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Original Research Article

Jejunoduodenal anastomosis as permanent biliary access loop post-hepaticojejunostomy: our experience

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ABSTRACT

Background: Post-hepaticojejunostomy stricture is a common problem may result in liver cirrhosis and portal hypertension and death if not treated. Different modalities to repair it are available including endoscopic management that needs access loop (including jejuno-duodenal access loop) to reach the site of stricture.
Methods: This prospective study was done in general surgery department, faculty of medicine, Zagazig University hospitals during the period from January 2016 to December 2018. The study included 23 patients (18 females and 5 males) all needed hepaticojejunostomy to treat biliary injuries during cholecystectomy, biliary stricture post-cholecystectomy or post-hepaticojejunostomy anastomotic stricture. Their ages ranged between 26 to 57 ys with mean age 37.3±5.1. The postoperative course of patients and the feasibility of postoperative endoscopic access to the hepaticojejunostomy and intrahepatic ductal system were assessed.
Results: This study included 23 patients (18 females and 5 males) where 19 (82.6%) patients were presented post-cholecystectomy and 4 (17.4%) patients post-hepaticojejunostomy, with different modes of presentation postoperative complications included; 2 patients complicated with chest infection, 3 (13%) patients with wound seroma and infection, 2 (about 8.7%) patients complicated with biliary gastritis and 1 (about 4.4%) patient with mild attack of cholangitis. There was no anastomotic leakage or mortality in the studied group. The trial of access to the hepaticojejunostomy using gastroduodenoscopy was successful in all cases with ease including trial of balloon dilatation. The average hospital stay ranged between 5-7 days.
Conclusions: Side-to-side jejunoduodenal anastomosis is a very useful technique as it provides good endoscopic access to hepaticojejunostomy and the intrahepatic ducts and needs more application and further evaluation.

Keywords: Biliary injuries, Laparoscopic cholecystectomy, Hepaticojejunostomy, Access loop, Jejunoduodenal anastomosis

INTRODUCTION

The standard procedure done by most of the biliary and GIT surgeons to repair biliary strictures especially iatrogenic ones is Roux-en-Y hepaticojejunostomy with good postoperative outcomes. But its long-term complications such as recurrent anastomotic stricture, cholangitis and bile duct stones mainly intrahepatic ones these complications may result in liver cirrhosis and portal hypertension and death if not treated.[1-4]

Trans-hepatic manipulations using interventional radiology can be used for treatment of such complications without need for reoperation however these manipulations could be difficult and liable for complications and failure. In order to avoid these trans-

hepatic manipulations the construction of subcutaneous jejunal access loop was used enabling percutaneous dilatation of strictures and extraction of biliary calculi.[5-7]

Endoscopic management is least invasive and very effective either by dilatation or stenting of the bilio-enteric stricture but it is extremely difficult due to altered anatomy of the Roux-en-Y anastomosis. The jejunal access loop for ERCP was used to enable its use, which could be jejunal loop interposition, subfacial or superficial jejunocutaneous loop, gastric access loop or jejunodudenostomy.[1,6-11]

This study is a prospective one to evaluate the jejunoduodenal access loop in patients presented with biliary stricture and managed with hepaticojejunostomy.

METHODS

This prospective study was done in general surgery department, faculty of medicine, Zagazig University hospitals during the period from January 2016 to December 2018. The study included 23 patients (18 females and 5 males) all needed hepatico-jejunostomy to treat biliary injuries during cholecystectomy, biliary stricture post-cholecystectomy or post-hepaticojejunostomy anastomotic stricture.

Institutional Ethical Committee approval was taken before start of the study. An informed and written consent was taken from all patients included in the study.

The age of the studied group ranged between 26 to 57 years with mean age 37.3±5.1. There was failed trial of ERCP (in post-cholecystectomy patients) and/or failed or difficult trial of percutaneous trans-hepatic balloon dilatation.

