

## Case Report

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# Laparoscopic antegrade cholecystectomy: a standard procedure?

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**Abstract:** Retrograde approach (“fundus first”) is often used in open surgery, while in laparoscopic cholecystectomy (LC) is less frequent. LC, with antegrade access, is done by putting in traction the infundibulum and going up to the fundus before to clip the cystic. Our study analyzes a number of surgical procedures performed by experienced surgeons in laparoscopy.

From 2002 to 2015, 1740 laparoscopic cholecystectomies were performed at our Institution. The operative procedure performed since 2002 consists of the incision of the visceral peritoneum from the infundibulum away from Calot’s triangle along the gallbladder bed up to the fundus. Then it continues from the fundus up to the infundibulum.

**Results:** There were no bile duct injuries. Average operative time was 40 min. 22 conversions to an open procedure (1.3%) occurred, in cases of acute cholecystitis and cirrhotic patient. Postoperative stay was mean 2 days with no delayed sequelae on follow up.

**Conclusions:** gallbladder antegrade dissection for laparoscopic cholecystectomy can reduce the time of surgery and is an easier technique to perform. Therefore, it can be proposed as the standard procedure and not only be used for difficult cholecystectomies.

**Keywords:** Difficult cholecystectomy; Laparoscopy; Antegrade dissection; Cholecystectomy; Cholecystitis; Fundus first

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## 1 Introduction

Laparoscopic cholecystectomy (LC) is one of the most common surgical procedures in Europe (and worldwide). It has become the standard procedure for the management of symptomatic cholelithiasis or acute cholecystitis in patients without specific contraindications.

The most significant LC morbidity is bile duct injury, which implies not only complex procedures of repair (surgery, radiology and endoscopy), but also a serious impact on patients outcomes [1,2].

In the subject with acute cholecystitis, the inflammation of Calot triangle present some difficulties in defining the biliary and vascular structures.

Gallbladder antegrade dissection (GAD) during laparoscopic cholecystectomy is a well-known procedure in surgical practice [3].

The aim of this study was to demonstrate the validity of a surgical procedure that is even safer than the routine operation. Another aim was to evaluate the usefulness of GAD for obtaining a lower risk of common biliary duct injuries and to show an easier and more time-sparing technique than the traditional one.

## 2 Methods

From 2002 to 2015, 1740 laparoscopic cholecystectomies were performed at our Institution (University of Foggia, Department of Medical and Surgical Sciences, Division of General Surgery, Polyclinic of Foggia, Italy): 1250 for simple cholelithiasis, 490 for acute cholecystitis. In our laparoscopic experience, a change of surgical technique was introduced, so that antegrade dissection replaced retrograde dissection.

LC was done using standard technique with 3 or 4 ports, electrocautery and a 30° laparoscope.

The procedure involves incision of the visceral peritoneum from the infundibulum away from Calot’s triangle along the gallbladder bed up to the fundus; then the

dissection continues from the fundus up to the infundibulum. In this way, the gallbladder is left pedunculated by the cystic artery and cystic duct, which can be clipped and divided in turn.

This method of dissection has allowed safe and complete preparation of the cystic duct. In fact, the cystic duct is isolated, identified, clipped, and divided (at the end of the dissection) more easily. Then, its position and connections with the principal biliary duct (PBD) can be seen.

The data are summarized in Table 1. The conditions that made the cholecystectomies difficult are the following: simple cholelithiasis, acute cholecystitis, cholelithiasis in a cirrhotic patient.

In each kind of pathology, the clinical scenarios were the following:

- patients with uncomplicated cholelithiasis had upper right quadrant pain, nausea, and sometimes vomiting;
- patients with acute cholecystitis had upper right quadrant pain and tenderness with rebound pain in some cases, chills before fever (up to 39.5°C), nausea, and vomiting;
- cirrhotic patients had upper right quadrant pain, nausea, and sometimes vomiting.

The hematologic and biochemical studies showed the following results:

- patients with uncomplicated cholelithiasis had in some cases only a modest increase in the hepatic transaminases;
- patients with acute cholecystitis had leukocytosis (up to 21000/ L); most of them had an increase in GOT/ GPT (up to 4 times the normal);
- in the cirrhotic patients, all the alterations of the hepatic function tests, that are normally present in these patients, were observed; all patients had up to an A6 Child-Pugh score.

The instrumental ultrasonographic (US) study showed the following results:

- in the uncomplicated cholelithiasis, the abdominal US evaluation showed a normal thickness of the gallbladder wall (up to 6 mm);
- in the acute cholecystitis, the abdominal US evaluation showed signs of local phlogosis of the gallbladder characterized by an increase in the thickness of the gallbladder wall (more than 6 mm) associated in some cases with empyema and pericholecystic fluid gathering;
- cirrhotic patients had all the US signs of portal hypertension and no signs of gallbladder phlogosis (gallbladder wall thickness up to 6 mm).

All patients affected by simple cholelithiasis and the cirrhotic patients underwent a programmed laparoscopic cholecystectomy.

All patients affected by acute cholecystitis underwent laparoscopic cholecystectomy within 24 hours to 72 hours after the admission.

Patients with choledocholithiasis underwent endoscopic-retrograde-colangio-pancreatography (ERCP) with sphincterotomy before cholecystectomy.

