بسم الله الرحمن الرحيم

شبكة المعلومـــــات الجامعية

التوثيق الالكتروني والميكروفيلم

شبكة المعلومات الجامعية

جامعة عين شمس

التوثيق الالكتروني والميكروفيلم

﴿ قـــسـم ﴾

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15 – 25c and relative humidity 20-40 %

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بالرسالة صفحات

لم ترد بالأصـــل

Magnetic Resonance Imaging and Color Doppler of Focal Hepatic Lesions in Patients with Cirrhosis

Thesis

submitted to the Faculty of Medicine

Alexandria University

in partial fulfillment of the requirements for

Doctor in Radiodiagnosis

by

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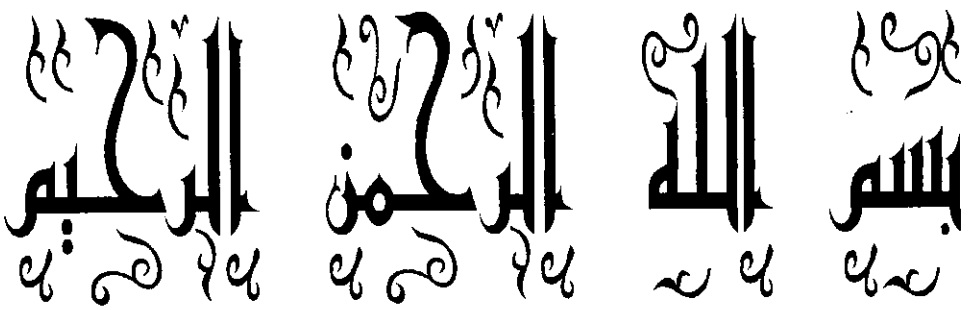
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Chapter 1

INTRODUCTION

such nodule may progress to turn into malignant one[6,7,9].

Cirrhosis refers to hepatocytes necrosis with regenerative nodules together with the development of irreversible hepatic fibrosis bridging the spaces between portal tracts. Since this involves destruction of the underlying hepatic architecture, it limits the capacity of the hepatic parenchyma to regenerate. In a trial to correct the diffuse hepatic damage, the liver cells proliferate haphazardly resulting in development of spectrum of nodules to overt hepatocellular carcinoma (HCC)[1,2].

The presumed premalignant nodular lesions in cirrhotic liver have a perplexing terminology in the literatures. The international working party chose the term "Dysplastic nodules" to refer to premalignant nodular lesions in cirrhotic liver[3]. Histologically, they vary from low to high-grade dysplasia. There are convincing clinico-pathologic data to support the premise that dysplastic nodules are a part of the multistep process of hepatocellular carcinoma carcinogenesis[4–8]. Other focal lesions are encountered in cirrhotic liver including focal fatty infiltration, and haemangiomata.

Among other means of diagnosis, the role of different imaging modalities is vital in not only detection of such focal lesions, but also characterization of them. The availability of the new different imaging techniques promises

CROSS SECTIONAL ANATOMY

OF THE LIVER

Classical description of the gross anatomic divisions of the liver was based solely on surface structures of the liver. The traditional right lobe was that portion of the liver to the right of the falciform ligament, the left lobe lies to the left of that ligamentum and to the left of the ligamentum venosum and teres.

The caudate lobe bounded by the fissure for the ligamentum venosum anteriorly and the inferior Vena Cava (IVC) posteriorly and the quadrate lobe bounded by the umbilical fissure. The porta hepatis and the gall bladder fossa were considered part of the right lobe[10].

These classical divisions of hepatic anatomy have been of little help to the surgeons and probably contributed to the delay in surgical technical advances. The surface anatomy of the liver poorly reflects the internal vascular structure. Consequently, the anatomic divisions of liver have been redefined in a manner that takes account of the distribution of the branches of the portal and hepatic veins. Three systems of nomenclature for identifying hepatic segments have been proposed[11–13].

In 1957, working independently, Goldsmith and Woodburne and Couinaud developed systems, for classifying hepatic segmental anatomy based on the location of the major hepatic veins:

The Couinaud's system further subdivided the liver according to the location of the right and left portal veins. The former system has been

widely adopted in the United States whereas the latter has been used predominantly in Europe. In 1982, Bismuth[13] devised a surgically relevant system of hepatic segmental nomenclature that combined both of the older systems.

According to Goldsmith and Woodburne, the liver is divided into right and left lobes, corresponding respectively to the distributions of the right and left branches of the portal veins. This division lies along a plane that passes through the long axis of the fossa for the gall bladder and through the IVC. The middle hepatic vein lies in that plane making it an important landmark of the boundary between the left and right hepatic lobes in transaxial images of the liver.

At a variable distance usually (0 to 3cm) beyond the division of the main portal vein into right and left branches, the right branch of the portal vein divides into anterior and posterior branches. The territories supplied by these two branches are respectively termed the anterior and posterior segment of the right hepatic lobe. The plane between these segments passes through the IVC and contains the right hepatic vein. Since the right hepatic vein lies in the intersegmental plane, the vein is an important landmark of the boundary between the anterior and posterior segments of the right hepatic lobe.

The division between the anterior and posterior segments is represented in transaxial images by a line passing through the right hepatic vein and the IVC. The anterior and posterior divisions of the right branch of the portal vein each divide into superior and inferior branches. Thus, the anterior and posterior segments of the right lobe each can be divided into superior and inferior subsegments consisting of territories supplied respectively by the superior and inferior right portal branches.

The left lobe is divided into medial and lateral segments. The boundary between these segments is indicated by the falciform ligament and the umbilical fissure. The main trunk of the left branch of the portal vein consists of two segments, the proximal (transverse) part and the distal (umbilical) part. The transverse part extends towards the left for approximately 3–5cm and then curves anteriorly into the umbilical fissure to continue as umbilical part ending bluntly in an attachment to ligamentum teres. The right branch of the portal vein is divided into two branches to supply two segments of the right lobe. On the other hand, the left branch of the portal vein distributes by means of three or four venous radicles into the medial segment of the left lobe and two important branches to the lateral segment. As noted earlier, the falciform ligament and the umbilical fissure denote the boundary between the medial and lateral segments of the left lobe. Since the umbilical parts of the left branch of the portal vein and ligamentum teres serve as important landmarks of the left intersegmental boundary in transaxial images. This line is indicated by lines passing through the IVC through the falciform ligament the umbilical part of the left portal branch or the ligamentum teres.

At levels above, the left portal vein serves as a landmark between the medial and lateral segments of the left lobe The caudate lobe has a vascular drainage that is distinct from the right and left lobes and is treated therefore as individual area. The lobule lies in direct contact with the IVC and receives one branch each from the left and right portal veins. It is drained by one to four veins that enter directly into the IVC.

The segmental nomenclature according to Couinaud is also based on the branching of the portal pedicles, i.e., the branched triad of portal vein, bile duct and hepatic artery. He divided the liver into eight segments, which can be related to the previous description. Segment 1 is the caudate lobe,