Acute fatty liver in critically ill patient

ESSAY

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Mahmoud Elsayed Mahmoud Dawood

الكبد الدهنى الحاد بمرضى الحالات الحرجة

رسالة

توطئة للحصول على درجة الماجستير فى

الرعاية المركزة العامة

مقدمة من الطبيب

محمود السيد محمود داود

بكالوريوس الطب والجراحة

كلية الطب – جامعة الزقازيق

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List of Abbreviations

AASLD	American association for study of liver disease
ACG	American college of gastroenterology
AFLP	acute fatty liver of pregnancy
AGA	American gastroenterology association
ALD	alcoholic liver disease
ALP	alkaline phosphatase
ALT	alanine aminotransferase
ANA	anti nuclear antibody
APO-B	APO lipoprotein B
ASH	alcoholic Steatohepatitis
ASMA	anti smooth muscle antibody
AST	aspartate aminotransferase
ATP	adenosine triphosphate
BMI	body mass index
CDT	carbohydrate deficient transferring
CPT	carnitine palmitoyl transferase
CT	computed tomography
FLD	fatty liver disease
G3P	glycerol-3- phosphate
G-6-P	glucose -6- phosphatase
GLUT	glucose transporter
GPAT	gluco phosphate acyl transferase
HDL	high density lipoprotein
HELLP	haemolysis +elevated liver enzyme+low platelet
HIV	human immunodeficiency virus
IL	inter leukins
IVC	inferior vena cava
LCHAD	long chain-3- hydroxyl acyl co enzyme A dehydrogenase

LHA	left hepatic artery
LHV	left hepatic vein
MRI	magnetic resonance imaging
NAD	nicotinamide adenine dinucleotide
NAFLD	Non alcoholic fatty liver disease
NASH	Non-alcoholic Steatohepatitis
OSA	obstructive sleep apnea
PI	plasma inhibitor
PPAR	peroxisome proliferator activated receptor
RES	reticuloendothelial system
RHA	right hepatic artery
RHV	right hepatic vein
SPEP	serum protein electrophoresis
SREBP	sterol regulatory element binding protein
TIBC	total iron binding capacity
tPA	tissue plasminogen activator
TPFI	tissue pathway factor inhibitor
TPN	total parentral nutrition
UNOS	American united network of organ sharing
uPA	urokinase plasminogen activator
US	ultrasonography
VLDL	very low density lipoprotein
VWF	von willebrand factor
WC	waist circumference

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INTRODUCTION

Fatty liver is the accumulation of triglycerides and other fats in the liver cells. The amount of fatty acid in the liver depends on the balance between the processes of delivery and removal. In some patients, fatty liver may be accompanied by hepatic inflammation and liver cell death. ***(Guy CD et al., 2012)***

Steatosis affects approximately 25-35% of the general population. Steatohepatitis may be related to alcohol-induced hepatic damage or may be unrelated to alcohol. Fatty liver also affected by age ,sex and race. ***(Park JW et al., 2007)***

Fatty liver (FL) is commonly associated with alcohol or metabolic disease such as diabetes, hypertension, obesity and dyslipidemia, but can also be due to nutritional causes such as malnutrition, weight loss, refeeding syndrome, gastric bypass. Also it may be due to drugs and toxins as amiodaron, methotrexate, tetracycline, diltiazem, glucocorticoids and tamoxifen. ***(Angulo p., 2002)***

Acute fatty liver of pregnancy is life-threatening complication of pregnancy that occurs in the third trimester or the immediate period after delivery. It is thought to be caused by a disordered metabolism of fatty acid by mitochondria in the

mother. The condition was previously thought to be universally fatal, but aggressive treatment by stabilizing the mother with intravenous fluids and blood products in anticipation of early delivery has improved prognosis**.** ***(Mjahed K et al.,2006)***

Most individuals of acute fatty liver are asymptomatic and are usually discovered incidentally because of abnormal liver function tests or hepatomegaly noted in unrelated medical conditions. Elevated liver biochemistry is found in 50% of patients with simple Steatosis. But, fatty liver may be also complicated to cirrhosis or liver cell failure. ***(Sleisenger&Marvin, 2006)***

The treatment of fatty liver depends on its cause, and, in general, treating the underlying cause will reverse the process of steatosis if implemented at an early stage. Two known causes of fatty liver disease are an excess consumption of alcohol and a prolonged diet containing foods with a high proportion of calories coming from lipids. For the patients with non-alcoholic fatty liver disease with pure steatosis and no evidence of inflammation, a gradual weight loss is often the only recommendation. In more serious cases, medications that decrease insulin resistance, hyperlipidemia, and those that induce weight loss have been shown to improve liver function**.** ***(Bayard M et al., 2006)***

