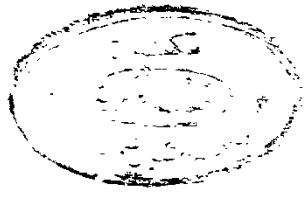
DIAGNOSIS AND MANAGEMENT OF EXTRAHEPATIC BILIARY ATRESIA

E S S A Y

Submitted in Partial Fulfillment
For the Master Degree in
General Surgery



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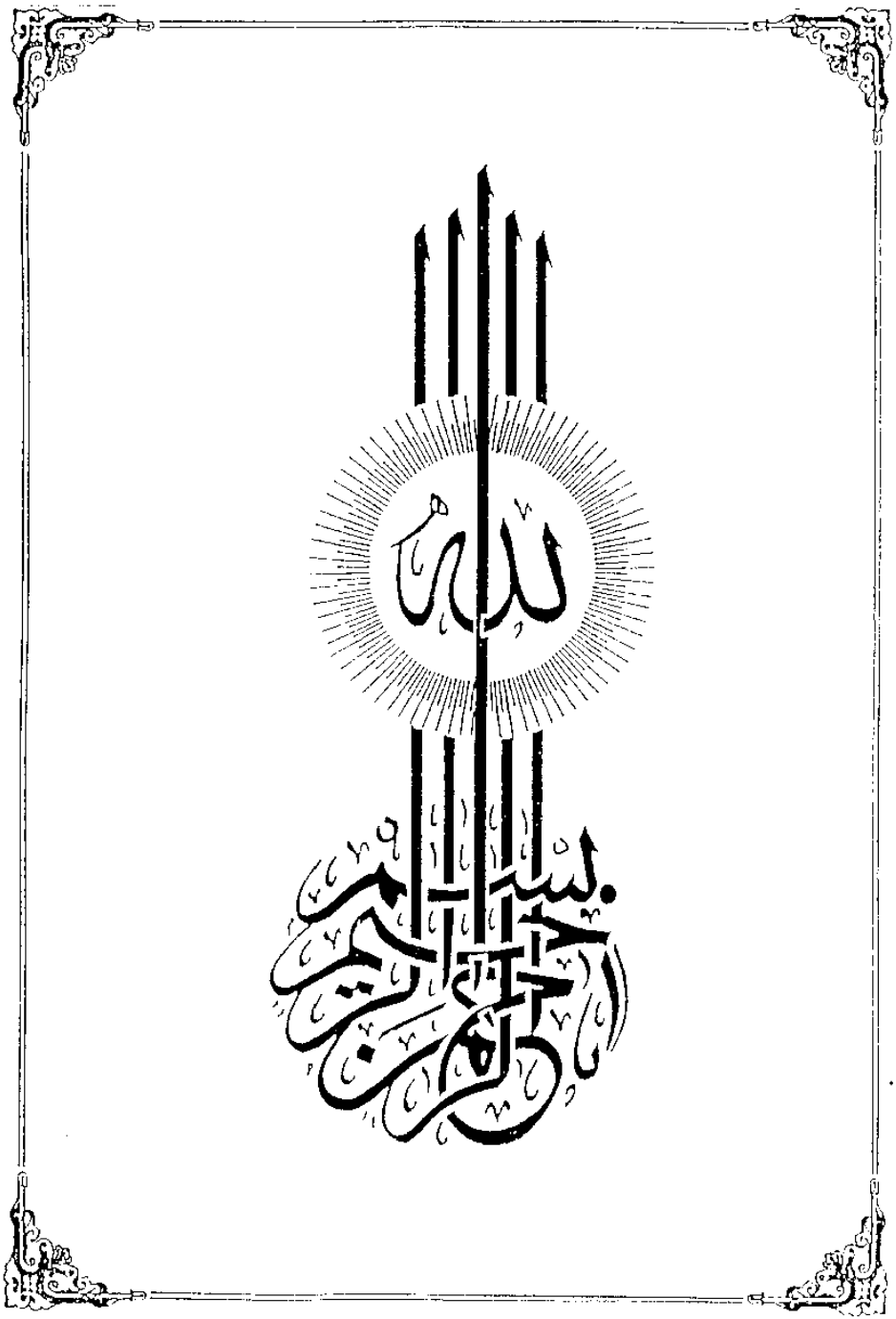
C O N T E N T S

This essay will spot light on the following items:



