e-ISSN: 0975-1556, p-ISSN:2820-2643

Available online on www.ijpcr.com

International Journal of Pharmaceutical and Clinical Research 2022; 14(6); 733-738

Original Research Article

Assessment of Outcome of Surgical Management of Bile Duct Injuries with Loss of Confluence

Amarjit Kumar Raj [1], Rakesh kumar Singh [2], Abhay Kumar [3], Saket kumar [4], Sanjay Kumar [5], Manish Mandal [6]

[1,2,4] Associate Professor, Department of Surgical Gastroenterology, Indira Gandhi Institute of Medical Sciences, Patna, Bihar, India.

[3] Senior Resident, Department of Surgical Gastroenterology, Indira Gandhi Institute of Medical Sciences, Patna, Bihar, India.

[5] Additional Professor, Department of Surgical Gastroenterology, Indira Gandhi Institute of Medical Sciences, Patna, Bihar, India.

[6] Professor and HOD, Department of Surgical Gastroenterology, Indira Gandhi Institute of Medical Sciences, Patna, Bihar, India.

Received: 04-10-2021 / Revised: 10-01-2022 / Accepted: 07-02-2022
Corresponding author: Dr Amarjit Kumar Raj
Conflict of interest: Nil

Abstract

Introduction: Iatrogenic bile duct injuries (IBDI) with loss of confluence are understood as those where right and left hepatic ducts lose continuity with the common biliary tree.

Material & Methods: This is an observational study conducted in the department of Surgical Gastroenterology, Indira Gandhi Institute of Medical Sciences, Patna, Bihar, India. over a period of 2 years from Jan 2017 to Dec 2018. All patients diagnosed with IBDI with loss of confluence determined transoperatively and treated with any bilioenteric derivation were included.

Results: In the period of time considered for the present study, a total of 55 bile duct complex injuries were repaired (Strasberg E: 1 - E5), from them, 10 (18.1%) were injuries with loss of confluence. During long term observation, 2 patients presented biliary stenosis (20%), from these, 1 case were managed with progressive dilatations through a percutaneous catheter; one case was considered successful (10%) with catheter removal without clinical or biochemical cholestasis, and 1 cases (10%) are still in dilatation process.

Conclusions: Iatrogenic bile duct injuries with ductal separation can be managed with single hepatojejunostomy with good results. Preplaced ductal catheter can be helpful in ductal identification. Post HJ anastomotic stricture can be managed with percutaneous dilatation as a first therapeutic intention.

Keywords: Lesion, Bile, Loss, Confluence

Background

Injury to the biliary tree poses a unique challenge for the surgeon due to the variable anatomy, limited working space, and morbidity of its complications. Minimally invasive cholecystectomy is performed over 750,000 times in the

United States annually. As laparoscopic cholecystectomy has been increasingly used to treat symptomatic cholelithiasis, the number of bile duct injuries (BDI) has also increased. The biliary tree and relationship of the cystic duct and its insertion onto the common hepatic duct is noted to have variable and anomalous anatomy. The most common reason for injuring the bile duct is due to the misidentification of normal biliary anatomy [1].

Iatrogenic biliary injury most commonly occurs by misidentifying the common bile duct for the cystic duct during laparoscopic cholecystectomy [2], with an incidence of 0.3 to 0.7%, which is historically three times higher than in open cholecystectomy [3]. The variable biliary anatomy is one of the factors in the causation of this injury. Injury to the biliary tree rarely occurs in penetrating or blunt abdominal trauma, with an incidence of 0.1% of hospital admissions for trauma. Depending on the location and time of diagnosis, the management ranges from cholecystectomy, drainage, reconstruction to restore the flow of bile into the intestine, or hepatic resection [4].

If there is a bile duct injury or leak noted intraoperatively, the surgeon must decide whether he has adequate training, staff, and resources to evaluate and treat the injury appropriately. If the surgeon decides to proceed, cholangiography must be performed to delineate anatomy and plan treatment [5]. If the surgeon feels he cannot safely repair the injury, no further dissection or conversion to laparotomy should be performed, and the patient should have a drain placed and transferred to an institution with experienced surgeons. If a cholangiogram catheter can easily be placed into the injury, this can help the next team identify the injury and perform prompt cholangiogram.

The Strassberg-Bismuth classification defines injuries and biliary strictures based on their anatomic location within the biliary system relating to the biliary confluence.[6] Due to the high technical demand required to repair them, they should be performed in high volume centers with an experienced and multidisciplinary biliary surgical team.

Material & Methods

This is an observational study conducted in the Department of Surgical Gastroenterology, Indira Gandhi Institute of Medical Sciences, Patna, Bihar, India, over a period of 2 years from Jan 2017 to Dec 2018.

Methodology

All patients diagnosed with IBDI with loss of confluence determined preoperatively and treated with any bilioenteric derivation were included.

It was considered as initial successful management those cases in which the bilioenteric anastomosis remains permeable for a period of time greater than one year without instrumentation or postsurgical manipulation, otherwise, those where anastomosis permeability was achieved after any instrumental or postsurgical biliary manipulation procedure (surgical remodeling or percutaneous catheter) due to a first attempt to repair that development were considered as cumulative success.

