



# Brief Insight about Immediate and Delayed Laparoscopic Cholecystectomy after Endoscopic Retrograde Cholangio-pancreatography

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## Abstract

Gallstones are aggregation of hard substance that forms inside gallbladder when there is disequilibrium in the constitution of bile such as more cholesterol, accumulated amount of pigment material and/or decreased amount of bile acid. Gallstones may also result from dysfunction of gallbladder contraction. Gallstones may occur as one large stone or hundreds of tiny stones. Cholesterol and calcium bilirubinate are the two main substances involved in gallstone formation. Gallstones derived from bile consist of mixture of cholesterol, bilirubin with or without calcium. Based on their chemical composition, gallstones found in the gallbladder are classified as cholesterol, pigmented, or mixed stones. Gallstones can be mostly white, yellow, brown, black and green colored. Approximately 80% of the gallstones are cholesterol gallstones, which chiefly consist of cholesterol plus bile salts. Endoscopic retrograde cholangiopancreatography (ERCP) is a technique that uses a combination of luminal endoscopy and fluoroscopic imaging to diagnose and treat conditions associated with the pancreatobiliary system. The endoscopic portion of the examination uses a side-viewing duodenoscope that is passed through the esophagus and stomach into the second portion of the duodenum. Many studies have supported Immediate laparoscopic cholecystectomy post-ERCP. On the same day, LC post-ERCP and simultaneous laparoendoscopic management are also being popularized. We too suggest that LC performed Immediate within 24-hour post-ERCP is beneficial in terms of surgery duration, hospital stay and operative difficulty.

**Key Words:** Laparoscopic Cholecystectomy, Endoscopic Retrograde Cholangio-pancreatography

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## Introduction

Gallstones are aggregation of hard substance that forms inside gallbladder when there is disequilibrium in the constitution of bile such as more cholesterol, accumulated amount of pigment material and/or decreased amount of bile acid. Gallstones may also result from dysfunction of gallbladder contraction (1).

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Gallstone disease is the most common gastrointestinal disorder for which patients are admitted to hospitals in European countries **(3)**.

Risk factors for gallstones include increasing age, female gender, obesity, metabolic syndrome, rapid weight loss, pregnancy, hemolytic disorders and cirrhosis. Abdominal adiposity and diabetes are associated with biliary calculi **(4)**.

The lack of endogenous CCK enhances susceptibility to gallstones by impairing gallbladder contractile function and small intestinal motility function. The association between bacteria and cholesterol gallstones had been confirmed. It was found that at least 14 bacterial genera reside in cholesterol gallstones **(5)**.

Endoscopic retrograde cholangiopancreatography (ERCP) is a technique that uses a combination of luminal endoscopy and fluoroscopic imaging to diagnose and treat conditions associated with the pancreatobiliary system. The endoscopic portion of the examination uses a side-viewing duodenoscope that is passed through the esophagus and stomach into the second portion of the duodenum **(6)**.

### I. Indications

The main reason for this evolution is that diagnostic modalities have been developed that are less invasive than ERCP but possess similar sensitivity and specificity for disease processes of the hepatobiliary system **(7)**.

- Endoscopic sphincterotomy.
- Removal of stones.
- Insertion of stents.
- Dilation of strictures (e.g., primary sclerosing cholangitis, anastomotic strictures after liver transplantation) **(8)**.

In June 2019, the ASGE issued a guideline for the use of ERCP in the evaluation and management of choledocholithiasis, which included the following recommendations:

- In patients with gallstone pancreatitis without cholangitis or biliary obstruction/choledocholithiasis, urgent (< 48 hours) ERCP is not recommended.
- In patients with large choledocholithiasis, large-balloon dilation after sphincterotomy is suggested rather than endoscopic sphincterotomy alone.
- For patients with large and difficult choledocholithiasis, intraductal therapy or conventional therapy with papillary dilation is

suggested **(9)**.

- Preoperative or postoperative ERCP or laparoscopic treatment is suggested for patients at high risk of choledocholithiasis or positive intraoperative cholangiopancreatography, depending on local surgical and endoscopic expertise **(10)**.
- Plastic and covered metal stents may facilitate removal of difficult choledocholithiasis but require planned exchange or removal **(11)**.

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### Contraindications

Absolute contraindications for ERCP include the following:

- Patient refusal to undergo the procedure.
- Unstable cardiopulmonary, neurologic or cardiovascular status.
- Existing bowel perforation **(12)**.

Structural abnormalities of the esophagus, stomach or small intestine may be relative contraindications for ERCP. Examples are acquired conditions such as esophageal stricture, paraoesophageal herniation, esophageal diverticulum, gastric volvulus, gastric outlet obstruction and small-bowel obstruction. An altered surgical anatomy, such as is seen after partial gastrectomy with Billroth II or Roux-en-Y jejunostomy, may also be a relative contraindication for ERCP **(13)**.

The presence of acute pancreatitis is typically considered a relative contraindication as well, unless the etiology of the pancreatitis is gallstone-related, and the therapeutic goal is to improve the clinical course by means of stone extraction. In addition, ERCP with sphincterotomy or ampullectomy is relatively contraindicated in coagulopathic patients (international normalized ratio [INR] >1.5 or platelet count < 50,000/ $\mu$ L) **(14)**.

### Technique

The main objectives of endoscopic retrograde cholangiopancreatography (ERCP) are to gain access to the biliary system or the pancreatic duct via the major duodenal papilla in the second portion of the duodenum to obtain fluoroscopic images of either the biliary tree or the pancreatic duct after injection of a radiopaque contrast agent to interpret those images in real time and to perform therapeutic interventions as indicated **(15)**.

