

Management and Outcomes of Iatrogenic Bile Duct Injuries Post-Cholecystectomy: A Tertiary Hospital Experience in Retrospective Review

Abstract:

Background and Aim: Bile duct injuries (BDI) remain one of the most complex problems in hepatobiliary surgery. Our aim is to assess iatrogenic BDI complicating laparoscopic and open cholecystectomy and to highlight the efficiency of BDI treatment and repair modalities of therapy.

METHODS: This is a retrospective study from July 2020 to July 2025. 159 patients with BDI occurring during open and laparoscopic cholecystectomy were included in this study. 138 patients had major BDIs and 21 had minor BDI of short- or long-term failures of repair. 132 of them (83%) were referred to Zagazig University Hospitals after cholecystectomy had been done for them in different institutions, while the other 27 patients (17%) were operated on in Zagazig University Hospitals.

Results: Of 138 patients with major BDI, surgical repair was performed in 93 of 138 (67.4%). Postsurgical morbidity occurred in 12 patients (12 of 93 = 12.9%), and there was one postsurgical death among the 93 surgically repaired patients. The rate of excellent or good results after surgical repair was 80.6% (75 of 93 patients), and this increased to 87.1% (81 of 93 patients) by continuing treatment with stenting in postsurgical strictures. Out of the 45 patients treated by endoscopic or percutaneous stenting, 36 (80%) had an excellent or good outcome. Patients with minor BDIs underwent various combinations of surgical and endoscopic or percutaneous treatments, always with good results.

Conclusion: The choice of intervention is highly influenced by local expertise and should optimally be determined in a multidisciplinary fashion.

Literature review:

The laparoscopic approach remains the standard surgical treatment for cholelithiasis despite varying patient factors such as body habitus, surgical history, anatomical variations, and cholecystectomy difficulty grade, which may pose challenges to perform a laparoscopic total cholecystectomy (Chathurika S. D. et.al., 2024).

Bile duct injury (BDI) is a dangerous complication of cholecystectomy, with significant postoperative sequelae for the patient in terms of morbidity, mortality, and long-term quality of life (de'Angelis et al., 2021).

Iatrogenic bile duct injury (BDI) during laparoscopic cholecystectomy continues to be an entity of great clinical relevance in surgery, both because of its prevalence and the large number of complications associated with its definitive treatment (Cohen et. al., 2019 & Lopez-Lopez et. al., 2022).

Past studies stated that the rate of BDI has steadily declined, it remains significantly higher with laparoscopic cholecystectomy (LC) (0.4-0.6%) than open cholecystectomy (0.1-0.2%) [Lau WY and Lai (2007), Kurumi et.al., (2000), Misra et. al., (2004)& Mercado (2006)]. However, Later studies found a considerable decline in the incidence of BDIs after LC, to around 0.2%0.4%, which is comparable to the rate observed with open cholecystectomy (Halbert et. al., 2016& Endo Y, et al., 2023).

44 The injury to the common bile duct during laparoscopic cholecystectomy is not a result of the
45 practice below the standard, but an inherent risk of the operation (Fischer. 2009).

46 Prevention of BDI remains the most important aspect in the application of the surgeon's learning
47 curve (Zidan et. al., 2024).

48 The World Society of Emergency Surgery (WSES) recommended in 2020 the use of a "Bailout"
49 procedure when the anatomy is unclear in order to avoid BDI. While conversion to open
50 cholecystectomy may improve visibility, there is inadequate evidence to substantiate that
51 conversion reduces the incidence of BDI (de'Angelis et al., 2021).

52 The timeliness of BDI identification is the most essential factor in managing BDI, which has a
53 big effect on the patients' health, well-being, and death rate. (David et. al., 2016, Fletcher et.al.,
54 2020 &Popa et. al., 2023).

55 Identifying the location of ductal injury and the availability of healthy proximal duct is critical;
56 successful repair requires healthy, non-ischemic duct without tension or loss of length. Also, the
57 mechanism and type of injury play critical roles in patient presentation and surgical management
58 (Haney and Pappas 2008).The World Journal of Emergency Surgery guidelines from 2020
59 recommend Roux-en-Y hepatico-jejunostomy for all MBDI post LC (de'Angelis et. al., 2021).
60 Endoscopic procedures have gained increasing potential as the treatment of choice in the
61 management of postoperative injuries to the bile duct are more likely to happen in people who
62 have peripheral bile duct leaks or strictures. So, it should be the first treatment option for these
63 patients. (Weber et. al., 2009 &Carannante et. al., 2023).

64 While endoscopic approaches offer an alternative, they may not be a viable option in most cases
65 due to altered bowel anatomy after surgery (Kim et. al., 2024). Consequently, percutaneous
66 treatment via the transhepatic route has been frequently employed as a primary treatment
67 strategy (DePietro et. al., 2015).For patients with strictures in their bile ducts, especially short
68 ones after laparoscopic cholecystectomy, percutaneous balloon dilatation and stenting can be a
69 good option. Anastomotic strictures yield suboptimal outcomes when addressed through
70 percutaneous interventional radiologic techniques (PIRT), achieving success in approximately
71 40% of patients. (LA MEDINA et. al., 2008).

72 A multidisciplinary approach was crucial during various stages of BDI treatment: initial
73 assessment, management of secondary complications, resolution of sepsis, percutaneous stenting
74 prior to surgical repair, dilation of strictures post-repair, final treatment in patients not surgically
75 repaired, and follow-up care.(Nuzzo et. al., 2008).

