

Bile Duct Reconstruction: Results of Various Techniques

SIDDIQUE AHMAD¹, MUHAMMAD ALAM², ALI GOHAR KHAN³, RIZMI TAHIR⁴, SHEEMA AMIN⁵

^{1,2}Associate Professors, Department of General Surgery, Hayatabad Medical Complex Peshawar

³Associate Professor Department of General Surgery, Fauji Foundation Hospital Peshawar

^{4,5}Postgraduate Residents, Surgical "C" Unit, Hayatabad Medical complex, Peshawar

Correspondence to: Muhammad Alam, Email: docalamgul@hotmail.com, Cell: 0334-9200347

ABSTRACT

Background: Due to the complex nature and diversity of bile duct injury (BDI) controversy exists regarding the best management plan of BDIs and sometimes this problem may be difficult to be managed even in the hands of an experience surgeon.

Aim: To evaluate different procedures used in the management of bile duct injuries

Study Design: Prospective cohort study

Place and Duration of Study: General Surgical Department, Hayatabad Medical Complex KPK, Pakistan from 1st January 2016 to 31st December 2020.

Methodology: Twenty five patients were enrolled for appropriate management of bile duct injuries. The age range was 15-70 years.

Results: Seven (28%) were males and 18 (72%) were females with mean age was 42 year. CBD injury occurred in 17 (68%) patients after open and 8 (32%) after laparoscopic cholecystectomy. Majority of the patients presented with obstructive jaundice 76% and bile leak 16%. Other presentation include biliary peritonitis, biloma, cholangitis etc were 8%. Fourteen (56%) patients had type E injuries and underwent Roux-en-y hepatico-jejunostomy. No patient presented with major bile leak or disruption of anastomosis. Minor leak occurred in 4 (16%), wound infection in 6 (24%), bleeding in 1 (4%), pulmonary embolism in 1 (4%).

Conclusion: Simple bile duct injuries can be treated with lateral repairs however for more major injuries Roux-en-y hepatico-jejunostomy can produce satisfactory results depending on Strasberg-classification and bile duct status.

Keywords: Reconstruction, Roux-En-Y hepaticojejunostomy, Bile duct injuries, Biliary stricture

INTRODUCTION

Bile duct injury (BDI) is the most serious surgical complication of biliary system with considerable impact on patient's morbidity and mortality.¹ It impairs patient's quality of life with high management cost and medicolegal impact. The severity of BDI ranges from minor leakage from the cystic duct stump or Gall bladder fossa to ligation and complete transection of bile duct. Sometimes BDI is associated with vascular injuries, mainly involving the right hepatic artery and right portal vein.²

Bile duct injury can be caused after a variety of abdominal surgeries i.e. cholecystectomy, gastrectomy, liver surgeries, common bile duct exploration and surgeries on the pancreas. Cholecystectomy being most common cause and laparoscopic cholecystectomy (0.4%-0.6%) having twice the complication rate as compared to open cholecystectomy (0.1%-0.2%).³

Laparoscopic cholecystectomy is considered as the gold standard modality of treatment for symptomatic gall stones.⁴ Initially BDI related to LC was as high as 2%.² The incidence of BDI after laparoscopic cholecystectomy has now decreased to less than 0.5%, but still higher than open cholecystectomy.^{5,6}

The complications associated with cholecystectomy are related to the experience of the operating surgeon and patient factors i.e. inflamed gall bladder, previous attacks of cholecystitis, thick-walled gall bladder, previous endoscopic procedures, male gender and anatomical variations.⁷

The Society of American Gastrointestinal and Endoscopic Surgeons (SAGES) advise the following 5 steps for safe LC.⁸ (i) establishing critical view of safety, (ii) understanding the relevant anatomy, (iii) appropriate retraction/exposure, (iv) knowing when to call for help and (v) recognizing the need for conversion or an alternate procedure.

Preoperative cholangiography can significantly reduce these devastating complications in difficult situation.⁹ Only 15% of the complications are identified intra operatively. The remaining 85% reveal itself post operatively by rising bilirubin level, continuous bile drainage in the drain or biliary peritonitis if no drain has been placed.¹⁰

The clinical suspicion of bile duct injuries can be investigated by ultrasonography, LFT, MRCP, ERCP and PTC.¹¹ The treatment of patients with BDI is often highly individualized based on the type of injury, time since injury, co-morbidities and clinical status of patient e.g. presence of sepsis and peritonitis.¹² A multidisciplinary

approach that involves hepatobiliary surgeon, gastroenterologist and interventional radiologist should be followed.