### Insertion of endoscope:

With the patient in the prone or semiprone position the duodenoscope is passed through a self-retaining mouth guard with the tip angled slightly downward to facilitate its movement to the level of the hypopharynx. Once the endoscope has reached this location the tip is brought back



to the neutral position and gentle pressure is applied until passage into the proximal esophagus is achieved (16).

Care must be taken in passing the endoscope through the esophagus and into the stomach; visibility is limited. If attempts to pass the duodenoscope meet with resistance and no cause is visible, removal of the duodenoscope and subsequent examination with a gastroscope (standard forward-viewing endoscope) should be considered (17).

#### **Gastric examination and duodenal positioning:**

Once the duodenoscope is in the gastric lumen, it is advanced to a position in which it lies on the mucosa of the greater curvature, allowing visualization of the lesser curvature and the distal stomach. With further advancement of the endoscope, the tip should pass the angular incisure. In this position, upward angulation of the tip should allow examination of the gastric cardia (16).

In the distal stomach, downward angulation of the tip should bring the pylorus into view. When the endoscope reaches the pylorus, the tip should again be placed in the neutral position, with the pylorus visible in the 6-o'clock location ("sun setting" position) as passage into the duodenal bulb is achieved (18).

This maneuver should advance the endoscope to the second portion of the duodenum and permit visualization of the major duodenal papilla, which appears as a small pink protuberance at the junction of the horizontal and vertical duodenal folds (19).



**Figure (1):** Endoscopic view of major duodenal papilla (20).

#### **Cannulation of major papilla:**

The key to successful cannulation of either the pancreatic or the biliary ductal system is proper scope positioning.

With the duodenoscope in the short position in the second portion of the duodenum the lens should be facing the papilla with the tip in close proximity to the duodenal wall (21).

The traditional approach to cannulation, termed contrast-guided cannulation, involves passage of the cannulation device tip into the papillary orifice, followed by injection of contrast material to confirm proper positioning. However, there are data to support a wire-guided approach (22),<sup>7315</sup>

In the wire-guided approach, a guide wire is passed under fluoroscopy into either the pancreatic duct or the CBD before the injection of contrast. A systematic review and meta-analysis demonstrated a significantly lower incidence of post-ERCP pancreatitis (PEP), higher primary cannulation rates, fewer precut sphincterotomies, and no increase in ERCP-related complications with the wire-guided technique as compared with the contrast-assisted cannulation technique (23).

Therefore, the guide wire-assisted cannulation technique has become the method preferred by most advanced endoscopists (15).

**Fluoroscopic imaging:**

Once passage of a guide wire into either the CBD or the pancreatic duct has been confirmed by means of fluoroscopy, the cannulation device is advanced into the duct and a radiopaque contrast agent is injected. With the patient in the prone, semiprone or supine position either on a dedicated fluoroscopy table or under a portable C-arm device, a cholangiogram or a pancreatogram is obtained by the endoscopist (24).

This measure allows immediate assessment for ductal structural abnormalities or filling defects (eg, from stones). If intervention is required, accessories can be passed over the guide wire into the duct with the help of fluoroscopy (25).

**Complications**

ERCP is an advanced endoscopic technique that carries a higher risk of procedure-related complications than other endoscopic procedures do. Besides the risks associated with most other endoscopic procedures (eg, mucosal perforation related to traumatic passage of the endoscope, cardiopulmonary events, adverse IV medication reactions, hemorrhage, infection or oxygen desaturation), ERCP also carries a risk for the following specific complications:

- Post-ERCP pancreatitis (PEP) - Prophylactic measures include rectal nonsteroidal anti-inflammatory drugs (NSAIDs), pancreatic duct stents and intensive intravenous hydration.
- Postsphincterotomy bleeding.
- Infection (cholangitis, bacteremia) (26).
- Retroperitoneal perforation.

**Immediate versus Delayed Laparoscopic Cholecystectomy after ERCP**

Cholelithiasis is commonly seen in middle-aged females. Choledocholithiasis is defined as the presence of a stone in the common bile duct (CBD), and it often coexists with cholelithiasis. Laparoscopic cholecystectomy (LC) is the gold standard treatment for symptomatic cholelithiasis, and the preferred treatment for coexisting choledocholithiasis is endoscopic retrograde cholangiopancreatography (ERCP) followed by Laparoscopic cholecystectomy (27).

However, the debate on the timing of surgery post-ERCP is still on. Many studies had recommended immediate Laparoscopic cholecystectomy post-ERCP, and others favor late Laparoscopic cholecystectomy after an interval of 6 to 8 weeks. Post-ERCP pancreatitis is not uncommon

and is considered one of the relative contraindications for immediate Laparoscopic cholecystectomy (28).

Many recent studies have shown that an interval of 6 to 8 weeks post-ERCP has shown increased operative difficulty as well as increased rate of conversion to open cholecystectomy (29).

Many studies have supported Immediate laparoscopic cholecystectomy post-ERCP. On the same day, LC post-ERCP and simultaneous laparoendoscopic management are also being popularized. We too suggest that LC performed Immediate within 24-hour post-ERCP is beneficial in terms of surgery duration, hospital stay and operative difficulty (30).

Immediate laparoscopic cholecystectomy performed within 24-hour post-ERCP is associated with shorter hospital stay, less operative difficulty and shorter duration of surgery. Results are consistent with lesser complications and morbidity. Therefore, it is recommended to go for Immediate laparoscopic cholecystectomy post-ERCP in the cases of choledocholithiasis (31).

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