76
77 *This study was performed to assess iatrogenic BDI complicating cholecystectomy and to
78 highlight the efficiency of BDI treatment and repair by multidisciplinary therapy*
79

80 **Patients and methods:**

81 This is a retrospective study. From July 2020 to July 2025, 159 patients with BDI
82 occurring during laparoscopic and open cholecystectomy were treated at Surgery
83 department, Zagazig University Hospitals.

84 132 of them (83%) were referred to our hospital after cholecystectomy had been done for
85 them in different institutions, while the other 27 patients (17%) were operated on in Zagazig

86 University Hospitals.

87 51 patients (32%) were males, and 108 patients (68%) were females, with mean age of 48.6±11.3
88 years (mean \pm SD).

89 The hospital records of the patients were reviewed for: presenting history as well as type of
90 operation (laparoscopic or open cholecystectomy), the nature of the BDI (transection, partial
91 laceration and strictures of the CBD, major ducts at the biliary confluence or minor lesions),
92 surgical findings at cholecystectomy, time of injury diagnosis, initial management, results of
93 diagnostic and therapeutic procedures performed before referral, laboratory results, imaging
94 studies, time of referral, subsequent management and complications.

95 The outcome was also recorded, and the long-term results was assessed by regular review in
96 the out-patient clinic, together with laboratory tests, liver ultrasound and magnetic resonance
97 cholangiography, if necessary, over a median follow-up period of 21 months (range, 3-36
98 months).

99 Abdominal US were carried out in all patients. All patients also underwent ERC or MRC or PTC
100 to delineate the type and level of injury.

101 Injuries were classified according to their location on the basis of modified Bismuth
102 classification (Bismuth & Majino 2001): type I = distance from biliary confluence \geq 2 cm, type II
103 = distance from confluence $<$ 2 cm, type III = ceiling of confluence intact 'with right and left
104 ductal system still communicating', type IV = ceiling of confluence destroyed 'with right and left
105 ductal system separated', and type V = strictures of an isolated right branch associated with types
106 I, II, or III. An isolated injury to the right hepatic duct was classified as Bismuth type VI.
107 Finally, ERCP sphincterotomy with stent placement was applied to reduce or eliminate bile
108 leakage in distal lesions and percutaneous transhepatic stents was applied immediately before
109 surgery in patients with high-level injuries.

110 The patient outcomes were graded as excellent (asymptomatic and normal serum liver
111 function tests), good (asymptomatic and mildly increased level of alkaline phosphatase and
112 gamma-glutamyl transferase or patients with normal liver function tests and transient symptoms),
113 fair (symptomatic and abnormal liver function tests), and poor (patients with recurrent stricture
114 requiring further treatment).

115 116 117 118 **Results:**

119 Between July 2020 to July 2025, 159 patients with BDI occurring during laparoscopic and
120 open cholecystectomy were treated at Surgery Department Zagazig University Hospitals.
121 The median time of presentation in patients with major BDI following LC was 2 days (range, 0–
122 77 days) and 4 days (range, 0–82 days) after open cholecystectomy with no statistical
123 significance.

124 138 patients (86.8%) had major BDIs which were defined as any disruption (ligation,
125 avulsion, or resection) of the extra hepatic biliary system, and 21 patients (13.2%) had minor
126 BDIs which were defined as any injury occurring with intact ductal anatomy without any
127 associated stricture.

128 Laparoscopic cholecystectomy was done for 126 patients (79.2%) while open
129 cholecystectomy was done for 33 patients (20.8%).

130 Among the patients of our study, there were 24 patients (15%) that underwent
131 cholecystectomy predominantly for symptomatic gallstones disease, 27 patients (17%) for
132 chronic calculus cholecystitis, and 108 patients (68%) for acute cholecystitis, where
133 cholecystectomy was defined by the surgeon as technically difficult.

134 Major BDI was detected during the primary surgical procedure in 52.2% (72/138) patients,
135 where 21 of them occurred during open cholecystectomy, 63.6% (21/33), and 51 during LC,
136 40.5% (51/126). The injury was most recognized by the presence of bile in the surgical field.
137 The injury was recognized postoperatively in 47.8% (66/138) patients and 36 underwent
138 subsequent surgical repair before referral: 24 underwent bile duct reconstruction over T-tube; and
139 6 underwent reconstruction without T-tube.

140 21 patients had minor BDIs. In all these cases, the BDI was recognized postoperatively. In 15
141 patients, ERCP sphincterotomy and stent placement was adequate treatment. Three patients
142 required laparotomy and bile duct ligation, and three patients underwent laparoscopy with
143 additional ligation of a duct of Luschka.

144 Regarding the major duct injuries, these could be classified as Bismuth type I in 33 patients
145 (23.9%), Bismuth type II in 75 patients (54.3%), Bismuth type III in 24 patients (17.4%),
146 Bismuth type IV in 6 patients (4.4%), table I.

147
148 Table (I): Level of injury in patients with major BDIs according to modified Bismuth
149 classification

Bismuth classification	No. of patients	%
Type I	33	23.9
Type II	75	54.3
Type III	24	17.4
Type IV	6	4.4

150
151 In referred patients the interval from injury to definitive repair ranged from 0 to 360 days (mean,
152 45 days), table II.

153
154 Table (II): Time elapsed between cholecystectomy and patient's presentation

The time elapsed	No. of patients	%
Operative day	72	52.2
Early post operative (2-7 days)	44	31.9
One week - One month	18	13
One month - Six months	3	2.2
Six months - One year	0	0

155
156 At the time of referral, 60 patients had ongoing biliary leaks, resulting in biliary ascites, biliary
157 peritonitis, biloma, abscess, or external biliary fistula. Another 48 patients had obstructive
158 jaundice, and 24 patients had recurrent cholangitis, table III.

