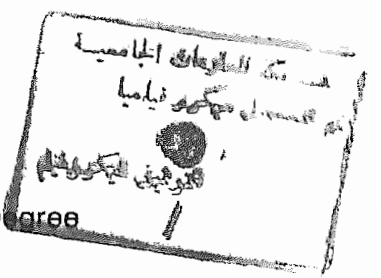
ROLE OF ULTRASONOGRAPHY AND COMPUTED TOMOGRAPHY IN THE EVALUATION OF SPLENIC FOCAL LESIONS



Essay

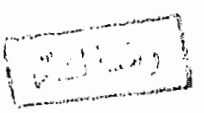
Submitted in Partial Fulfillment for the Master Degree

In Radiodiagnosis

616.07543
N. D

By

Noha Diaa Zaky
M.B., B.Ch.



Supervisors

DR. HEBA MOHAMED KHALIL EL-DEEB

Ass. Prof. of Radiodiagnosis
Faculty of Medicine
Ain Shams University

DR. FATEN KAMEL

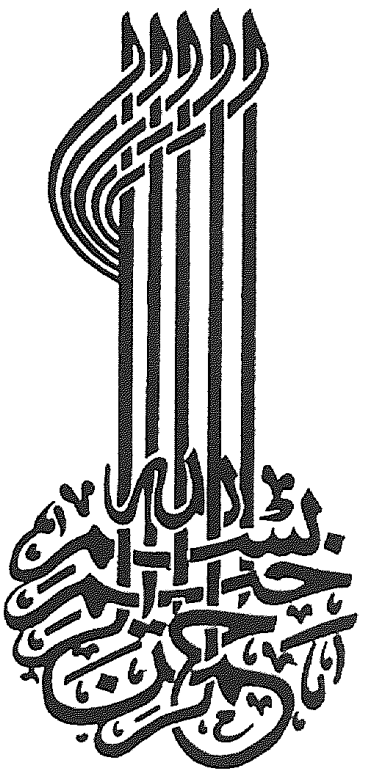
Lecturer of Radiodiagnosis
Faculty of Medicine
Ain Shams University