Anatomy of The Liver

The liver is the largest gland (weighting an average of 1500 g) in the body. It lies under the diaphragm in the right upper abdomen and mid abdomen and extends to the left upper abdomen. The liver has the general shape of a prism or wedge, with its base to the right and its apex to the left (fig.(1)). It is pinkish brown in color, with a soft consistency, and is highly vascular and easily friable ***(Gray and Lewis., 2000).***

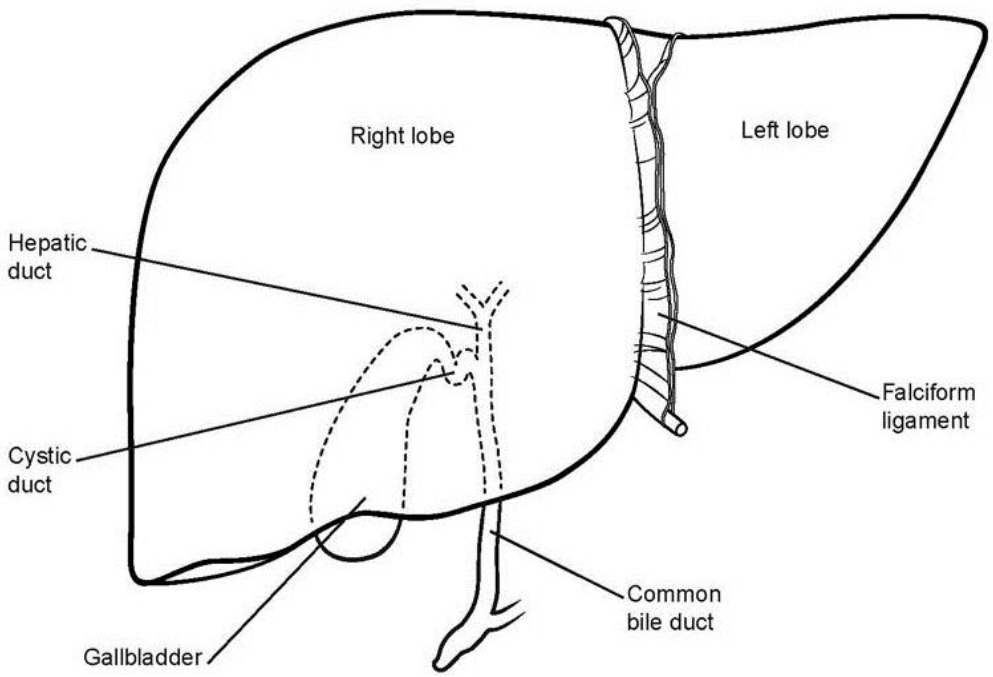

Fig. (1): The liver and gallbladder anterior view ***(Gray and Lewis, 2000)***

The surface of the liver is covered by visceral peritoneum (serosa), with a Glisson capsule underneath. At the porta hepatis, the Glisson capsule travels along the portal tracts (triads), carrying branches of the hepatic artery, the portal vein, and the bile ducts into the liver substance. Sinusoids are large-diameter capillaries lined by endothelial cells between rows of plates or cords of hepatocytes. Sinusoids also contain Kupffer cells of the reticuloendothelial system (RES). Each hexagonal lobule has a central portal tract with branches of the hepatic artery, the portal vein, and bile ducts, as well as a peripheral tributary of the hepatic vein. Bile canaliculi between hepatocytes drain into bile ductules in the portal triad. Bile ductules then form several orders of intrahepatic bile ducts, in an arrangement resembling the twigs and branches of a tree ***(Agur et al., 2008)***

Two major types of cells populate the liver lobes; parenchymal and non-parenchymal cells. 80% of the liver volume is occupied by parenchymal cells commonly referred to as hepatocytes. Non-parenchymal cells constitute 40% of the total number of liver cells but only 6.5% of its volume. Sinusoidal hepatic endothelial cells, Kupffer cells and hepatic stellate cells are some of the non-parenchymal cells that line the liver sinusoids ***(Kmieć., 2001).***

1. Divisions of the liver

Liver anatomy can be described using two different aspects: morphological anatomy and functional (surgical) anatomy.

