SURGICAL JAUNDICE

Essay

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the Master Degree

in

General Surgery

By

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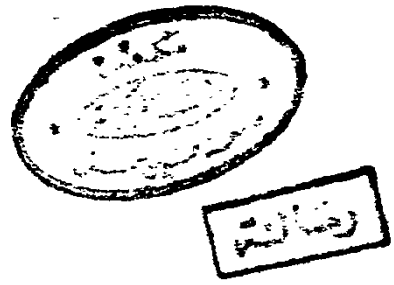

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(1986)

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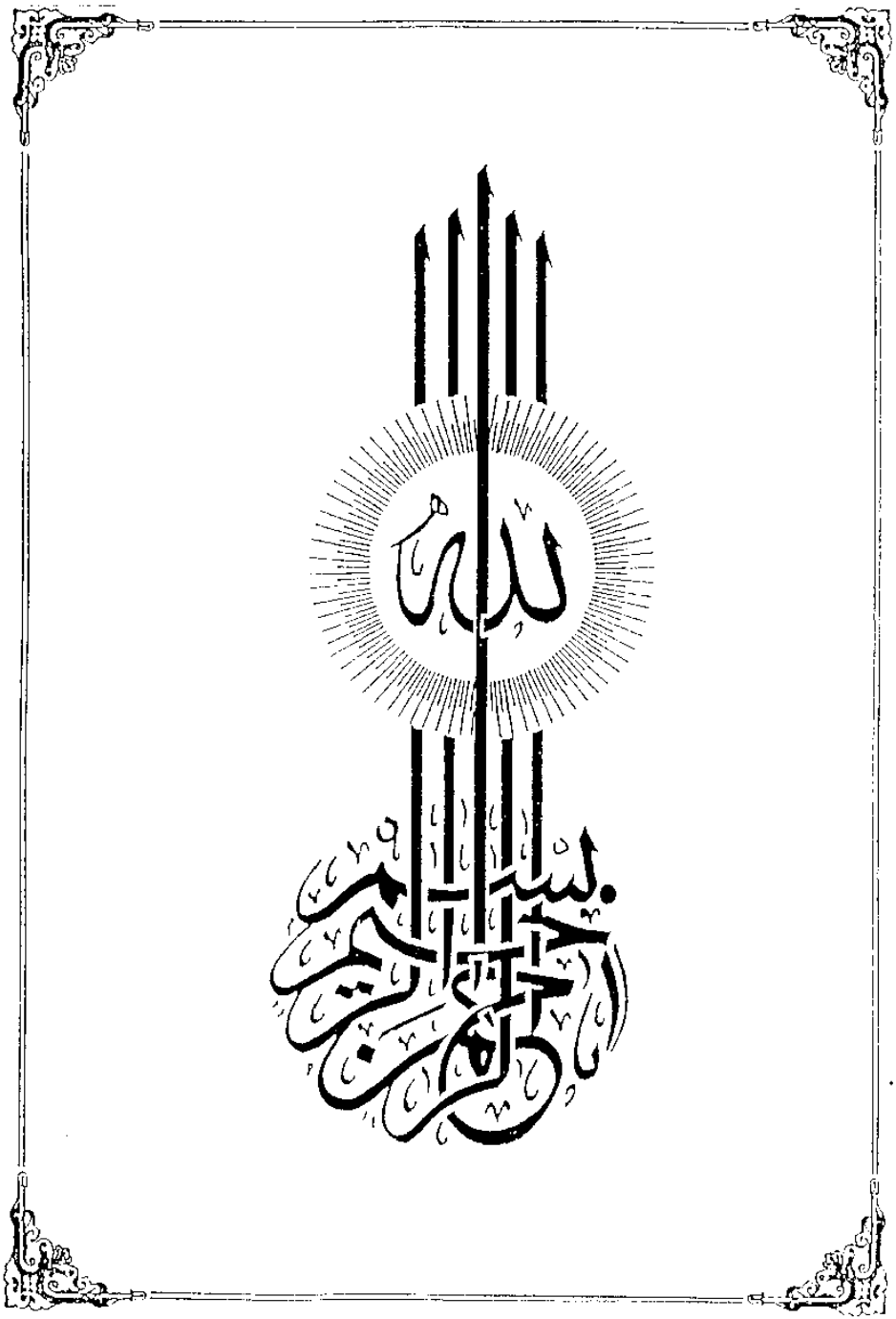


Contents

The liver is the largest gland in the body (exocrine & endocrine). The anatomists described the liver as having two unequal lobes viz; a small left lobe and a large right lobe. This was based on the external appearance. The falciform ligament and fissures for ligamentum teres and ligamentum venosum were taken as the line of division. Such anatomical lobulation does not represent the real vascular and biliary classification which divides the liver into two equal right and left lobes; thus explains the equal sizes of right and left hepatic arteries and ducts.