159
160
161
162 Table (III): Symptoms at patient's presentation

Symptoms at presentation	No. of patients	%
--------------------------	-----------------	---

Biliary ascites	12	8.7
Biliary peritonitis	25	18.1
Biloma	6	4.3
Abscess	3	2.2
External biliary fistula	20	14.5
Obstructive jaundice	48	34.8
Recurrent cholangitis	24	17.4

163

164 A total of 93 patients (93 of 138 =67.4%) underwent surgical repair. As shown in table (IV) the
 165 most common surgical procedure performed for the patients included in this study was Roux-en
 166 Y hepaticojenunoostomy, which represents (71%) of the operative procedures.

167

168 Table (IV): Different surgical procedures done for the patients.

Surgical procedure	No. of patients	%
Roux-en Y hepaticojenunoostomy	66	71
Hepaticojejunostomy	12	13
Primary repair over a T-tube	6	6.5
End to end anastomosis	6	6.5
Gastric tube choledocoplasty	3	3.2

169

170

171 There was one postsurgical death among the 93 surgically repaired patients. Short-term
 172 complications occurred in 12 patients (12 of 93= 12.9%). These included cholangitis in 6, biliary
 173 fistula with intra-abdominal abscess in 3, and moderate liver insufficiency in 3 patients.

174

175 The outcome was excellent or good in 75, fair in 6, and poor in 12 patients. Therefore, the rate of
 176 excellent or good results after surgical repair was 80.6% (75 of 93 patients). 12 patients had
 177 evidence of postsurgical biliary stricture with recurrent cholangitis: 6 of them underwent
 178 percutaneous biliary dilatation with insertion of stents progressively increasing in size (up to 14F
 179 or 16F). This treatment lasted 19 ± 11 months (range 6 to 36 months), and the result was classified
 180 as good in these patients. The other 6 patients are still being treated with stenting (till the time of
 181 writing this series). The total percentage of patients with excellent or good results after surgical
 182 repair alone, or after surgical repair and percutaneous stenting, was thus 87.1% (81 of 93
 183 patients). No further surgical repair was performed.

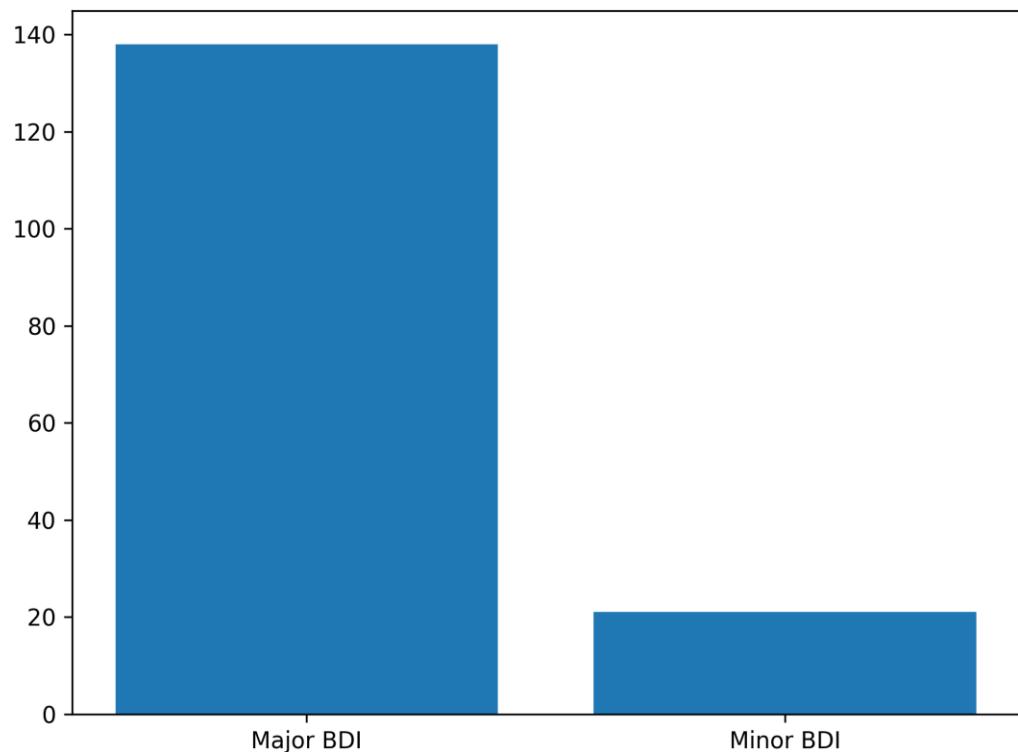
184

185 Out of the 45 patients treated by endoscopic or percutaneous stenting, 36 (80%) had an excellent
 186 or good outcome; in these patients the mean duration of stenting was 11 ± 3 months (range 3 to
 187 32). 9 patients are still being treated "till the time of writing this series" (6 endoscopically and 3
 188 percutaneously) after a mean duration of stenting of 8 ± 2 months (range 3 to 14). This supports
 189 endoscopic/percutaneous approaches as effective definitive or bridging strategies in selected
 190 cases.