A. Anatomical division:

Anatomical division is based on external appearance, four lobes are distinguished: right, left, quadrate, and caudate on the diaphragmatic surface, ligamentum falciforme divides the liver into the right and left anatomic lobes. On the visceral surface the ligamentum venosum and round ligament fissures provide a demarcation. The quadrate lobe is demarcated on the visceral surface by the gallbladder fossa, porta hepatis, and ligamentum teres. The caudate lobs demarcated by the inferior vena cava groove, porta hepatis, and the venous ligament fissure. The right portion of the caudate lobe lengthens into the right lobe by the caudate process, which forms the epiploic foramen superior boundary***(McClusky et al., 1997).***

B. Functional (surgical) division(figure 2):

From a surgical point of view, the liver is divided into right and left lobes of almost equal sizes by a major fissure (Cantlie's line) running from the gallbladder fossa in front to the IVC fossa behind. Each lobe is divided into 2 sectors. The right hepatic vein (RHV) divides the right lobe into anterior and posterior sectors;

the left hepatic vein (LHV) divides the left lobe into medial (quadrate) and lateral sectors. The posterior sector of the right lobe and the caudate lobe are not seen on a frontal view of the liver; the anterior sector of the right lobe forms the right lateral border in this view. The sectors are further divided into segments (after Couinaud); each segment has its own blood supply and biliary drainage. The anterior sector of the right lobe contains superior (VIII) and inferior (V) segments. The posterior sector of the right lobe has superior (VII) and inferior (VI) segments. The medial sector of the left lobe (quadrate lobe, segment IV) is part of the left lobe from a surgical perspective but lies to the right of the midline; it is further divided into a superior sub segment (A) and an inferior sub segment (B) (note: Japanese surgeons call the superior sub segment B and inferior sub segment A). The lateral sector of the left lobe contains segments II and III.The caudate lobe (segment I) lies in the lesser sac on the inferior surface of the liver between the IVC on the right, the ligamentum venosum on the left, and the porta hepatis in front. The caudate lobe receives numerous small branches from the right hepatic artery (RHA), the LHA, the portal vein, and the confluence; bile ducts drain similarly. A caudate process connects the caudate lobe to the right lobe ***(Gray and Lewis., 2000).***

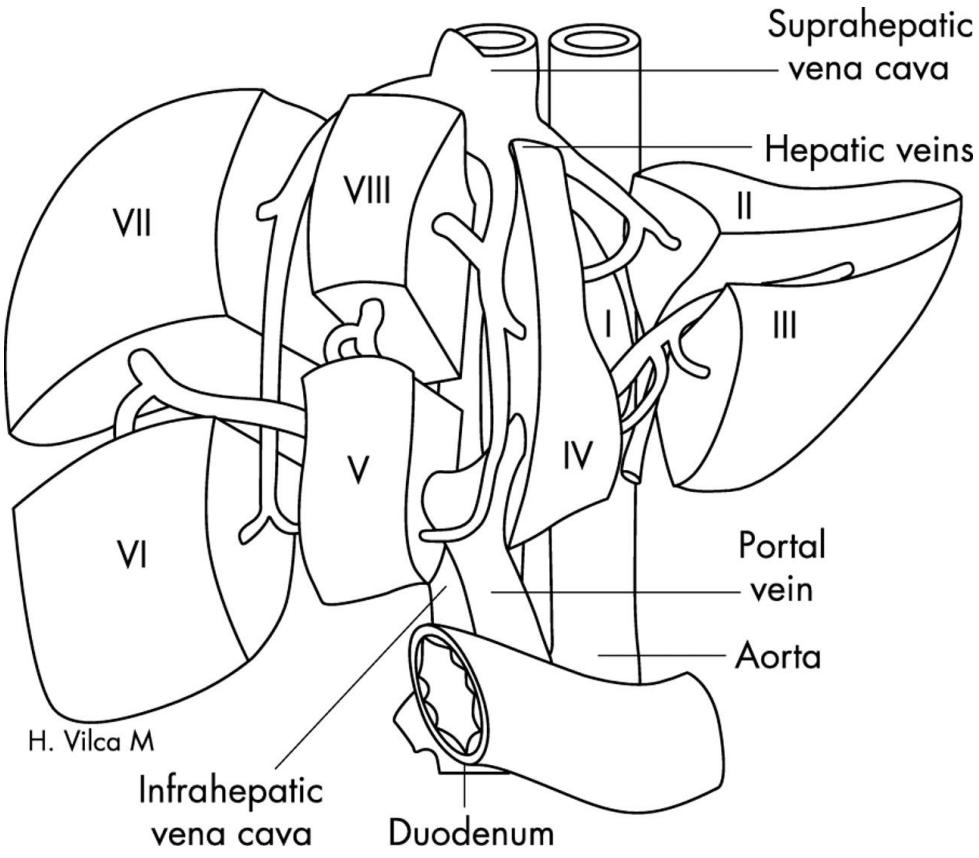

Fig. (2): Diagrammatic representation of the segments of the liver ***(Launois and Jamieson, 1993)***.

2. Ligaments

The falciform ligament (which divides the liver into a larger anatomical right lobe and a smaller anatomical left lobe) has 2 layers of peritoneum; it attaches the antero superior surface of liver to the anterior abdominal wall and diaphragm. The free edge of the falciform ligament contains the ligamentum teres hepatis