Development of the liver

The liver develops by proliferation of cells from the blind ends of a Y-shaped diverticulum which grows from the foregut into the septum transversum. The cranial part of the septum transversum becomes the pericardium and diaphragm. The caudal part becomes the ventral mesogastrium, into which the liver grows. At this stage the caudal part of the septum transversum transmits the vitelline veins which, by numerous anastomoses, form a rich venous plexus here. The proliferating liver cells break through the venous walls and grow freely in the blood-stream; thus in the adult liver the blood in the sinusoids is in direct contact with liver cells.

The original diverticulum from the endoderm of the foregut becomes the bile duct, its Y-shaped bifurcation produces the right and left hepatic ducts. A blind diverticulum from the common

bile duct becomes the cystic duct and gall-bladder.

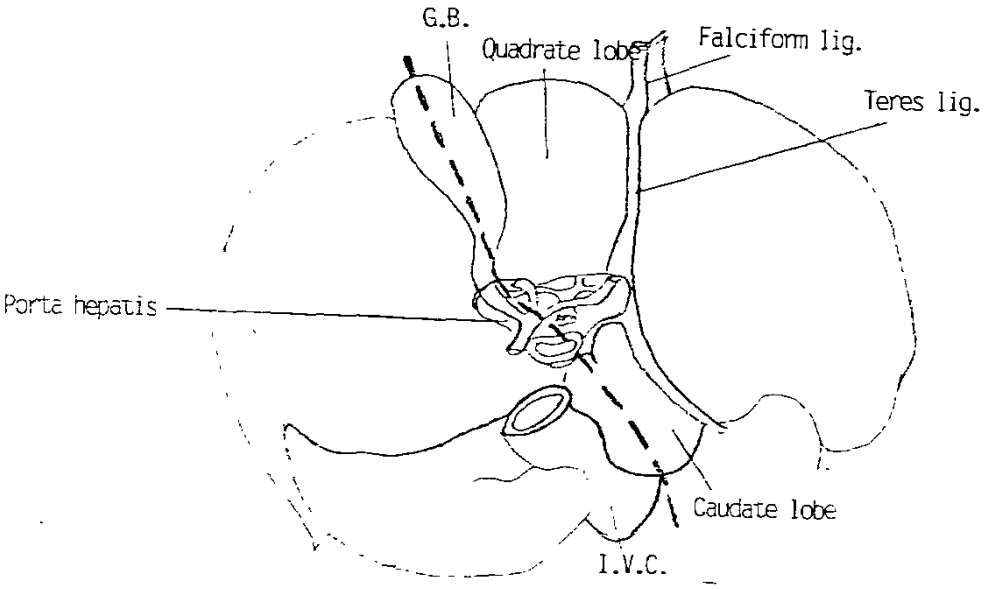
The hepatic ducts divide and re-divide until finally liver cells grow, from the blind end of each, into the blood in the vitelline veins.

The embryological center of each liver lobule is a bile duct, but this is not the histological center of the adult lobule. The lobules of the embryo fuse and are re-divided by the growth of fibrous septa along the bile ducts which thus lie at the periphery of the adult lobule.(Last,1981)

The Biliary System (Farag et al.,1973, Grant,1973, Gray et al.,1985)

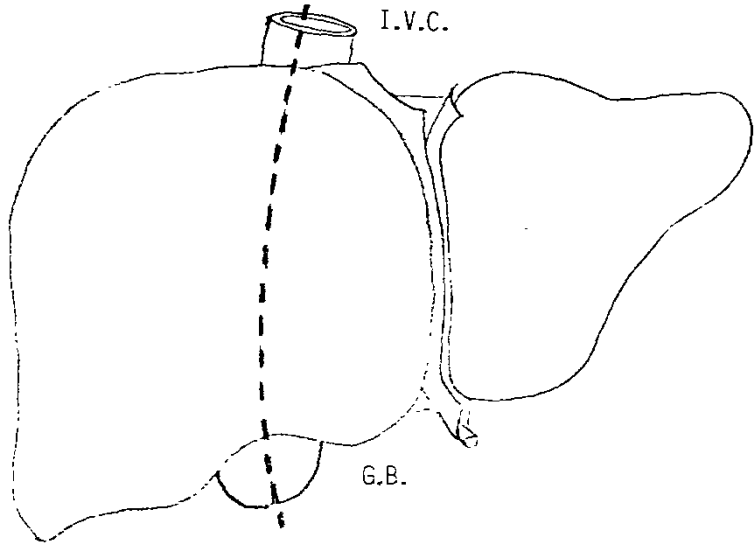
By the work of Farag et al.,1973, the liver is found to be subdivided into two halves by avascular plane which is called the middle fissure placed in the sagittal plane passing through the center of the gall-bladder fossa and the left wall of the inferior vena cava, at the site where the left hepatic vein enters the latter (fig. 1,2).

