Differential Diagnosis of Fatty Liver during Pregnancy

Essay

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Intensive Care

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List of Abbreviations

AASLD……American Association for the Study of Liver Diseases

ACG……. American College of Gastroenterology

AFLP……Acute Fatty Liver Of Pregnancy

AGA……. American Gastroenterological Association

ALD…….. Alcoholic Liver Diseases

ALF……...…Acute Liver Failure

CHA ……Common Hepatic Artery

COP……...…Cardiac Output

CYP2E1……Cytochrome P450 2E1

DILD…… Drug Induced Liver Diseaeses

DNL……...…Denovo Lipogenesis

FFA ……...…Free Fatty Acids

FFP……..….. Fresh Frozen Plasma

FL……Fatty Liver

FXR……. Farnesoid X-receptor

GDA…… Gastrodeudenal Artery

HELLP ……Hemolysis, Elevated Liver Enzymes, And Low Platelets Syndrome

HFD……...… High Fat Diet

IBAT……. Intestinal Bile Acid Transporter

ICP……Intracranial Pressure

IMV……...…Inferior Mesenteric Vein

INR ……...…International Normalized Ratio

IR……. Insulin Resistance

IVC…… Inferior Vena Cava

KDa…… Kilo-Dalton

LCAT ……Lecithin-Cholesterol Acyltransferase

LCHAD……... Long Chain 3-Hydroxy Acyl Coenzyme A Dehydrogenase

LGA……Left Gastric Artery

LHA……Left Hepatic Artery

LHV……Left Hepatic Vein

MARS……Molecular Absorbent Recirculating System

NAC……N-acetylcysteine

NAFLD……... Non-Alcoholic Fatty Liver Diseases

NASH……..…Non-Alcoholic Steatohepatitis

NF-Kb……..…Nuclear Factor κB

OLT……Orthotopic Liver Transplantaton

RES…… Reticulo-Endothelial System

RHA……Right Hepatic Artery

RHV……Right Hepatic Vein

RXR ……... Retinoid X Receptor

SMV……Superior Mesenteric Vein

TNF-α ……Tumor Necrosis Factor-α

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Introduction

Fatty liver is the accumulation of triglycerides and other fats in the liver cells and it is called Steatosis, it affects approximately 25-35% of the general population. 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 and called Steatohepatitis ***(Guy et al., 2012).***

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 and gastric bypass. Also it may be due to drugs and toxins as amiodarone, methotrexate, valproate, glucocorticoids and tamoxifen or could be a pregnancy related diorder ***(Knight et al., 2008).***

Liver diseases during pregnancy encompass diverse range of problems. They could be classified into diseases unique to pregnancy, coincidental with pregnancy and other chronic hepatic disorders which affect and are affected by pregnancy ***(Knight et al., 2008)***

Many physiological and hemodynamic changes occur in uncomplicated pregnancy to support fetal growth like increased

maternal COP by 30- 50%, increased sex hormone levels and increased COP are normally affecting liver functions ***(Guyton and Hall, 2011)***

Liver diseases unique to pregnancy are those not occur except in instance of pregnancy and include: hyperemesis gravidarum, intrahepatic cholestasis of pregnancy, preeclampsia, and HELLP syndrome, acute fatty liver of pregnancy, hepatic rupture, hematoma and primary hepatic pregnancy. Coincidental liver diseases like acute viral hepatitis and biliary stones. Chronic diseases like cirrhosis and chronic HBV& HCV **(*Bhala* et al, 2009).**

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 et al., 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 ***(Bhala et al., 2009).***

Aim of the Essay

The Aim Of this essay is to discuss the pathogenesis of fatty liver during pregnancy and how to differentiate it from other causes of liver dysfunction during pregnancy.

ANATOMY OF THE LIVER

The liver is the second largest (after the skin) organ in the human body and the largest gland (weighing an average of 1500 g). 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 (**Figure 1**). It is pinkish brown in color, with a soft consistency, and is highly vascular and easily friable ***(Gray and Lewis, 2000).***

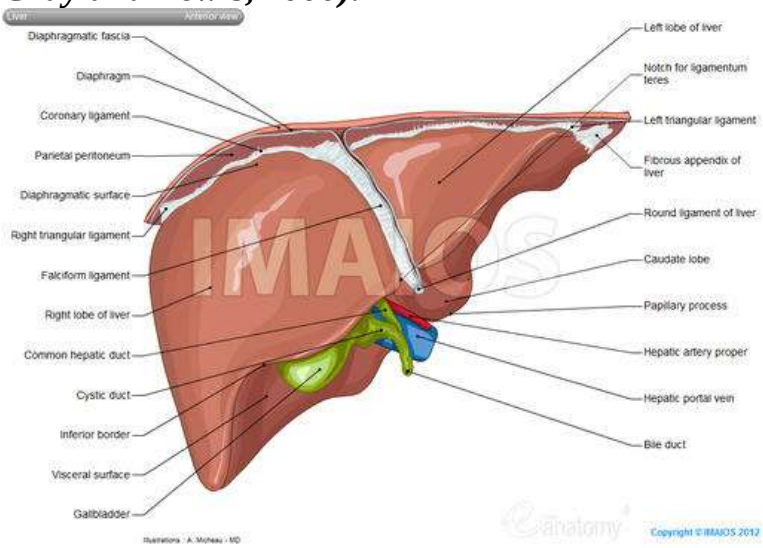

Figure (1): Liver and gallbladder, anterior view. Adopted from ***(Gray and Lewis, 2000).***

