

Advantages and Disadvantages of Single Incision Laparoscopic Cholecystectomy

Thesis

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The Master Degree in General Surgery

By

Ahmed Shadad Abd El-Wahed

M.B.B.Ch, Faculty of medicine, Cairo University

Supervised by

Prof.Dr.Faheem El-Bassiony

Professor of General Surgery,
Faculty of Medicine, Cairo University

Prof.Dr.Mostafa Abd El-Hamed Soliman

Professor of General Surgery,
Faculty of Medicine, Cairo University

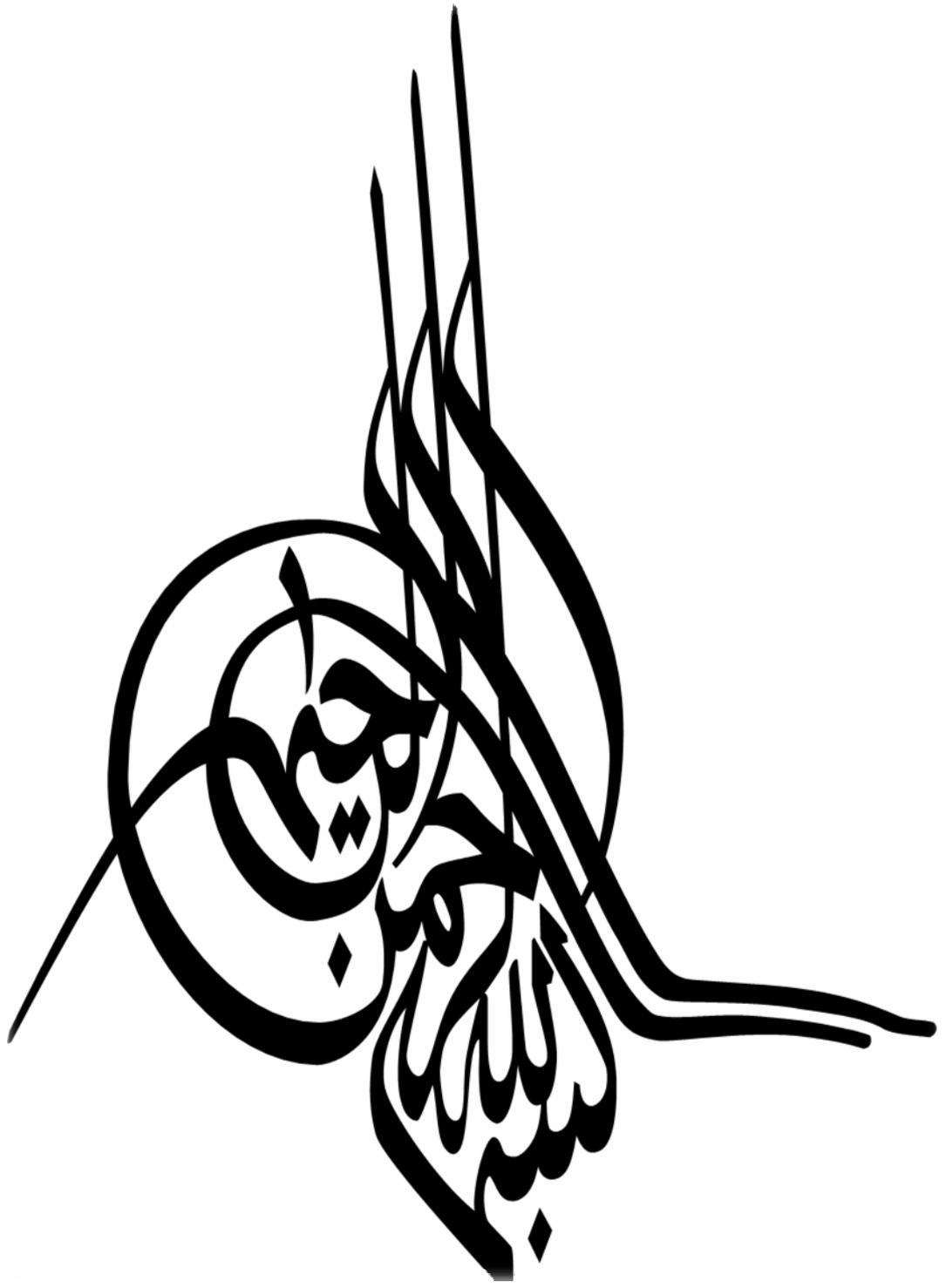
Dr.Mohammed El-Masry

Lecturer of General Surgery,
Faculty of Medicine, Cairo University

Faculty of Medicine

Cairo University

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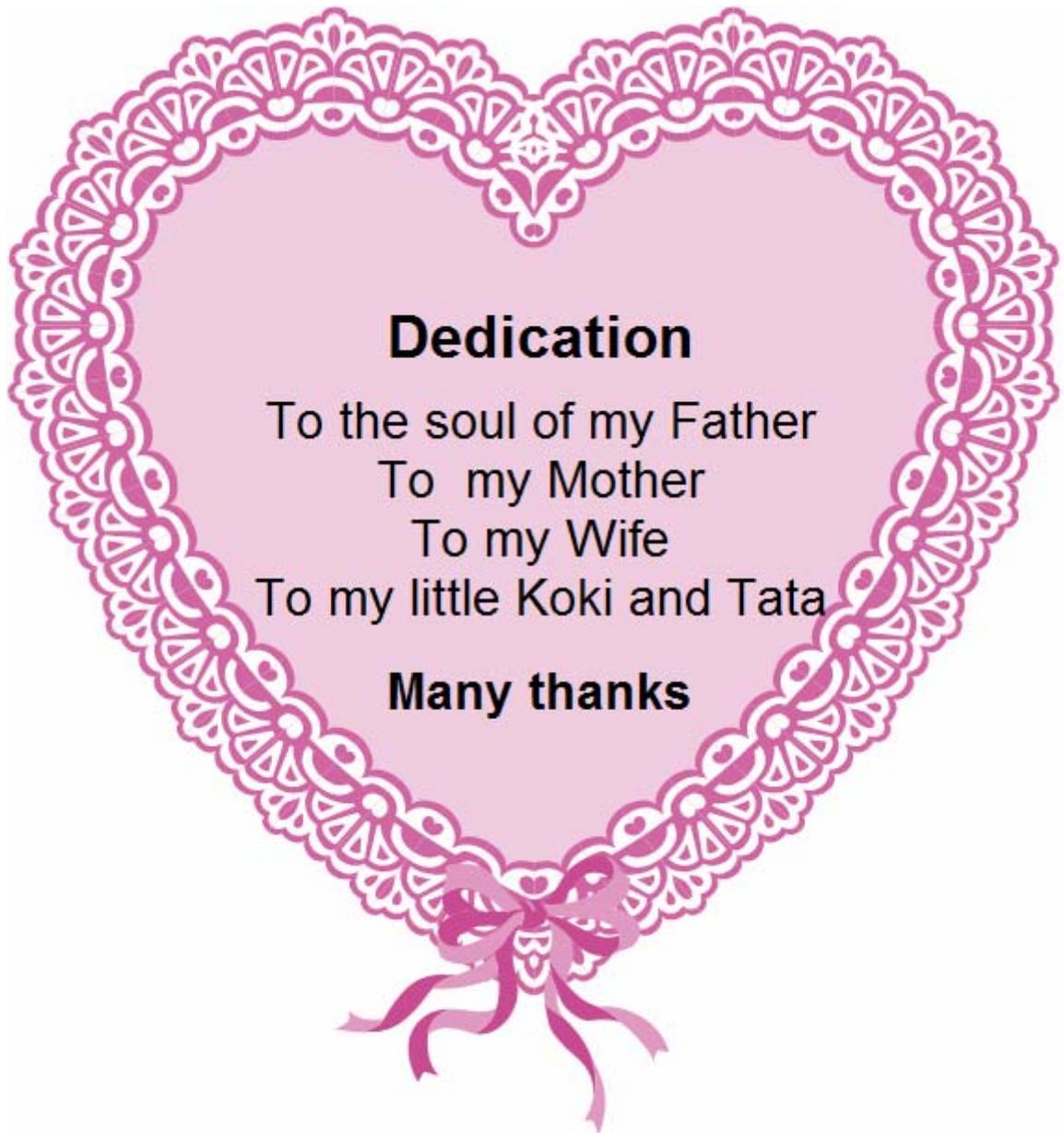
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Dedication

