

## BILE DUCT INJURIES DURING OPEN AND LAPROSCOPIC CHOLECYSTECTOMY: MANAGEMENT AND OUTCOME

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### ABSTRACT

**Objectives:** To evaluate the management of twenty two patients, with bile duct injuries during open and laproscopic cholecystectomy who were referred to the tertiary center.

**Methodology:** It is a prospective cohort study conducted at Department of Surgery, Sindh Government Lyari General Hospital, affiliated with Dow University of Health Science Karachi. Patients who sustained bile duct injuries following open cholecystectomy and laproscopic cholecystectomy were included. Time between cholecystectomy and recognition of injury, method of repair and post operative outcome was recorded. Strassburg classification was used to delineate the type of bile duct injury.

**Results:** Twenty two patients of bile duct injuries following open cholecystectomy and laproscopic cholecystectomy were managed. Mean age of patients was forty six (thirty four - fifty six) years. Injury was sustained in fifteen patients during laproscopic cholecystectomy and in seven patients during open cholecystectomy. Overall fourteen patients had Strassburg E1 and E2 and eight patients had E3 and E4 injuries. In nineteen patients, Roux-en-Yhepaticojejunostomy was done, while three patients underwent lateral choledochorraphy with T-tube drainage. One patient died of septicemia, while one patient was re-explored for revision of hepaticojejunostomy for stenosis of bilioenteric anastomosis. Other minor complications were treated conservatively.

**Conclusion:** Bile duct injury after open and laproscopic cholecystectomy can be successfully managed in a tertiary center by hepatobiliary surgeon. Principles of management include anatomic definition of injury, control of sepsis, staged approach involving interventional radiology and refined operative technique.

**KEYWORDS:** Bile duct injury, Hepaticojejunostomy, Cholecystectomy, Cholangiography.

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## INTRODUCTION

Carl Langenbuch performed the first open cholecystectomy (OC) in 1882.<sup>1</sup> In 1905 Mayo reported first two cases of bile duct strictures following cholecystectomy.<sup>2</sup> Open Cholecystectomy remained the gold standard for treatment of cholelithiasis till the late 1980s, when laproscopic cholecystectomy was first introduced.<sup>3</sup> During the surgical learning curve of this technique there was an initial spurt in the

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reports of bile duct injuries<sup>4</sup> resulting mainly from surgeon's inexperience and misinterpretation of the anatomy. The mechanism and pattern of injuries differed in some way from the traditional ones.

Common anomalies responsible for the bile duct injuries includes those of cystic duct (CD) and its insertion into the common hepatic duct (CHD) e.g. long parallel course with common hepatic duct or a spiraling cystic duct opening into the medial aspect of the common hepatic duct. Anomalies of the right hepatic duct like (RHD) e.g. low insertion onto the common hepatic duct, right anterior and posterior sectoral hepatic ducts, anomalies of the right hepatic artery and the aberrant vessels coursing along the common bile duct (CBD) are the other important examples.

Incidence of bile duct injury during open cholecystectomy ranges from 0.1% to 0.3%.<sup>5</sup> Laproscopic Cholecystectomy initially carried a high risk of injury (>2%), the main risk factor being the inexperience probably, as the risk has since dropped to 0.5%.<sup>6</sup>

The aim of this study was to report our experience with diagnosis, management and outcome of bile duct injury during open cholecystectomy and Laproscopic cholecystectomy.

## METHODOLOGY

This prospective study was conducted at surgical Unit-I, Sindh Govt. Lyari General Hospital, affiliated with Dow University of Health Science from July 2003 to December 2006. Patients who sustained bile duct injuries following open cholecystectomy and laproscopic

cholecystectomy in our unit and those referred from elsewhere were included in this study. Patients with minor bile leak from cystic duct stump or liver bed were excluded. Time between cholecystectomy and recognition of an injury, type of injury method of definitive repair and post operative outcome was recorded. Strassburg classification<sup>7</sup> was used to delineate the type of bile duct injury.

## RESULTS

From July 2003 to December 2006, twenty two patients of bile duct injuries following open cholecystectomy and laproscopic cholecystectomy were managed in our units. Five patients were from our unit while rest (seventeen) were referred from elsewhere. Age of patients ranged between 34 - 56 (mean age 46). Injuries were sustained at Laproscopic Cholecystectomy in fifteen patients and at Open cholecystectomy in seven patients. Injuries were recognized at time of operation in four patients out of fifteen patients in the Laproscopic cholecystectomy and in three out of seven patients in Open cholecystectomy (Table-I). Type of Bile Duct Injuries sustained during Open cholecystectomy and Laproscopic cholecystectomy are summarized in Table-II. Six patients in the Open cholecystectomy group had a Bismuth type I and II injuries. In contrast, eight had type III and IV (Strassburg type E3 and 4).

