

# Investigation of Bile Ducts before Laparoscopic Cholecystectomy

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## ABSTRACT

**Background:** Since the advent of laparoscopic cholecystectomy, there has been controversy about the investigation of the bile ducts and the management of common bile duct stones. Routine peroperative cholangiography (POC) in all cases has been recommended. We have adopted a policy of not performing routine POC, and the results of 700 cases are reported.

**Methods:** Since 1990, all patients have undergone preoperative ultrasound scan. We have performed selective preoperative endoscopic retrograde cholangiopancreatography (ERCP) because of a clinical history of jaundice and/or pancreatitis, abnormal liver function tests and ultrasound evidence of dilated bile ducts (N=78, 11.1%). The remaining 622 patients did not have a routine POC, but selective peroperative cholangiogram (POC) was performed only in 42 patients (6%) because of unsuccessful ERCP or mild alteration in the criteria for the presence of bile duct stones. The remaining 580 patients did not undergo POC. Careful dissection of Calot's triangle was performed in all cases to reduce the risk of bile duct injuries.

**Results:** The overall operative complications, postoperative morbidity and mortality was 1.71%, 2.14% and 0.43%, respectively. Bile duct injuries occurred in two patients (0.26%) and both were recognized during the operation and repaired. There was a single incidence of retained stone in this series of 700 cases (0.14%), which required postoperative ERCP.

**Conclusions:** This policy of selective preoperative ERCP, and not routine peroperative cholangiogram, is cost effective and not associated with significant incidence of retained stones or bile duct injuries after laparoscopic cholecystectomy.

**Key Words:** Cholecystectomy, Laparoscopic, Cholangiography, Endoscopic retrograde cholangiography, Common bile duct calculi.

## INTRODUCTION

A variety of investigations are available for imaging the common bile ducts (CBD) before laparoscopic cholecystectomy (LC), and none has been accepted as gold standard. The guidelines were reasonably well established regarding the management of common bile duct stones in the era of open cholecystectomy. With the development of preoperative ERCP, when many bile duct stones can be confirmed and treated, the situation has changed, and there is ongoing debate about a rational method of investigation of the bile ducts before laparoscopic cholecystectomy. There are arguments for and against each modality of investigations, eg, preoperative ERCP, intravenous cholangiogram (IVC), ultrasonography (USS), and routine use of peroperative cholangiogram (POC). Routine POC has been advocated to demonstrate the biliary anatomy and to demonstrate unsuspected bile duct stones. Selective ERCP has reduced the incidence of unsuspected stones. We present a personal series of 700 laparoscopic cholecystectomies in the 7-year period between 1991-1998 where we have adopted a policy of not performing routine peroperative cholangiography.

## MATERIALS AND METHODS

Seven hundred patients have undergone laparoscopic cholecystectomy during the 7-year period. Prospective analysis of all the patients was carried out with the help of meticulously filled proformas and clinical notes. There were 544 females and 156 males. Diagnosis of symptomatic gallstone disease was made by ultrasound examination (USS). All the patients had estimation of liver function tests (LFTs).

Investigation of bile ducts was by combination of history of jaundice, cholangitis and gallstone pancreatitis, LFTs and ultrasound evidence of dilated CBD. The first 215 patients underwent routine preoperative IVC in the

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**Table 1.**

Total number of operative complications was 12 (1.71%).

Operative Complications	Number (n=12)
Bleeding required laparotomy	7
Liver injury	1
Visceral injury	2
CHD/CBD injury	2

**Table 2.**

Total number of laparoscopic cholecystectomy related complications was 15 (2.14%).

Postoperative Complications	Number (n=15)
Bile leak	13
Retained stones	1
Hemorrhage	0
Stricture	1

initial period of the series. The remaining 485 patients had only LFTs and ultrasound examination. Preoperative ERCP was performed in 78 patients based on clinical history, abnormal LFTs and/or dilatation of biliary tree on ultrasound. Selective peroperative cholangiogram (POC) was performed in 42 patients because of failed ERCP or slightly abnormal LFTs. We have presented our results with regard to conversion rate, morbidity, mortality, management of complications and incidence of retained stones.

## RESULTS

Results are shown in **Table 1** and **Table 2**. The total number of operative complications was 12 (1.71%), and the total number of laparoscopic cholecystectomy related complications was 15 (2.14%).

