Comparative Study of Different Recent Lines for the Treatment of Obstructive Jaundice

An Essay

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CONTENTS

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AIM OF THE WORK :-

This work is a study of the causes of obstructive jaundice and the different recent lines of treatment to evaluate the advantages and disadvantages of each procedure.

Embryology of Biliary Passage

EMBRYOLOGY

The liver begins its development as the hepatic bud from the most caudal part of the foregut. The hepatic bud elongates up into the ventral mesentry and divides into :-

(1) Large cranial part (pars hepatica) which gives rise to two branches which later form the right and left hepatic ducts. These ducts branch repeatedly inside the substances of septum transversum forming the biliary system. Their terminal parts form interlacing cords of liver cells. The liver cells anastomose around pre-existing endothelium lined spaces (as the vetelline veins break into a network of blood sinusoids in the septum transversum). The fibrous, haemopoitic and Kupffer cell derived from the mesenchyme of the septum transversum. The proximal part of the pars hepatica form the common hepatic duct.

(2) A small caudal part (pars cystica) which expands to form the gall bladder and its stalk becomes the cystic duct.

Initially the extrahepatic biliary apparatus is occluded with endodermal cells but later it recanalizes.

The stalk connecting the hepatic and cystic ducts to the duodenum becomes the common bile duct. Rotation of the duodenal loop leads to migration of its opening to the posteromedial aspect of the second part of duodenum. (*Skandalkis et al.,* 1983).

Anatomy of Biliary Passage

ANATOMY

The liver appears to be divided into two livers by the main hepatic scissura 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 divided into two segments: anterior sector - segment V inferiorly and segment VIII superiorly; and the posterior sector segment VI inferiorly and segment VII superiorly.

- The left liver is also divided into 2 sectors by the left portal scissura. The anterior sector is divided by the umbilical fissure into two segments: medially segment IV, the anterior part of which is the quadrate lobe, and laterally segment III, which is the anterior part of the left lobe. The posterior sector is formed of only one segment, segment II which is the posterior part of the left lobe.

The caudate lobe must be considered from the functional point of view as autonomous segment. This definition of the segments according to *Couinaud's nomenclature* (1957). Precise anatomy of the liver intraoperatively can be known by operative ultrasound.

THE BILIARY TREE :-

Right and left liver are respectively drained by the right and left hepatic ducts. The lobe is drained by one or several ducts joining both the right and left hepatic ducts (*Healy & Schory,* 1953). The intrahepatic ducts are tributaries of the corresponding hepatic ducts which form part of the major portal tracts and which penetrate 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 venous components. (*Skandalkis et al.,* 1983). Bile ducts are usually located above the corresponding portal branches whereas hepatic arterial branches are situated inferior to the veins. Each branch of the intrahepatic portal veins corresponds to one or two bile ducts which form outside the liver, the right and left hepatic ductal system converging at the liver hilus to constitute the common hepatic ducts.

The left hepatic duct drains the three segments of the liver III, IV, II which constitutes the left liver. The duct draining segment III is located slightly behind the left horn of the umbilical 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 ducts traverses beneath the left liver at the base of segment IV, just above and behind the left branch of portal vein crosses the anterior edge of that vein and joins the right hepatic ducts to constitute the hepatic duct confluence. In its transverse portion it recieves one to three small branches from segment IV.

The right hepatic duct drains segment 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 is a satellite of its corresponding vein. The right posterior sectoral duct has an almost horizontal course, and is constituted by the confluence of the ducts of segment VI, VII. The ducts then runs to join the right anterior sectoral duct as it descends in a vertical manner. The right anterior sectoral duct is formed by the confluence of the ducts draining segments V, VIII. Its main trunk is located to the left of the right anterior sectoral branch of the portal vein. (*Ton Tung et al.*, 1979).

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 *Healy & Schory* (1953), the dorsal lobe comprises two portion, a caudate lobe proper located at the posterior aspect of the liver and a caudate process passing behined the portal structures to join the right liver. The caudate lobe proper is divided into the right and left portions. In 44% three separate ducts drain these three parts of the lobe, while in 26% there is a common duct between the right portion of the caudate lobe proper and the caudate lobe process and an independent duct draining the left part of the caudate lobe. The site of drainage of these ducts is variable. 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 the right hepatic system.

