CHARACTERISTIC CHANGES IN US ECHOGENICITY, CT ATTENUATION AND MR IMAGING SIGNAL INTENSITY IN CHARACTERIZATION OF INFECTIOUS LIVER DISEASES.

Essay

Submitted for Partial fulfillment of the Master Degree in Radiodiagnosis

Presented by

Raghda Asaad Abdel-Wahab

M.B., B.Ch.

Faculty of medicine

Ain shams university

Supervisors

Prof. Dr. Mohsen Gomaa Hassan

Professor of Radiodiagnosis

Faculty of Medicine

Ain Shams University

Dr. Ahmed Mohamed Hussien

Lecturer of Radiodiagnosis

Faculty of Medicine

Ain Shams University

2012

Acknowledgment

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

I wish to express my deepest thanks, gratitude and appreciation to Prof. Dr. Mohsen Gomaa Hassan, for his sincere encouragement, constant advice and valuable guidance throughout the performance of this work.

I owe special gratitude to Dr. Ahmed Mohamed Hussien , for his close supervision and continuous advice which gave me the best guide during different stages of this work.

I would like to thank my professors, my husband, my family, my friends and my colleagues for their support and moral encouragement.

Raghda Asaad Abdel-Wahab

Contents

List of Abbreviations

Acc :	*Accessory*
ADC :	*Apparent diffusion coefficient*
ALA :	*Amebic liver abscess*
2D :	*Two-dimensional*
CECT :	*Contrast enhanced computed tomography*
CEUS :	*Contrast enhanced ultrasound*
CHA :	*Common hepatic artery*
CT :	*Computed tomography*
3D :	*Three dimensional*
DWI :	*Diffusion weighted imaging*
FIESTA :	*Fast imaging employing steady state acquisition*
FISP :	*Fast imaging with steady-state precession*
FLASH :	*fast low-angle shot*
FOV :	*Field of view*
GDA :	*Gastroduodenal artery*
HA :	*Hepatic artery*
HASTE :	*Half-Fourier acquisition single-shot turbo spin echo*
HAV :	*Hepatitis A virus*

HBs Ag :	*Hepatitis B surface antigen*
HBV :	*Hepatitis B virus*
HCC :	*Hepatocellular carcinoma*
HCV :	*Hepatitis C virus*
HDV :	*Hepatitis D virus*
HT :	*Hepatic trunk*
HU :	*Hounsfield unit*
IV :	*Intravenous*
IVC :	*Inferior vena cava*
LAVA :	*Liver acquisition with volume acceleration*
LGA :	*Left gastric artery*
MRCP:	*Magnetic resonance cholangiopancreatography*
MRE :	*Magnetic resonance elastography*
RES :	*Reticulo endothelial system*
PLA :	*Pyogenic liver abscess*
RPV :	*Right portal vein*
RPPV :	*Right posterior portal vein*
SMV :	*Superior mesenteric vein*
SPAIR :	*Spectral presaturation attenuated inversion recovery*

SPIR :	*Spectral presaturation inversion-recovery*
SSFSE :	*Single-shot fast spin echo*
RHA :	*Right hepatic artery*
SGE :	*Spoiled gradient echo*
SI :	*Signal intensity*
SMA :	*Superior mesenteric artery*
SPIO :	*Super paramagnetic iron oxide*
STEAM :	*Stimulated echo acquisition mode*
T :	*Tesla*
TE :	*Time of echo*
TR :	*Time to repeat*
VIBE :	*Volumetric interpolated breath-hold examination*

List of Figures

INTRODUCTION

Imaging has an important role in the diagnosis and follow-up of hepatic infections. In routine clinical practice, US, CT, and MR imaging may be used. Characteristic changes in US echogenicity, CT attenuation, or MR imaging signal intensity and typical enhancement patterns can contribute to the diagnosis of specific infectious diseases, including abscesses, parasitic diseases, fungal diseases, granulomatous diseases, viral hepatitis, and other less common infections ***(Mortelé et al, 2004)***.

In planning the therapeutic approach for patients who have or are suspected of having liver lesions, imaging is one of the major sources of information. Although ultrasonography (US) will depict most of the focal liver lesions, characterization of the nature of such lesions often depends on an additional imaging evaluation, sometimes followed by a histopathologic examination ***(Matthijs Oudkerk et al, 2002)***.

The two principal modalities for the additional imaging evaluation of the liver, computed tomography (CT) and magnetic resonance (MR) imaging, have undergone marked technical advances over the past few years ***(Matthijs Oudkerk et al, 2002)***.

CT is particularly helpful in revealing the presence of calcifications and gas and in detailing the enhancement pattern ***(Mortelé et al, 2004)***.

In patients suspected of having hepatic fungal infection, arterial phase CT depicts significantly more hepatic lesions than does CT performed during the other phases, and it reveals more lesions with enhancement patterns suggestive of infection. Arterial phase CT should be performed in

addition to portal venous phase CT in patients suspected of having hepatic fungal infection ***(Metser et al, 2005)***.

The multiplanar capability of MR imaging and its sensitivity to small differences in tissue composition increase its specificity for certain hepatic infections, including hydatid cyst and candidiasis ***(Mortelé et al, 2004)***.

Clinical MR imaging sequences for hepatic imaging continue to evolve at a fast rate. The three basic demands if MR imaging has been chosen for hepatic imaging are: improving parenchymal contrast, suppressing respiratory motion artifact, and ensuring complete anatomic coverage. To guarantee satisfactory consideration of these three basic demands, use of the advanced designs of T1-weighted and T2- weighted imaging sequences remains the greatest challenge in hepatic MR imaging ***(Boll and Merkle, 2009)***.

With the introduction of abdominal diffusion weighted imaging, a very promising tool for extraction of both qualitative and quantitative information from hepatic MR imaging series without the administration of exogenous contrast medium became available ***(Boll and Merkle, 2009)***.

The elasticity of liver parenchyma shows a strong correlation with degree of hepatic fibrosis and association with increased vascular resistance, as seen in elevated portal venous pressure. MR Elastography allows quantification of the viscoelastic property of the liver, in particular for assessment of hepatic fibrosis ***(Boll and Merkle, 2009)***.

AIM OF THE WORK

This essay is designed to demonstrate characteristic changes in US echogenicity, CT attenuation & MR imaging signal intensity in characterization of infectious liver diseases.