Predictive Factors Influencing Conversion to Open Surgery in Patients Undergoing Laparoscopic Cholecystectomy

THESIS

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Abstract

In the period of January 2011 to October 2011 Laparoscopic cholecystectomy was attempted in 150 patients suffering from symptomatic cholelithiasis. A retrospective analysis of parameters, including patient demographics, laboratory values, radiologic data, and intraoperative findings, was performed. Univariate and multivariate analysis was done to determine those variables predicting conversion.

Elderly, male gender, leucocytosis, a history of previous upper abdominal surgery, preoperative ERCP, USC evidence of thickened GB wall >4mm, high-grade adhesion, and thickened wall of the gallbladder intraoperatively were predictive factors of conversion to open surgery. LC was successfully completed in 138 patients (92%), whereas a conversion to open surgery was required in 12 patients (8.0%). Patient selection is very important for efficient, safe training in LC. Pathways could be suggested, enabling the surgeon to precisely decide during LC when to convert to open surgery.

Key Word:

Laparoscopic – cholecystectomy - conversion

Dedication

To my parents, for their never ending love and support in all my efforts.

My wife, my soul mate and confidence, for always being there for me. I could not have made it through without you by my side.

Finally, to those who believe in richness of learning.

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List of Abbreviations

- γ-GT: Gamma-glutamyl transpeptidase.
- ALP: Alkaline phosphatase.
- ALT: alanine transaminase.
- ASA: American Society of Anesthesiologists.
- AST: Asparate transaminase.
- BMI: Body mass index.
- CA: Cystic artery.
- CBD: Common bile duct.
- CHA: Common hepatic artery.
- CHD: Common hepatic duct.
- ERCP: Endoscopic Retrograde Cholangiopancreatography.
- GB: Gall bladder.
- GDA: Gastroduodenal artery.
- HIDA: Hydroxyiminodiacetic acid .
- IOC: Intraoperative cholangiography.
- LC: Laparoscopic cholecystectomy.
- LFTs: Liver function tests.
- LGA: Left gastric artery.
- LHA: Left hepatic artery.
- LMWH: Low molecular weight heparin.
- MHA: Middle hepatic artery.
- MRA: Magnetic resonance arteriography.
- MRCP: Magnetic Retrograde Cholangiopancreatography.
- NIH: National Institutes of Health.

- OC: Open cholecystectomy.
- OCHRA: Observational Clinical Human Reliability Assessment.
- PHA: Proper hepatic artery.
- RHA: Right hepatic artery.
- RUQ: Right upper quadrant.
- SA: Splenic artery.
- SMA: Superior mesenteric artery.
- USG: Ultrasonography.

Introduction

With decreased postoperative pain, earlier oral intake, shorter hospital stay, early resumption of normal activity and improved cosmesis, laparoscopic cholecystectomy (LC) has become a routine surgical procedure in general surgical units for cholelithiasis all over the world. but, substantial proportions of patients in whom LC cannot be successfully carried out are converted to open cholecystectomy (OC) because of technical difficulty or intraoperative complications**. (Zhang et al, 2008).**

Conversion to open surgery may be required during the attempted LC due to inflammation and fibrosis of Calot's triangle, unclear anatomy, uncontrollable bleeding, and bile duct injury. Conversion is not a complication, but a means of preventing more serious problems**. (Ji et al, 2006).**

As experience has been accumulated over time, several other reliable risk factors have been identified to increase the likelihood of conversion. These risk factors can predict the possibility of certain difficulties or conversion in a particular patient, thereby allowing for appropriate planning and management. They should not be considered as a contraindication to laparoscopic cholecystectomy, but they should draw the attention and patience of the laparoscopic surgical team. **(Theodoros et al, 2007)**

The importance of factors predisposing to conversion from laparoscopic to open cholecystectomy has been emphasized in numerous studies, Many of these studies showed that acute cholecystitis is one of the most important risk factors for conversion. By excluding the patients with acute cholecystitis, pre- and perioperative factors affecting conversion has not previously been evaluated sufficiently in patients who had undergone elective LC for chronic longstanding cholecystitis. A determination of preoperative factors affecting conversion in patients who undergo elective LC for cholelithiasis may give valuable ideas to operating surgeons about patient selection and, according to intraoperative findings, whether the procedure can be completed laparoscopically or not. **(Ercan et al, 2010).**