Diagnostic approach of suspected IBDI patients consisted of an image study to evaluate collections (abdominal tomography or ultrasound), if there were found, were drained through a percutaneous catheter. Eventually sepsis was controlled by antibiotic therapy. Preoperative MRCP was done in all patients, Direct cholangiography was performed using a preoperatively placed percutaneous transhepatic biliary catheter towards the bile duct of higher caliber. Occasionally a catheter in both right and left sides was placed.

As a choice procedure, our preference is single anastomosis with interrupted sutures with monofilament suture material of slow absorption caliber 5-0 (PDS) towards a desfunctionalized Roux-en-Y jejunal loop.

Sometimes double anastomosis is also required. As a protocol we follow late repair (> 3 months from index surgery) or there is no external biliary fistula and patient should we sepsis free and without intra-abdominal collections. Percutaneous catheter is usually advanced until the anastomosis was traversed and removed on average 3 to 4 weeks after.

Perioperative complications were considered in the first 90 days. Biliary derivation stenosis were suspected in patients with clinically manifested jaundice or with serum elevation of direct bilirubin, then a hepatobiliary ultrasound was performed to confirm intrahepatic biliary dilatation followed by a MRCP. After confirmation of stricture, percutaneous catheter placement 8.5fr caliber on the biliary segment with the highest caliber was done and through which a direct cholangiography was done and cholestasis palliation was achieved, to then move toward the jejunum overpassing the stenosis site; in case of getting it, a trimestral dilatation protocol was initiated with 2fr per session up to a variable caliber, generally 16fr.

Results

In the period of time considered for the present study, a total of 55 bile duct injuries were repaired (Strasberg E: 1 - E5), from them, 10 (18.1%) were injuries with loss of confluence.

Mean age was 35.7 years (17 to 60), with a female predominance (n=42). Mean period between index and repair surgeries was 134 days (from 3 to 310). Hospital stay was in average 10.2 days and complications´ incidence was 30% (n=3). Reoperations were not required within the first 90 days and no deaths were observed. One case was found in biliary fistula, Cholangitis and Surgical site abscess [Table 1].

During long term observation, In 80% of the cases (n=10) success was found at a mean follow-up of 34.5 months and 20% required dilatation procedures (n=2). 2 patients who diagnosed to have biliary stenosis (20%) were managed with progressive dilatations through a percutaneous catheter; one case was considered successful (10%) with catheter removal without clinical or biochemical cholestasis, and Second cases are still in dilatation process.

Table 1: 90-day results.

Complications	n = 3 (30%)
Biliary fistula	n = 1
Cholangitis	n = 1
Surgical site abscess	n = 1
Days of hospital stay (Mean)	12.5 days (3 - 34 days)
Reoperations	n = 0
Mortality	n = 0

Table 2: Long-term results (>90 DAYS).

Result	n	%
Cholangitis *	1	10%
Cholangitis + liver abscess *	1	10%
Stenosis	2	20%
Management with dilatation by percutaneous catheter	2	20%

* Patients who presented cholangitis belong to the same group of patients with stenosis

Table 3: Actual state

Successful management *	8	80%
Stenosis	2	20%
In dilatation protocol with percutaneous catheter	2	20%
Successfully managed with percutaneous dilatation	1	10%
Currently on percutaneous dilatation	1	10%

Discussion

Safe cholecystectomy should be dictum of cholecystectomy. Iatrogenic biliary injury most commonly occurs by misidentifying the common bile duct for the cystic duct during laparoscopic cholecystectomy Techniques during the procedure that can facilitate visualization of the anatomy include retraction of the gallbladder infundibulum towards the umbilical fissure to open the posterior aspect of hepatocystic triangle. Another method for avoiding injury is the identification of anatomical fixed landmarks with the pneumonic B-SAFE, which stands for the bile duct and the base of segment 4 (B), Rouviere's sulcus (S), hepatic artery (A), umbilical fissure or the fissure between the left lateral and left medial segments and is a continuation of the falciform ligament (F), and enteric viscera such as the duodenum and pylorus (E) [7]. As with all surgery, the judicious use of electrosurgery and proper tissue handling will avoid inadvertent tissue injury due to thermal spread or excessive traction [8].

Surgical treatment of bile duct injury is indicated when loss of duct continuity is found and endoscopic and/ or radiological approach is ruled out [9]. Roux-en-Y hepatojejunostomy has been proven to be the best treatment option by several groups [10]. A high quality bilioenteric anastomosis, which is defined as tension free, wide, with adequate suture material, done in healthy, non-scarred non-ischemic ducts that are anastomosized to an afferent Roux-en-Y jejunal limb, offers the best results [11]. There are several technical maneuvers that can be done in order to reach this goal, including the anterior opening of the confluence and the left duct, as well as partial removal of segments IVand V [12-13].

