HEPATICOJEJUNOSTOMY: A PROSPECTIVE LOOK AT INDICATIONS AND OUTCOMES

Koirala R, Rajbhandari A, Rai P, Ghimire S

Department of surgery Nepal Medical College and Teaching Hospital (NMCTH)

ABSTRACT

Hepaticojejunostomy is a common procedure. It is associated with significant morbidity and mortality. Recent reports suggest better long term results and manageable morbidity and mortality. This study was carried out to identify the indications and outcomes of hepaticojejunostomy in our setting. All patients admitted in the Department of surgery, Nepal Medical College and Teaching Hospital (NMCTH) from January 2015 to December 2017 for a surgical procedure requiring Hepaticojejunostomy with or without other additional procedures were included in the study. A total of 41 patients underwent the procedure. Hepaticojejunostomy was performed using interrupted absorbable 5-0 monofilament Glyconate sutures. Postoperatively patients were discharged when they were stable and feeding was adequate through the enteral route(oral or through a Feeding jejunostomy). Liver function tests and ultrasound were performed at discharge at 1 month postoperatively and at 3 months of follow up on an outpatient basis. All the data was entered in EXCEL and analyzed using the SPSS 16 software. A p value of less than 0.05 was taken as significant. There were 41 patients, M: F 19:22.mean age was 52 years. Morbidity rate was 36% (15/41). There were two mortalities 4.9%. There was a significant difference between the malignant and the benign group in the age at presentation with the benign group presenting at a younger age [43 vs 59 p<0.001] and had a shorter length of hospital stay [7.8 vs 11.2 p=0.04]. Both the arms had similar morbidity and mortality. Conclusion: Benign and malignant indications requiring Hepaticojejunostomy were equally common in our study. Patients with benign etiology tend to present at a younger age and have a shorter hospital stay. Hepaticojejunostomy is a safe procedure and has manageable morbidity and mortality.

KEYWORDS

Biliary anastomosis,
hepaticojejunostomy,
obstructive jaundice

CORRESPONDING AUTHOR

Dr. Rabin Koirala,
Associate Professor,
Department of Surgery,
Nepal Medical College Teaching Hospital
Email: rabinkoirala@hotmail.com

INTRODUCTION

Hepaticojejunostomy is performed for various reasons. The most common indication is in bile duct injuries in patients who have undergone laparoscopic cholecystetomy. Gallstone disease is one of the most commonly seen cases in the surgical practice. During the era of opencholecystectomy the incidence of bile duct injury was 0.2-0.3%.[1] With the introduction of laparoscopic cholecystectomy the incidence of bile duct injury increased dramatically initially and has since then remained stable at 0.4-0.6%.[2] Not only has the incidence of bileduct injury increased they are more likely to be higher, more complex and are detected intraoperatively in only a third of the cases.[3-5] Hepaticojejunostomy is also a part of the reconstruction in periampullary cancers, cancers of the head of pancreas, cholangiocarcinomas and in children with choledochalcysts.[6,7] These data bring in to focus both the need to be careful during laparoscopic cholecystectomy and expertise in performing hepaticojejunostomy.

As with other complex procedures hepatico-jejunostomy was initially associated with significant morbidity and mortality. Stricture, cholangitis, postoperative bile leak and sepsis were common complications.[6-8] However improved understanding of biliary ductal and vascular anatomy and its delineation preoperatively by MRI and contrast CT scan combined with availability of fine absorbable monofilament sutures and meticulous technique has made hepaticojejunostomy a much less dreaded procedure.[8] Many studies have now documented long term success rates of more than 90% in patients who have undergone hepaticojejunostomy.8-10 This study explored the indications and outcomes of hepaticojejunostomy in our patients.

MATERIALS AND METHODS

All patients admitted with department of surgery Nepal Medical College and Teaching Hospital (NMCTH) from January 2015 to December 2017 for a surgical procedure requiring Hepaticojejunostomy with or without other additional procedures were included in the study.

Ethical clearance was taken from the Institutional Review Committee of NMCTH. Informed consent was taken. Hepaticojejunostomy was performed using interrupted absorbable 5-0 monofilament Glyconate (Monosyn V Braun) sutures. Standard end to side hepaticojejunostomy was performed in all cases except those with post cholecystectomy biliary strictures where side to side anastomosis was performed when feasible. First posterior row of sutures were taken and then anterior row was taken for the bile ducts. The posterior rows were then tied one by one followed by anterior rows on the jejunal side. Duct to jejunal mucosa approximation was achieved and the edges were kept everted.