5097

FACULTY OF MEDICINE

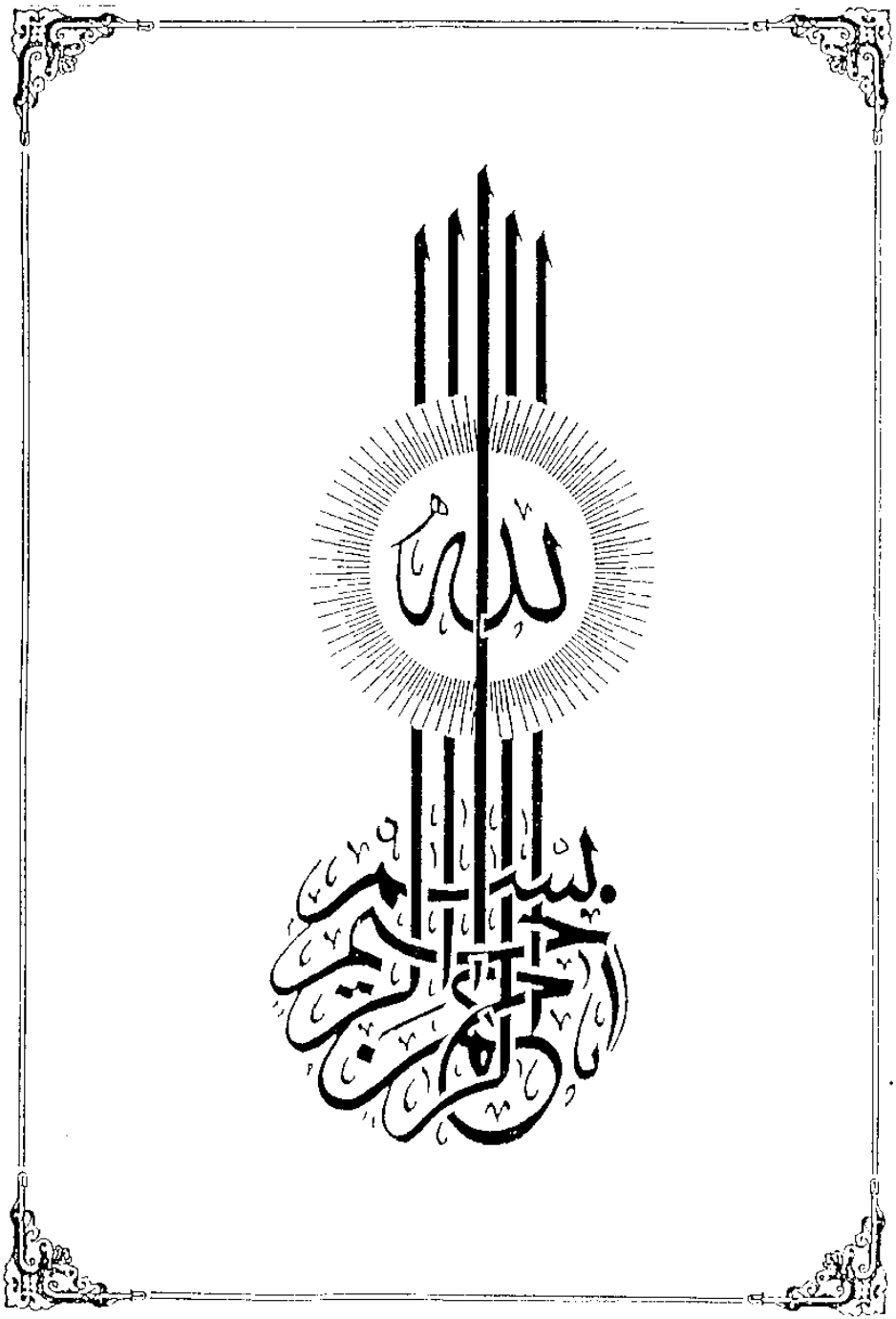
AIN SHAMS UNIVERSITY

1993



وقل اعملوا فسيرى الله عملكم ورسوله والمؤمنون

صدق الله العظيم



Central Library - Ain Shams University

DEDICATION

To My Family

Acknowledgement

I wish to express my sincere gratitude to my Professor Dr. Heba Mohamed Khalil El-Deeb, Professor of Radiodiagnosis, Faculty of Medicine, Ain Shams University, for her patience, continuous support and valuable comments throughout this work.

I also wish to thank Dr. Faten Kamel, Lecturer of Radiodiagnosis, Faculty of Medicine, Ain Shams University, for her guidance, support and encouragement.

Dr. Ahmed El-Serafi, my husband, deserves a special mention for his genuine interest, stimulating suggestions, help and co-operation that made the accomplishment of this work possible.

Finally, no words can express the warmth of my feelings towards my parents, sister and brother for their continuous encouragement and sincere help and also everyone involved in making contributions to this work.

CONTENTS

Page

- INTRODUCTION AND AIM OF THE WORK 1-2
- ANATOMY 3-20
  - Gross Anatomy 3-10
  - Normal sonographic appearance of the Spleen 11-15
  - Normal appearance of the spleen by computed tomography 16-20
- PATHOLOGY 21-43
- METHODS OF EXAMINATION 44-50
  - Ultrsonographic examination 44-46
  - Computed tomographic examination 47-50
- MANIFESTATIONS WITH ILLUSTRATIVE CASES 51-98
- SUMMARY AND CONCLUSION 99-100
- REFERENCES 101-108
- ARABIC SUMMARY

LIST OF FIGURES

Page

Fig. (1): Relationship of the spleen to adjacent structures 3

Fig. (2): The spleen and surrounding structures 4

Fig. (3): The visceral surface of the spleen 5

Fig. (4): The hilum of the spleen 6

Fig. (5): The left upper quadrant of the abdomen 7

Fig. (6): U.S. scanning of the left upper quadrant of the abdomen 12

Fig. (7): U.S. scanning of the left upper quadrant of the spleen 15

Fig. (8): CT of splenic margin 18

Fig. (9): CT of splenic lobulation 18

Fig. (10): CT of accessory spleen in a patient after splenectomy 19

Fig. (11): CT of accessory spleen in a patient with splenomegaly 20

Fig. (12): Age distribution of Hodgkin's disease 34

Fig. (13): Age distribution of non-Hodgkin's disease 42

Fig. (14): Sonographic appearance of the splenic cyst 52

Fig. (15): A and B, Sonographic appearance of the splenic cyst 54

Fig. (16): Sonographic appearance of epidermoid cyst 55

Fig. (17): Sonographic appearance of post-traumatic cyst 55

Fig. (18): Sonographic appearance of cystic haemangioma 57

Fig. (19): Sonographic appearance of intrasplenic pseudocyst 58

Fig. (20): CT examination of a splenic cyst 59

Fig. (21): CT examination of a false cyst of the spleen .....

