THE VALUE OF THREE-DIMENSIONAL CT SCANNING IN DIAGNOSIS OF LESIONS OF WEIGHT BEARING JOINTS OF THE LOWER LIMB

Thesis

Submitted for partial fulfillment of M.D. Degree in **Radiodiagnosis**

By **Amany Emad El-Din Radi**

 $\mathcal{M}.\mathcal{B}.\mathcal{B}.\mathcal{Ch}.,\,\mathcal{M}.\mathcal{Se}.$

Supervised By

Prof. Dr. Saad Aly Abd Rabou

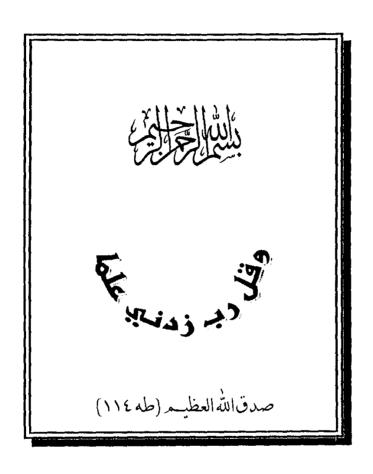
Prof. of Radiodiagnosis Faculty of medicine Ain Shams University

Prof. Dr. Ahmed Emad El-Din Radi

Assist. Prof. of Orthopaedics Faculty of Medicine Ain Shams University

Faculty of Medicine Ain Shams University 1997







Acknowledgment

I feel it is my duty to express my deep gratitude to Prof. Dr. Soad Aly Abd Rabou, Professor of Radiodiagnosis, Ain Shams University, who suggested this subject and offered me a great help and fatherly guidance along all the steps of this work.

I would like also in this respect to express my sincere thanks to **Prof. Dr. Ahmed Emad, Assistant** Professor of Orthopaedics, Ain Shams University, for his close supervision, assistance and detailed revision of this work.

I am most grateful to **Prof. Dr. Zeinab Abd** Allah, Head of the Department of Radiodiagnosis, Ain Shams University, for helpful spirit and constant encouragement.

Finally, I extend my deep thanks to all the staff members of the radiodiagnosis Department. Ain Shams University, for their sincere advice and help.



CONTENTS

		Page
•	Introduction and aim of the work	1
•	Review of Literature	3
•	Normal anatomy and CT anatomy of the	3
	weight bearing joints of lower limb	
•	Pathology	28
•	Basic requirements and physical principles of	99
	3D reconstruction	
•	Materials and Methods	105
•	Results	113
•	Illustrated Cases	152
•	Discussion	237
•	Summary and Conclusion	255
•	References	259
•	Arabic Summary	

LIST OF FIGURES

Fig. No.	Title	Page
1	Ligamentous structures of the hip joint	4
2	synovial membrane of hip joint	6
3	Acetabular larbrum	7
4	The ligament of head of femur	7
5	Normal CT anatomy of adult hip	9
6	Anteroposterior and lateral radiograph of	11
	the knee joint	
7	The femoral condyles (lateral view)	14
8	the articular surface of distal end of femur	14
9	The articular surface of the patella	15
10	The posterior surface of the patella	15
11	The synovial membrane of the knee joint	17
l 2	The menisci of the knee joint	19
13	The ligamentum patellae	22
l4	The cruciate ligaments	22
15	CT anatomy of the right knee joint	23
l 6	CT anatomy of the menisci	23
17	Parts of the deltoid ligament	25
18	CT anatomy of right ankle joint and hind	27
	foot	
19	Posterior column fracture	32
20	Posterior wall fracture	32
21	Posterior column associated with post wall	32
	fractures	
22	Associated posterior wall with transverse	32
	fracture	
23	Anterior column fracture	34
24	Anterior wall fracture	34
25	Anterior wall and anterior column	34
	fractures	