All the complications were treated and tabulated. Postoperatively patients were discharged when the patient was stable and the feeding was adequate through the enteral route (oral or through a feeding jejunostomy). Liver function tests and ultrasound were performed at discharge at 1 month postoperatively and at 3 months of follow up on an outpatient basis. Those patients who could not followup were contacted by phone or email and asked clinical questions inquired regarding complications. They were asked to investigate locally and forward their ultrasonography and liver function reports via email or social media (facebook) to the research team.

RESULTS

During the three year period a total of 41 patient underwent hepaticojejunostomy as a standalone or as a part of other surgical procedure. There were 20 male and 21 females between the ages of 18 to 82 years of age. The mean age of presentation was 52.4years (SD of 4.6 yrs). The average postoperative hospital stay was 8.6(+2.5) days. There were two mortalities (4.9%) in the study group and fifteen patients had one or more morbidities. (Table 1)

Table 1: Patient characteristics

Total number of patients (n)	**41**
M: F	20:21
Benign: Malignant	19:22
Age in years (mean)	52.4 (+ 4.6)
Average hospital post operative stay in days	9.6 (+ 2.5)
Mortality	4.9% (2/41)
Morbidity	36.6% (15/41)

Twenty two of the patients had a malignant disease and nineteen had a benign etiology. Carcinoma of head of pancreas was the most common indication for surgery followed by periampullary and choledochal cyst. We had six cases of postcholecystectomy biliary strictures (Table 2).

Table 2: Indication for surgery

Diagnosis	**No. of patients (n=41)**
Cancer head of pancreas	8
Periampullary cancers	7
Distalcholangio cancers	3
Klatkins (cholangio cancer)	2
Advanced Ca stomach	2
Choledochal cyst	7
Postoperative CBD stricture	6
Choledocholithiasis with dilated CBD and hepatolithiasis	5
Duodenal diverticuli	1

Hepaticojejunstomy with a roux loop was the most common procedure. Sixteen patients underwent a Whipples procedure. Three patients had unresectable or metastatic cancer head of pancreas and so underwent triple bypass (Table 3). Five patients had large dilated common bile duct with multiple choledocho and hepatolithiasis these patients underwent stone clearance and a hepaicojejunostomy. Two patients had kaltkins tumor type II they underwent a Common bile duct resection up to and above the confluence, hepaticojejunostomy was performed for the right and left duct separately in one patient while ductoplasty with single hepaticojejunostomy was performed in the other. Two patients had advanced carcinoma stomach with infiltration in to the hepatoduodenal ligament via lesser curvature and so gastrectomy with common bile duct excision and reconstruction was performed.

Table 3: Procedure performed

Name of procedure	Number (n= 41)
Hepaticojejunostomy (HJ) with roux loop	19
Whipples procedure	16
Triple bypass (HJ+GJ+JJ)	3
Gastrectomy and HJ	2
Hepaticojejunostomy with Pyloric exclusion and GJ	1

Fifteen patients (36.6%) developed morbidity. Majority of them had Superficial surgical site infection (SSI) and pneumonia (Table 4). Urinary tract infection was the third most common complication as all the patients were catheterized for the surgery. Two patients underwent pigtail drainage for intraabdominal collection. One for a pancreatic fistula post whipples procedure and the other for hepaticojejunostomy in a choledochal cyst. The second patient developed a bilioma in the subphrenic space requiring a pigtail placement.

Table 4: Morbidity

Morbidity	Number of patients (n=15)
Surgical site infection (SSI)	9
Pneumonia and atelectasis	9
Urinary tract infection	5
Pancreatic fistula	2
Wound dehiscence	1
Enterocutaneous fistula	1
Pulmonary embolism	1

One patient undergoing exploration for biliary stricture with bile leak post laparoscopic cholecystectomy had severe adhesions leading to iatrogenic duodenal injury. Pyloric exclusion and gastrojejunostomy was added for the same. Patient developed enterocutaneous fistula and was reexplored 2 days later a small rent was detected in the adhesiolysed section of jejunum twenty cm distal to the gastrojejunostomy site it was fashioned in to a feeding jejunostomy. The patient developed wound dehiscence and was closed secondarily on the 34th postoperative day.

There were two mortalities (4.6%). One patient operated with curative intent for carcinoma head of pancreas was found to have multiple deposits in the mesocolon so triple bypass was performed but the patient developed post operative pneumonia and succumbed on the sixth postoperative day. The second mortality was in a patient with post laparoscopic cholecystectomy biliary stricture. The patient had stricture at the confluence extending in to the right duct so right and left duct were separately anastomsed patient was taking adequately orally, on oral medication with no fever and a normal leukocyte counts when she suddenly developed shortness of breath on day 11. Electrocardiogram revealed rightventricular strain pattern and pulse oximetry showed decreased oxygen saturation. Patient's cause of death was postulated as pulmonary embolism.

