



شبكة المعلومات الجامعية
التوثيق الإلكتروني والميكروفيلم

بسم الله الرحمن الرحيم



MONA MAGHRABY



شبكة المعلومات الجامعية
التوثيق الإلكتروني والميكروفيلم



شبكة المعلومات الجامعية التوثيق الإلكتروني والميكروفيلم



MONA MAGHRABY



شبكة المعلومات الجامعية
التوثيق الإلكتروني والميكروفيلم

جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
علي هذه الأقراص المدمجة قد أعدت دون أية تغيرات



يجب أن

تحفظ هذه الأقراص المدمجة بعيدا عن الغبار



MONA MAGHRABY



The Role of High Resolution Ultrasound In Comparison To MRI In The Evaluation Of Painful Knee

Thesis

*Submitted for Partial Fulfillment of M.D Degree
in Radiodiagnosis*

By

Maged Mohamed Elzakzouk

M.B.B.Ch, M.Sc

Supervised by

Prof. Dr. Hanaa Abdelkader Abdelhameed

Professor of Radiodiagnosis

Faculty of Medicine - Ain Shams University

Dr. Khaled Ahmed Mohamed Ali

Assistant Professor of Radiodiagnosis

Faculty of Medicine - Ain Shams University

*Faculty of Medicine
Ain Shams University
2020*

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

قالوا

سبحانك لا علم لنا
إلا ما علمتنا إنك أنت
العليم العليم

صدق الله العظيم

سورة البقرة الآية: ٣٢

Acknowledgment

*First and foremost, thanks to **Allah**, to whom I relate any success in achieving any work in my life.*

*I would like to express my deepest gratitude and extreme appreciation to **Dr. Hanaa Abdelkader**, Professor of Radiology, Faculty of Medicine, Ain Shams University for her kind supervision, kind advice, constructive encouragement, generous help throughout the whole work which could not be a fact, without his guidance and kind help.*

*Also I would like to send special thanks for **Dr. Khaled Ali Shehata**, assistant Professor of Radiology, Faculty of Medicine, Ain Shams University, whom I overloaded too much throughout the whole work, for his great support, and valuable assistance throughout the whole work,*

Finally I would like to express my respect, appreciation, and thanks for my amazing family for their assistance and encouragement.

Abstract

This study included 50 patients (32 females and 18 males) with painful knee joints. They were subjected to Dynamic Ultrasonography and MRI examinations. The preliminary results have shown the great complementary role of dynamic ultrasonography in the diagnosis of different pathological conditions causing knee pain.

Key Words: Dynamic ultrasonography-MRI-knee pain

List of Contents

Title	Page No.
List of Abbreviations.....	i
List of Tables	ii
List of Figures	iv
Introduction	1
Aim of the Work.....	4
Review of Literature	
Gross Anatomy of the Knee Joint	5
Technique with Radiological Ultrasound and MRI	
Anatomy of the Knee Joint.....	25
Pathology of Painful Knee Joint with Ultrasound and	
MRI Manifestation	63
Patients and Methods.....	121
Results	126
Case Presentation	153
Discussion	164
Limitations, Recommendations & Conclusion.....	173
Summary	175
References	177
Arabic Summary	—

List of Abbreviations

Abb.	Full term
3D	<i>Three dimensional</i>
4D	<i>Four dimensional</i>
ACL	<i>Anterior cruciate ligament</i>
CT	<i>Computed tomography</i>
DVT	<i>Deep venous thrombosis</i>
FOV	<i>Field of view</i>
Gd-DTPA	<i>Gadolinium-diethylenetriamine pentaacetic acid</i>
ITB	<i>Iliotibial band</i>
LCL	<i>Lateral collateral ligament</i>
LS	<i>Longitudinal section</i>
MCL	<i>Medial collateral ligament</i>
MHz	<i>Mega hertz</i>
MRI	<i>Magnetic resonance imaging</i>
MSUS	<i>musculoskeletal ultrasound</i>
PCL	<i>Posterior cruciate ligament</i>
PDUS	<i>Power doppler ultrasound</i>
RA	<i>Rheumatoid arthritis</i>
SI	<i>Signal intensity</i>
STIR	<i>Short time inversion recovery</i>
TE	<i>Time of echo</i>
TR	<i>Time of repetition</i>
TS	<i>Transverse section</i>