All patients were subjected to full history taking, complete physical examination and full laboratory investigations (CBC, liver and kidney function tests and bleeding profile) together with cardiac consultation for patients above 40 years or younger patients with history of cardiac disease. Pelvi-abdominal ultrasonography and magnetic resonance cholangio-pancreatography (MRCP) were done first in all patients to establish the diagnosis of biliary injury or stricture. Trial of ERCP was done in patients with biliary leakage (injury) or stricture post-cholecystectomy for possibility of stenting and/or dilatation and stenting. When failed and in patients with post-hepaticojejunostomy anastomotic stricture, trial of percutaneous transhepatic dilatation and/or stenting was done.

These procedures failed in the studied group, so those patients were prepared for primary hepaticojejunostomy or revision of previous hepaticojejunostomy together with establishment of jejunoduodenal access loop (between the Reux-en-Y loop and first part of duodenum in side to side fashion) to make it easy for future ERCP when needed Figure 1 (A and B). Entero-enterostomy was done about 40 cm distal to the hepatico-jejunostomy. After complete hemostasis the abdomen was closed after putting 2 drains one in subhepatic space and one in the pelvis.

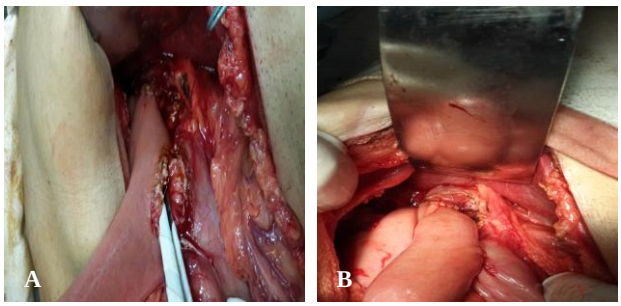

Figure 1: (A) jejunoduodenal anastomosis construction; (B) hepaticojejunostomy and jejunoduodenostomy completed.

Postoperatively, it was the same as any case of intestinal anastomosis. The patients were given antibiotics in the form of third generation cephalosporin, analgesics and IV fluids till start of oral intake (on the 3rd postoperative day on average). The drains were removed after about 5 days where abdominal ultrasonography was done before removal of the drains to exclude any collection. So, the addition of this of jejunoduodenal anastomosis did not need any special considerations in the early postoperative period. Just before discharge of the patient liver function tests were done to confirm decline of bilirubin levels and/or liver enzymes to assess the efficacy of hepaticojejunostomy.

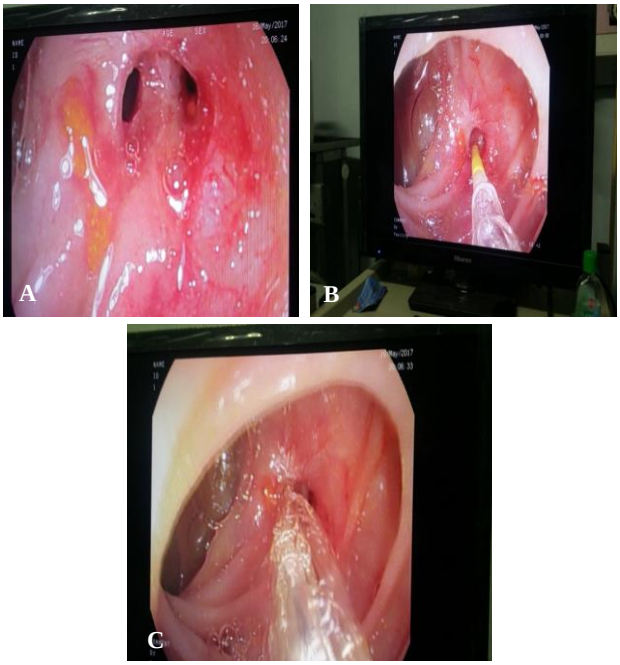

Figure 2 (A-C): Gastroduodenoscopy passed towards the hepaticojejunostomy to visualize the hepatic ducts and endoscopic balloon was passed and inflated to evaluate future possible dilatation whenever needed.

The patients were recommended to have regular weekly visits during the 1st month postoperatively then every month for the next 6 months to be examined clinically and do laboratory investigations to exclude cholangitis or stricture.

