Post Cholecystectomy Iatrogenic Biliary Injury

Thesis

Submitted for the partial fulfillment of the M.Sc. Degree in General Surgery

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2007

ABSTRACT

Bile duct injuries represent an important complication of cholecystectomy whether open or laparoscopic. The commonest cause of major bile duct injury is failure to identify correctly the anatomy of Calot's triangle as well as incomplete knowledge of the possible embryological anomalies.

Early diagnosis of patients with suspected biliary injury is important to get the best results of repair. Management of biliary injuries after cholecystectomy entails conservative measures, endoscopic treatment and surgical treatment. The ideal surgical treatment for biliary injuries is Roux-en-Y, choledocho or hepaticojejunostomy.

Key Words:

- Cholecystectomy.
- Biliary injury.
- Iatrogenic.

ACKNOWLEDGEMENT

Thanks to "ALLAH" who inspired me the will and effort to complete this work.

I wish to express my supreme gratitude and appreciation to **Prof. Dr. Ramadan Ahmed Nabawy Morra,** professor of general surgery, Cairo University who gave me a lot of his valuable time for support and guidance in preparation of this work and for whom no words of gratitude are sufficient.

I am indebted to **Prof. Dr. Ibrahim Kamel Eyada**, professor of general surgery, Cairo University for his unconditional support and sincere piloting.

I do honestly wish to extend my deepest appreciation and sincere gratitude to **Prof. Dr. Ali Ahmed Shafik,** assistant professor of general surgery, Cairo University who inspired me the spirit of research and granted me close supervision, precious aid and extreme help.

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Introduction

The management of the patients with gall stone diseases has been revolutionized during the last decade with the introduction and evolution of laparoscopic cholecystectomy **(Koran and Roslyn, 1997)**. The laparoscopic technique for cholecystectomy was first performed by Philippe Mouret in Lyon, France, in 1987 and was developed and spread among general surgeons all over the world **(Dubois, 1991)**.

Laparoscopic cholecystectomy, after rapidly substituting traditional cholecystectomy, represents the gold standard for surgical treatment of cholelithiasis **(Nuzzo et al, 2005)**. Although the laparoscopic surgery has many advantages; it is still having many hazards. The majority of operative major complications of laparoscopic surgery result from puncture injuries following incorrect insertion of Veress needle or trocars **(Mintz, 1994)**. Bleeding and bile duct injuries are common hazards of both open and laparoscopic cholecystectomy **(Alexander, 1996)**. Injury of the biliary tree is reported in approximately 0.2% of patients undergoing open cholecystectomy **(Roslyn et al, 1993)**. It is widely recognized that the incidence of bile duct injuries has increased with the spread of laparoscopic cholecystectomy raising the percentage to 0.5% to 2% in some studies **(Meyers et al, 1991)**. Despite the

progress achieved, bile duct injuries represent an important complication, and have become more frequent than in the past **(Nuzzo et al, 2005)**.

It may not always be possible to determine the precise nature of the bile duct injury but a number of possible mechanisms may be responsible, such as excessive traction on the gall bladder or the excessive use of the diathermy around the common bile duct area leading to bile duct necrosis or ischemic stricture **(Terblanche et al, 1990)**. The commonest cause of major bile duct injury is failure to identify correctly the anatomy of Calot's triangle and the bile duct is mistaken for the cystic duct and is then divided **(Davidoff, 1996)**.

Early diagnosis in patients with suspected bile duct injury is important because the clinical condition may rapidly deteriorate after three to five days when ileus, peritonitis, and sepsis develop. Several authors have, therefore, emphasized the importance of early aggressive investigations in patients with diffuse abdominal pain, fever, malaise or liver function abnormalities **(Rossi et al, 1992)**. The diagnosis of postoperative biliary injury is first made or suspected on clinical basis, then a number of laboratory tests and imaging techniques are used to confirm and define precisely the nature of the injury. The gold standard for patients with bile duct injuries is cholangiography (ERCP, PTC and MRCP) **(Martin et al, 1994)**.

The ideal surgical treatment for complete transection of the bile duct recognized intra operatively is primary end to end anastomosis with a T-tube **(Browder et al, 1987).** However, a Roux-en Y, choledocho- , or hepaticojejunostomy remains the procedure of choice for late discovered injuries **(Collins and Gorey, 1984)**. Trials for primary suture repair was described by **Woods et al(1994)** with the additional postoperative endoscopic stenting while **Frattaroli et al (1996)** reported high success rate of bilioenteric anastomosis in mid level bile duct injuries. Retrospective studies comparing endoscopic and open treatment regimens suggested that both are equally successful **(Davids et al, 1992).**

Aim of work

This study is conducted to review the problem of iatrogenic bile duct injury following open and laparoscopic cholecystectomy as regards the aetiology, type of injury, clinical presentation, investigations and different modalities of management of this condition.

Through this study, it is sought that a better understanding of the causes of this condition will be reached and the different methods of their prevention and repair will be identified.

Embryology

Development of Liver, Gallbladder, and Biliary Apparatus:

The liver, gallbladder, and biliary duct system arise as a ventral outgrowth from the caudal part of the foregut early in the fourth week (see Fig. 1A). Based on recent research findings, it has been suggested that both the hepatic diverticulum and the ventral bud of the pancreas develop from two cell populations in the embryonic endoderm. At sufficient levels, fibroblast growth factors *(FGFs),* secreted by the developing heart, interacts with the bipotential cells and induce formation of the hepatic diverticulum. The hepatic diverticulum extends into the septum transversum, a mass of splanchnic mesoderm between the developing heart and midgut. The septum transversum forms the ventral mesentery in this region.

The hepatic diverticulum enlarges rapidly and divides into two parts as it grows between the layers of the ventral mesentery (Fig. 1A).The larger cranial part of the hepatic diverticulum is the primordium of the liver. The proliferating endodermal cells give rise to interlacing cords of hepatic cells and to the epithelial lining of the intrahepatic part of the biliary apparatus. The hepatic cords anastomose around endothelium lined spaces, the primordia of the *hepatic sinusoids*. The fibrous and *hematopoietic tissue* and *Kupffer cells* of the liver are

derived from mesenchyme in the septum transversum.

The liver grows rapidly and from the fifth to tenth weeks, fills a large part of the upper abdominal cavity. The quantity of oxygenated blood flowing from the umbilical vein into the liver determines the development and functional segmentation of the liver. Initially, the right and left lobes are about the same size, but the right lobe soon becomes larger. *Hematopoiesis begins during the sixth week,* giving the liver a bright reddish appearance. By the ninth week, the liver accounts for about 10% of the total weight of the fetus. *Bile formation* by the hepatic cells begins during the twelfth week.

The small caudal part of the hepatic diverticulum becomes the gallbladder, and the stalk of the diverticulum forms the cystic duct (see Fig. 1C). Initially, the extrahepatic biliary apparatus is occluded with epithelial cells, but it is later canalized because of vacuolation resulting from degeneration of these cells. The stalk connecting the hepatic and cystic ducts to the duodenum becomes the bile duct. Initially, this duct attaches to the ventral aspect of the duodenal loop; however, as the duodenum grows and rotates, the entrance of the bile duct is carried to the dorsal aspect of the duodenum (see Fig. 1C and D). The bile entering the duodenum through the bile duct after the thirteenth week gives the meconium (intestinal contents) a dark green color (Moore & Persaud, 2003).