ANATOMY OF THE LIVER

AND BILIARY TREE

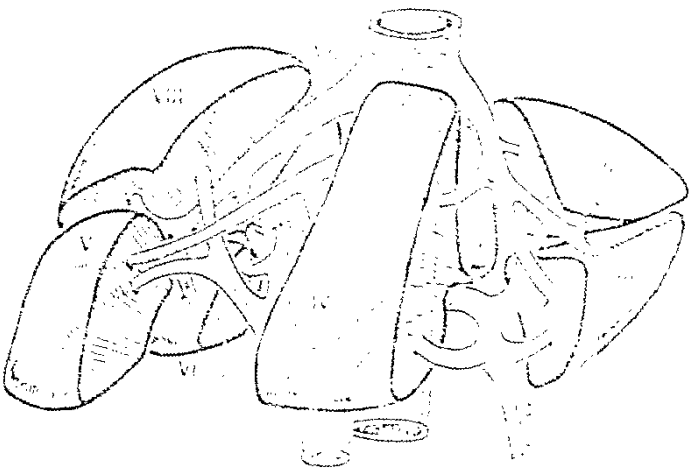
ANATOMY OF THE LIVER

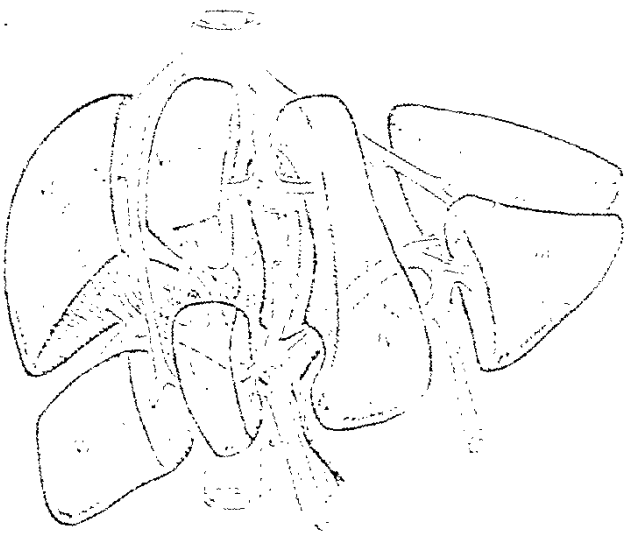
The liver appears to be divided into two livers by the main hepatic sciessure within which the middle hepatic vein runs. The right liver is divided into two sectors by the right portal scissura within which runs the right hepatic vein. Each of these two sectors is divided into two segments; Anterior sector is divided into segment V inferiorly and segment VIII superiorly; and the posterior sector is divided into segment VI inferiorly and VII superiorly.

The left liver is also divided into two sectors by the left portal scissura. The anterior sector is divided by the umblical fissure into two segments: Laterally segment III, which is the anterior part of the left lobe, and medially segment IV, anterior part of which is quadrate lobe.

The posterior sector which is formed only from one segment II which is the posterior part of the left lobe.

The caudate lobe must be consideraded from the functional point of view as autonomous segment. This definition of the segments according to the couinaud's nomenclature (1957).





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Precise anatomy of the liver intraopratively can be known by operative ultrasound.

ANATOMY OF THE BILIARY TREE

The right liver and left liver are respectively drained by the right and the left hepatic ducts, the lobe is drained by one or several ducts joining both the right and left hepatic ducts (Healey & Schroy 1953).

The intrahepatic are tributaries of the corresponding hepatic ducts which form part of the major portal tracts and which peneterate the liver invaginating Glisson's capsule at the hilus, of the different biliary and vascular elements of the major portal triads, the least liable to variation are the portal venous components. Bile ducts are usually located above the corresponding portal branches. Wherease, hepatic arterial branches are suituated inferior to the veins. Each branch of the intra hepatic portal veins corresponds to one or two bile ducts which form out side the liver, the right and left hepatic ductal systems converging at the liver hilus to consititute the common hepatic duct.

The right hepatic duct:

Which drains segments V, VI, VII & VIII and arises from the junction of two main sectoral ductal tributaries: the posterior or lateral duct and the anterior or medial duct, each a satellite of its corresponding vein. The right posterior sectoral duct has an almost horizontal course (Tontung 1979) and is constituted by the confluence of the ducts of segments VI, VII. The duct, then runs to join the right anterior sectoral duct as it descends in a vertical manner (Ton that tung 1979). The right anterior sectoral duct is formed by the confluence of ducts draining segments V and VIII.

Its main trunk is located to the left of the right anterior sectoral branch of portal vein.

The left hepatic duct:

Which drains the three segments (II, III & IV)which constitute the left liver. The duct draining segment III is located slightly behind the left horn of the umblical recessus, running backwards to join the duct of segment II at the point where the left branch of the portal vein turns forwards and caudally at the recessus of Rex. The left hepatic duct traverses beneath the left liver at base of segment IV, just above and behind the left branch of the

portal vein crosses the anterior edge of that vein and joins the right hepatic duct to constitute the hepatic ductal confluence. In its transverse portion it receives one to three small branches from segment IV.