Each liver half is also found to be divided into two lobes by a fissure. The left interlobar fissure corresponds to the plane of the falciform ligament. The right interlobar fissure is not indicated on the external surface by any landmark and is variable in position depending upon the divisional pattern of the right half of the Glissonian system. It starts at the lower margin of the



The lobulation of the Liver
(Posterior surface)
The broken line (line of Rex) marks the division into Rt. & Lt. lobes
(From the inferior vena cava to the gallbladder).

Fig. 1



The lobulation of the Liver
(Anterior surface).

Fig. 2

ventral surface at a point approximately one third the distance from the right liver margin. Over the ventral surface it runs upwards for a distance of 10 to 15 cm parallel to the right liver margin then it curves to the left to terminate at the right side of the inferior vena cava.

The caudate lobe is found to be separated from the above mentioned four ventral lobes by a frontally placed plane; the dorsal fissure which cuts the upper border of the porta hepatis in a vertually a straight line. This dorsal part of the liver is also found to be subdivided into two lobes (the right and left dorsal paramedian lobes) by the middle fissure. Therefore, on considering the internal subdivision of the liver, one can speak of three lobes on either side of the middle fissure viz; dorsal and ventral paramedian lobes and right or left lobes.(Frag et al.,1973)

Biliary drainage of the right half of the liver

The right half of the liver is drained by the right hepatic duct which is formed by the union of the right lobar and the right ventral paramedian ducts. This anatomical feature is found to be present in only 70%. In the remaining 30% no right hepatic duct is formed. Instead, each lobar duct drains separately in the left hepatic duct. In such cases the left hepatic duct will then course to the right side of the porta hepatis to recieve the lobar ducts of the right side.

The right lobar duct is found to be formed of two ducts, one draining the superior area and the other draining the inferior area. This feature is present in 94.33% of cases. In the rest of the cases additional duct issued from the superior area. Thus, three ducts form the right lobar duct.

The right ventral paramedian duct: In 97% of cases two main ducts (one from the inferior area and the other from the superior area) form this duct. In 1.5% of cases the superior area is drained by two ducts which open separately in the left lobar duct and in 1.5% of cases additional inferior area duct opens separately in the right lobar duct.

The two area ducts join each other in 88.57% of cases to form the right paramedian duct. In 11.43% of cases the two area ducts join separately the right lobar duct or the inferior area duct joins the right lobar duct and the superior area duct joins the left lobar duct.

The right lobar and right ventral paramedian ducts extend medially to the region of the porta hepatis where they join each other to form the right hepatic duct in 70% of cases and average 10 mm in length (4-25 mm) before joining the left hepatic duct.

The subvesical duct: An important and interesting duct located in the gall-bladder bed. The subvesical duct is encountered in 8.52% of cases. It drains into the right hepatic duct. Unlike the other biliary ducts, the subvesical duct is not accompanied by

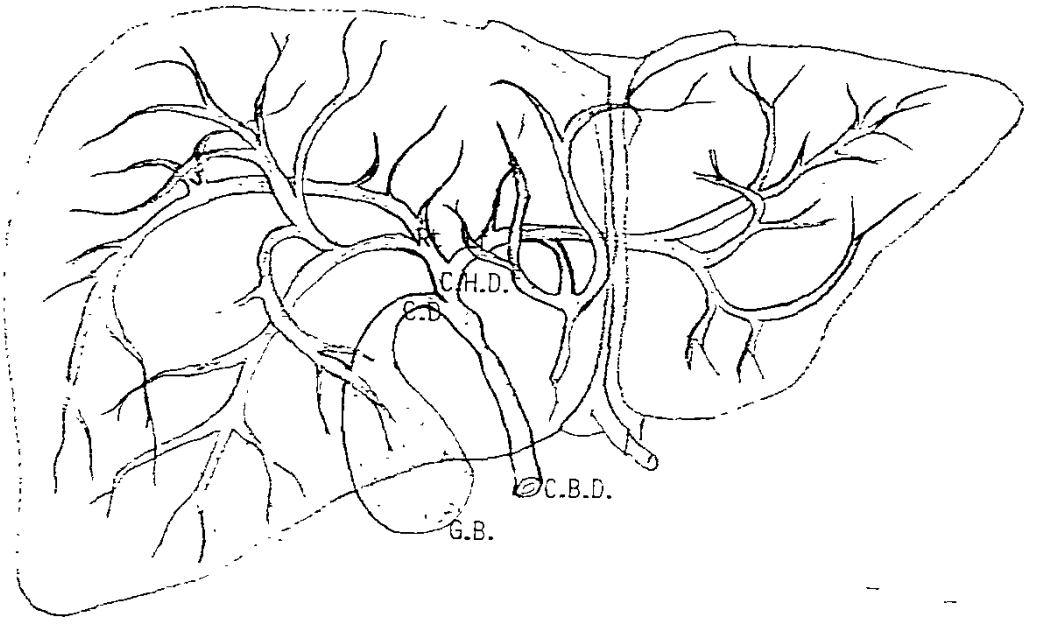
a branch of the portal vein.(fig. 3)

