UPDATE IN THE DIAGNOSIS AND THE TREATMENT OF SCLEROSING CHOLANGITIS

Essay

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بسم الله الرحمن الرحيم

Emberiology and Surgical Anatomy of intrahepatic and extrahepatic biliary tract .

EMBERIOLOGY

Normal Development :

In the course of the fourth week of gestation, the embryonic foregut, at its junction with the midgut, gives rise to the hepatic diverticulum. From the distal end of the diverticulum develops the parenchyma of the liver; the extrahepatic biliary tract and the gallbladder arise from the proximal portion. By the start of the fifth week, all the parts of the system are apparent. During this stage, the future duct system, like the duodenum itself, is a solid cord of cells.

Toward the end of the fifth week, growth of the left side of the duodenum initiates a shift of the attachment of the liver and the two pancreatic diverticulae to their final position on the dorsal surface of the duodenum. (Fig.1). During the sixth week, the lumina of the ducts become established, starting with the common bile duct and progressively extended to the remainder of the system. The gallbladder remains solid until the twelfth week. During the process of recanalization, two or three lumina may appear and eventually coalesce. This pattern of solid stage followed by recanalization parallels the changes in the duodenum, but strangely, no solid stage appears in the pancreatic ducts.

More than one duodenal opening of the common bile duct is not unusual at this stage. The lower one usually vanishes, but a case in which a bifurcated common bile duct persisted was described by Schwegler and Boyden 1937.

The proximal portion of the hepatic diverticulum, the future common bile duct, becomes absorbed into the expanding duodenum so that the bile and pancreatic ducts enter the wall together. In most individuals, the dividing septum between the two passages retracts to leave a common ampulla of variable length (Schwegler and Boyden 1937).

The biliary tract is the site of great variation and even gross anomalies; some are fatal in postnatal life, while others, although physiologically functional, may result in operative catastrophes if they are unrecognized during surgical procedures later in life. (Markle, 1981).

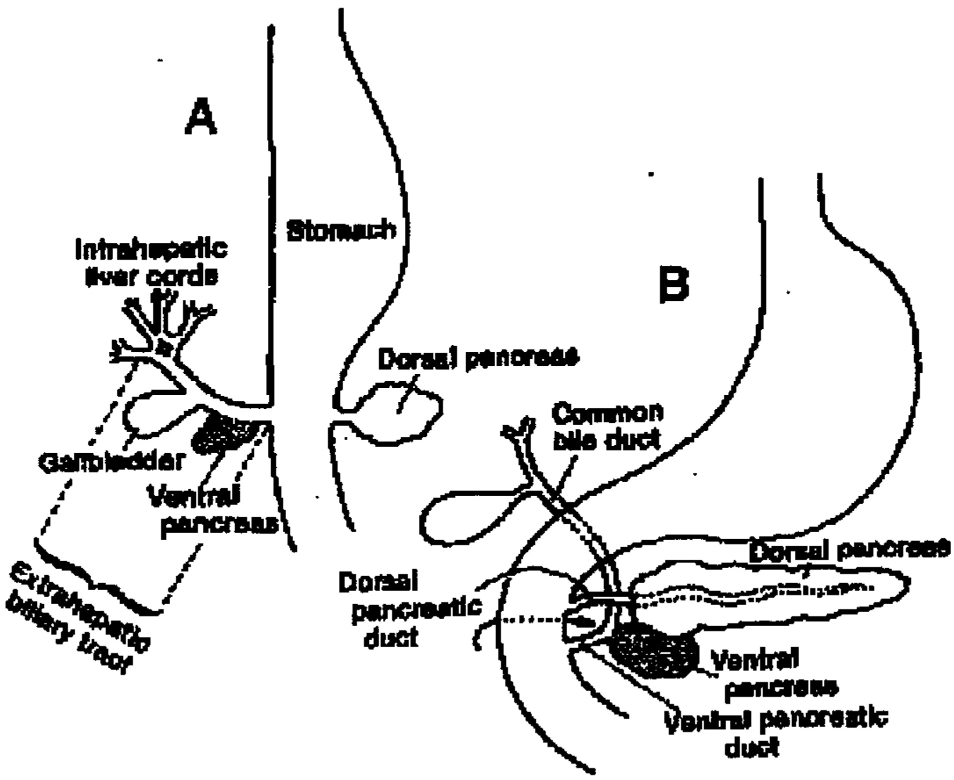

Fig. 1 : The development of the extrahepatic biliary tract.

A. The hepatic diverticulum, from which are formed the hepatic cords and intrahepatic ducts, the gallbladder and the ventral pancreas.

B. Rotation of the duodenum, bringing the common bile duct posterior to the duodenum and the two pancreatic primordia together.