Various classification systems are used to classify the type and extent of BDI with Strasberg and Bismuth being widely accepted.¹³

The purpose of this study was to identify common causes of BDI in our country and to evaluate the results of biliary reconstruction in our set up.

MATERIALS AND METHODS

This prospective cohort study was conducted on 25 patients in the General Surgical Department of Hayatabad Medical Complex, Peshawar, KPK from January 2016 to December 2020, after approval from the ethical committee and taking informed consent from the patients. After detailed history all the previous records per used and physical examination were performed. Patients were investigated with LFTs, Ultrasound, MRCP and ERCP and PTC in selected cases. Consultation with gastroenterologist was taken. All patients presented with BDI, age range 15 to 70 years and both genders were included. ASA-IV (patient not fit for general anesthesia), patients with active wound infection, CBD stricture due to malignant causes, age <15 years and biliary injury managed by Gastro unit through ERCP were excluded. The type of surgical procedure performed was based upon pre-operative and intra-operative assessment of the patients, type of bile duct injury, choice of the surgeon based on his personal experience and current guidelines for BDI management. The data was entered and analyzed through SPSS-25.

RESULTS

The age range between 15-70 years and mean age was 42 years. Seen (28%) were male and 18 (72%) were female (Table 1). Majority of the patient presented within the first 2 weeks of surgery, the main presentation were jaundice 19 (76%), bile leaks 4 (16%) and others (biliary peritonitis, biloma, cholangitis etc were 2 (8%). No patient presented with major bile leak or disruption of anastomosis, minor leak occurred in 4 (16%), wound infection in 6(24%), bleeding in 1 (4%), pulmonary embolism in 1 (4%) [Table 2].

Table 1: Type of operation, injury and procedure performed

Type of surgery	No.	Type of injury	Patients	Procedure
Open	17 (68%)	Type D	8	Primary repair of CBD
		Type E1	2	All type E underwent Roux-en-Y Hepaticojejunostomy
		Type E2	3	
		Type 3	3	
		Type 4	1	
Laparoscopic	6 (32%)	Type D	3	Primary repair of CBD
		Type E1	2	All type E underwent Roux-en-Y Hepaticojejunostomy
		Type E2	2	
		Type E3	1	

Table 2: Frequency of complication after biliary reconstruction

Complications	Frequency (%)
Local	
Bleeding	1 (4%)
Wound infection	6 (4%)
Biliary leak	4 (16%)
Pancreatitis	1 (4%)
Systemic	
Chest infection	4 (16%)
Pulmonary embolism	1 (4%)

DISCUSSION

Cholecystectomy is one of the most commonly performed procedure and laparoscopic approach is now the gold standard for symptomatic gall stone. Bile duct injury is still a common complication having devastating effects on patient's quality of life. It requires proper assessment, identification of the type of injury, early intervention and proper management to maintain biliary continuity and functional integrity. Open cholecystectomy (OC) is still commonly being performed in Pakistan and the majority of patients included in our study had undergone open surgery in the periphery or referred cases from Afghanistan. This is because of the lack of laparoscopic cholecystectomy (LC) facilities/ expertise in the periphery hospitals. However data shows that BDI is more common in LC as compared to OC. Sahajpal et al¹⁴ reported BDI rate for OC to be 0.2% vs 0.4% to 0.6% with LC.

The majority of patient in our study had Bismith type E injuries 14 (56%). These patients were managed by Roux-en-y hepaticojejunostomy which is currently the most practiced reconstructive procedure for maintaining biliary continuity.¹⁵ Type D injuries occurred in 11 (44%) of cases and were treated with primary repair over T-tube or biliary stent placed during ERCP. This is in comparison with other studies in which equal number of patient underwent primary repair of CBD vs Roux-en-y hepaticojejunostomy.¹⁶

Both local and systemic complications occurred in this study. Wound infection was the most common local complication 6 (24%) cases. Minor biliary leak occurred in 4 (16%) patients. No major bile leak or disruption of anastomosis was observed. Bleeding was noted in one patient (4%) from entero-enterostomy site for which re-exploration was done and entero-enterostomy reconstructed after evacuation of the haematoma. In a study conducted by zafar et al¹⁷, the wound infection was 23% and biliary leak was 10%. Systemic complications were also noted in this study all of them were conservatively managed. One patient developed pulmonary

embolism at 4th post-operative day. Chest infection noted in 4 (16%) of the patients. No mortality noted in our study.

CONCLUSION

Management of bile duct injuries is very complex and depends on the type of injury and condition of the patients. Hepaticojejunostomy offers a viable option in most of the cases.

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