INJURIES OF THE BILIARY SYSTEM DURING OPERATION AND THEIR MANAGEMENT

(Essay)

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BY

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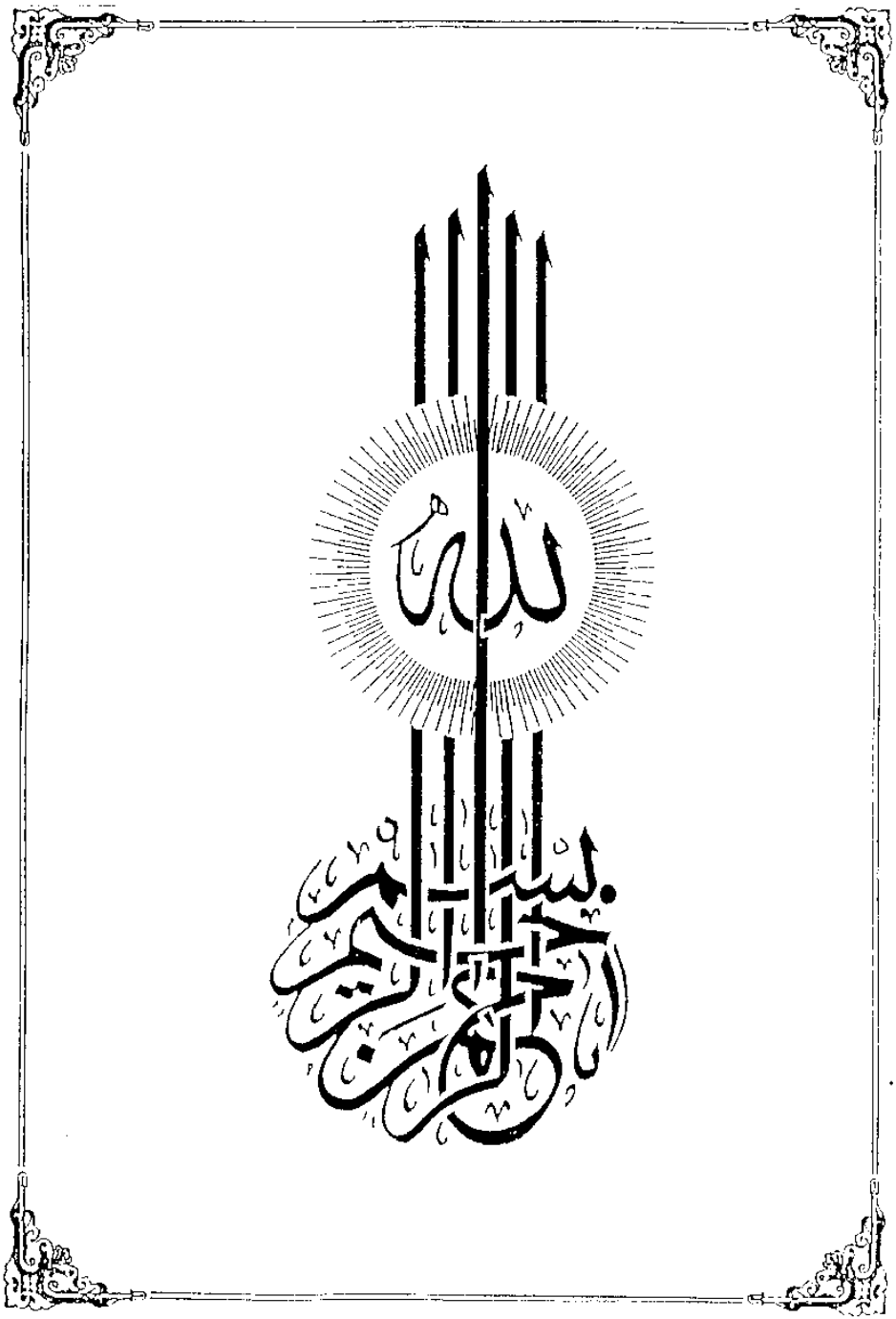