For assessment of the jejunoduodenostomy and its future function as access loop, gastroduodenoscopy was done 3 months postoperatively. The endoscopist entered the opening of the jejunoduodenostomy simply just after the pyloric ring then the gastroduodenoscopy was passed towards the hepaticojejunostomy to visualize the hepatic ducts and endoscopic balloon was passed and inflated to evaluate future possible dilatation whenever needed, Figure 2 (A-C).

Statistical analysis

Data collected throughout history, basic clinical examination, laboratory investigations and outcome measures were coded, entered and analyzed using Microsoft Excel software. Data were then imported into Statistical Package for the Social Sciences (SPSS version 20.0) software for analysis. According to the type of data, qualitative data were represented as number and percentage; quantitative data were represented by mean±SD. Differences between frequencies (qualitative variables) and percentages in groups were compared by Chi-square test. Differences between parametric quantitative independent groups by student t -test. Non parametric by Mann Q Whitny, paired by paired t-test. Significant p value was set at <0.05 for significant results and <0.001 for highly significant results.

RESULTS

This study included 23 patients (18 females and 5 males). The age of the studied group ranged between 26 to 57 years with mean age 37.3±5.1 (Table 1).

Table 1: Age and sex distribution among studied group.

Age group (in years)	Number		Total patients n=23
	Male n=5	Female n=18	
30≤40	1	5	6
40≤45	2	6	8
45≤50	1	4	5
50≤55	1	2	3
55≤60	0	1	1

19 (82.6%) patients were presented post-cholecystectomy and 4 (17.4%) patients were presented post-hepaticojejunostomy. Post-cholecystectomy patients (19) had different forms of presentation; 12 (52.2%) patients presented with obstructive jaundice during the first month after cholecystectomy (3 patients after open cholecystectomy and 9 patients post laparoscopic cholecystectomy), 4 (17.4%) patients presented with external biliary fistula (>500 cc/day) through the drain and 3 (13%) patients presented with biloma at the gallbladder bed (proved with ultrasonography and aspiration). Post-hepaticojejunostomy patients (4) were presented as follow; 3 (13%) of them presented with gradual progressive course of obstructive jaundice over about 6 months duration and 1 (4.4%) patient presented with cholangitis (jaundice, fever, pain and chills) (Table 2).

Table 2: Presentations of studied group.

Presentation	No. of patients	Percentage (%)
Post-cholecystectomy		
Obstructive jaundice	12	52.2
Biliary fistula	4	17.4
Biloma	3	13
Post-hepaticojejunostomy		
Obstructive jaundice	3	13
Cholangitis	1	4.4
Total	23	100

Table 3: Level of obstruction or injury according to Bismuth classification.

Level of obstruction or injury.	N	%
At bifurcation	14	60.9
Below bifurcation <2 cm	6	26.1
Below bifurcation >2 cm	3	13

After the initial MRCP and/or ERCP and according to Bismuth classification the level of biliary injury or obstruction was at common hepatic duct bifurcation in 14 (60.9%) patients, <2 cm below the bifurcation in 6 (26.1%) patients and >2 cm below the bifurcation in 3 (13%) (Table 3).

The operative time ranged between 160–240 minutes being longer in post-hepaticojejunostomy and post open cholecystectomy patients mostly due to adhesions and relatively higher level of stricture or injury.

Table 4: Postoperative complications.

Postoperative complications	No. of patients	Percentage (%)
Chest infection	2	8.7
Wound seroma and infection	3	13
Biliary gastritis	2	8.7
Cholangitis (mild)	1	4.4
Anastomotic leakage	0	0
Mortality	0	0

Postoperative complications included; 2 (about 8.7%) patients complicated with chest infection (treated with antibiotics and mucolytics within 10 postoperative days),

3 (13%) patients with wound seroma and infection (treated with repeated dressing under cover of antibiotics), 2 (about 8.7%) patients complicated with biliary gastritis (treated with omeprazole 40 mg infusion twice daily and antiemetic) and 1 (about 4.4%) patient with mild attack of cholangitis (treated with antipyretics and ciprofloxacin infusion). There was no anastomotic leakage or mortality in the studied group (Table 4).