List of Tables

Table No.	Title	Page No.
Table (1):	Bursae about the knee	13
Table (2):	MRI sequences parameters.	36
Table (3):	The frequency, percentage and ratio according to sex....	126
Table (4):	Distribution of the 204 pathological entities that were diagnosed by used imaging modalities in 66 knees joint.	127
Table (5):	Comparison between US and MRI in detection of to anterior cruciate ligament (ACL) in 66 knees.....	128
Table (6):	Comparison between US and MRI in detection of to posterior cruciate ligament (PCL) in 66 knees.....	129
Table (7):	Comparison between US and MRI in detection of to medial collateral ligament (MCL) in 66 knees.	131
Table (8):	Comparison between US and MRI in detection of to lateral collateral ligament (LCL) in 66 knees.	132
Table (9):	Comparison between US and MRI in detection of medial meniscus in 66 knees.....	134
Table (10):	Comparison between US and MRI in detection of lateral meniscus in 66 knees.	135
Table (11):	Comparison between US and MRI in detection of tendinous lesions in 66 knees.....	137
Table (12):	Comparison between US and MRI in detection of synovial thickening in 66 knees.....	139
Table (13):	Comparison between US and MRI in detection of joint effusion in 66 knees.....	140
Table (14):	Comparison between US and MRI in detection of osteoarthritis in 66 knees.	142
Table (15):	Comparison between US and MRI in detection of bony erosion in 66 knees.....	143
Table (16):	Comparison between US and MRI in detection of bony tumors in 66 knees.	145

List of Tables Cont...

Table No.	Title	Page No.
Table (17):	Comparison between US and MRI in detection of fractures in 66 knees.	146
Table (18):	Comparison between US and MRI in detection of bone marrow edema in 66 knees.....	147
Table (19):	Comparison between US and MRI in detection of bursal lesions in 66 knees.	149
Table (20):	Comparison between US and MRI in detection of periarticular soft tissue lesions in 66 knees.....	151

List of Figures

Fig. No.	Title	Page No.
Fig. (1):	Anterior view of the knee joint.....	7
Fig. (2):	Anterior view of the knee joint showing the relationship between the knee capsule and synovium	10
Fig. (3):	Lateral view of the knee joint.....	12
Fig. (4):	Bursae around the knee joint. Lateral, posterior and medial views	14
Fig. (5):	Right knee-joint posterior view	16
Fig. (6):	Right knee-joint, from the front, showing cruciate ligament.....	18
Fig. (7):	Left knee-joint from behind, showing cruciate ligaments.....	18
Fig. (8):	Right knee-joint anterior view	19
Fig. (9):	(a-b): Articular surface from above after removing the femur showing menisci and ligaments.....	22
Fig. (10):	Transverse (axial) section of the left knee joint to show the relations of the joint.....	24
Fig. (11):	Anterior aspect of the knee	28
Fig. (12):	Anterior suprapatellar longitudinal approach showing longitudinal view of the quadriceps tendon (t) inserting on the upper pole of the patella (p), the suprapatellar fat (pf) and the prefemoral fat (ff)	38
Fig. (13):	Anterior infrapatellar longitudinal approach showing patella (P), patellar tendon (PT), and Hoffa fat pad (H).....	39
Fig. (14):	Normal patellar and quadriceps tendons. Sagittal section shows patellar and quadriceps tendons	40

List of Figures Cont...