C O N T E N T S

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INTRODUCTION

The surgeon must be familiar not only with the anatomy but also with the anomalies of the biliary system which may be encountered during operation. A good knowledge of such anomalies is of the greatest importance to the surgeon to minimize operative biliary injuries. It is estimated that in at least 10 percent of operations or autopsies one or more anomalies of the extrahepatic biliary tract can be observed (Henry L. Bockus, 1966). operative injuries and especially those produced during cholecystectomy and/ or choledochotomy for gall stones are the most common causes (93%)of benign strictures of the bile ducts (Charis,B. , 1970, Rodney Smith,1977). Surgical trauma during gastric pancreatic and duodenal operations account for only a small proportion of cases (Rob and Smith, 1981).

Non surgical trauma to the extrahepatic biliary tract is rare but becoming more frequent, the recent increase in the incidence of non surgical extrahepatic biliary tract injuries has been attributed to the rise in high speed moter vehicle accidents and criminal violence (Akio et al. 1982).

A biliary injury can be a partial or a total section of a bile duct with or without loss of substance. Extensive sclerosis at the level of the injury will lead to formation of a cicatricial stenosis, among the many theories that

attempt to explain this process of scarring with sclerosis are the roles played by infection, which is always present and the vascular disorders at the level of the choledochal wall which are directly linked to the action of the injury. The direct result of this stenosis is dilatation of the bile ducts (suprastenotic) with biliary stasis, itself a source of infection and intrahepatic calculous precipitations. Only after several months of evolution do injuries to the hepatic parenchyma appear characterized by an irreversible cirrhosis, which is why these biliary injuries are so serious. (Seror et al. 1978).Duct injuries may be opened with bile leakage leading to biliary peritonitis , subdiaphragmatic abscess or late postoperative duct stricture, or it may be closed injuries in the form of a bite during clamping or a ligature to a bile duct . Injuries of the biliary system during operation are numerous, from these e.g. injury to an abnormal blood vessel will lead to bleeding which in turn may mask the field of the operation and may predispose to injury to the bile duct during its haemostat.

The true frequency of these operative injuries is difficult to estimate because of the significant number of unrecognized injuries. Gutgemann et al. collected reports of 116 injuries to the common bile duct during 55, 694 cholecystectomies for lithiasis by nine different authors i.e. a

frequency of 0.3%.

There are many literature searches showing the frequency of injuries to the bile ducts after cholecystectomies as shown in the following table : (Seror et al. 1978).

Authors		Cholecyst-ectomies No.	Injuries No.	Frequency percent
Kothe	1965	2959	23	0.74
Rudler	1972	1103	8	0.70
Mouchet	1968	2200	9	0.40
Von Helleus	1963	823	3	0.30
Guillemin	1972	2248	7	0.30
Madsen	1960	1963	6	0.30
Viikari	1960	21337	42	0.20
Rosenquist	1960	21530	43	0.20
Gutgemann	1965	1750	4	0.20
Cosman	1960	7500	15	0.20
Borgstrom	1959	5666	5	0.10
Goldstein etal	1975	2062	6	0.30

Recognition of a duct injury may be immediate (at operation), early (during the postoperative period),or late (after discharge from hospital), if common duct injury is recognized during operation reconstruction of the duct should immediately be undertaken.

The form of repair will depend upon the severity and site of the damage but, in general, the results of such primary treatment are excellent, on the other hand late repair gives more morbidity and mortality rate.

(McSherry and Gleen, 1980) reported a 0.5% mortality for cholecystectomy and 3.9% mortality for choledocholithotomy.

Our aim of work is to minimize the operative injuries of the biliary system as much as possible and We shall discuss in details how these injuries occur and also how to avoid these injuries during operations in order to reduce the mortality and morbidity rates.

ANATOMY OF THE BILIARY SYSTEM AND ITS ANOMALIES

- The biliary ducts and gall bladder :

The excretory apparatus of the liver consists of : (Fig. 1)

1) The common hepatic duct, formed by the junction of the right and left hepatic ducts which leave the liver at the portahepatis.
2) The gall bladder which serves as a reservoir for the bile.
3) The cystic duct, or duct of the gall bladder.
4) The bile duct, formed by the jnuction of the common hepatic and cystic ducts.