Determining variables associated with the risk of conversion would be useful for evaluating patients preoperatively, thus avoiding wasteful laparoscopic attempts by proceeding directly to an open operation. Unfortunately, the reported

factors indicating a risk for conversion from laparoscopic to open cholecystectomy have been inconsistent. **(Simopoulos, 2005).**

Identification of the preoperative parameters that are risk factors for possible conversion would be useful for both patients and surgeons. With the availability of such information, patients can be counseled and are able to make the necessary arrangements for their recuperation. The surgeons can better plan their operating schedules. **(Ibrahim et al, 2006).**

CHAPTER 1

EMBRYOLOGICAL AND SURGICAL ANATOMY OF THE INTRAHEPATIC AND EXTRAHEPATIC BILIARY TREE

1.1. Normal Development of the liver and biliary tract.

1.2. Surgical Anatomy of the liver and biliary tract.

1.3. Anatomical Variations and Anomalies of the Biliary Tree and Vessels.

1.4. Anatomic landmarks for safe laparoscopic cholecystectomy.

1.1. Normal Development of the liver and biliary tract.

The hepatobiliary system develops during the second half of the eighth week of the embryonic stage of development, known as the *organogenetic period,* ***(Moore and Persaud, 2003).***

Many of the anatomic variations of the system are the consequences of occurrences during this period***, (Wind, 2000).***

On approximately the 22nd day, a small endodermal thickening, the *hepatic plate,* appears in the endodermal lining of the caudal part of the foregut, adjacent to the transverse septum***,(Larsen, 2001).***

This outgrowth, the hepatic diverticulum, or liver bud, consists of rapidly proliferating cells that penetrate the septum transversum, that is, the mesodermal plate between the pericardial cavity and the stalk of the yolk sac, ***(Sadler, 2009).***

On the 25th-26th day, the plate begins to proliferate and invaginates into the caudal region of the septum between the right and left venous returns, forming the *hepatic diverticulum (liver bud),*The initially bulbous "head" of the larger cranial part of the diverticulum bears the cells that constitute the *primordium of the liver parenchyma,* while its "neck" will elongate to become the *extrahepatic portion of the hepatic duct,****(Karaliotas et al, 2006).***

The smaller caudal part of the hepatic diverticulum, the cystic diverticulum, becomes the *gallbladder,* its "neck" forming the *cystic duct****, (Ross and Pawlina, 2006).***

The cells forming the gallbladder and cystic duct are from histologically distinct populations of endodermal cells***, (Larsen, 2001).***

The stalk of the hepatic diverticulum, between gut (now differentiating into duodenum) and the cystic diverticulum elongates into the *(common) bile duct.* Variations in the gallbladder and extrahepatic duct arise from developmental anomalies that occur during the 4th week, ***(Karaliotas et al, 2006).***

During week 6, the extrahepatic ducts recanalize through a process of vacuolation resulting from the degeneration of the occluding cells, starting from the duodenal end. Incomplete recanalization results in a *septated common duct. Ductal atresia,* the most serious affliction of the neonatal biliary system was

formerly considered to be a malformation due to a failure to recanalize. However, it is now thought to be a secondary phenomenon, resulting from an inflammatory process that leads to sclerosis of recanalized ducts - most likely a viral infection during late fetal development, ***(Skandalakis, 1993).***