Complications of bile duct injury vary in their potential morbidity. A biliary leak can cause biloma, abscess, wound infection, intraabdominal infection, and sepsis. Almost all bile duct stricture are successfully treated with surgical reconstruction. Bile duct reconstruction with hepaticojejunostomy for transection or stricture can result in wound infection and bile leak [14]. Overall morbidity after hepaticojejunostomy reconstruction is 36% and mortality approximately 2%. More serious complications after reconstruction include stricture (30%) which can be treated conservatively, with a percutaneous stent, or with a redo hepaticojejunostomy. If this fails or the complication is recognized too late, the patient may develop secondary biliary cirrhosis and require liver resection or transplant. Other surgical related complications include dehiscence of the anastomosis, pulmonary embolism, bleeding, or uncontrolled sepsis. About 65% of patients have no complications after hepaticojejunostomy.

The behavior that aims to preserve the irrigation, may represent a risk of stenosis due to the reduced caliber of the anastomoses, which is reflected in our high incidence of stenosis, but no case of manifest ischemia. It is considered that a good quality anastomosis is free of tension, with a wide diameter, with the correct suture material, performed in healthy bile ducts (without fibrosis) and correctly perfused [15-16].

Conclusion

Iatrogenic bile duct injuries with ductal separation can be managed with single hepatojejunostomy with good results. Preplaced ductal catheter can be helpful in ductal identification as well as can be used for transanastomotic stents. Post HJ anastomotic stricture can be managed with percutaneous dilatation as a first therapeutic intention results in a standardized practice that leads to reasonable results compared with other high volume centers.

References

1. Pesce A, Palmucci S, La Greca G, Puleo S. Iatrogenic bile duct injury: impact and management challenges. ClinExpGastroenterol. 201 9;12:121-128.
2. Hassler KR, Collins JT, Philip K, Jones MW. StatPearls. StatPearls Publishing; Treasure Island (FL): Sep 28, 2021. Laparoscopic Cholecystectomy.
3. Pesce A, Portale TR, Minutolo V, Scilletta R, Li Destri G, Puleo S. Bile duct injury during laparoscopic cholecystectomy without intraoperative cholangiography: a retrospective study on 1,100 selected patients. Dig Surg. 2012;29(4):310-4.
4. Thomson BN, Nardino B, Gumm K, Robertson AJ, Knowles BP, Collier NA, Judson R. Management of blunt and penetrating biliary tract trauma. J Trauma Acute Care Surg. 2012 Jun;72(6):1620-5.
5. Strasberg SM. Biliary injury in laparoscopic surgery: part 2. Changing the culture of cholecystectomy. J Am Coll Surg. 2005 Oct;201(4):604-11.
6. Bismuth H, Majno PE. Biliary strictures: classification based on the principles of surgical treatment. World J Surg. 2001 Oct;25(10):1241-4.
7. Abdel-Misih SR, Bloomston M. Liver anatomy. SurgClin North Am. 2010 Aug;90(4):643-53.
8. Gupta V, Jain G. Safe laparoscopic cholecystectomy: Adoption of universal culture of safety in cholecystectomy. World J Gastrointest Surg. 2019 Feb 27;11(2):62-84.
9. Chapman WC, Abecassis M, Jarnagin W, Mulvihill S, Strasberg SM. Bile duct injuries 12 years after the introduction of laparoscopic cholecystectomy. J Gastrointest Surg

   2003; 7: 412-416 [PMID: 12654568 DOI: 10.1016/S1091-255X(02)00162-2]
10. Sicklick JK, Camp MS, Lillemoe KD, Melton GB, Yeo CJ, Campbell KA, Talamini MA, Pitt HA, Coleman J, Sauter PA, Cameron JL. Surgical management of bile duct injuries sustained during laparoscopic cholecystectomy: perioperative results in 200 patients. Ann Surg2005; 241: 786-792; discussion 793-795 [PMID: 15849514
11. Mercado MA, Orozco H, Chan C, Quezada C, Barajas-Olivas A, Borja-Cacho D, Sánchez-Fernandez N. Bile duct growing factor: an alternate technique for reconstruction of thin bile ducts after iatrogenic injury. J GastrointestSurg2006; 10: 1164-1169
12. Strasberg SM, Picus DD, Drebin JA. Results of a new strategy for reconstruction of biliary injuries having an isolated right-sided component. J GastrointestSurg2001; 5: 266-274
13. Mercado MA, Chan C, Orozco H, Villalta JM, Barajas-Olivas A, Eraña J, Domínguez I. Long-term evaluation of biliary reconstruction after partial resection of segments IV and V iniatrogenic injuries. J GastrointestSurg2006; 10: 77-82
14. Otto W, Sierdziński J, Smaga J, Dudek K, Zieniewicz K. Long-term effects and quality of life following definitive bile duct reconstruction. Medicine (Baltimore). 2018 Oct;97(41):e12684.
15. Mercado M, Arriola J, Dominguez I, Elnecavé A, Urencio M, Ramirez F, *et al*. Lesióniatrogénica de víabiliar con pérdida de confluencia: Opcionesquirúrgicas. Cir Gen. 2010; 32 (3):160-166.

16. Jabłońska B, Lampe P. Iatrogenic bile duct injuries: Etiology, diagnosis and management. World J Gastroenterol. 2009; 15 (33):4097-4104.