The right hepatic duct is short and joins the left hepatic duct to constitute the confluence lying in front of the right portal vein and forming the common hepatic duct.

The dorsal (caudate) lobe (segment I) has its own biliary drainage. According to Healey & Schroy (1953)the dorsal lobe comprises two portions, a caudate lobe proper located at the posterior aspect of the liver and a caudate process passing behind the portal structures to join the right liver. The caudate lobe proper is divided into right and left portions. In 44% three separate ducts drain these three part of the lobe, while in 26% there is a common duct between the right portion of the caudate lobe proper and the caudate process and an independent duct draining the left part of the caudate lobe. In 78% of cases, drainage of the caudate lobe is into both right and left hepatic ducts but in 15% drainage is by the left hepatic ductal system only. In about 7% the drainage is into right hepatic system.

THE EXTRA HEPATIC BILIARY ANATOMY:

The confluence of the right and left hepatic ducts takes place at the right of the hilus of the liver anterior to the portal venous bifurcation and overlying the origin of the right branch of the portal vein. The extrahepatic segment of the right duct is short but the left duct has a much longer extrahepatic course. The biliary confluence is separated from the posterior aspect of the quadrate lobe (segment IV) of the liver by the hilar plate, which is the fusion of connective tissue enclosing the biliary and vascular elements with Glisson's capsule.

Because of the absence of any vascular interposition it is possible to open the connective tissue constituting the hilar plate at the inferior border of the quadrate lobe (segment IV) and by elevating it to display the biliary convergence and left hepatic duct (Hepp & Couinaud 1956).

The main bile duct the mean diameter of which is about 6 mm, is divided into two segments: the upper segment is called the common hepatic duct and is situated above the cystic duct, which joins it to form the common bile duct.

The common duct courses downwards anterior to the portal vein in the free edge of the lesser omentum and is

closely applied to the hepatic artery which runs upwards on its left, giving rise to the right branch of the hepatic artery which crosses the main bile duct usually posteriorly, though sometimes anteriorly.

The cystic artery, arising from the right branch of the hepatic artery, may cross the common hepatic duct posteriorly or anteriorly. The common hepatic duct constitutes the left border of the triangle of calot, the other borders of which were originally described as the cystic duct below and the cystic artery above (Rocko,Swan & Di Giulia 1981). However, the commonly accepted working definition of calot's triangle recognizes the inferior surface of the right lobe of the liver as the upper border and the cystic duct the lower (Wood 1979).

BLOOD SUPPLY OF BILIARY TREE:

According to Northover & Terblanche (1979, the bile duct may be divided into three segments: Hilar, supraduodenal and retropancreatic (lower common bile duct).

The blood supply of the supraduodenal duct is essentially axial : most vessels to the supra duodenal duct arise from the retroduodenal artery, the right branch of the hepatic artery, cystic artery the gastroduodenal artery and the retroportalartery. On average, eight small

arteries measuring each about 0.3 mm diameter supply the supraducdenal duct.

The most important of these vessels run along the lateral borders of the duct and have been called the 3 o'clock and 9 o'clock arteries. 60% of the blood vessels vascularizing the supraduodenal duct run upwards from the major inferior vessels and only 38% of arteries run downwards, originating from the right branch of hepatic artery and other vessels. Only 2% of the arterial supply is non-axial, directly from the main trunk of the hepatic artery.

The hilar ducts receive a copious supply of arterial blood from the surrounding vessels forming a rich network on the surface of the ducta. The source of the blood supply of retropancreatic common bile duct is from the reteroduodenal artery, which provides multiple small vessels running around the duct to form a mural plexus.

The veins draining the bile ducts are satellite to the corresponding arteries, draining into 3 o'clock and 9 o'clock veins along the borders of the common biliary channel. Veins draining the gall bladder empty into this venous system and not directly into the portal vein. The biliary tree seems to have its own portal venous pathway to the liver (Northover & Terblanche 1982).

EMBRYOLOGY OF THE LIVER AND BILIARY TREE

EMBRYOLOGY OF THE LIVER

The liver consists of liver cells (hepatocytes) in addition to blood vessels, bile canaliculi and connective tissue. These tissues of the liver develop from 2 sources endoderm and mesoderm.

Steps of Development:

(A) Formation of hepatic diverticulum:

The liver arises from the endodermal lining of the ventral wall of the caudal part of the foregut in the form of hepatic diverticulum.

The hepatic diverticulum grows ventrally and cranially into the ventral mesogastrium. It, then divides into 2 parts called pars hepatica, which forms the liver and pars cystica which forms the gall bladder as follows:

1. Pars hepatica: divides into 2 buds which proliferate to form the liver cells of the right and left lobes of the liver.

2. Pars cystica: gives rise to the gall bladder and its cystic duct.

3. Stem of hepatic diverticulum: becomes the common