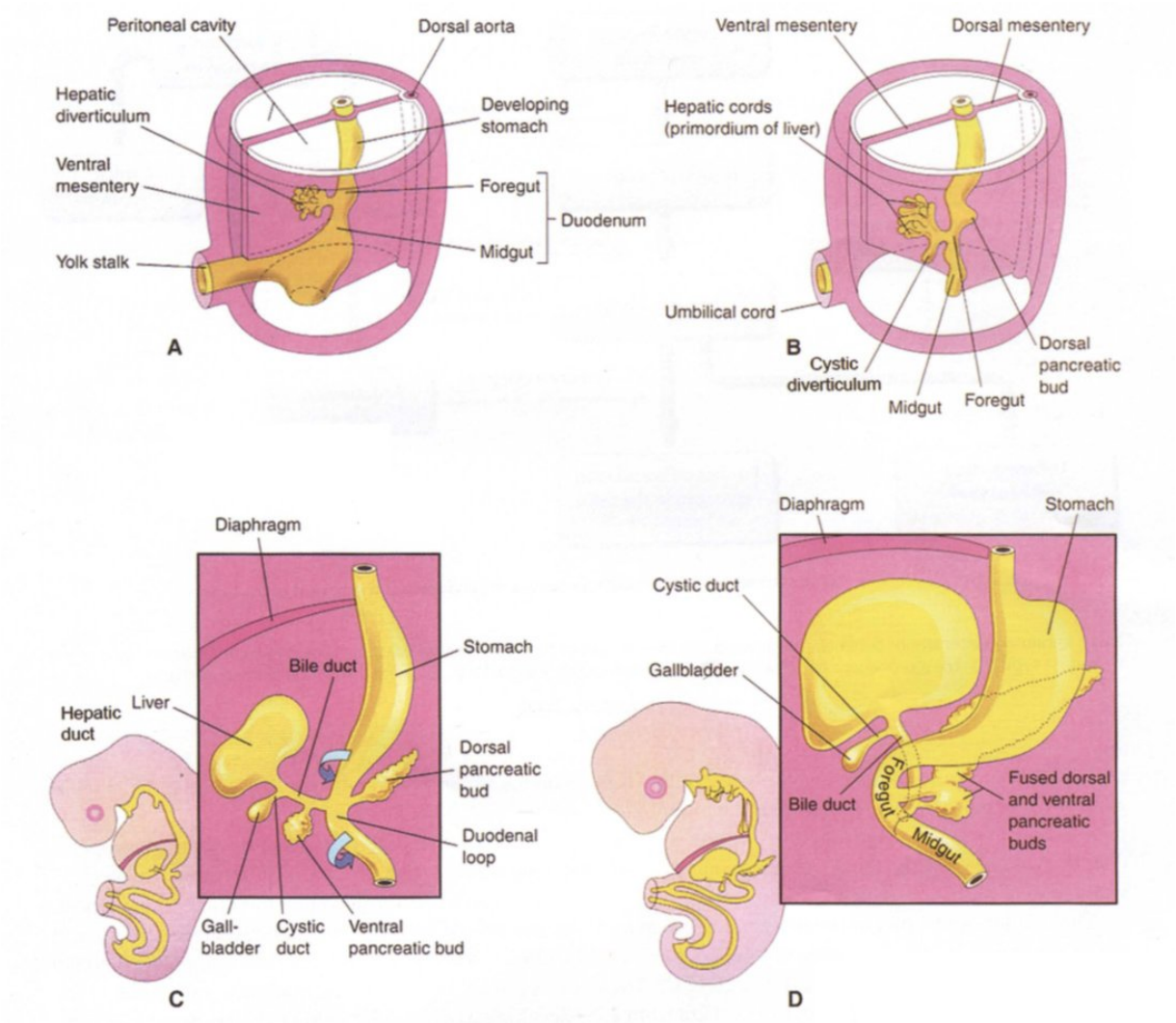

Fig.(1): Progressive stages in the development of the duodenum, liver, extrahepatic biliary system, and pancreas. **A:** 4 weeks, **B** and **C:** 5 weeks, **D:** 6 weeks. Note that the entrance of the bile duct into the duodenum gradually rotates from its initial ventral position (A- C) to a dorsal one (D). This explains why the bile duct passes posterior to the 1st part of the duodenum and head of the pancreas, and how the ventral pancreatic bud joins to the dorsal pancreatic bud, ***(Moore & Persaud ,2003).***