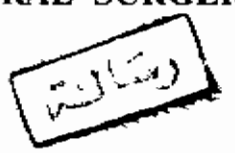
OPERATIVE AND ENDOSCOPIC MANAGEMENT OF RETAINED COMMON BILE DUCT CALCULI

ESSAY
SUBMITTED IN PARTIAL FULFILMENT
OF MASTER DEGREE IN GENERAL SURGERY



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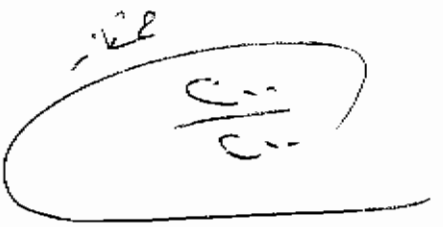

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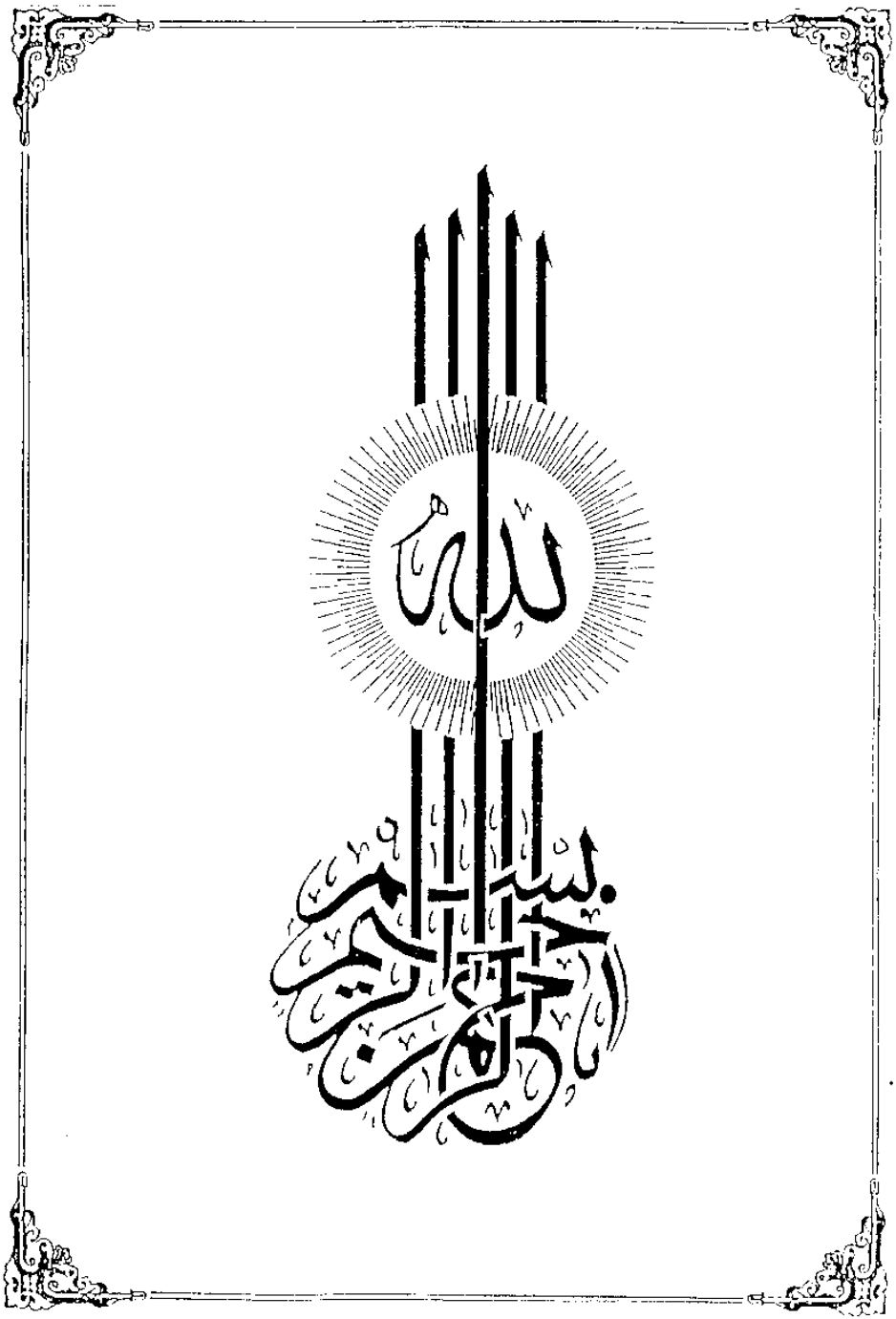

AIM OF WORK

This essay aims at discussion of both operative and endoscopic management of retained common bile duct calculi and the selection of the most suitable method for treatment of such calculi.