191

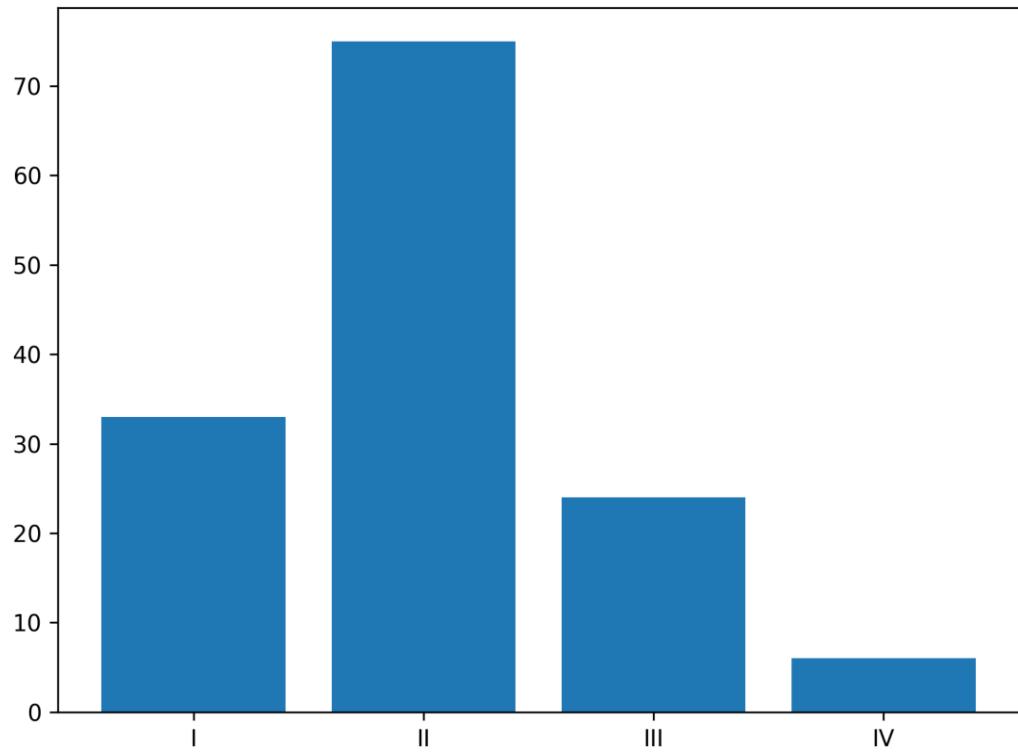
192

Figures:



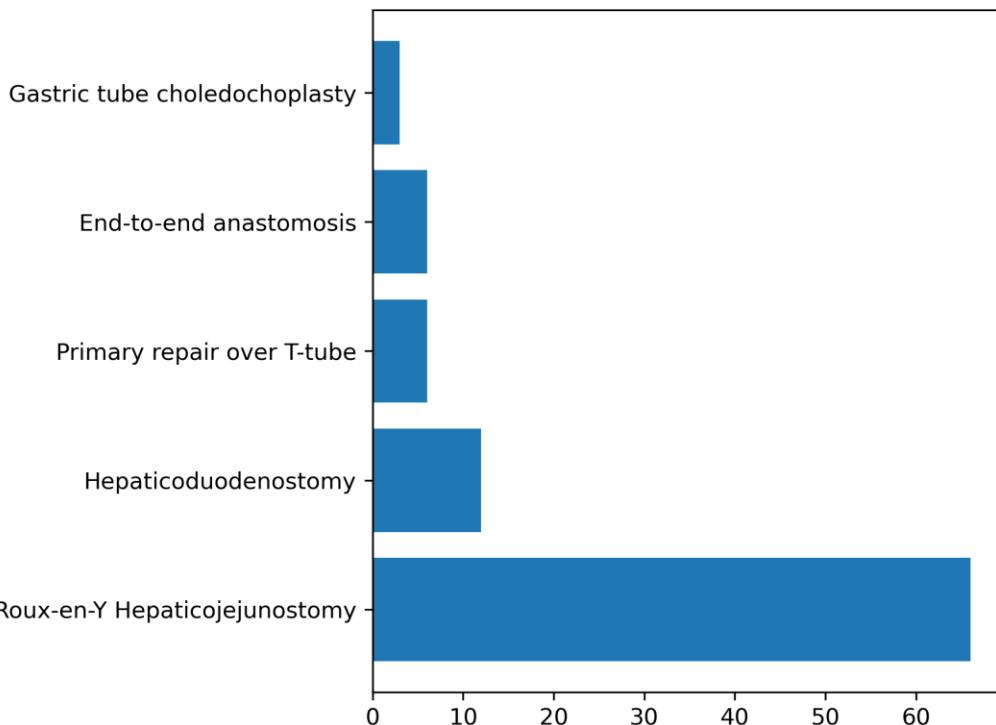
193

194 **Figure 1. Distribution of bile duct injuries.**



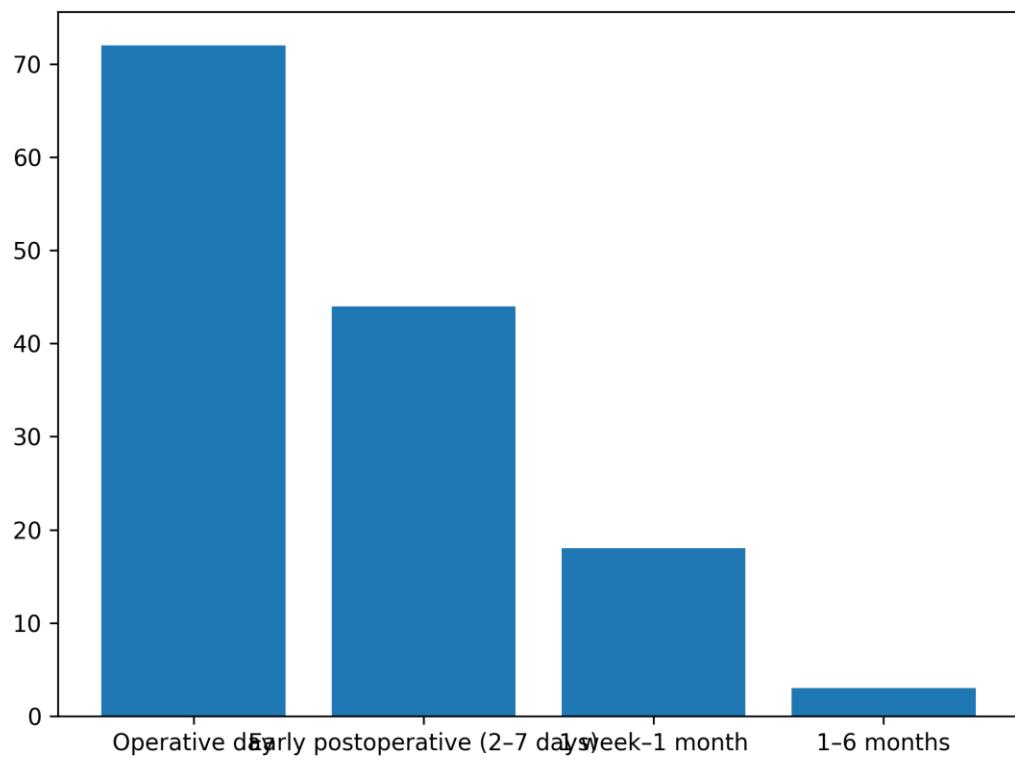
195

196 **Figure 2. Major bile duct injuries according to modified Bismuth classification.**



