

ORIGINAL ARTICLE

Pattern and management of bile duct injuries presented to Hepatobiliary Unit of Shaikh Zayed Hospital Lahore.

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ABSTRACT... Objective: To find out the pattern and management of Bile Duct Injuries (BDIs) presented to Hepatobiliary unit. **Study Design:** Descriptive Cross Sectional. **Setting:** Hepatobiliary Unit, Shaikh Zayed Hospital Lahore. **Period:** November 1, 2022, to April 30, 2023. **Methods:** Total of 79 patients with Bile duct injuries were included. Demographic data and relevant investigations were performed. BDIs severity was classified using the Strasberg Classification. Patients underwent appropriate surgical interventions, with follow-up for period of 6 months postoperative complications. **Results:** The mean age was 39.89 ± 10.01 yrs, primarily females (81%). BDI resulted from laparoscopic cholecystectomy in 44.3%, open cholecystectomy in 51.9%, and conversion to open surgery in 3.8% cases. Jaundice (58.2%), bile leak (38.0%), and itching (3.8%) were common presentations. Surgical procedures included hepaticojejunostomy (77.2%), right hepatectomy with hepaticojejunostomy (8.9%), and liver resection + hepaticojejunostomy (13.9%). BDI classification revealed E2 (57.0%), E3 (36.7%), and E4 (6.3%) cases. Surgical site infection was observed in 11.4% of cases. Postoperatively 5.1% patients experienced anastomotic leaks and only the site of BDI was a significant factor for leak with the p value of <0.001 . **Conclusion:** In conclusion the majority of BDIs were E2 (57.0%), E3 (36.7%), and E4 (6.3%). Procedure performed were hepaticojejunostomy (77.2%), right hepatectomy with hepaticojejunostomy (8.9%), and liver resection + hepaticojejunostomy (13.9%). Anastomotic leaks were significantly linked to the site of BDI.

Key words: Bile Duct Injury, Hepatobiliary Unit, Laparoscopic Cholecystectomy, Open Cholecystectomy.

INTRODUCTION

Cholecystectomy is one of the most frequently performed procedures in gastroenterological surgery, and the laparoscopic approach has become the gold standard for managing symptomatic cholelithiasis, chronic cholecystitis, and acute cholecystitis.¹ The laparoscopic method offers advantages like faster recovery and improved cosmetic outcomes but is associated with an elevated risk of iatrogenic bile duct injury (IBDI) and hepatic (right) artery injury. IBDI is a complication linked to significant perioperative morbidity and mortality, diminished long-term quality of life, and a high incidence of subsequent legal actions.² Despite the experience of surgeons and advancements in laparoscopic techniques, the incidence of IBDI is on the rise compared to

open cholecystectomy.² The clinically significant bile duct injury rate after conventional open cholecystectomy is 0.1–0.5%.^{3,4,5,6} Conversely, biliary leakages have increased in the era of laparoscopic cholecystectomy (LC) by up to 3%. In addition to abnormalities in bile ducts, cystic stumps, or minor bile leakage from the common bile duct, the primary duct or a branch (often the abnormal right bile duct) can become completely occluded. Furthermore, bile duct stricture and bile leakage are substantial long-term complications following LC.^{7,8,9,10} These injuries are associated with elevated morbidity, mortality, and prolonged hospital stays.¹¹ Presently, endoscopic procedures are the most commonly employed approach to address postoperative IBDI. Several endoscopic techniques are available, including biliary stenting, biliary sphincterotomy, and nasobiliary

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drainage.^{12,13,14} Consequently, endoscopic treatment can reduce the transpapillary pressure gradient, enhance transpapillary blood flow, and decrease extravasation from the bile ducts. This reduction in bile leakage allows for the healing of ductal lesions without direct surgical repair. Nevertheless, in cases of severe BDI, such as complete dissection of the common bile duct (CBD), surgical intervention will be necessary to resolve the issue.¹⁵ Surgical procedures should be carried out in collaboration with qualified and experienced hepatobiliary surgeons, interventional radiologists, and gastroenterologists from tertiary referral centers to minimize further complications.^{16,17}

OBJECTIVE

The primary outcome of this study was to find out the pattern of BDI after open or laparoscopic cholecystectomy presented to HPB Unit of SZHL.

The secondary outcome was to assess the management and its outcome in HPB unit.

METHODS

After approval from ethical review board (IRB No: SZMC/TERC/365/23, Dated:2-9-23), a descriptive cross sectional study was conducted on patients presented with bile duct injuries to specialized Hepatobiliary Unit of Shaikh Zayed Hospital Lahore from 1st November 2022 to 30th April 2023.. Total of 79 patients were included in the study. 28 patients were excluded from the study based on exclusion criteria.