Biliary drainage of the left half of the liver

The left hepatic duct is found to be formed of the union of the left lobar and left ventral paramedian ducts in 97.1% of cases, in 2.9% of cases no left hepatic duct is formed, instead each lobar duct opens separately in the right hepatic duct.

The inferior area duct characteristically courses through the left lobe in an arc, the concavity of which faces upwards. It usually recieves the ducts draining the convex portion of the left lobe. The superior area duct begins at the upper outer angle of the liver. It extends into the left triangular ligament of the liver in 7% of cases. From the periphery, this duct follows an oblique course downwards to reach the porta hepatis where it joins the inferior area duct. In 60% of cases the union of both area ducts occurs at the level of the left interlobar fissure. In the remaining 40% there is late union of the area ducts and in such cases each area duct of the left lobe recieves the corresponding area duct of the left paramedian lobe before final union to form the left hepatic duct.

The ventral paramedian lobe: This lobe includes the area of the liver tissue between the middle and the left interlobar fissures. The superior area of this lobe is not sharply demarcated from the inferior area. 2 to 4 ducts drain this lobe. They join each other in a variety of ways. However, they end in one single duct in 57% of cases and in two ducts in 43% of cases.



Distribution of the intrahepatic bile ducts.

Fig. 3

The caudate (dorsal paramedian) lobes: The caudate portion of the liver is divided by the fissura media into two lobes. Each lobe is found to be drained by a single duct in the corresponding side of the ductal system. No free communication is encountered between the two halves of the liver through the caudate lobes.

The Gall Bladder (Last,1981)

It lies against the under surface of the right lobe. Its bulbous blind end, the fundus, projects a little beyond the sharp anterior margin of the liver and touches the parietal peritoneum of the anterior abdominal wall at the tip of the ninth costal cartilage, where the transpyloric plane crosses the right costal margin, at the lateral border of the right rectus abdominis muscle. The body of the gall-bladder is narrower than the fundus. It passes backwards and upwards from this point towards the right end of the porta hepatis. Here it narrows into a neck, from which the cystic duct lies against the porta hepatis to join the hepatic duct between the two layers of peritoneum that form the free edge of the lesser (gastro-hepatic) omentum. The cystic duct lies immediately in front of the right branch of the hepatic artery. The artery can be caught easily in a clamp placed on the cystic duct (a hazard during cholecystectomy).

The fundus and the body of the gall-bladder are firmly bound to the under surface of the liver by connective tissue and

many small cystic veins that pass from the gall-bladder into the liver substance. The peritoneum covering the liver passes smoothly over the gall-bladder. Occasionally the gall-bladder hangs free on a narrow 'mesentery' from the under surface of the liver, a condition that greatly facilitates the operation of cholecystectomy.

The fundus of the gall-bladder lies on the commencement of the transverse colon, just to the left of the hepatic flexure, while the body that lies behined it is in contact with the first part of the duodenum. The under surface of the liver is sloping, so the neck of the gall-bladder lies at a higher level than the fundus. It lies against the upper part of the free edge of the lesser omentum.

The gall-bladder is a fibro-muscular sac which, histologically, shows a small amount of smooth muscles in its wall. Its mucous membrane is a lax areolar tissue lined with a simple columnar epithelium. It is projected into folds which produce a honeycomb appearance in the body of the gall-bladder, but are arranged in a more or less spiral manner in the neck (the spiral valve) just short of the cystic duct. There are no glands in the gall-bladder. In pathological conditions mucus is secreted by the columnar epithelium itself, the cells becoming Goblet cells such as are found throughout the alimentary canal.

The blood supply of the gall-bladder is furnished by the cystic artery, a branch of the right hepatic artery; it passes behind the cystic duct and branches out over the surface of the gall-