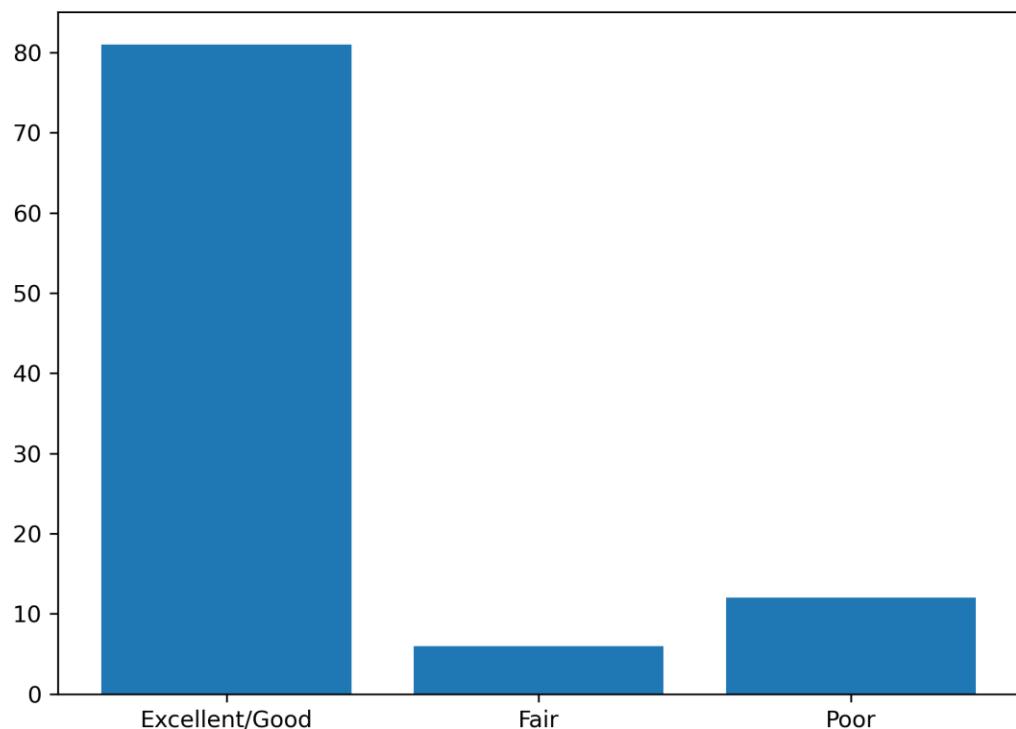
197

198 **Figure 3. Surgical procedures performed for major bile duct injuries.**



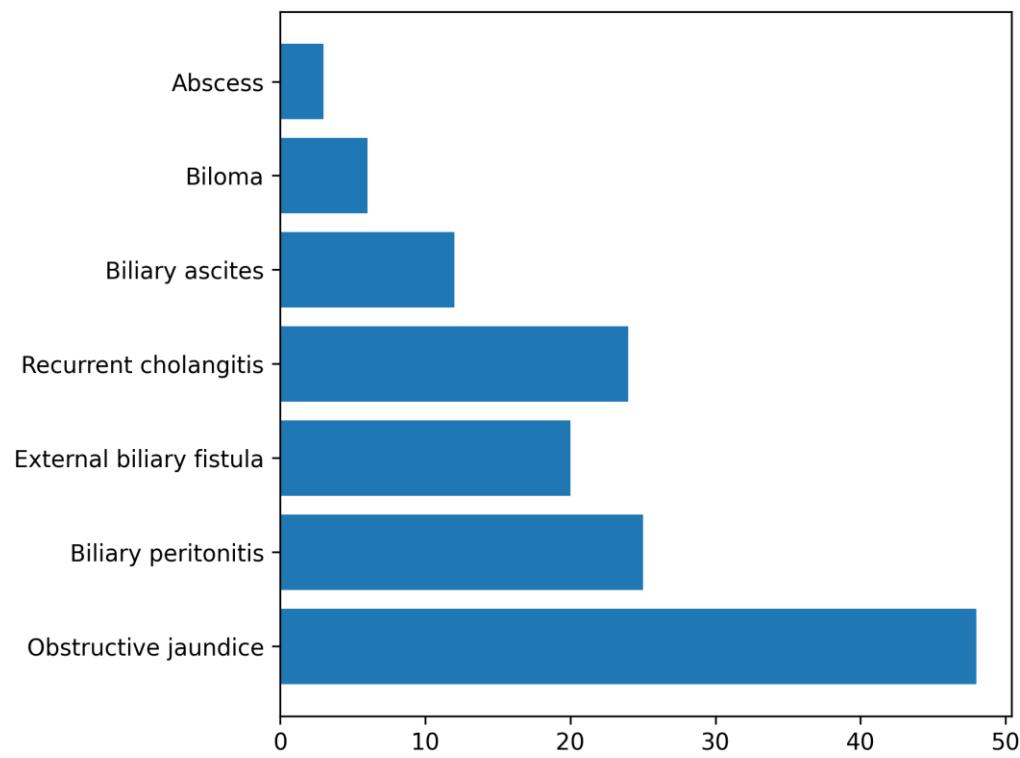
199

200 **Figure 4. Timing of patient presentation after bile duct injury.**



201

202 **Figure 5. Treatment outcomes.**



203

204 **Figure 6. Clinical presentation at referral.**

205 **Discussion:**

206
207 Major bile duct injury during cholecystectomy is not only a disaster for the patient and the
208 operating surgeon, but also an economic disaster, a serious problem for the health insurance, for
209 the patient's family and finally it is a very serious legal problem (Deziel et. al., 1993 &Kaman,
210 et. al., 2006).

211 Since the introduction and widespread diffusion of LC, the incidence of BDI has at least
212 doubled: the incidence during OC has been reported to be between 0.1% and 0.25%, whereas
213 during LC it has been reported to be between 0.3% and 2.6% (Huerta and Pham 2021).

214 The main goal of biliary reconstruction is to make a high-quality bilioenteric anastomosis that
215 will work well for a long time. (Goykhman et. al., 2008).Multiple factors may alter outcome,
216 including timing of repair,associated sepsis, vascular injury, level of injury, and operative
217 techniqueWalshet.al., (2007, Mier et. al., 2017 and Xianget. al., 2020).

218
219 When BDI occurs, it is important to recognize the lesion intra-operatively. In our series, this
220 happened in 52.2% of patients with major BDIs (72 of 138) where 58 of them referred to our
221 hospital (Zagazig University Hospital) immediately post operatively and the other 14 patients
222 were operated on in our hospital. This is consistent with the results of Kaman et.al.,(2006) were
223 48% in LC group and 54% in OC group. While it was 46.2% of patients with major BDIs in
224 David et.al., series in (2016) and 42% in Stilling et. al., in (2015). Salter et.al.,states in (2002)
225 that in 20 to 50% of patients the BDI may be recognized at the time of surgery and can be
226 repaired immediately. While Mier et. al., stated in (2017) that 20% BDI were recognized during
227 initial surgery and 80% were diagnosed postoperatively.

228
229 Timing of repair raises interesting considerations when managing these patients.
230 Intraoperative diagnosis and repair are an espoused goal in the management of injuries to reduce
231 the severity of injuryand risk of litigation, while improving long-term outcome (McLean 2006).
232 In our series all the patients with intraoperative recognized injuries were subjected to immediate
233 repair. The same protocol was done by Nuzzo et.al.,(2008).Also, Flum et.al., reported in (2003)
234 that early or intraoperative recognition may help in the primary repair at the time of the initial
235 surgery, which may be important for the outcome. While Jose-Luis stated in (2016) that timing of
236 surgical repair should be individualized, based on type of injury, coexistent comorbidities, septic
237 complications, etc.

238
239 A major BDI detected during cholecystectomy can be repaired with a Roux-en-Y
240 hepaticojjunostomy (HJ) if the expertise and experience are available “the best time to fix it is
241 that time” (Lillemoe K.D. et. al., 2000). This is supported by Juan et. al., in (2013) who stated
242 that the repairing BDI that happened during cholecystectomy by experienced hepatobiliary
243 surgeons, whether through open or laparoscopic surgery, seems to be very important to get the
244 best results. Also, in 2021, Sweigert suggested that early repair leads to shorter overall hospital
245 stays for inpatients without increasing the risk of death after surgery.

246 Kapoorin (2015) did not recommend early repairs and record that early repair, in the presence of
247 sepsis, is fraught with dangers. While (Monroy, 2022) and (Kong, 2025) reported that there were
248 no statistical differences between the timing of bile duct reconstruction and the postoperative
249 outcomes.