We have analyzed, above all, the operative time, the conversions, the major morbidity, hemorrhages, PBD injury, residual PBD stones attributable to the mobilization of little stones.

**Ethical approval:** The research related to human use has been complied with all the relevant national regulations, institutional policies and in accordance the tenets of the Helsinki Declaration, and has been approved by the authors' institutional review board or equivalent committee.

**Informed consent:** Informed consent has been obtained from all individuals included in this study.

**Table 1:** Pathologic and Demographic Data

Gallbladder Antegrade Dissection 1740 (2002–2005)	
Simple cholelithiasis	1210
Acute cholecystitis	450
Cholelithiasis in cirrhotic	80
Females	1050
Males	690
Mean age	54

**Table 2:** Results

Gallbladder Antegrade Dissection 1740 (2002–2005)	
Principal Biliary Duct Lesions	0
Hemorrhagic complications	10 (0.6%)
Cystic duct dehiscence	3 (0.2%)
Residual choledocholithiasis	15 (0.9%)
Conversions to open	22 (1.3%)
Mean operative time (min)	40' (12'-90')
Mean postoperative stay (d)	2

### 3 Results

The elements evaluated were the following: lesion of the PBD, dehiscence of the cystic duct, hemorrhagic complications, residual choledocholithiasis, conversions to an open approach, mean operative time, and hospital stay (Table 2).

In this study, complications not as significant as the PBD injuries were reported.

Hemorrhagic complications and a more representative conversion rate are in evidence.

Average operative time was 40 min.

22 conversions to an open procedure (1.3%) occurred, in cases of acute cholecystitis and cirrhotic patient.

Moreover, we registered an appreciable decrease in the conversions to an open procedure with the GAD technique.

We do not have ileus within the complications, instead we have included into surgical wound infections also a case started as wound seroma. The incidence of these post-operative complications was very low because of decreased wall dissection in laparoscopic approach. No mortality was observed.

### 4 Discussion

In our study the most frequent indication for cholecystectomy was cholelithiasis. Chronic cholecystitis implies recurrent inflammatory process of the gallbladder with gallstones as causative factor. These recurrent attacks can lead to gallbladder sclerosis.

The preoperative diagnosis of biliary lithiasis was made by clinical and instrumental evaluation. Abdominal Ultrasonography (US) was currently the diagnostic tool employed in the diagnosis of cholelithiasis. All the patients showing, at the admission, clinical signs such as biliary colics with jaundice, fever, etc; or altered indexes of cholestasis (alkaline phosphatase, direct bilirubin, gamma GT) or common bile duct (CBD) dilation at US greater than 8 mm were submitted to MRCP prior to intervention.

While there used to be a laparoscopic cholecystectomy (LC) relative indication in the subjects with acute cholecystitis, today this LC is also commonly applied on such subjects. However, in the cases where anatomic and pathological problems cannot identify biliary tracts and cystic artery, there appears an indication of an open operation. The rate of open operation in the laparoscopic surgery of acute cholecystitis is 4-35% [4, 5].

Use of antegrade laparoscopic dissection is not aimed at eliminating conversion to an open procedure [6], which is safe for the patient, in some cases. In our opinion antegrade dissection, used extensively during laparoscopic cholecystectomy is not only a safe, easy procedure but also seems to reduce the operation time as well.

Full dissection of Calot's triangle with the neck of the gallbladder mobilized from the liver bed is recommended to avoid CBD.

In this study, the results of the intraoperative lesions are very positive.

In common practice, antegrade dissection is the procedure of choice for cholecystectomies considered difficult because of inflammation of Calot's triangle, fibrosis, or both, presence of fatty tissue, and portal hypertension [7-9].

Moreover, the lesions of the CBD occur also in a few patients without anatomic-pathologic alterations of Calot's triangle.

In fact, the literature refers to a global incidence (minimal, moderate, and severe lesions, in all cases of laparoscopic cholecystectomies in all pathologic conditions) of about 1% (0.85%: one case every 120 laparoscopic cholecystectomies) [5].

In this study, the low incidence of such complications as CBD injuries and hemorrhages encourages us to say that this surgical technique is safe enough.

Besides, we think that the laparoscopic cholecystectomy must always be carried out by minimizing all the risks of iatrogenic injuries regardless of the presence of inflammation or fibrosis.

In this way, GAD can be proposed as an easy, safe, and time-sparing technique, and it should be chosen as a procedure for training all residents in general surgery. Another object of discussion is the possible migration of stones in the course of GAD laparoscopic cholecystectomy.

In our study, the residual choledocholithiasis after laparoscopic cholecystectomy was the same as international literature, 0.9%. So the antegrade dissection procedure has not confirmed the fear of the residual choledocholithiasis.

### 5 Conclusion

The conversion is the best choice when the dissection of triangle of Calot is too difficult, because it is too high risk of vascular or biliary lesions [10].

The GAD procedure has been accepted and used until now only for cases in which it is difficult to dissect Calot's

triangle because of the presence of phlogosis, fibrosis, or portal hypertension. So GAD for laparoscopic cholecystectomy represents an easier procedure that seems to reduce the operative time. Therefore, it can be proposed as a standard procedure and not only for difficult cholecystectomies.

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