1- The common hepatic duct :

Two main ducts (right and left hepatic ducts) issue from the liver and unite near the right end of the portahepatis to form the common hepatic duct which passes downwards forming an acute angle by its union with the cystic duct , the common hepatic duct is on the right of the hepatic artery proper and in front of the portal vein. The common hepatic duct is usually less than 2.5 cm long.

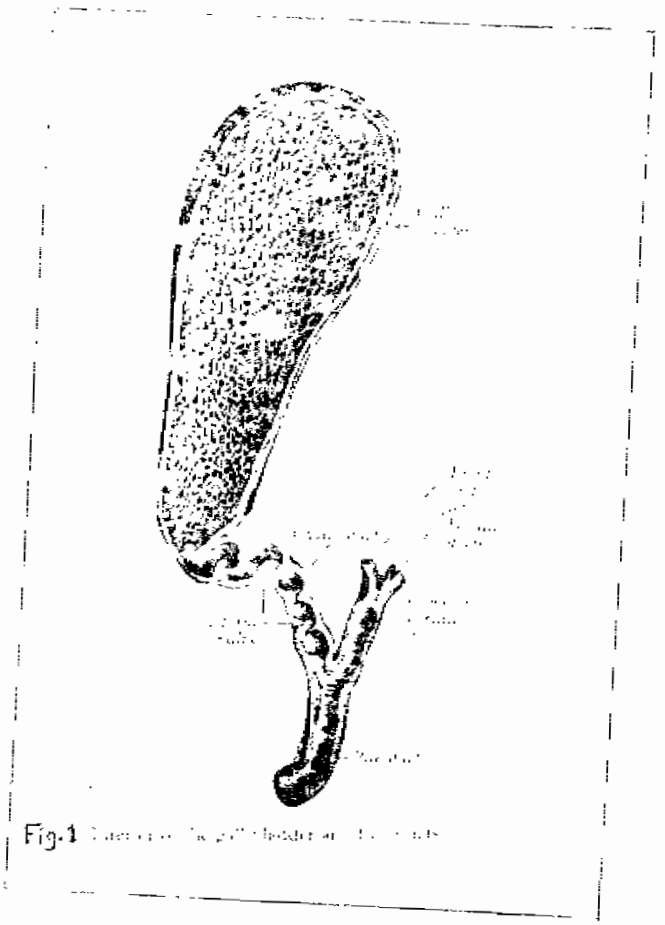

Fig. 1

2- The gall bladder :

The gall bladder is a slate-blue, piriform sac partly contained in a fossa on the inferior surface of the right hepatic lobe extending from near the right extermity of the portahepatis to the inferior border of the liver,its upper surface is attached to the liver by connective tissue, its under surface and sides are covered with peritoneum continued from the surface of the liver. Occasionally it is completely invested with peritoneum and may be connected to the liver by a short mesentr , it is 7-10 cm long, 3 cm broad at its widest part, and from 30-50 ml in capacity, but capable of fifty fold distension,it is divided anatomically into a fundus,a body and a neck which terminates into the narrow infundibulum. The fundus or expanded end is directed downwards, forewards and to the right, it projects beyond the inferior border of the liver and comes into relationship with the posterior surface of the anterior abdominal wall below the $9^{\underline{th}}$ right costal cartilage, behind the point where the lateral edge of the right rectus abdominis crosses the costal margin, posteriorly the fundus is in relation with the transverse colon near its commencement (these relations are however considerably altered when the gall bladder descends lower in the abdomen as it

frequently does particularly in slender females). It is entirely covered with peritoneum. The body is directed upwards, backwards and to the left, near the right end of the portahepatis it is continuous with the neck. It is in the relation by its upper surface with the liver, by its under surface with the right part of the transverse colon and further back with the superior part of the duodenum and the upper end of the descending part. The neck is narrow, it curves upwards and forwards and then turning abruptly backwards and downwards, it becomes continuous with the cystic duct, at its point of continuity with the cystic duct there is a constriction, the neck is attached to the liver by areolar tissue in which the cystic artery is embedded ,the mucous membrane which lines the neck projects into its lumen in the form of oblique ridges, forming a sort of spiral valve, when the neck is distended this valve causes the surfaces of the neck to present a spiral constriction.