The age at presentation of benign group was significantly younger (43yr vs 59yr pvalue <0.001) and they had significantly reduced hospital stay (7.8d vs 11.2d p value of 0.004). However there were no significant differences in morbidity and mortality (Table 5).

Table 5: Comparision between benign and malignant group

	Benign group	Malignant group	P value
Age at presentation (Years)	43 (+ 4.2)	59 (+ 5.6)	< 0.01
Average length of hospital stay(Days)	7.8 (+1.6)	11.2 (+1.7)	0.04
Morbidity	37% (7/19)	36% (8/22)	0.87
Mortality	5.2% (1/19)	4.5% (1/22)	0.79

At the time of discharge all the patients were taking adequately enterally and were stable. Majority of the patients on discharge still had deranged liver function tests (see Table 6).

Table 6: Follow up (n=39)

	Deranged LFT	Abnormal Ultrasound	Symptoms related to cholangitis
At discharge	36	4	0
At one month	7	0	0
At 3 months	3	0	1

At one month follow up that had decreased to 18% (7/39) and at 3 months 7.5% (3/39). Two had increased alkaline phosphatase but liver enzymes and bilirubin levels were normal. One patient presented on the 87th postoperative day with high grade fever and right upper abdominal pain. Patient's leukocyte count was high and his LFT was deranged. The patient was diagnosed to have cholangitis and improved on intravenous antibiotics and fluids. On follow up the liver function normalized andultrasonography was unremarkable.

DISCUSSION

Overall benign biliary strictures requiring hepaticojejunostomy especially due to biliary injury during laparoscopic cholecysteectomy are more common than malignant causes.[1,2,4,6] Our results show a larger portion of malignant causes. A study that includes more patients and is multicentric may provide a better picture in our context. It could also be because our institute has relatively low rates of biliary injury during laparoscopic cholecystectomy (unpublished data).

The age at presentation of benign causes of obstructive jaundice is significantly less than malignant causes.[6,7,12,13] This is because cholelithiasis and choledocholithiasis is more common in the young and malignancy more common in the elderly.

The morbidity rate of 36% in our study is comparable with other studies reporting morbidity in hepaticojejunostomy patients of 26% to 40%.[11,13,14] Surgical site infection, pneumonia and urinary tract infection were the most common causes of morbidity in these patients.[13,15] Surgical site infection rates can be explained by long duration and contaminated/ clean contaminated nature of the surgery . Since all patients were catheterized before surgery urinary tract infection is explainable. Large subcostal incisions in these patients predisposes them to basal atelectasis and pneumonia.

We had two mortality out of 41 patients(mortality rate 4.6%). Rates ranging between of 1.8% to 9.8% have been reported in the literature.[11,12,14,15] Since patients with malignant disease were older and underwent more extensive surgeries morbidity and mortality rates should be higher in the malignant group but in our study there was no significant difference. This would probably have manifest if the study was carried out with a larger number of patients.

Restricture rates are variable with Pappalardo and collegues reporting restricture rates of up to 43%.[14] Recent result are more encouraging with long term success rates of 90% or higher. 16-18 Although our follow up period was only up to 3 months,we had no incidence of proven strictures in our study which is more in line with the recent results. We also had only one case (2.5%) of cholangitis during followup which was managed with hydration and intravenous antibiotics. Various attempts have been made to decrease bile leak and associated morbidity from hepaticojejunostomy sites. Jayant kumar and collegues used falciform ligament wrap to prevent bile leak had an incidence of 4.-9 %(2/41).[15] Other studies also report better results with this method.[19] Complication due to bile leak in our study was 4.6% we had one bilioma requiring pigtail placement and one requiring rexploration.

There were five patients with choledocholithiasis with hepatolithiasis who underwent stone extraction and hepaticojejunostomy. The postoperative and follow up period was uneventful. While this is recomended treatment for hepatolithiasis; Shao-Qiang li and colleagues have associated the procedure with higher complication rates including cholangitis (24%) and recommend a common bile duct exploration and a T-tube placement for percutaneous lithotripsy.[20] Mostafa and Hussein created a bilio entero gastric bypass to facilitate repeated stone extraction in seventeen patients where restricture and cholangitis rates were low; 7% at 18 months followup.[21] While this appears promising larger studies are required.

Further studies preferably multicentric andof a longer duration of followup would be more useful.