Gross Anatomy

Embryologically, the liver grows as a ventral diverticulum from the junction of foregut and the midgut into the ventral mesogastrium (the caudal part of the septum transversum; the cranial part forms the diaphragm). The same diverticulum forms

the gallbladder and bile ducts as well. The ligamentum teres hepatis is the obliterated umbilical vein, which joins the left portal vein; the ligamentum venosum is the obliterated ductus venosus, which joins the left portal vein to left hepatic vein ***(Anjamrooz et al., 2012).***

The upper surface of the liver is percussed at the level of the fifth intercostal space. Superior, anterior, posterior and right surfaces of the liver are continuous with each other and are related to the diaphragm and anterior abdominal wall.

The anterior surface is separated from the inferior (visceral) surface by a sharp anterior (inferior) border that is clinically palpable on deep inspiration. The inferior surface is related to the hepatic flexure (the area where the vertical ascending (right) colon takes a right-angle turn to become the horizontal transverse colon), right kidney, transverse colon, duodenum and stomach **(Jamieson 2006).**

Anatomic divisions

Anatomically, the liver is divided into a larger right lobe and a smaller left lobe by the falciform ligament (**Figure 2**). This division, however, is of no use surgically.

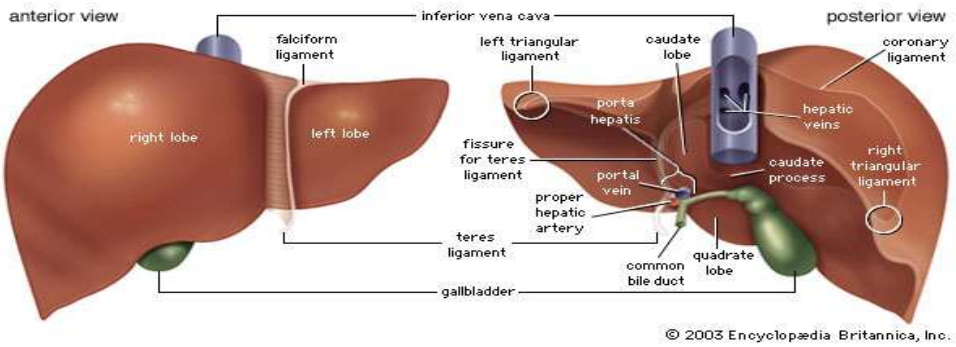

Figure (2): Anterior and Posterior surfaces of The Liver, adopted from ***(Gray and Lewis,2000)***

On computed tomography (CT), the portal vein branches (with the left being higher than right) divide the right and left lobes of the liver into superior and inferior halves. (**Figure 3)**

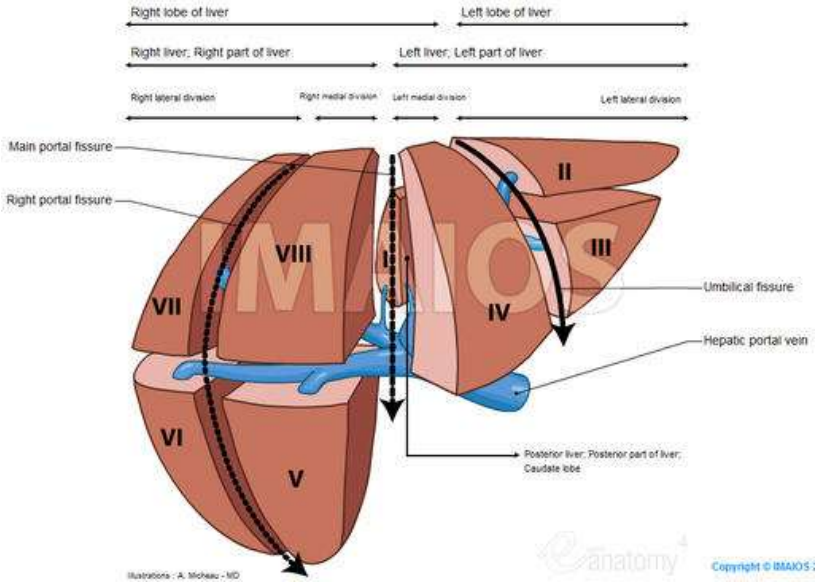

Figure (3): Anatomic Divisions of the Liver, adopted from ***(Sinnatamby, 1999)***

Accordingly, the right portal vein divides the posterior sector of the right lobe into segments VII (superior) and VI (inferior) and the anterior sector of the right lobe into segments VIII (superior) and V (inferior). The left portal vein divides the medial sector of the left lobe (quadrate lobe) into subsegments A (superior) and B (inferior) and the lateral sector of the left lobe into segments II (superior) and III (inferior) ***(Agur Amr et al.,1999).***

Blood supply

The liver has a unique dual blood supply (about 1500 mL/min) both from the proper hepatic artery (20-40%) and from the portal vein (60-80%). (**Figure 4).**

The celiac trunk (axis) comes off the anterior surface of the abdominal aorta at the level of T12 – L1 between the right and left crura of the diaphragm. It is a short structure (about 1 cm) that trifurcates into the common hepatic artery (CHA), the splenic artery, and the left gastric artery (LGA) ***(Skandalakis et al., 2004).***