In nineteen patients Roux-en-Y hepaticojejunostomy was done (a separate anastomosis with left and right hepatic ducts had to be performed in two patients). While

Table-I: Clinical Details of Twenty Two Patients

	<i>Open cholecystectomy</i>	<i>Laproscopic cholecystectomy</i>	<i>P</i>
Mean age M/F	46 3/4	40.5 3/12	—
Intraoperative recognition of injury (%)	3 (43%)	4 (27%)	>0.05
Median time of presentation(Range)(Days)	26 (3-180)	37 (1-20)	<0.01
Presentation bile leak/fistula	3	7	<0.01
Jaundice	1	4	<0.01

Table-II: Types of bile duct injuries

<i>Types Of Injury</i>	<i>Open Cholecystectomy (N=7)</i>	<i>Laprosopic cholecystectomy (N=5)</i>
Bismuth I and II (Strassburg E1& 2)	2+4	3+5
Bismuth III and IV (Strassburg E3&4)	1+0	4+3

three patients underwent lateral choledochorraphy with T-tube drainage. A transanastomotic stent was used in seven patients. Postoperatively one patient died secondary to septicemia. Postoperative complications included bile leakage (n=3), jaundice (n=2), cholangitis (n=2) and wound infection (n=5). All were managed conservatively, (except one patient who needed revision hepaticojejunostomy for stenosis of the bilioenteric anastomosis). Hospital stay ranged between 6 - 18 (mean 10.3) days. The patency of the hepaticojejunostomy was confirmed by radionucleotide scanning (HIDA) in three patients. The follow up ranged between 4 - 36 (mean 15.5) months. Four patients were lost to follow after initial three visits.

## DISCUSSION

Cholecystectomy is one of the common elective general surgical operations. In the 1990s, the Open cholecystectomy was virtually superseded by the Laproscopic cholecystectomy. There are many advantages over the open approach, but it has been associated with a two to three folds increase in the risk of Bile duct injuries, with an estimated incidence of 0.7-0.8%.<sup>8-17</sup>

Ideal time to repair a biliary injury is when it occurs and primary repair in experienced hands are known to give the best result.<sup>18</sup> Intraoperative cholangiography is supposed to protect against Bile duct injuries by preventing wrong identification of anatomy. In none of the patients in this series this investigation was performed. The protective effect of intraoperative cholangiography in preventing bile duct injuries has been suggested in both Open cholecystectomy and laproscopic cholecystectomy.<sup>19,20</sup> Roux-en-Y hepaticojejunostomy is

now the standard procedure for the repair of these injuries and a good outcome has been documented in several series.<sup>21,22</sup> In our study, bile duct injuries was recognized at the time of open cholecystectomy and laproscopic cholecystectomy in about 1/3<sup>rd</sup> of the patients, which is consistent with other studies.<sup>11,22</sup> We agree with others that the best outcome for these patients can be achieved in tertiary units. Therefore, best treatment for injuries recognized during operation is to achieve adequate drainage and to eliminate potential source of sepsis. The patients can be transferred to specialized unit where complete cholangiography can be achieved. Eradication of sepsis should be attempted in all cases before the repair is performed.

The level of anastomosis in patients, who undergo revision hepaticojejunostomy is always higher than the original injury because further proximal resection of the bile duct is required in order to reach healthy mucosa for anastomosis. Bismuth level of injury has important impact on the outcome of these patients. This aspect always emphasizes that attempt at repair outside tertiary unit should be discouraged.<sup>21,23,24</sup>

*Limitations of the study:* Bile duct injury is not an uncommon complication after open and close cholecystectomy, but in our study number of patients were limited to twenty two due to the fact that we were dealing in peripherally located tertiary care hospital. Most of the patients preferred to go to centrally located tertiary care hospitals.

## CONCLUSION

Bile duct injury after either open or laproscopic cholecystectomy should be man-

aged at a tertiary hospital by an experienced surgeon. Principles of management include anatomic definition of injury, control of infection, use of interventional radiology and refined operative technique.

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