Out of 13 patients who had bile leak, four needed laparotomy and drainage, and two were treated conservatively. The remaining seven patients who had localized bile collection were treated by ultrasound-guided insertion of a pigtail catheter. Two of these patients also required ERCP and temporary stenting of the CBD. ERCP was also required to extract the stone in one patient with retained

stone. A single case of biliary stricture was referred to a hepatobiliary unit where Roux-en-Y hepaticojejunostomy was performed.

Conversion to open procedure was performed in 36 patients (5.1%). The total mortality in the series was 0.43% (n=3). One of them was after a bile leak, and the other two were due to associated severe cardiorespiratory diseases.

Selective POC was performed in 42 patients (6%). Bile duct stones were demonstrated in four patients, and in two patients they were retrieved laparoscopically. Another two patients required open bile duct exploration, and four patients who had an operative cholangiogram developed bile leak (9.5%).

Postoperative ERCP was required in only four patients. In one patient, it was carried out to retrieve the stone from the CBD, and this was the only case in a series of 700 patients. In two patients, it was performed to place the stent in the CBD following bile leak. In the remaining one patient, an ERCP was performed as there were abnormal LFTs in the postoperative period, but the ERCP did not demonstrate any abnormality.

## DISCUSSION

Standard method of investigation of bile ducts before laparoscopic cholecystectomy is still controversial. In the early days of our experience, it was a routine practice to perform intravenous cholangiogram in all the patients before laparoscopic cholecystectomy. This was mainly due to the fact that insufficient data was available about the investigation of bile ducts before laparoscopic cholecystectomy. It also seemed IVC was helpful in delineating the anatomy of the biliary tree and indicating the possibility of CBD stones. After initial experience, we found that a large majority of patients had normal IVC's if there was a negative clinical history and normal LFT's and USS. This made us abandon the IVC as preoperative investigation of the biliary tree and adopt the policy of selective peroperative cholangiogram (POC) if there was minor alteration in the criteria of common bile duct stones. The other argument in favor of routine POC is that it provides a radiological picture of the anatomy of the biliary tree. But there are reports suggesting that the majority of biliary injuries occur due to the surgeon misidentifying the anatomy.<sup>1</sup> With the policy of extremely careful dissection of Calot's triangle and adherence to

the rule 'Not to ligate or divide any structures until the anatomy of Calot's triangle is clearly defined,'<sup>1</sup> we believe that we can avoid relying on routine radiological imaging as a guide.

The number of preoperative ERCP's is 78 (11.14%), similar to other reported series, which is between 7 and 12%.<sup>2-5</sup> This was based on the criteria of clinical history of jaundice, cholangitis and gallstone pancreatitis, abnormal LFT's suggesting biliary obstruction and/or dilatation of the biliary tree on ultrasound.

Selective peroperative cholangiography under fluoroscopy control was performed in 6% of patients, which is low compared to other series where an aggressive policy is adopted and routine POC is carried out in all laparoscopic cholecystectomies. We performed POC's only in those patients where ERCP was unsuccessful or where there were minor abnormalities in the above-mentioned criteria. There was a 9.5% incidence of complications in this series, highlighting the risks involved in routine POC's.<sup>6</sup>

Routine POC does not appear to decrease the absolute incidence of biliary injuries<sup>6,7</sup> but it reduces the sequelae. It definitely increases the cost of the procedure.<sup>8</sup> There are also reports that in comparison to selective POC's, routine POC did not increase the detection of common bile duct stones.<sup>8</sup> If POC is not performed, the incidence of unsuspected CBD stones during cholecystectomy is 4% to 6%.<sup>9,10</sup> With the selective use of preoperative ERCP and POC, the majority of these patients are identifiable, and our series has shown that there was only one patient with retained stone. The other contributing factor for the very low incidence of retained stones in this series may be due to either spontaneous passage of CBD stones in the postoperative period or they have remained asymptomatic. There are no incidences of further recurrent stones to date.

## CONCLUSION

In laparoscopic cholecystectomy, a policy of selective preoperative ERCP and not routine peroperative cholangiogram has been found to be cost effective, reduce the time of operations and is associated with low morbidity, mortality and is not associated with a significant incidence of retained bile duct stones or bile duct injuries.

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