CONTENTS

ANATOMY

A) ANATOMY

I) SURGICAL ANATOMY OF THE EXTRA HEPATIC BILIARY TREE:

Hepatic Ducts:

The intrahepatic segmental bile ducts unit to form lobar ducts, which in turn coalesce to form the right and left hepatic ducts that represent the beginning of the extrahepatic biliary system. The right hepatic duct is formed by the intrahepatic confluence of dorsocaudal & ventrocranial branches. It enters the left duct with a sharp curve.

The left hepatic duct is longer than the right and has a greater propensity for dilatation as a consequence of distal obstruction. The junction of the right and left hepatic ducts occurs extrahepatically in almost all instances, but incision and dissection of the fibrous tissue in the "hepatic plate" may be necessary to expose this junction. The common hepatic duct, which begins at the confluence of the right and left hepatic ducts, is 3 to 4cm in length; it is joined by the cystic duct to form the common bile duct (Schwartz, 1990).

The Gall Bladder:

The gall bladder is located in the bed of the liver, in line with the anatomic division of that organ into right and left lobes. It is pear shaped, has an average capacity of 50ml and is divided into four anatomic portions: Fundus, corpus or body, infundibulum and neck. The fundus represents the rounded, blind end that normally extends beyond the liver's margin and is covered with peritoneum. It contains most of the smooth muscle of the organ, in contrast to the corpus, or body, which is the major storage area and contains most of the elastic tissue. The body is covered extrahepatically by peritoneum and tapers into a neck, which is funnel shaped and lies in the free border of the hepatoduodenal ligament (lesser omentum). The convexity of the neck may be distended into a dilatation known as the infundibulum or Hartmann pouch (**Schwartz, 1990**).

The gall bladder lies along the right edge of the quadrate lobe of the liver in a shallow fossa (**Romanes, 1977**).

The gall bladder 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, narrower than the fundus, 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 (Gastrohepatic) omentum (Last, 1986).

The fundus and 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 (Last, 1986).

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 behind 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 (gastro-hepatic) omentum (Last, 1986).

The gall bladder enters the common duct system by means of the cystic duct that has a variable length, averaging 4cm. It joins the common hepatic duct at an acute angle and the right branch of the hepatic artery resides immediately behind it (Schwartz, 1990).

The Cholecystohepatic triangle:

This anatomic region of surgical importance was originally described by Calot (1891), it is formed by the cystic duct and the gall-bladder laterally, the right lobe of the liver above and the common hepatic duct medially. The contents of the triangle include the right hepatic artery, which enters posteriorly to the common hepatic duct in 87% of cases and anteriorly to that duct in the remaining 13%. It parallels the cystic duct for a short distance before turning craniad to reach the liver. In about one quarter of cases there is an aberrant right hepatic artery originating from the superior mesenteric artery and coursing through the triangle.

The cystic artery arises from a normal or aberrant right hepatic artery within the cholecystohepatic triangle. It usually divides into a superficial branch that goes to

