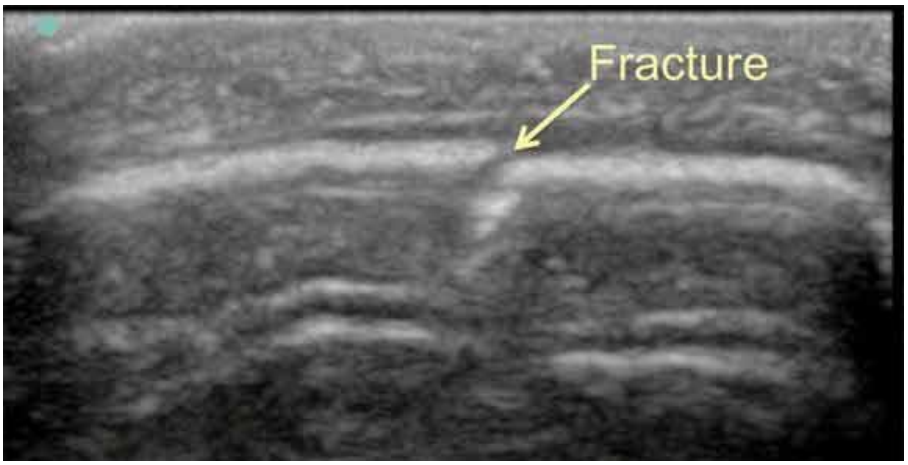

Fig.3.US picture of a bony surface with a focal area of lost cortical regularity which is pointed by the arrow representing a fracture (quoted from Wu et al, 2011)

2.Synovium: Fig. 4

The joint has an outer fibrous layer representing the fibrous capsule, and an inner thin layer of the synovium.

MRI and US appearance: normally synovial layer could not be seen in normal situations in both MRI and US examinations, and become evident when pathology presents.

(Bolog et al, 2015 and Friedman et al, 2001)

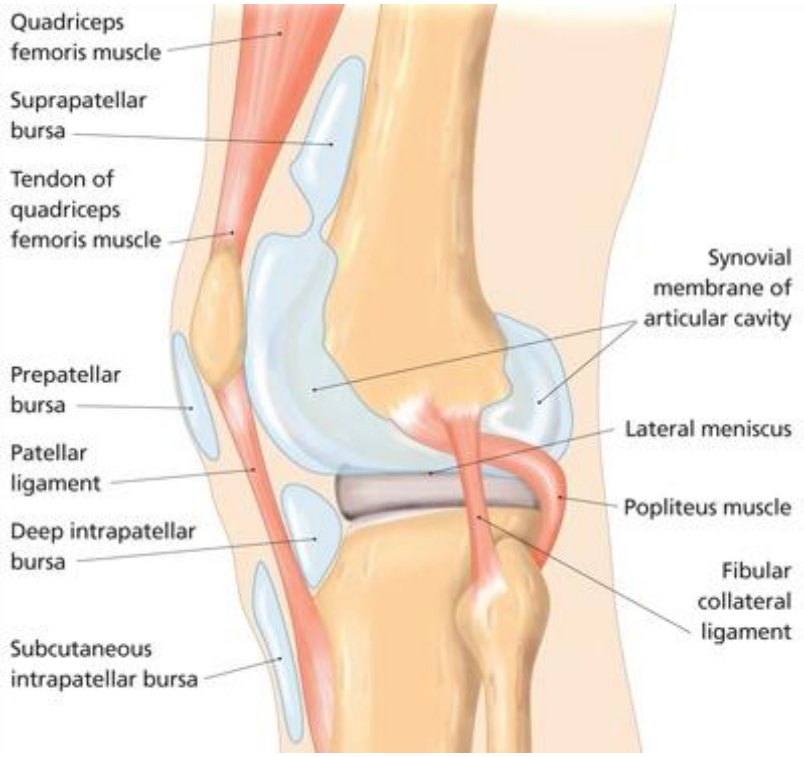

Fig.4. Diagram representing the synovial membrane with different bursae around the knee joint. (quoted from Price, 2008)