In conclusion, benign and malignant indications requiring Hepaticojejunostomy were equally common in our study. Patients with benign etiology tend to present at a younger age and have a shorter hospital stay. Hepaticojejunostomy is a safe procedure and has manageable morbidity and mortality

REFERENCES

1. Roslyn JJ, Pinns GS, Hughes EF *et al.* Open cholecystectomy: A contemporary analysis of 42,474 patients. *Ann Surg* 1993; 218: 129–137.
2. Strasberg SM, Hertl M, Soper NJ. An analysis of the problem of biliary injury during laparoscopic cholecystectomy. *J Am Coll Surg* 1995; 180:101-25.
3. Deziel DJ, Millikan KW, Economou SG, *et al.* Complications of laparoscopic cholecystectomy: A national survey of 4,292 hospitals and an analysis of 77,604 cases. *Am J Surg* 1993; 165: 9-14.
4. Letcher DR, Hobbs MST, Tan P *et al.* Complications of cholecystectomy: Risks of the laparoscopic approach and protective effects of cholangiography—a population-based study. *Ann Surg* 1999; 229: 449-57.
5. Wherry DC, Marohn MR, Malansoki MP *et al.* An external audit of laparoscopic cholecystectomy in the steady state performed in medical treatment facilities of the Department of Defense. *Ann Surg* 1996; 224: 145-54.
6. Toumi Z, Aljarabah M, Ammori BJ. Role of the

laparoscopic approach to biliary bypass for benign and malignant biliary diseases: a systematic review. *Surg Endosc* 2011; 25: 2105-16.

7. Hung MH, Lin LH, Chen DF, Huang CS. Choledochal cysts in infants and children: experiences over a 20-year period at a single institution. *Eur J Pediatr* 2011; 170: 1179-85
8. Lillemoe KD, Martin SA, CameronJL *et al*. Major bile duct injuriesduring laparoscopic cholecystectomy: Follow-up after combined radiological and surgical management. *Ann Surg* 1999; 225: 459-68.
9. Stuart L, Way LW. Bile duct injuries during laparoscopic cholecystectomy. *Arch Surg* 1995; 130: 1123-8.
10. Murr MM, Gigot JE Nagorney DM, *et al*. Long-term results of biliary reconstruction after laparoscopic bile duct injuries. *Arch Surg* 1999; 134: 604-10.
11. Ismael HN, Cox S, Cooper A, Narula N, Aloia T. The morbidity and mortality of hepaticojejunostomies for complex bile duct injuries: a multi-institutional analysis of risk factors and outcomes using NSQIP. HPB (Oxford). 2017; 19: 352-8.
12. Lubikowski J, Post M, Białek A, Kordowski J, Milkiewicz P, Wójcicki M. Surgical management and outcome of bile duct injuries following cholecystectomy: a single-center experience. *Langenbecks Arch Surg* 2011; 396: 699-707.
13. Schmidt SC, Fikatas P, Denecke T, Schmaucher G *et al*. Hepatic resection for patients with cholecystectomy related complex bile duct injury. *Eur Surg* 2010; 42: 77-82.
14. Pappalardo G, correnti S, Mobarhan S *et al*. Long term results of roux en Y hepaticojejunostomy and Hepaticoduodenostomy. *Ann Surg* 1982; 196: 149-152.
15. Banarjee JK, Bharathi RS, Rao PP. Buttressing hepaticojejunostomies with hepatic round ligament flap may be beneficial. *Pol Przegl Chir* 2017; 89: 7-10.
16. AbdelRafee A, El-Shobari M, Askar W, Sultan AM, El Nakeeb A. Long-term follow-up of 120 patients after hepaticojejunostomy for treatment of post-cholecystectomy bile duct injuries: A retrospective cohort study. *Int J Surg* 2015; 18: 205-10.
17. Stilling NM, Fristrup C, Wettergren A *et al*. Long-term outcome after early repair of iatrogenic bile duct injury. A national Danish multicentre study. *HPB (Oxford)* 2015; 17: 394-400.
18. Xia HT, Liu Y, Yang T, Liang B, Wang J, Dong JH. Better long-term outcomes with hilar ductoplasty and a side-to-side Roux-en-Y hepaticojejunostomy. *J Surg Res* 2017; 215: 21-7.
19. Zhang CH, Yang XY, Chen X *et al*. A no¬vel use for the round ligament of the liver in a complicated bile duct operation. *ANZ J Surg* 2011; 81: 572-3.
20. Shao-Qiang Li, Li-Jian Liang, Bao-Gang Peng, Jia-Ming Lai, Ming-De Lu, Dong-Ming Li. Hepaticojejunostomy for hepatolithiasis: A critical appraisal. *World J Gastroenterol* 2006; 12: 4170-4.
21. Mostafa AH, Hussein EA: Bilio-entero-gastrostomy. Prospective assessment of a modified biliary reconstruction with facilitated future endoscopic access. *BMC Surgery* 2012; 12: 1-10.