250
251 The availability of experienced endoscopists and radiologists is of paramount importance not
252 only in the acute management of septic patients but also for the definitive treatment of those
253 injuries that can be successfully repaired without surgery. In our series, this occurred in 45
254 patients with major BDIs, 32.6%, (45/ 138). This is nearly going with the results of Nuzzo
255 et.al.,in (2008) who record35.9% of MBDIs were successfully repaired without surgery.
256

257 The most common surgical procedure performed for patients included in this study was Roux-en-
258 Y hepaticojjunostomy (HJ). This accord with (Seeras et. al., 2023) who said thatthe most
259 common technique to repair major bile duct injuries is the Roux-en-Y hepaticojjunostomy
260 (RYHJ). Kapoor also reported in (2007) that, tension-free, mucosa-to-mucosa HJ performed in a
261 single layer, using interrupted fine absorbable sutures between unscarred proximal bile ducts
262 (right and left hepatic) and a 60-cm-long Roux loop of jejunum is the procedure of choice for
263 benign biliary stricture (BBS) and can be performed in all cases including those patients with
264 Bismuth type IV BBS.Whileaccording to Sekido et. al., in(2004) duct-to-duct anastomosis
265 should be the first choice of treatment after common bile duct transection as, according to the
266 author's experience, postoperative cholangitis has not occurred in such patients as compared with
267 those having undergone duct enterostomies.
268

269 In our series there was one postoperative mortality out of 93 operative cases (1.1%). Nearly
270 same that of Sicklick et.al.,in (2005) who showed a mortality rate of 1.5% in the post injury
271 period caused by uncontrolled sepsis.
272

273 The rate of excellent to good long-term results in surgically repaired patients with major BDIs
274 was 80.6% (75 of 93 patients), and this increased to 87.1% (81 of 93) patients by continuing
275 treatment with stenting in postsurgical strictures. This is nearly like the results of Nuzzo
276 et.al.,(2008) which was 78.0% (32 of 41).
277

278 All these data show clearly the importance of a multidisciplinary approach not only to decide the
279 best treatment for each patient but also to combine different types of treatment.
280

281 **Acknowledgements:**

282 I extend my sincere thanks and appreciation to the Deanship of Scientific Research and Qassim
283 University for their continuous support and encouragement to produce high-quality scientific
284 research that meets international standards.
285

286 **Conclusion:**

287 Regardless of the inciting event leading to injury of the bile duct, management strategies for
288 similar types of injuries remain the same. The choice of intervention is highly influenced by local
289 expertise and should optimally be determined in a multidisciplinary fashion with the involvement
290 of therapeutic endoscopists, interventional radiologists, and surgeons with experience in
291 managing hepatobiliary complications.
292
293
294

295 **References:**

296 1. Bismuth H. and Majino P.E. (2001). Biliary strictures: classification based on the
297 principles of surgical treatment. *World J Surg.* 25: 1241-1244.

298

299 2. Carannante F. et al., (2023). Identification and management of subvesical bile duct
300 leakage after laparoscopic cholecystectomy: A systematic review. *Asian Journal of
301 Surgery.* 46(10): 4161-4168.

302

303 3. Chathurika S. D. et al., (2024). A comparison of outcomes including bile duct injury of
304 subtotal cholecystectomy versus open total cholecystectomy as bailout procedures for
305 severe cholecystitis: A multicenter real-world study. *Surgery.* 176(3). 605-613.

306

307 4. Cohen J.T. et al., (2019). An Update on Iatrogenic Biliary Injuries: Identification,
308 Classification, and Management. *Surgical Clinics of North America.* 99(2): 283-299.

309

310 5. David M. et al., (2016). Bile duct injuries after laparoscopic cholecystectomy: 11-year
311 experience in a tertiary center. *BioScience Trends.* 10(3):197-201.

312

313 6. de'Angelis N., et al., (2021). 2020 WSES guidelines for the detection and management of
314 bile duct injury during cholecystectomy. *World J Emerg Surg.* 16(1):30.

315

316 7. DePietro D.M. et al., (2015). Long-Term Outcomes of a Benign Biliary Stricture
317 Protocol. *Journal of Vascular and Interventional.* 26(7): 1032-1039.

318

319 8. Deziel D.J. et al., (1993). Complications of laparoscopic cholecystectomy: a national
320 survey of 4292 hospitals and an analysis of 77 604 cases. *Am. J. Surg.* 165: 9–14.

321

322 9. Endo Y, et al., (2023). Impact of AI system on recognition for anatomical landmarks
323 related to reducing bile duct injury during laparoscopic cholecystectomy. *Surg
324 Endosc.* 37:5752-5759.

325

326 10. Fischer JE. (2009). Is damage to the common bile duct during laparoscopic
327 cholecystectomy an inherent risk of the operation? *The American Journal of Surgery.* 197:
328 829-832.

329

330 11. Fletcher R, et al., (2020). Bile duct injuries: a contemporary survey of surgeon attitudes
331 and experiences. *Surg Endosc.* 34(7):3079–84.

332

333 12. Flum D.R. et al., (2003). Bile duct injury during cholecystectomy and survival in
334 Medicare beneficiaries. *JAMA.* 290:2168–2173.

335

336 13. Goykhman Y. et al., (2008). Long-term Outcome and Risk Factors of Failure after Bile
337 Duct Injury Repair. *J Gastrointest Surg.* 12: 1412-1417.

338

339 14. Halbert C, et al., (2016). Beyond the learning curve: incidence of bile duct injuries
340 following laparoscopic cholecystectomy normalize to open in the modern era. *Surg*
341 *Endosc.*;30(6):2239–43.

342

343 15. Haney JC and Pappas TN (2008). Management of Common Bile Duct Injuries. *Operative*
344 *Technique in General Surgery.* 01: 175-184.

345

346 16. Huerta S. and Pham T. (2021). Bile duct injuries: incidence, prevention, and
347 management. *Dig Med Res.* 4:44.

348

349 17. Jose-Luis B.H. (2016). Current controversies in management of bile duct injuries. *J Liver*
350 *Res Disord Ther.*2(2):41–42.