Results of liver functions postoperatively in comparison to preoperative ones are shown in Table 5.

Table 5: Liver functions postoperatively in comparison to preoperative ones.

Liver functions	Preoperatively (mean±SD)	Postoperatively (mean±SD)
Total bilirubin	6.41±2.93	1.2±0.15
Direct bilirubin	4.81±2.43	0.31±0.07
Alkaline phosphatase	268±105.4	62.3±7.03
Albumin	3.04±0.3	3.9±0.3
ALT	194.3±85.94	42.2±2.6
AST	198±84.2	40.9±5.86

The trial of access to the hepaticojejunostomy using gastroduodenoscopy was successful in all cases with ease including trial of balloon dilatation.

The average hospital stay ranged between 5-7 days.

DISCUSSION

Biliary diseases especially gall bladder stones constitute a major part of digestive tract diseases. About 80% of bile duct injuries (BDIs) occur after cholecystectomy, having very bad sequelae for both the patient and the surgeon. Add to this the cost of its repair is about 4.5 to 26 times the cost of usual cholecystectomy. Improper management of these injuries has its own sequences especially recurrent attacks of pyogenic cholangitis that may end with liver transplantation.[12-15]

Since the first LC in the 1990s, BDI incidence became double folded from 0.2% to 0.4% and remained stationary despite advances in knowledge, technique, and technology. Also, the injuries become more compound. Cholecystectomy is responsible for 80% of iatrogenic BDI.[16-18]

Patients with benign biliary stricture are most commonly treated with Roux-en-Y hepaticojejunostomy for reconstruction of the biliary tract. In such patients, there is a relatively high incidence (ranging from 2% to 25%) to develop stricture at the hepaticojejunostomy.[3,19-23] Treatment options of such complication include endoscopic management (considered the best and least invasive option), interventional radiology or reoperation. However, the use of standard gastroduodenoscope showed extreme difficulty, time-consuming procedure associated with high failure rate; all due to altered anatomy of the Roux-en-Y hepaticojejunostomy. To overcome such difficulties many attempts were reported using long enteroscope (either single or double balloon) but their success is limited adding to that the enteroscopes and their accessories are not available in every endoscopy unit.[7,24,25]

On the other hand, modifications of the surgical technique of hepaticojejunostomy construction were tried in order to enable access to HJ; by either endoscopy or interventional radiology. Some authors suggested jejunostomy for one year (the time by which about 90% of strictures occur) then closed, while others suggested subcutaneous jejunostomy that could be accessed and opened under local anesthesia whenever needed. Others recommended construction of interpositioned jejunal loop as conduit and access entry between the duodenum and CBD. Another modification is the use of gastric access through entero-gastostomy or duodenal access through side to side jejuno-duodenostomy.[1, 26-28]

In our study we used the jejunoduodenal anastomosis JDA as our access loop to hepaticojejunostomy because we think it is more physiological compared to gastric access or subcutaneous route and gives better drainage of the bilio-enteric anastomosis.

Our study included 23 patients; 19 patients (82.6%) presented with post-cholecystectomy injuries and 4 patients (17.4%) presented with post-hepaticojejunostomy stricture or cholangitis. There was a predominance of middle aged female patients (18 patients), as they are the population group most susceptible to chronic calcular cholecystitis which is the most common indication for elective cholecystectomy performed for the patients included in this study.