Abnormal Development of Biliary Passages :

In contrast to the liver, the gallbladder is subject to many anomalies. It may be misplaced, deformed, and suffer intrusion of epithelia from other parts of the digestive tract (Gray and Skandalakis 1972). All these anomalies may be associated with atresia or duplication of other parts of the biliary tract. These defects are unusual and rarely fatal, but they may confuse the radiologist and baffle the surgeon.

Extrahepatic Biliary Atresia :

Atresia may involve a short segment of a duct, an entire duct, or the whole biliary tract. The defective portion may be severely stenosed, it may be present but without a lumen, or it may be represented by only a fibrous band. Untreated, few patients live more than 1 year. Early diagnosis is necessary for early treatment. (Potts, 1959)

Biliary atresia is often associated with major intestinal and vascular malformations. (Lilly and Chandra 1974) found 6 infants with such malformations among 22 with biliary atresia. A thorough evaluation of the child must be done.

Total extrahepatic biliary atresia is the most serious of the anomalies of the biliary tract. If at least one patent hepatic duct expands far enough outside the liver to permit anastomosis with an intestinal loop, the defect is considered to be "correctable". The specific procedure required varies with the amount of usable duct available. Some examples are given below :

Atresia of Common Hepatic duct :

If the gallbladder, cystic, and common bile ducts are patent, an anastomosis of the stump of the common hepatic duct with the gallbladder is the procedure of choice. If not, an anastomosis with the duodenum or the jejunum may be done.

Atresia of Upper Common Bile Duct :

If the common hepatic and cystic ducts are patent, an anastomosis of the gallbladder with the duodenum or the jejunum may be done.

Atresia of Lower Common Bile Duct :

If the patent common bile duct is long enough, an anastomosis of the common bile duct with the duodenum may be done.

Absence of the Common Bile Duct :

In some patients, the common hepatic duct emptied into the gallbladder, from which a cystic duct drained into the duodenum. Routine removal of the gallbladder would have interrupted the continuity of the biliary tract. Absence of the common bile duct also applies to the configuration in which the common hepatic and cystic ducts reach the duodenum without joining each other. (Markle 1981).

ANATOMY

- **Surgical Anatomy of Intrahepatic biliary tract:**

The liver is divided into two major portions and a dorsal (caudate) lobe (fig.2). The right liver is formed of four segments; antero - inferior (segment V), postero - inferior (segment VI), postero superior (segment VII) and antero superior (segment VIII). The left liver is formed of three segments, lateral superior (segment II), lateral - inferior (segment III) and medial segment (segment IV). The dorsal (caudate lobe) constitutes (segment I). (Bismuth, 1982)

The right and left lobes are drained by the right and left hepatic ducts respectively, whereas the dorsal lobe is drained by several ducts joining both the right and left hepatic ducts. (Last, 1986)

The Intrahepatic ducts are tributaries of the corresponding hepatic ducts which penetrate the liver invaginating the Glisson's capsule at the hilus.

The Right hepatic duct (Fig. 3)

It drains segments V, VI, VII and VIII. It is formed by union of two main sectoral ductal tributaries; the posterior and anterior ducts. The right posterior sectoral duct has almost horizontal (dorso caudal) course (Blumgart, 1984) and is formed by the confluence of the ducts of segments VI and VII. The duct then run to join the right anterior sectoral duct as it descends in a vertical (ventro cranial) manner. The right anterior sectoral duct is formed by the confluence of the ducts draining segment V and segment VIII. Its main trunk is located to the left of the right anterior sectoral branch of portal vein which pursues an ascending course. The junction of these two main right biliary channels usually takes place above the right branch of the portal vein. (Blumgart, 1984).

The left hepatic duct (Fig. 4) :

It drains segments II, III, IV. The duct draining segment III is located slightly behind the left horn of the umbilical recessus. It runs backwards to join the duct of segment II to the left of the main portal branch to segment II. The left hepatic duct traverses beneath the left liver at the base of IV. In its transverse portion, it receives one to three small branches from segment IV.

The dorsal (caudate) lobe (fig.5):

It constitutes segment I. It has its own biliary drainage. The caudate lobe is divided into caudate lobe proper which is divided into the right and left portions and a caudate process that joins the caudate lobe proper with the right lobe behind the portal structures. In 44% of cadavers, three separate ducts drain these three parts while in 26%, the right portion of the caudate lobe proper and the caudate process opens into a common duct and the left portion into another one, the remaining 30% has a solitary duct. (Skandalakis, 1983)