To the soul of my Father
To my Mother
To my Wife
To my little Koki and Tata

Many thanks

Abstract

Minimally invasive surgery has become the “gold standard” for cholecystectomy and patient’s choice because of less postoperative pain, better cosmetic results, faster recovery, and earlier return to normal activity.

For that reason many surgical diseases can be treated laparoscopically ensuring the same safety standard as conventional surgery. Applying laparoscopic techniques, operations are less traumatic; thus, the incidence of wound infections and incisional hernias has decreased.

In this study SILS was successfully performed in 20 patients (14 females and 6 males) using this single-port. Although the procedures seemed to take longer than expected for traditional laparoscopic cholecystectomy, each intraoperative step was accomplished with confidence, similar to standard multi-port laparoscopy.

This study has shown that laparoscopic cholecystectomy can be done using commercially available instruments, through a single umbilical incision.

SILS is more difficult than conventional laparoscopic Cholecystectomy. The single port procedure may give less than adequate visualization of the Callot’s triangle in some cases and in these it would be wise to add a needle in the right hypochondriac region for fundus or liver retraction (13 cases in this study), a second retraction stitch for Hartmann’s pouch was required in 7 cases in this study.

Key word:

- Gallstones
- Laparoscopic Cholecystectomy
- Single Port.

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REVIEW OF LITERATURE

Embryology and Anatomy of the biliary tract

Embryology of the biliary tract

The liver and the biliary tract are derived from the distal part of the foregut. The liver first appears in the 3 weeks embryo as a hollow endodermal bud from the foregut this bud, the future hepatic diverticulum, consists of rapidly proliferating cells that penetrate into septum transversum in the ventral mesogastrum. These cells eventually develop into the liver; the connection between the hepatic diverticulum and the foregut is preserved to form the bile duct. A ventral outgrowth of the bile duct gives rise to the gall bladder and the cystic duct. As the intestine rotates, the entrance from the bile duct into the duodenum moves to a posterior position and the common bile duct comes to lie behind the duodenum and the pancreas. **(Britton and Savage, 1994)**

Anatomy of the Biliary Tree and the Gall Bladder

The Gall Bladder: Figure (1)

The gallbladder is a pear shaped sac about 10 cm in length and is situated on the inferior surface of segment V of the right lobe of the liver. It has a capacity of 30-50 cc. **(Cuschieri, 2002)**

It is attached to the liver bed by loose connective tissue containing lymphatics, veins, and occasionally small accessory bile ducts, the so-called ducts of Luschka. The gallbladder wall is composed of four layers: mucosa, muscularis, perimuscular subserosal connective tissue, and serosa. **(Greenfield, 1997)**

The gallbladder is divided anatomically into four parts: the fundus projects beyond the hepatic border and is completely covered with peritoneum and touches the anterior abdominal wall opposite the ninth costal cartilage at the lateral margin of the rectus

abdominal muscle. It lies just to the left of the hepatic flexure of the colon .The body is the largest part of the gallbladder, it is related to the transverse colon and the first part of the duodenum. **(Last 1988)**

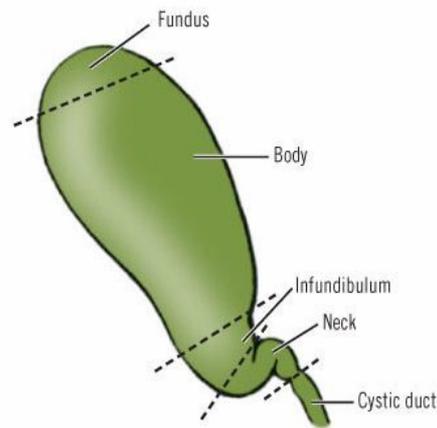


Figure 1: Arbitrary divisions of gallbladder.

