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Management of Bile Duct Injury Following Cholecystectomy

Bala Ram Malla,[1] Nripesh Rajbhandari,[1] Robin Man Karmacharya[1]

[1]Department of Surgery, Dhulikhel Hospital, Banepa, Kavre, Nepal.

ABSTRACT

Background: Laparoscopic cholecystectomy is responsible for 80-85% of the bileduct injury, and twice as frequentcompared to open cholecystectomy.Injury affects the quality of life and overall survival of the patient. The management of these injuries is complex and challenging. There are few locally published reports regarding management of bile duct injury. The objective of this study is to evaluate the management of bile duct injury and its outcome

Methods: This retrospective study includes patients bile duct injury following cholecystectomy who were managed at Dhulikhel Hospital, Nepal, during January 2014 to December 2016. The clinical features, type of injuries(Strasberg classification) management, outcome (as per McDonald and colleague grading system) and follow up were analyzed descriptively.

Results: Out of 35 bile duct injuries,only 3 (8.57%)occurred following open cholecystectomy. Three (8.7%) cases of bile duct injury were diagnosed intraoperatively and had primary biliary anastomosis over T-tube. Five (14.28%) were diagnosed postoperatively and underwent Roux-en-y hepatojejunostomy 6 weeks after index surgery. And, 27(77.14%) with type A injuries were treated by endoscopic retrograde cholangio-pancreatography and stenting. After surgical repair, 1 (2.85%) had transient biliary leak. One patient had grade B outcome. During 18 months follow up, no stricture or cholangitis were observed.

Conclusions: Bile duct injury with intact continuity of the duct can be successfully managed with endoscopic stenting of the biliary tree. Intraoperative diagnosis of bile duct injury and immediate surgical management has good outcome.

Keywords: Bile duct injury; cholecystectomy; repair; strasberg classification.

INTRODUCTION

Cholecystectomy is one of the most common surgery performed worldwide.[1] Iatrogenic bile duct injury (BDI) occurs in 0.1-0.2% in open cholecystectomy (OC)[2,3] and 0.4- 0.6% with more severe grade of injury in laparoscopic cholecystectomy (LC)[4,5] leading to significant morbidity, mortality and poor quality of life. About 90% of the BDI have good outcome with timely managed by good technical expertise[6,7] However, there is still mortality and morbidity associated with the BDI.[8]

Till date, only a limited number of studies have been published regarding the management of BDI and its clinical outcomes in the settings like Nepal. To address the current requirement, this study set out to investigate the usefulness of the proper management of BDI and its outcome in our context.

METHODS

This was a retrospective study of BDI following cholecystectomy managed in the department of surgery, Dhulikhel Hospital, Kathmandu University Hospital, Nepal, from January 2014 to December 2016. The clinical data, severity of BDI, preoperative management, operative management and postoperative outcomes were analyzed. All the cases of BDI following cholecystectomy either open or laparoscopic for cholelithiasiswere included in this study. The necessary ethical approval has been obtained prior to initiate this study.

The BDI was classified as per the Strasberg classification[3] and operative repair of Roux-en-Y hepato-jejunostomy as per the Heppcouinaud[9] approach.

We analyzed the follow up data from six months to 18

Correspondence: Dr Bala Ram Malla, Department of Surgery, Dhulikhel Hospital, Banepa, Kavre, Nepal. Email: mallabr504@yahoomail.com, Phone: +9779851094434.

months for clinical outcomes, liver function test (LFT) and abdominal sonography. The clinical outcome was gradedas per the system suggested by McDonald and colleague;[10] Grade A, asymptomatic and Normal LFT; Grade B, asymptomatic or occasionally mild symptoms with deranged LFT; Grade C, cholangitis i.e pain and fever with deranged LFT; Grade D, recurrent cholangitis requiring intervention or revision.

Descriptive analysis was done using SPSS 18.0, IBM corporation.

RESULTS

Total 35 cases of BDI were included in our study of which 3(8.57%) cases of BDI were following OC while the rest of cases (91.42%)were after LC. Among the total BDI, the most of cases were belong to female population (n=26; 74.28%) and the mean age was found to be 44 years (ranges from16-68years).

Three (8.57%) were diagnosed to have BDI during the index surgery, of which one was in our hospital and 2 (5.71%) referred from outside within 48 hours of injury,27(77.14%) were referred after 7 days but within 3weeks of the index operation, and 5 (14.28%) presented late with obstructive jaundice.

Except the three cases who were diagnosed of BDI during index surgery, all were investigated with abdominal sonography followed and ERCP. Five patients underwent MRCP following ERCP as the proximal biliary tree was not visualized at ERCP.

Table 1. Types of bile duct injury-BDI (as per Strasberg classification), following cholecystectomy, N=35.

Types	Number (n)	Percentage (%)
A	27	77.14
B	0	0
C	0	0
D	0	0
E1	3	8.57
E2	3	8.57
E3	2	5.71

Twenty-seven cases (77.14%)of type A bile duct injury were managed with biliary stenting during ERCP. Three cases (8.57%) of type E1 diagnosed of BDI during index surgery were treated with end to end primary anastomosis of bile duct stump as there was less than 1cm segmental loss in all three cases. Rest cases 5(14.28%) of type E2 and E3 BDI were managed with hepatojejunostomy.