Informed consent will be taken from patients. Demographic characteristic will be noted in preforma. Investigations i.e full blood count, liver function tests (LFTs), Prothombin Time (PT), Activated partial Thromboplastin Time (APTT), urea, creatinine, blood sugar and serum electrolytes were be sent. Specific investigations to reach a final diagnosis included abdominal ultrasonography (US), ERCP and MRCP. Strasberg Classification was used to classify the BDI. Patients will be prepared for surgery and type of surgery (Hepaticojejunostomy, Liver Resection, Right Hepatectomy) were chosen by specialist surgeon based on the extent of injury.

Patients will be followed postoperatively for complications.

Inclusion Criteria

All patients with BDI after open or laparoscopic cholecystectomy presented to Hepatobiliary Unit, SZHL, irrespective of their age, gender and ethnicity.

Exclusion Criteria

BDI due to surgeries other than laparoscopic or open cholecystectomy. BDI with associated malignancies. Emaciated patients. Patient on immunosuppressant. BDI due penetrating abdominal trauma.

SPSS version 23 was used to analyze the data. The Chi-square test will be used in the comparison of the qualitative data in addition to the descriptive statistical methods (frequencies) in the evaluation of the study data. P value of <0.05 will be considered as statistically significant.

RESULTS

The mean age was 39.89 ± 10.012 with minimum age was 21 and maximum was 65 years. Most patients were female (81%), while males constituted a smaller proportion (19%). The age distribution showed 59.5% of patients falling into the 18-40 years category, with the remaining 40.5% being 41 years or above. Regarding previous surgeries, 44.3% had undergone Laparoscopic Cholecystectomy, 51.9% had Open Cholecystectomy, and 3.8% were converted to an open procedure. The most common presentation among patients was Jaundice (58.2%), followed by Bile Leak (38.0%) and Itching (3.8%). A significant proportion of patients (78.5%) had no history of surgery for BDI, while 21.5% had previous surgeries. Abdominal drains were present in 36.7% of cases, and T Tubes were used in 7.6%. Most patients had no associated arterial injury (88.6%), while 11.4% had a Right Hepatic Artery Injury. Based on BDI classification bismuth and Strasberg, the highest proportion of patients belonged to E2 (57.0%), followed by E3 (36.7%) and E4 (6.3%). Most of the procedure performed for BDI was HEPJJEJ in 77.2% of cases and 22.8% patients underwent liver resection.

The occurrence of SSI (surgical site infection) was observed in 11.4% of cases, and 5.1% experienced postoperative leaks. In-hospital deaths were recorded in 3.8% of cases. Shown in Table-I)

Laboratory parameters of patients were described in Table-II.

Table-III summarizes the association between

different clinicodemographic and perioperative characteristics with development of SSIs. Only gender (borderline) and previous history surgery was significant with p value of 0.061 and 0.23 respectively.

Table-IV shows the association of between different clinicodemographic and perioperative characteristics with post operative anastomotic leak and only the site of bile duct injury was a

Clinicodemographic Characteristics	Categories	Frequency	Percentage
Gender	Female	64	81
	Male	15	19
Previous Surgery	Laposcopic Cholecystectomy	35	44.3
	Open Cholecystectomy	41	51.9
	Converted to Open	3	3.8
Pre-sentation	Jaundice	46	58.2
	Bile Leak	30	38.0
	Itching	3	3.8
Previous HX of surgery for BDI	Yes	17	21.5
	No	62	78.5
Abdominal Drain in SITU	Yes	29	36.7
	No	50	63.3
T Tube in SITU	Yes	6	7.6
	No	73	92.4
Current Procedure for BDI	HEPJ EJ	61	77.2
	Right Hepatectomy + HEPJ EJ	7	8.9
	Liver Resection + HEPJ EJ	11	13.9
SSI	Yes	9	11.4
	No	70	88.6
Post Operative Leak	Yes	4	5.1
	No	75	94.9
In Hospital Death	Yes	3	3.8
	No	76	96.2
Age of Patient in Category	18-40 yrs	47	59.5
	41 or above	32	40.5
Associated Arterial Injury	None	70	88.6
	Right Hepatic Artery Injury	9	11.4
BDI Classification	E2	45	57.0
	E3	29	36.7
	E4	5	6.3

Table-I. Clinicodemographic characteristics of patients n=79

Laboratory Parameters	N	Minimum	Maximum	Mean	Std. Deviation
Total Biluribin Level	79	.40	25.31	6.1023	5.80933
Alanine Transaminase Level	79	23	211	73.09	49.457
Aspartate Transaminase Level	79	23	390	82.94	62.299
Alkaline Phosphatase Levels	79	96	1862	503.76	373.732
Serum Albumin Level	79	1.5	4.7	2.910	.5995