351

352 18. Juan P. et al., (2013). Intraoperative Management and Repair of Bile Duct Injuries
353 Sustained during 10,123 Laparoscopic Cholecystectomies in a High-Volume Referral
354 Center. *Journal of the American College of Surgeons.* 216(5): 894-901.

355

356 19. Kaman L. et al., (2006). Comparison of major bile duct injuries following laparoscopic
357 cholecystectomy and open cholecystectomy. *ANZ J. Surg.* 76 :788-791.

358

359 20. Kapoor VK (2007). Bile duct injury repair: when? what? who? *J Hepatobiliary Pancreat*
360 *Surg.*14: 476–479.

361

362 21. Kapoor V. K. (2015). Bile duct injury repair — earlier is not better. *Front Med.* 9(4);
363 508-511.

364

365 22. Kim K. Y. et al., (2024). Percutaneous treatment of bilioenteric anastomotic strictures:
366 Comparison of long-term outcomes between temporary covered stents and balloon
367 dilation. *European Journal of Radiology.*181: 111816.

368

369 23. Kong J. et al., (2025). Bile Duct Injury: A Novel Risk Stratification System for the
370 Timing of Repair. *The American Surgeon.* 91(7): 1163-1169.

371

372 24. Kurumi Y, et al., (2000). The prevention of bile duct injury during laparoscopic
373 cholecystectomy from the point of view of anatomic variation. *Surg*
374 *LaparoscEndoscPercutan Tech;* 10: 192-199.

375

376 25. LA MEDINAA.R.,et al., (2008). Management of benign biliary strictures by
377 percutaneous interventional radiologic techniques (PIRT). *HPB.*10: 428-432.

378

379 26. Lau WY and Lai EC (2007). Classification of iatrogenic bile duct injury. *Hepatobiliary*
380 *Pancreat Dis Int;* 6: 459-463.

381

382 27. Lillemoe K.D. et al., (2000). Postoperative bile duct strictures: management and outcome
383 in the 1990s. *Ann Surg.* 232: 430–441.

384

385 28. Lopez-Lopez V. et al., (2022). Vascular injury during cholecystectomy: A multicenter
386 critical analysis behind the drama. *Surgery.* 172(4): 1067-1075.

387

388 29. McLean T.R. (2006). Risk management of observations from ligation involving
389 laparoscopic cholecystectomy. *Arch Surg.* 141: 643-648.

390

391 30. Mercado M. A. (2006). Early versus late repair of bile duct injuries. *Surg Endosc;* 20:
392 1644-1647.

393

394 31. Mier G. M. et al., (2017). Factors Associated with Adverse Outcomes after Surgical
395 Repair of Bile Duct Injury. *J Gastroenterol Res.* 1(2):67-73.

396

397 32. Misra S, et al., (2004). Percutaneous management of bile duct strictures and injuries
398 associated with laparoscopic cholecystectomy: A decade of experience. *J Am Coll Surg;*
399 198: 218-226.

400

401 33. Monroy D. C. et al., (2022). Early versus delayed reconstruction for bile duct injury a
402 multicenter retrospective analysis of a hepatopancreaticobiliary group. *Scientific
403 Reports.* 12:1160.

404

405 34. Nuzzo G, et al.,(2008). Advantages of multidisciplinary management of bile duct injuries
406 occurring during cholecystectomy. *The American Journal of Surgery.* 195: 763-769.

407

408 35. Popa C, et al., (2023). Aretrospective analysis of bile duct injuries treated in a tertiary
409 center: the utility of a universal classification-the ATOM classification. *Surg
410 Endosc.* 37:347-357.

411

412 36. Salter K. et.al., (2002). Iatrogenic bile duct injury: The scourge of laparoscopic
413 cholecystectomy. *Aust NZ J Surg.* 72: 83-88.

414

415 37. Seeras K. et al., (2023). Bile Duct Repair. *NCBI (National Center for Biotechnology
416 Information) In: Stat Pearls [Internet].*

417

418 38. Sekido H. et al., (2004). Surgical strategy for the management of biliary injury in
419 laparoscopic cholecystectomy. *Hepato-gastroenterology.* 51: 357-361.

420

421 39. SicklickJ.K. et al., (2005). Surgical management of bile duct injuries sustained during
422 laparoscopic cholecystectomy. *Ann Surg.* 241: 786 –792.

423

424 40. Stilling N. J. et al., (2015). Long-term outcome after early repair of iatrogenic bile duct
425 injury. A national Danish multicentre study. *HPB.* 17: 394–400.

426
427 41. Sweigert P. J. et al., (2021). Biliary Enteric Reconstruction After Biliary Injury: Delayed
428 Repair Is More Costly Than Early Repair. *Journal of Surgical Research.* 257: 349-355
429
430 42. WalshR.M. et al., (2007). Long-term outcome of biliary reconstruction for bile duct injuries
431 from laparoscopic cholecystectomies. *Surgery.* 142: 450-457.
432
433 43. Weber A. et al., (2009). Long-term outcome of endoscopic therapy in patients with bile
434 duct injury after cholecystectomy. *JGH;* 24:762-769.
435
436 44. XiangW. et al., (2020). Early Versus Delayed Surgical Repair and Referral for Patients
437 with Bile Duct Injury A Systematic Review and Meta-analysis. *Annals of Surgery.*
438 271(3): 449-459.
439
440 45. Zidan M. H. E. et Al., (2024). Post-cholecystectomy bile duct injuries: a retrospective
441 cohort study. *BMC Surgery.* 24:8.
442
443
444
445
446
447
448
449
450
451
452
453
454
455
456
457
458
459
460
461
462
463
464
465