Surgical site infection(SSI) was seen in 2 (25%) of eight operated cases, and 1 (12.5%) had transient (<72 hours) biliary leak which was treated conservatively.

All the operated cases completed 18 months were follow-up. As per McDonald grading of outcome, 7 (87.5%) had grade A and 1 (12.5%) grade B.

DISCUSSION

In our series, 91.42 % of BDI were caused by LC. BDI is a serious complication of cholecystectomy with a long term morbidity and also impairs the quality of life.[11,12] Up to 83% of injuries following LC has been reported.[13] The clinical profile of our series is comparable with other studies.[14-16]

In our series, only 8.57% BDI were detected intraoperatively, similar to the reports of majority(10-80%) of injuries not being detected at the time of operation.[8,17,18] It is recommended that repair be done by a surgeon who is routinely dealing with the problemand performing bile duct repair surgery and not necessarily by the operating surgeon who had done BDI. [12] All cases in our series were repaired by the surgeon other than the operating surgeon.

Table 2.Clinical profile of the patients with BDI following cholecystectomy in present series compared to other reported series.

	Ala Musa sayed et al[14]	Virindar K et al[15]	Mannan et al[16]	Our study
No of Cases	40	138	16	35
Mean age(yrs) (range of years)	41(23-72)	20-63	51(27-70)	44 (16-68)
Male (%)	10	23.2	25	25.71
Female (%)	90	76.8	75	74.28
Presentation	2 days to 3 yrs	>3 months 61% < 10 days 5.8% Intraop 3.6%	In 1 yr 6.3% In 6 mon 1s8.8% In 1 mon 75%	<3wks 91.42% Intraop 8.57%

As per Strasberg classification of BDI, 77.14% of the injuries were of type-A and the rest were of type-E in our study, unlike others[8,14,15,19,20].

Table 3.Types of BDI following cholecystectomy in present series compared to other reported series.

Types	Ala Musa sayed et al[14]	Virindar K et al[15]	Gupta R k et al[20]	Our study
A				77.14%
D	7.5%	0		0
E1	20%	12.5%		8.57%
E2	35%	21.7%	70.7%	8.57%
E3	35.7%	61%		5.71%
E4	0	4.4%		0

As Strasberg-A injuries maintain continuity with the rest of the bile ducts, they are easily treated through endoscopic intervention.The objective is to decrease intraductal pressure distal to the bile leak. If endoscopy is not available, a T-tube could be useful.[21] As our hospital is an endoscopy referral centre, all the cases with Type-A BDI were treated successfully with ERCP and biliary stenting. The BDI presenting between 8 days to 6 weeks of injury should be considered for delayed repair, following adequate sepsis control to prevent complication.[22] We followed similar approach in five cases with Type-E injury who came after 7 days of the injury and were managed conservatively with sub-hepatic drain for 6 weeks and followed by Roux-en-y Hepato-jejunostomy with Hepp- Cauinaud[9] approach using fine absorbable suture 3-0 or 4-0 polyglactin (Vicrylâ) in single layer. In all these cases, right hepatic duct was indentified following gallbladder fossa and left hepatic duct traced with ligamentumteres approach.

We had transient bile leak (<72 hours) in 12.5% and wound infection in 25% of the cases. Similar finding is reported, with transient bile leak in 22 (15.9%) and wound infection in 26(18.8%) cases.[15]

Biliary injury repair is a complex procedure with the failure rate of 10-19%.[23,24] Cirrhosis, portal hypertension and previous attempt of anastomosis are the significant factors for poor outcome.[24] Repair in less than 3-weeks from index surgery is also associated with poor outcome,like anastomotic stricture, high morbidity and mortality.[25] In our study, there were no patients with cirrhosis, portal hypertension and previous attempt of repair. This may be the reason we have better outcome compared to the other studies.[25] In our series, there were no anastomotic stricture, redo hepato-jejunostomy and mortality.This disparity may be due to our smaller sample size of operative repair (8) in comparison to larger sample size (137) of study done.

Relatively low rate of re-stricture and good outcome following hepaticojejunostomyin our series may be due to our policy of delayed repair, mucosa to mucosa anastomosis and hepp-couinaud approach. Studies show, aminimum period of 4-6 weeks between injury and repair isdesirable for resolution of tissue edema and inflammationand for dilatation of the proximal ductal system.[26,27] Also, end-to-side hepaticojejunostomy, mucosa-to-mucosa, tension-free anastomosis between the well vascularized proximal bile ducts and the jejunum using Hepp-Couinaud technique produces a wide anastomosis and decreases the risk of devascularization of the ducts.[28,29]

It has been seen that although two-thirds of failure occur within 2 years and 80% within 5 years, as many as 20% of failures may occur after 5 years.[30] Up to 40% of re-strictures were identified after more than 5 years following the initial surgery.[11] This is one the limitation of our study with a follow up of only 18 months.

CONCLUSIONS

Bile duct injury with intact continuity of the duct can be successfully managed with endoscopic stenting of the biliary tree. Intraoperative diagnosis of bile injury and immediate surgical management has good outcome. Similarly, bile duct injury diagnosed after 7 days of surgery can be managed with roux en-y hepatojejunostomy with Hepp- Cauinaud approach after 6 weeks of index surgery following resolution of inflammation with good long term outcome.

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