Table-II. Laboratory parameters of patients undergoing surgery for BDI

Characteristics	Categories	SSI after Surgery		P-Value
		Yes	No	
Gender	Female	5	59	0.061
	Male	4	11	
Age in Categories	18-40yrs	4	43	0.266
	41 or above	5	27	
Concomitant Arterial Injury	None	8	62	0.729
	Right Hepatic Artery Injury	1	8	
Procedure done for BDI	HEPJ EJ	7	54	0.944
	Right Hepatectomy + HEPJ EJ	1	6	
	Liver Resection + HEPJ EJ	1	10	
Site of BDI	E3	2	27	0.418
	E4	1	4	
	E2	6	39	
T Tube Insitu	Yes	1	5	0.528
	No	8	65	
Drain In situ	Yes	1	28	0.088
	No	8	42	
Redo Procedure done	Yes	1	16	0.378
	No	8	54	
Presenting Sign and Symptomes	Jaundice	7	39	0.133
	Bile Leak	1	29	
	Itching	1	2	
Previous Cholecystectomy Procedure	Female	2	33	0.023
	Male	5	36	
	Converted to open	2	1	

Table-III. Association of SSI with different clinicodemographic characteristics

Characteristics	Categories	Post Op Leak		P-Value
		Yes	No	
Gender	Female	3	61	0.577
	Male	1	14	
Age in Categories	18-40yrs	3	44	0.464
	41 or above	1	31	
Concomitant Arterial Injury	None	4	66	0.610
	Right Hepatic Artery Injury	0	9	
Procedure done for BDI	HEPJ EJ	7	54	0.944
	Right Hepatectomy + HEPJ EJ	1	6	
	Liver Resection + HEPJ EJ	1	10	
Site of BDI	E3	0	29	0.001
	E4	2	3	
	E2	2	43	
T Tube Insitu	Yes	0	6	0.724
	No	4	69	
Drain In situ	Yes	1	28	0.532
	No	3	47	
Redo Procedure done	Yes	0	17	0.371
	No	4	58	
Presenting Sign and Symptomes	Jaundice	3	43	0.759
	Bile Leak	1	29	
	Itching	0	3	
Previous Cholecystectomy Procedure	Laparoscopic	0	35	0.26
	Open	3	38	
	Converted to open	1	2	

Table-IV. Association of different pre and peri operative factor with post operative anastomosis leak

significant factor with p value of 0.001.

DISCUSSION

Bile duct injury (BDI) is still a much feared complication following gallbladder surgery. After the introduction of laparoscopy, the initial learning curve resulted in a rise in the incidence of major BDI.¹⁷

The factors most commonly involved in biliary injury are misinterpretation of anatomy Calot's triangle, diathermy injury causing partial or complete transection of bile duct and inaccurate application of clip.¹⁸

In our study majority of patients were female (81%) compared to 19% of male. These findings are same compared to other study findings.^{19,20}

The most common procedure performed previously in our study population was open cholecystectomy accounting for 51.7% of the cases and 44.3% had initial procedure of laparoscopic cholecystectomy. The study findings are similar to study conducted by Halbert C et al.²¹ Other studies showed that patients who presented with BDI, the majority of patients were operated laparoscopically.^{22,23}

In our study the most common presentation among patients was obstructive jaundice (58.2%), followed by Bile Leak (38.0%) and Itching (3.8%). These findings are similar to findings of de Ruvear PR et al and El Nakeeb A et al.²⁴ These findings are opposed to findings other study which showed abdominal pain as the main symptoms on arrival.²⁰

BDI classification revealed that most cases were classified as E2 (57.0%), followed by E3 (36.7%), and a smaller percentage falling under E4 (6.3%). These results correspond to results of other study which reported BDIs in E Strasberg Category.²¹

Most of the procedure performed for BDI was HEPJEJ in 77.2% of cases and 22.8% patients underwent liver resection. These are similar to findings of Li J et al.²⁴

The occurrence of SSI (surgical site infection) was

observed in 11.4% of cases. Gender and previous history of surgery for BDI on arrival showed statistically significance with post operative surgical site infections with p value of 0.006 and 0.023 respectively. These findings are similar to findings of other study which showed wound infection of 9.2% following BDI reconstruction.²⁵ Al-Kubati WR noted an overall wound infection of 40.4%.²⁶ Hadi A reported 12.5% wound infection.²⁷ Sohu KM had 1.6% wound infection while Viste A reported 1.5% wound infection in their studies respectively.^{28,29}

In our study postoperatively 5.1% patients experienced postoperative leaks and only the site of BDI was a significant factor for leak with the p value of <0.001. Al-Kubati WR reported 9% cases of bile leak in cases operated by senior surgeons and only 4.5% for Junior surgeons.²⁶ Viste A noted 9% bile leak post operatively.²⁹

In-hospital deaths were recorded in 3.8% of cases. This is opposed to findings of de Ruvear PR et al where no mortality was noted post operatively.²⁴

In our study no stricture post operatively was recorded after 6 months of follow up. This is comparable to other study findings.^{29,30} While Perine MV et al and Pikolji J et al reported repeated stricture of 2 out of 22 and 3 out of 20 in their case series.^{31,32}

CONCLUSION

In conclusion the majority of BDIs were E2 (57.0%), E3 (36.7%), and E4 (6.3%). Procedure performed were hepaticojejunostomy (77.2%), right hepatectomy with hepaticojejunostomy (8.9%), and liver resection + hepaticojejunostomy (13.9%). Anastomotic leaks were significantly linked to the site of BDI.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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