EXTRAHEPATIC BILIARY TREE ANATOMY :-

The confluence of the right and left hepatic duct takes place at the right of the hillus of the liver anterior to the portal venous bifurcation and overlying the origin of the left branches of the portal vein. The extrahepatic segment of the right duct is short but the left has much longer extrahepatic course (*Skandalkis et al.,* 1983). The Biliary confluence is separated from the posterior aspect of the quadrate lobe (segment IV) of the liver by hilar plate which is the fusion of connective tissue enclosing the biliary and vascular element with Glisson's capsule. Because of the abscence 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 & Couninaud,* 1956).

The main bile duct the mean diameter of which is 6mm, 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 bile 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 posteriory, though sometimes anteriorly. The cystic artery, arising from the right branch of the hepatic artery, may cross the common hepatic duct posteriory 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 Gioia,* 1981). However, the commonly accepted working definition of Calot's triangle recognizes the inferior surface of the liver as the upper border and the cystic ducts the lower. (*Wood,* 1979).

BLOOD SUPPLY OF THE BILE DUCT

According to *Northover and 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 supraduodenal duct arise from the retroduodenal artery, the right branch of the hepatic artery, cystic artery and gastroduodenal artery. On average, eight small arteries measuring each about 0.3mm diameter supply the supraduodenal duct. The most important of these vessels run along the lateral borders of the duct and have been called 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 the 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 surrounding vessels forming a rich network on the surface of the ducts in continuity with the plexus around the supraduodenal duct. The source of the blood supply of the retropancreatic common bile duct is from the retroduodenal artery, which provides multiple small vessels running around the duct to form a mural plexus.

The veins draining the duct are satellite to the corresponding arteries. Veins of the gall bladder empty directly into this venous system not in the portal vein. The biliary tree seems to have its own portal pathway to the liver.

Arterial anomalies and variations in the bile ducts are very common (*Flint*, 1922). Figure 1,2.

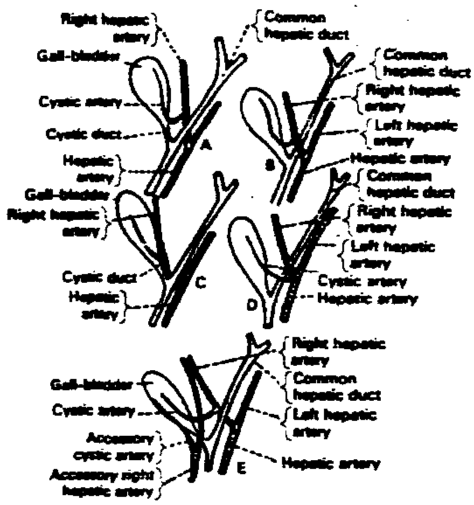

Fig 1 Abnormalities in the arteries to the liver. A. The blood vessels as usually described—i.e. the normal. B The right hepatic artery passes in front of the common hepatic duct. C. The right hepatic artery parallel to and very near the cystic duct. D. The cystic artery passes in front of the common hepatic duct. E. An accessory right hepatic artery arising from the superior mesenteric artery and giving off an accessory cystic artery.

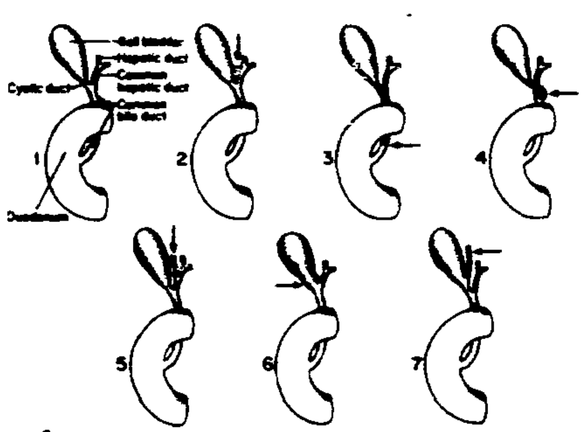

Fig 2 Variations in the bile ducts. (1) The ducts as usually described; (2) the common hepatic and cystic ducts lie parallel, being joined by connective tissue; (3) the common hepatic duct and cystic ducts join just before the duct enters the duodenum; (4) the cystic joins the common hepatic duct on its *left*; (5) accessory right hepatic duct; (6) absence of cystic duct—the common hepatic duct enters the gallbladder and the common bile duct leaves it. (7) The right hepatic duct joins the neck of the gallbladder. (After Flint.)