Fig. (22): CT examination of calcified echinococcus cyst 61

Fig. (23): CT examination of cystic lymphangiomatosis of the spleen 62

Fig. (24): CT scan of the upper abdomen 63

Fig. (25):	A and B, CT examination of pancreatic pseudocysts	64
Fig. (26):	Sonographic appearance of splenic abscess	66
Fig. (27):	CT examination of splenic abscess	67
Fig. (28):	CT examination of multiple candidal abscesses	68
Fig. (29):	A and B, CT examination of a large intrasplenic abscess	69
Fig. (30):	Follow-up sonographic examination in a patient with splenic infarct	71
Fig. (31):	A and B, CT examination of splenic infarct	73
Fig. (32):	CT examination of splenic infarct	74
Fig. (33):	A and B, CT examination of splenic infarct in a patient with a prosthetic heart valve	75
Fig. (34):	CT examination of splenic infarct	76
Fig. (35):	Sonographic examination of splenic haematoma	78
Fig. (36):	CT examination of splenic laceration	82
Fig. (37):	CT examination of splenic notches	82
Fig. (38):	Interface between extensive left hepatic lobe and spleen	83
Fig. (39):	Inhomogenous splenic enhancement after rapid bolus injection	83
Fig. (40):	A1 and A2, CT examination of subcapsular haematoma	84
Fig. (41):	CT examination of intrasplenic hematomas	84
Fig. (42):	CT examination of subcapsular splenic hematoma	85
Fig. (43):	Sonographic examination of tuberculosis of the spleen	88
Fig. (44):	A and B, CT examination of splenic angiosarcoma	90
Fig. (45):	CT examination of splenic metastases	93
Fig. (46):	CT examination of metastatic melanoma of the spleen	93
Fig. (47):	Sonographic examination of splenic lymphoma	94
Fig. (48):	CT examination of splenic lymphoma	96
Fig. (49):	A and B, CT examination of splenic lymphoma	97
Fig. (50):	A and B, CT examination of splenic lymphoma	98

Introduction & Aim of the Work

The spleen, as a part of the reticulo-endothelial system has a definite and important role in manifacture of lymphocytes, destruction of worn-out red blood cells, antibody synthesis, storage of blood and also production of red blood cells in prenatal life.

The spleen is frequently affected by many diseases whether focal or systemic and unfortunately its clinical evaluation is still unsatisfactory and in a good number of cases, inaccurate. This is because it is a difficult organ to be examined being inaccessible to palpation unless moderately enlarged.

There are different modalities available to image the spleen; selective splenic angiography and splenoportography are invasive techniques while ultrasonography, computed tomography, scintigraphy and magnetic resonance imaging are non-invasive techniques. They are complimentary tests but ultrasonography is the preliminary initial screening method in every case of suspected splenic lesion.

In general US ánd CT offer better anatomic analysis while contrast-enhanced CT and technetium 99m sulfur colloid nuclear medicine scans give functional information.

Contrast-enhanced CT permits evaluation of the splenic structure and function and also adjacent abdominal organs and intraperitoneal cavity. Although ultrasound may give similar structural and anatomic information about the spleen, it cannot accurately evaluate its vascular integrity. Although

nuclear medicine can evaluate the anatomic and vascular integrity of the spleen, it is unable to image the surrounding structures.

Ultrasonography is sufficient in the evaluation of splenic size and for serial follow up of size changes, evaluation of the type of echogenicity and is more tailored to the patient. Nuclear medicine scanning is frequently inaccurate for detection of changes of splenic size over time, due to variations in patient position even when multiple projections are used.

The aim of this study is to emphasize the diagnostic capabilities of US and CT in the different splenic focal lesions which may eventually help in solving many medical problems.

Anatomy

GROSS ANATOMY

The spleen is an intraperitoneal organ which lies in the left hypochondrium, with its long axis along the shaft of the tenth rib, and its lower pole extends forward as far as the mid axillary line (Fig. 1).

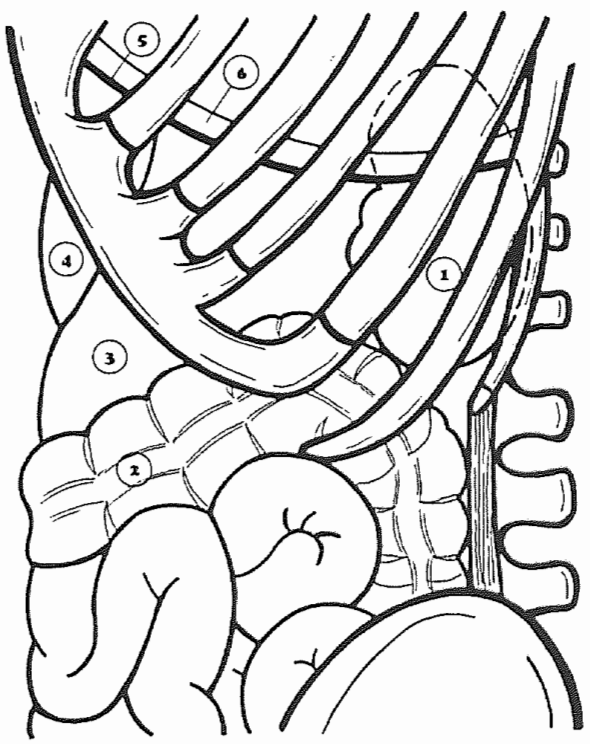


Fig. (1): Relationship of the spleen to adjacent structures as viewed from the left lateral position. 1. Spleen, 2. Transverse colon, 3. Stomach, 4. Liver, 5. Diaphragm, 6. Costophrenic recess *(From Hagen-Ansert, 1986).*