Fig. No.	Title	Page No.
Fig. (15):	Anterior infrapatellar longitudinal approach showing the normal, fluid-filled deep infrapatellar bursa (arrows). tibia (T), patellar tendon (PT), and Hoffa's fat pad (H)	41
Fig. (16):	Anterior transverse approach showing tranverse view of the hypoechoic prepatellar bursa (arrows) between the hyperechoic subcutaneous fat and the hyperechoic patella	41
Fig. (17):	Anterior oblique sagital approach showing the medial patellar retinaculum (arrows) bridging the patella (P) and the medial femoral condyle (F) hoffa fat pad (H).....	42
Fig. (18):	Anterolateral oblique sagital orientation showing the bilaminar lateral retinaculum.....	43
Fig. (19):	Axial T1 weighted MR image shows patellar retinacula, cruciate ligaments and peri-articular tendons	44
Fig. (20):	Anterior infrapatellar longitudinal approach showing the ACL	45
Fig. (21):	a,b): Normal Cruciate Ligaments. Sagittal sections show A anterior cruciate ligament B posterior cruciate ligament.....	46
Fig. (22):	Anterior suprapatellar transverse approach showing transverse view image of the anechoic hyaline cartilage (o) of the femoral trochlea (f).....	47
Fig. (23):	Medial longitudinal approach showing the MCL consisting of 2 hyperechoic layers separated by s thin hypoechoic (arrowed) line	48
Fig. (24):	Medial collateral ligament	48

List of Figures Cont...

Fig. No.	Title	Page No.
Fig. (25):	Medial longitudinal approach showing the triangular, homogeneous, hyperechoic medial meniscus.....	49
Fig. (26):	a,b): Normal medial and lateral Menisci	50
Fig. (27):	Anteromedial longitudinal approach at the proximal tibia showing the pes anserinus (arrow) which is seen as a hyperreflective concavity in the anteromedial surface of the proximal tibia.....	51
Fig. (28):	Lateral longitudinal approach showing the LCL (arrowed) bridging the lateral femoral condyle (F) and the head of the fibula (FIB). The hypoechoic appearance of the ligament is caused by anisotropy	52
Fig. (29):	Lateral collateral ligament	53
Fig. (30):	Lateral longitudinal approach showing the biceps femorus insertion on the head of the fibula	54
Fig. (31):	Lateral longitudinal approach showing longitudinal view of the iliotibial band (arrows) as it crosses over the lateral femoral condyle (F) and inserts on Gerdy's tubercle of the tibia (t) on the anterolateral surface of the proximal tibia.....	55
Fig. (32):	Axial T1 weighted MR image shows patellar retinacula, cruciate ligaments and peri-articular tendons	56
Fig. (33):	Lateral longitudinal approach showing the triangular anterior horn of the lateral meniscus (arrows),Femur (F) and tibia (T)	57

List of Figures Cont...

Fig. No.	Title	Page No.
Fig. (34):	Lateral longitudinal approach showing transverse scan of the common peroneal nerve behind neck of fibula.....	57
Fig. (35):	Posteromedial longitudinal approach showing the posterior horn of the medial meniscus (arrows) which is beautifully shown as a hyperechoic triangle in the posteromedial femorotibial joint space.....	58
Fig. (36):	Posteromedial longitudinal approach showing the PCL appearing as a hypoechoic fibrillar structure due to anisotropy bridging the tibia	59
Fig. (37):	Posterolateral approach showing the triangular posterior horn of the lateral meniscus	59
Fig. (38):	The popliteal vessels in LS	60
Fig. (39):	Focal tendinopathy of the quadriceps tendon.....	65
Fig. (40):	(a-b): Partial-thickness tear of the quadriceps tendon	66
Fig. (41):	Complete tear of the quadriceps tendon	67
Fig. (42):	Quadriceps tendinosis	68
Fig. (43):	Full thickness quadriceps tendon tear	68
Fig. (44):	Rupture of the medial retinaculum.....	69
Fig. (45):	Partial tear of the medial retinaculum	70
Fig. (46):	Posttraumatic suprapatellar bursa hematoma	71
Fig. (47):	Sagittal T2-weighted MR imaging reveals a suprapatellar recess distended by intra-articular effusion.....	72
Fig. (48):	Suprapatellar recess: intra- articular effusion with Synovial hypertrophy.....	72