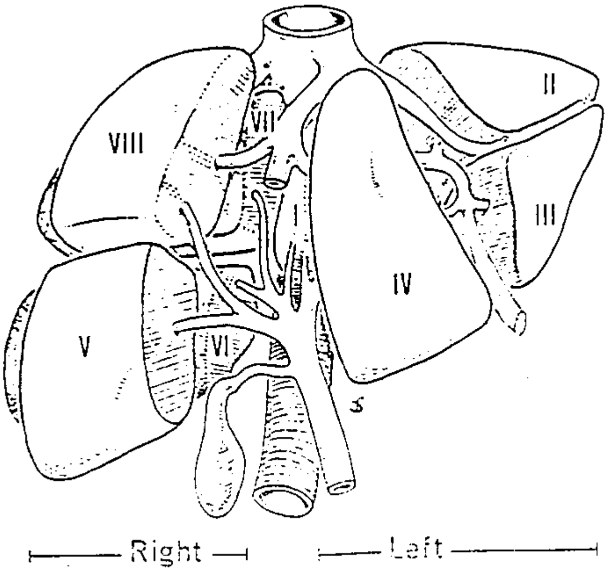

Fig. 2 : Diagram showing the biliary drainage of the two functional hemilivers. Note the position of the right anterior and right posterior sectors. The caudate lobe drains into the right and left ductal system. (Blumgart, 1994).

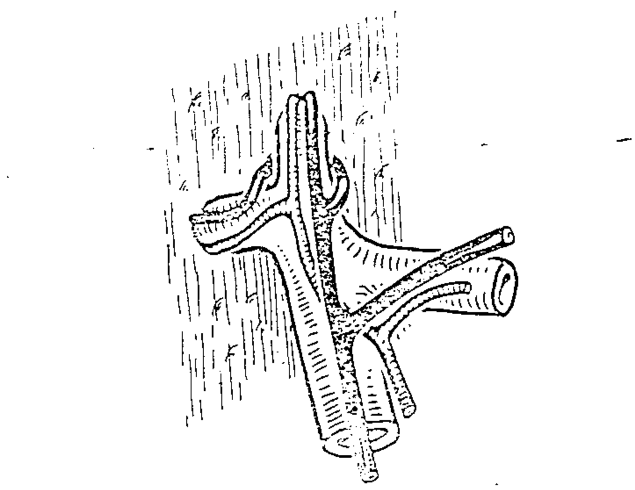

Fig. 3 : Biliary vascular anatomy of the right liver. Note the horizontal course for the posterior sectoral duct and the vertical course of the anterior sectoral duct. (Blumgart, 1994).

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%, drainage is into the right hepatic duct system. (Skandalakis, 1983)

Surgical anatomy of extrahepatic biliary tract (fig.6):

The extrahepatic bile ducts are represented by the extrahepatic segments of the right and left hepatic ducts. The common hepatic duct, the gallbladder, the cystic duct and the common bile duct.

A) The extrahepatic segments of the hepatic ducts:

1- The right hepatic duct : It is much shorter than the left hepatic duct. Its average length is 0.9 cm. It maybe absent when the right anterior and right posterior sectoral ducts enter the left hepatic duct.

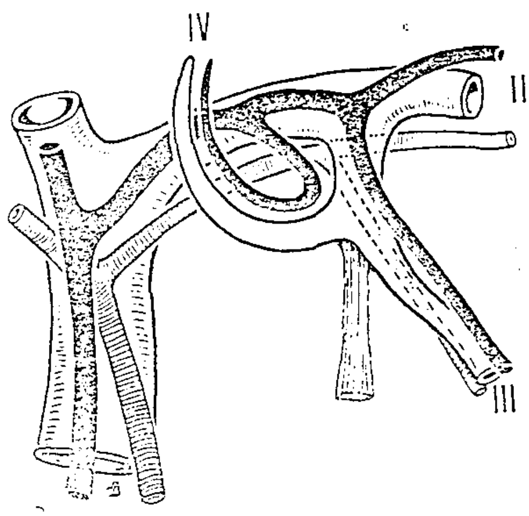

Fig. 4 : Biliary and vascular anatomy of the liver. Note the location of the segment III duct above the corresponding vein and its relationship to the recessus of Rex. The anterior branch of the segment IV duct is not represented (Blumgart, 1994)

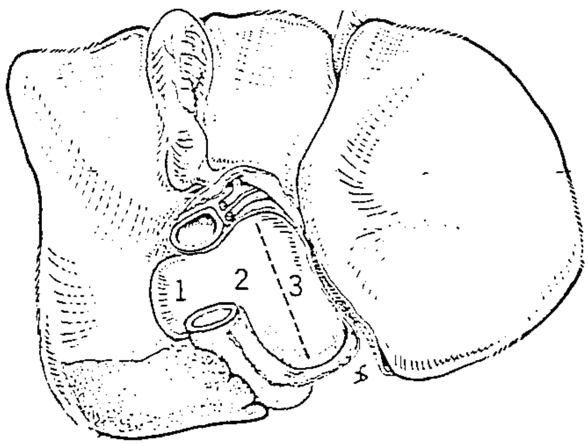

Fig. 5 : Diagram showing the anatomy of the caudate lobe which is divided into a caudate process (1) and a caudate lobe proper which is itself sub-divided into a right (2) and left (3) portion. Note the relationship of the caudate process to the inferior vena cava and the portal triad. (Blumgart, 1994)