(Skandalakis et al., 1987)

Where the body tapers to form the neck, an outpouching is often formed on the inferior and lateral aspect of the gallbladder, referred to as the infundibulum or the Hartmann's pouch. The neck of the gallbladder has an S-shaped course and terminates in the cystic duct. The infundibulum and the neck are covered by a peritoneal reflection from the free edge of the hepatoduodenal ligaments. **(Greenfield, 1997)**

Relations

- Anteriorly: The anterior abdominal wall and the inferior surface of the liver.

Posteriorly: The transverse colon and the first and second parts of the duodenum.
(Snell, 2008)

Blood supply and venous drainage of the gall bladder: Figure (2)

Arterial blood reaches the gallbladder via the cystic artery, which originate from the right hepatic artery. The course of the cystic artery is normally posterior to the common hepatic duct, superior to the cystic duct and enters the hepatocystic triangle created by the cystic duct, common hepatic duct, and inferior edge of the right lobe of the liver. Other important structures that sometimes pass through this area are a replaced right hepatic artery and accessory bile ducts, so that it is essential to define structures clearly before ligating them. **(Greenfeild, 1997)**

The cystic veins are numerous and minute. Those from the hepatic surface pass to enter the quadrate lobe of the liver ,while those from the peritoneal surface may pass to the gallbladder neck and enter the quadrate lobe directly or by the way of plexus around the bile ducts. These veins entering the liver open into the hepatic veins, not the portal veins. **(Last, 1988)**

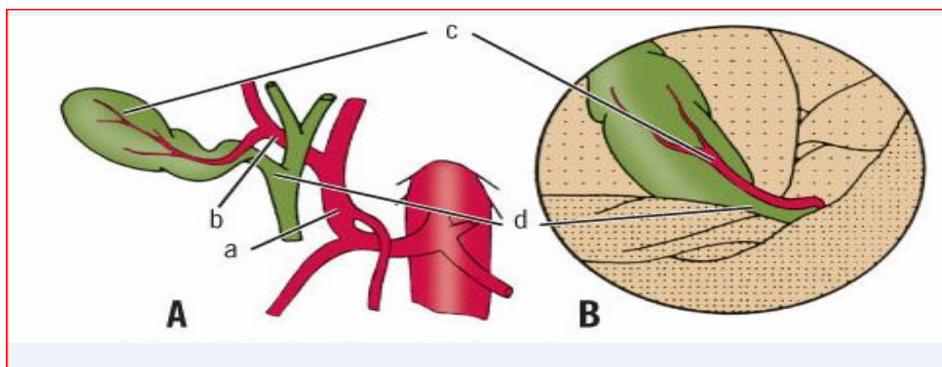


Figure 2: Normal position of the cystic artery. **A,** Conventional visualization. **B,** Laparoscopic visualization. a, Common hepatic artery; b, Right hepatic artery; c, Cystic artery; d, Cystic duct. **(Balija et al., 1999)**

Lymphatic drainage of the gall bladder

The lymphatic drainage of the gallbladder passes through the lymph vessels to lymph nodes in the portahepatis and then in the free edge of the lesser omentum to celiac group of pre-aortic lymph nodes. **(Last, 1988)**

Nerve Supply

Parasympathetic fibers, mainly from the hepatic branch of the anterior vagal trunk, stimulate contraction of the gallbladder and relax the ampullary sphincter. Sympathetic fibres from the celiac ganglia, which inhibit contraction. Afferent fibres including those subserving pain from the gallbladder may run with right sided sympathetic fibres and reach spinal cord segment, (T₇₋₉) and this explains radiation of the pain to the back in the infrascapular region or run into the right phrenic nerve (C₃₋₅) and this explains the occasional referral of pain to the right shoulder region. **(McMinn, 1990)**

The Cystic Duct

It is about 3 mm in diameter and about 2-4 cm in length. It is the continuation of the gallbladder neck at the portahepatis and joins the hepatic duct between the two layers of the lesser omentum. It lies immediately in front of the right main branch of the hepatic artery, which can be caught easily in a clamp placed on the cystic artery during cholecystectomy. **(Last, 1988)**