The spleen has a diaphragmatic surface and a visceral surface *(Gray, 1966).* The diaphragmatic surface is convex and smooth, it is opposed to the caudal surface of the left hemidiaphragm which separates it from the caudal

border of the left lung, left pleura and left 9th through 11th ribs. It is directed to the left, cranially, and posteriorly, with its cranial margin extending medially towards the epigastrium (Fig. 2).

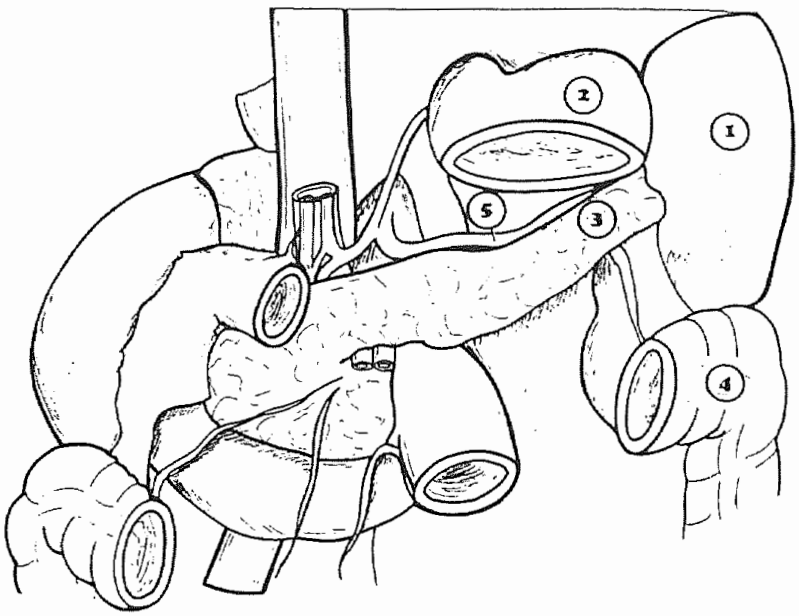


Fig. (2): The spleen and surrounding structures; 1. spleen, 2. stomach, 3. Tail of pancreas, 4. Descending colon, 5. Splenic artery *(From Hagen-Ansert, 1986).*

The visceral surface is concave and divided by a middle ridge into three flattened regions: the gastric, renal and colic surfaces.

The gastric surface, the largest of the three, is angled superiorly, medially and posteriorly and is in contact with the posterior wall of the stomach. The renal surface is directed posteriorly and medially and is adjacent to the cranial anterior surface of the left kidney and occasionally the left adrenal gland. The colic surface, the smallest of the three, is angled anteriorly and inferiorly and is in contact with colon at the splenic flexure and the phrenicocolic ligament.

Additionally, both the gastric and colic surfaces are closely related to the pancreatic tail (Fig. 3).

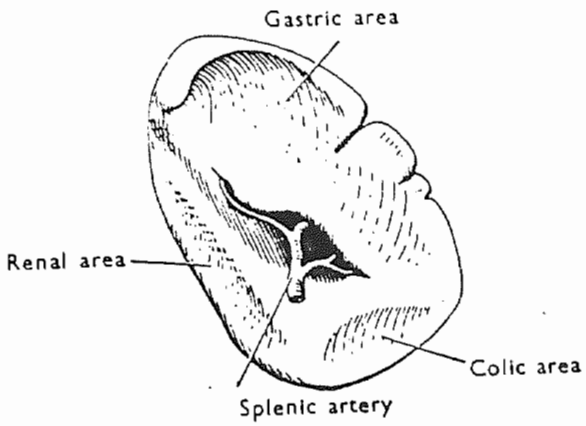


Fig. (3): The visceral surface of the spleen *(From Warrick, 1979)*

The spleen is contained within a fibrous capsule. It is entirely surrounded by peritonium which closely adheres to its capsule except on its visceral gastric surface where the splenic hilum is located where splenic artery and vein enter.

Several folds of peritonium act as suspensory ligaments *(Meyers et al., 1982).* The splenorenal (lienorenal) ligament connects the hilum of the spleen with the left kidney, and it contains the splenic artery and vein and the tail of the pancreas.

The gastrosplenic ligament is formed by the union of two leaves of peritonium of the greater and lesser sacs and connects the hilum of the spleen with the stomach, it contains branches of the short gastric and left gastroepiploic vessels between its two layers (Fig. 4).