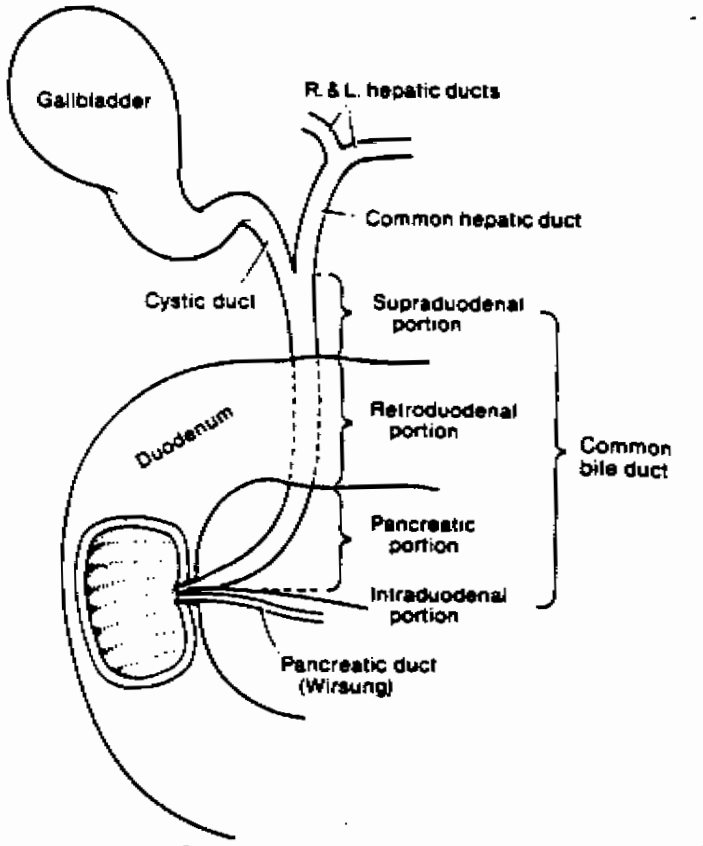

Fig. 1
Extrahepatic biliary tract and the four portions of the common bile duct. (Schwartz, 1990).

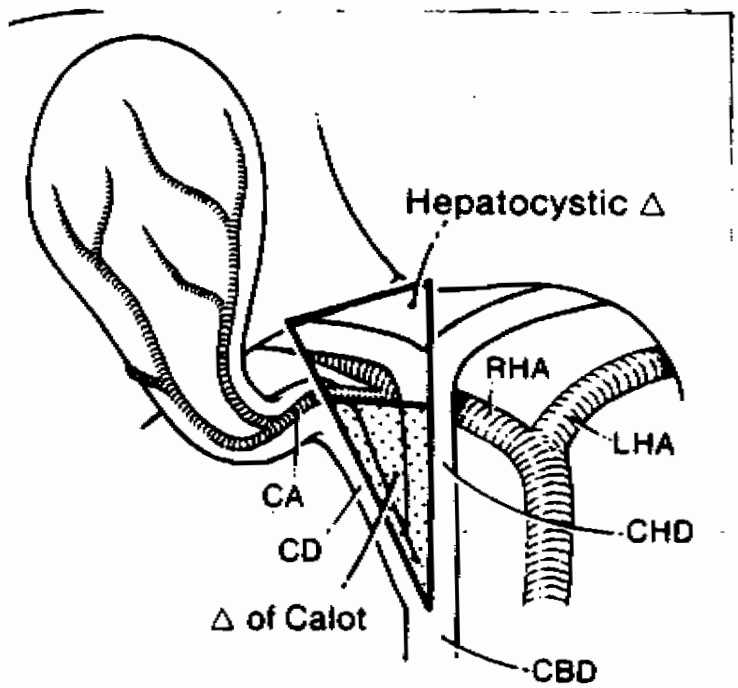

Fig. 2
Hepatocystic triangle and the triangle of Calot. The upper boundary of the former is the margin of the liver; that of the latter is the cystic artery. The triangle of Calot is stippled. (Schwartz, 1990).

the serosal surface and a deep branch that reaches to the hepatic surface of the gall-bladder. Duplication of the cystic artery is found in about 25% of patients and these vessels may arise either from adjacent or separate sites. The cholecystohepatic triangle may contain aberrant or accessory hepatic ducts that enter the cystic or common hepatic duct separately in about 15% of cases (**Schwartz, 1990**).

Common Bile Duct:

The length of the common bile duct varies from 5 to 15cm depending on the position of the entrance of the cystic duct. The duct may be divided arbitrarily into 4 portions:

1. Supraduodenal; average length 2cm, range 0 to 0.4cm.
2. Retroduodenal; average length 1.5cm, range 1 to 3.5cm.
3. Pancreatic; average length 3cm, range 1.5 to 6cm.
4. Intraduodenal; average length 1.1cm, range 0.8 to 2.4cm (**Skandalakis et al., 1983**).

Supraduodenal Portion:

The supraduodenal portion lies between the two leaves of the hepatoduodenal ligament, in front of the foramen of Winslow, to the right of the hepatic artery and anterior to the portal vein. The supraduodenal portion may be crossed anteriorly by one or more of the following: right gastric,

right hepatic, supraduodenal or even gastroduodenal artery. The right hepatic artery may lie to the right, left, anterior or posterior to the bile duct (**Skandalakis et al., 1983**).

Retroduodenal Portion:

The retroduodenal portion lies between the superior margin of the first part of the duodenum and the superior margin of the head of the pancreas. It may be free or partially fixed to the posterior duodenal wall. The gastroduodenal artery is to the left and the posterosuperior pancreaticoduodenal artery crosses first anterior to the bile duct and then posterior to the duct just before it enters the duodenum (**Skandalakis et al., 1983**).