It contains the valves of Hiester, which are folds of mucosa that projects into its lumen and occasionally make it difficult to insert a catheter during cholangiography. **(Greenfield, 1997)**

The length of the cystic duct is quite variable. It may be short or absent and have a high union with the hepatic duct, or long and run parallel, behind, or spiral to the main hepatic duct before joining it, sometimes as far as at the duodenum. **(Clemente, 1985)**

Extra hepatic biliary tract

The right and left lobes of the liver are drained by ducts originating as bile canaliculi in the lobules. The canaliculi empty into the canals of Hering in the interlobular triads. The canals of Hering are collected into ducts draining the hepatic areas, the four hepatic segment ducts, and finally, outside the liver, the right and left hepatic ducts. **(Healey and Schroy, 1953)**

Right Hepatic Duct

The right hepatic duct is formed by the union of the anterior and posterior segment ducts at the portahepatis. This pattern was present in 72% of specimens examined. In the remainder, the posterior segment duct (or, rarely, the anterior segment duct) crossed the segmental fissure to empty into the left hepatic duct or one of its tributaries. In these cases, the right hepatic duct is absent. The average length of the right hepatic duct, when present, is 0.9 cm. **(Healey and Schroy, 1953)**

Left Hepatic Duct

The left hepatic duct is usually (67%) formed by the union of the medial and lateral segment ducts, although the medial segment duct sometimes enters the inferolateral duct. The union of the two area ducts is in line with the left segmental fissure (50%), to the right of the fissure (42%), or to the left of the fissure (8%). The average length of the left hepatic duct is 1.7 cm. usually the right and left hepatic ducts are of equal size. In patients with chronic obstructive biliary disease, the left duct, for unknown reasons, is larger than the right duct. **(Hermann, 1979)**

Common Hepatic Duct: Figure (3)

The common hepatic duct is formed by the union of the right and left hepatic ducts in the porta at the transverse fissure of the liver. Its lower end is defined as its junction with the cystic duct. The distance between these points varies from 1.0 cm to 7.5 cm. The diameter of the duct is about 0.4 cm. (Hermann, 1979)

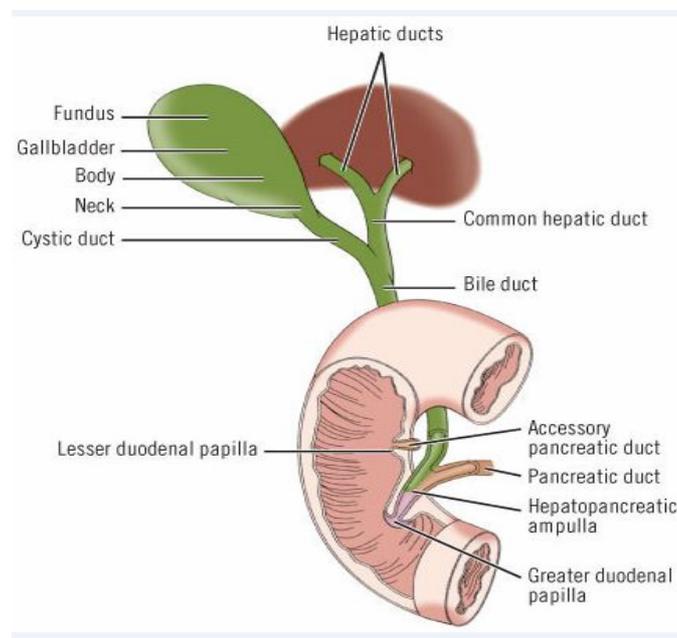


Figure 3: Location of common hepatic duct. (O'Rahilly, 1986)

Common Bile Duct (Ductus Choledochus)

The common bile duct begins at the union of the cystic and common hepatic ducts and ends at the papilla of Vater in the second part of the duodenum. It varies in length from 5 cm to 15 cm, depending on the actual position of the ductal union. In 22%, the common hepatic and cystic ducts, on average, run parallel for 17 mm before the ducts actually unite. The average diameter is about 6 mm. (Newman and Northrup, 1963)