From the right wall of the neck of the gall bladder a small pouch may project downwards and backwards towards the duodenum, this pouch often termed "Hartmann's pouch" (although originally described by Broca) and has been widely regarded as a constant feature of the normal gall bladder ,

but investigations have shown that it is always associated with pathological conditions, especially dilatation. When the pouch is well marked, the cystic duct arises from its upper and left wall and not from what appears to be the apex of the gall bladder.

3- The cystic duct :

It is from 3-4 cm long, passes backwards, downwards and to the left of the gall bladder neck, and joins the common hepatic duct to form the bile duct, it runs parallel with and adheres to the common hepatic duct for a short distance before joining with it. the junction is usually situated immediately below the portahepatis, but it may be at a considerably lower level, in the later event the cystic duct lies in the right free margin of the lesser omentum. The mucous membrane lining its interior is thrown into a series of cresentic folds, from 5-10 in number similar to those found in the neck of the gall bladder. They project into the duct in regular succesion, and are directed obliquely around the tube, presenting much the appearance of a crescentic spiral valve of Heister which makes the passage of calculi difficult , when the duct is distended , the spiral spaces between the folds are dilated

and the exterior of the duct appears twisted in the same manner as the neck of the gall bladder.

4- The bile duct :

It is formed near the portahepatis by the junction of the cystic and common hepatic ducts, it is usually about 7.5 cm long and about 6 mm in diameter (Vide infra). It runs at first downwards, backwards and slightly to the left, anterior to the epiploic foramen, here it lies in the right border of the lesser ommentum, in front of the right edge of the portal vein and on the right of the hepatic artery proper (Fig. 2). It passes behind the superior part of the duodenum with the gastroduodenal artery on its left and then runs in a groove on the upper and lateral part of the posterior surface of the head of the pancreas, here it is situated in front of the inferior vena cava and it sometimes completely embedded in the pancreatic tissue, it has been pointed out that the bile duct may lie close to the left border of the descending part of the duodenum or lies as far away as 2 cm from the duodenal wall, and that, even when the duct is embedded in the pancreas, its position is indicated by a groove on the back of the head of the pancreas. This groove can be palpated by the fingers of the left hand passed behind the descending part of the duodenum with the

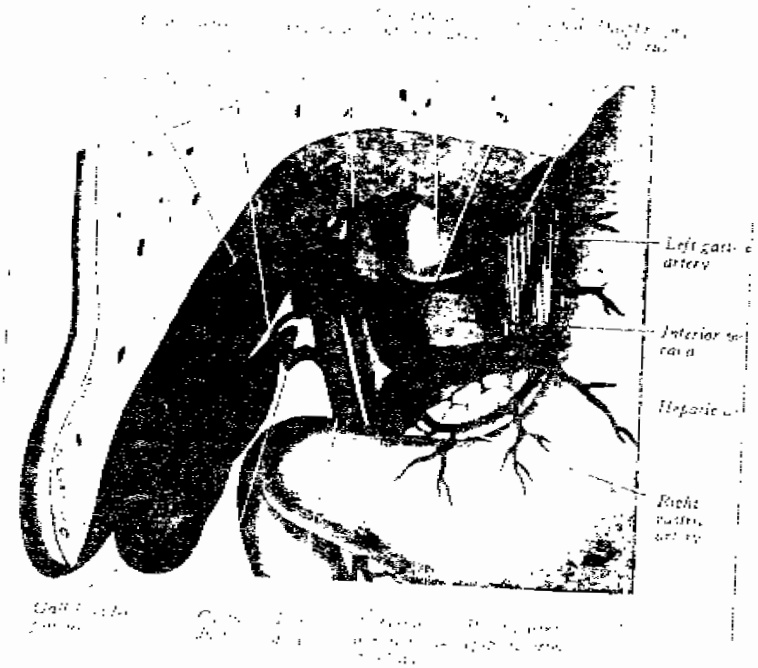

Fig 2