This portion of the common bile duct curves to the right behind the first portion of the duodenum, where it diverges from the portal vein and hepatic arteries (**Schwartz, 1990**).

Pancreatic Portion:

The common bile duct may be partly covered by a tongue of pancreas (44%) and completely within the pancreatic substance (30%), uncovered on the pancreatic surface (16.5%) or completely covered by two tongues of pancreas (9%). Even

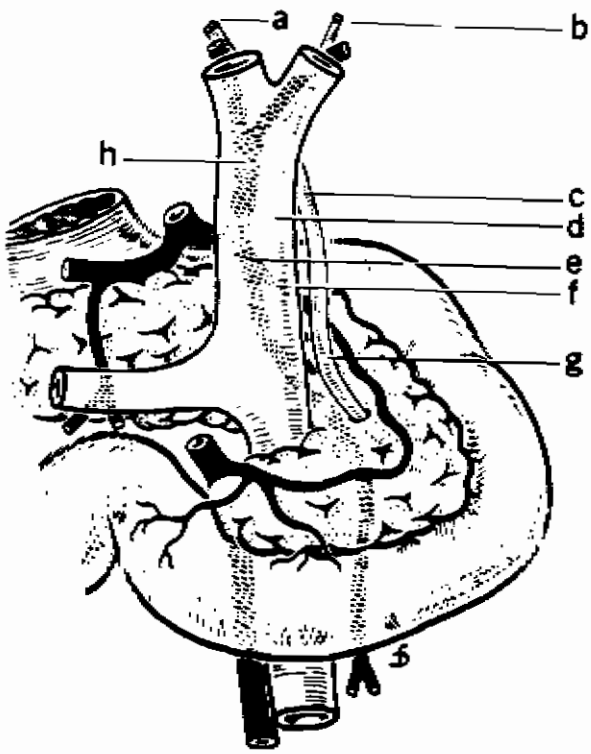

Fig. 3
Posterior aspect of the biliary tree: a) laft hepatic duct,
b) right hepatic duct, c) common hepatic duct,
d) portan vein, e) gastroduodenal artery,
f) retroduodenal artery, g) common bile duct, h) hepatic artery. (Smadja, 1988).

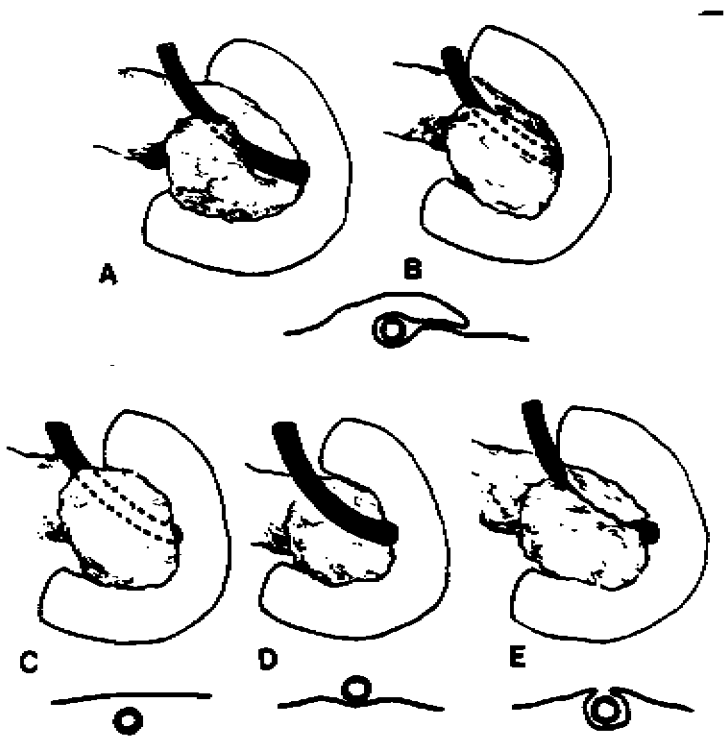

Fig. 4
Relation of the pancreas and the common bile duct. A,B. Duct is partially covered by a tongue of pancreas(44 percent). C. Duct is completely covered by the pancreas (30 percent). D. Duct lies free on the surface of the pancreas (16.5 percent). E. Duct is covered by two tongues of pancreas, with a cleavage plane between. (Schwartz, 1990).