26	Pure transverse fracture	34
27	T-fractures	36
28	Associated transverse and acetabular wall	36
	fractures	
29	Double columns fractures	36
30	Type I A superior dislocation with no	38
	associated fracture	
31	Type I B superior dislocation associated	38
	with fracture head of femur	
32	Type IC superior dislocation associated	38
	with fracture acetabulum	
33	Type IIA inferior dislocation with no	38
	associated fracture	
34	Type II B inferior dislocation associated	40
	with fracture head of femur	
35	Type II C inferior dislocation associated	40
	with fracture of acetabulum	
36	Type I simple posterior dislocation	40
37	Type II posterior dislocation with large	40
	single fracture of acetabulum	
38	type II posterior dislocation with	42
	comminution of rim of acetabulum	
39	Type IV posterior dislocation with fracture	42
	of acetabular floor	
40	Type V posterior dislocation with femoral	42
	head fracture	
41	Classification of supra- and intercondylar	42
	fractures	
4 2	Types of femoral condylar fractures	44
43	Classification of tibial plataeu fractures	46
44	Classification of fracture dislocations of the	46
	knee	
45	Classification of patellar fractures	48

46	Anterior dislocation of the knee	50
47	Types of Pott's fracture	53
48	Normal hip and predislocation stage of hip	59
	dysplasia	
49	Aitken type I proximal femoral focal	63
	deficiency	
50	Aitken type B proximal femoral focal	63
	deficiency	
5l	Aitken type C proximal femoral focal	63
	deficiency	
52	Aitken type D proximal femoral focal	63
	deficiency	
53	Stages of congenital hyperextension,	64
	sublaxation and dislocation of knee	
54	healing of suppurative arthritis	68
55	The four bone sites of origin of tuberculosis	68
	of the hip joint	
56	Cysts and cyst-like lesions of bone	80
57	The progress of osteonecrosis	95
58	Case No. 1	154
59	Case No. 2	158
60	Case No. 3	162
6l	Case No. 4	166
62	Case No. 5	170
63	Case No. 6	174
64	Case No. 7	178
65	Case No. 8	182
66	Case No. 9	186
67	Case No. 10	190
68	Case No. ll	194
69	Case No. 12	198
70	Case No. 13	202
71	Case No. 14	206

72	Case No. 15	210
73	Case No. 16	214
74	Case No. 17	218
75	Case No. 18	222
76	Case No. 19	226
77	Case No. 20	230
78	Case No. 2l	234

LIST OF TABLES

Tab. No.	Title	Page
1	Number and sex of cases	105
2	Main clinical presentations of the 55	106
3	patients	107
	Provisional diagnosis in the studied cases	107
4	the affected joint	
5	The various pathological lesions affecting each joint	108
6	Classification of 6 groups of lesions of the	113
	weight bearing joints of the lower limb	
7	Plain x-ray, CT findings and data obtained	116
	from 3-D reconstruction in congenital defects	
8	types of traumatic lesions	118
9	Various types of traumatic lesions seen	119
	around the hip joint	
10	Plain x-ray, CT findings and data obtained	120
	from 3-D reconstruction in traumatic	
	lesions around the hip	
11	Plain x-ray, CT findings and data obtained	128
	from 3-D reconstructions in traumatic	
	lesions around the knee joint	
12	Various traumatic lesions seen around the	131
127	ankle joint	-01
13	Plain x-ray, CT findings and data obtained	132
10	from 3-D reconstruction in traumatic	
	lesions around the ankle joint	
14	Various infective lesions seen in our series	135
15	Plain x-ray, CT findings and data obtained from 3-D reconstruction in the infective	136
	lesions	

16	The various neoplastic lesions	140
17	Plain x-ray, CT findings and data obtained	141
	from 3-D reconstruction in various	
	neoplastic lesions of the weight bearing	
	joints of lower limb	
18	Various degenerative lesions	145
l 9	Palin x-ray, CT findings and data obtained	146
	from 3-D reconstruction in the degnerative	
	lesions	
20	The different miscellaneous lesions	148
21	Plain x-ray, CT findings and data obtained	149
	from 3-D reconstruction in the	
	migrellaneous legions	