In our study all included patients were diagnosed in the post-operative period. In a study included 33 patients done by Abdel Modaber et al 29 patients (87.9%) were diagnosed postoperatively and 4 patients (12.1%) only were diagnosed intra-operatively.[29] In a study by Agabiti et al they showed that one third of the lesions were discovered intra-operatively from 200 cases of biliary injuries studied following open or laparoscopic cholecystectomy.[30] In another study done by Ibrahim et al they showed that postoperative diagnosis was 95% from a study included 472 patients of biliary injuries following laparoscopic or open cholecystectomy and only 5% of the lesions were discovered intra-operatively.[31]

The main presentation in our study was obstructive jaundice with or without cholangitis; 16 patients (69.6%). Other presentations included biliary fistula (17.4%) and biloma (13%). In a study done by Cameron and Gadacz, 50% of the patients in their study also presented with jaundice, with occasional cholangitis.[32] Another study done by Modaber et al, 70% of patients presented with

obstructive jaundice, 12.1% presented with biliary fistula, and 6% presented with biloma.[29] Schmidt et al showed that obstructive jaundice was the main presentation in their study, accounting for 90% of patients out of 50 patients, while only 4% were presented with biliary fistulae.[33]

In our study, abdominal ultrasound was the first routine investigation done. Dilatation of the intrahepatic biliary radicles was detected in 69.6% of patients (jaundiced patients) and detected the presence of intra-peritoneal collections in 13% of patients (those who presented with a biloma) however it couldn't differentiate accurately bile leak from other postoperative fluid collections such as serous fluid reaction, blood or pus; may be because of similar densities and further diagnosis was done after diagnostic aspiration hence it was negative in 30% of cases. So ultrasound sensitivity in our study sensitivity was 70%. In a study done by Fleming et al, the sensitivity of U/S was 88.89% and in another study done by Chapman et al.[3,34] US had 62% sensitivity where it showed biliary dilatation in 35% of patients and abdominal collections were detected in 30% with. In Abdel Modaber et al their study showed that ultrasound sensitivity was 74%.[29]

In our study, MRCP was done to all patients as a preoperative diagnosis of biliary injury and to delineate the biliary tree. It had a diagnostic accuracy of 100% with sensitivity and specificity of 100%. This is the same results of a study done by Modaber et al and comparable to the results of a study performed by Waleed et al where the overall sensitivity, specificity and accuracy of MRCP in the detection of bile duct lesions in post-cholecystectomy injuries were: 93%, 99% and 97%, respectively.[29,35]

In our study all patients underwent Roux- en Y hepaticojejunostomy with side to side jejunoduodenal anastomosis (JDA) as future access entry to evaluate the hepaticojejunostomy and treat any possible stricture. We found that the construction of jejunoduodenal anastomosis following hepaticojejunostomy was easy as the Roux limb naturally lies in front of the first part of the duodenum making anastomosis easy whether done during primary constructed hepaticojejunostomy or reoperation of strictured hepaticojejunostomy. The postoperative period was the same as any case of intestinal anastomosis, so, the addition of this of jejunoduodenal anastomosis did not need any special considerations in the early postoperative period. Also, the wide stoma created by side to side JDA made the entry of the gastrodudenoscope into the biliary system easy and successful (100%) in all cases. All these advantages coincide with Ramesh et al.[36]

In our study, the overall rate of postoperative morbidity was 34.8% (8 out of 23 patients) including chest infection, wound infection, transient mild gastritis and cholangitis which were all treated medically with no intestinal fistula. In a study done by Ramesh et al, they had 5 patients came with wound infection and two patients had chest infection, but 44.4% of patients developed cholangitis that needed hospital admission and ERCP.[36] Fischer et al had a postoperative complications rate of 39% including postoperative wound and chest infections, sub phrenic collections as well as other long-term complications such as incisional hernia and bile leaks.[37]

We had no postoperative mortality. Also, in Ramesh et al there was no mortality.[36] In a study done by Ibrahim et al the average mortality rate for patients undergoing biliary reconstruction was 4.5%.[31] In another study done by Ardiles et al the mortality rate was 12.5%.[38]

According to Bittner the results of surgery were considered excellent if the patient remained symptoms free and required no further surgery.[39] Patients were considered to have a good result if they had only mild symptoms including rare episode of cholangitis and did not require further surgery. Patients were considered to have a poor result if obstructive jaundice or severe cholangitis developed requiring reoperation, died within 30 days postoperative or died from biliary cirrhosis or liver failure. According to that the results in our study were as follow; the results of surgery were excellent in (100%) compared with 75% in reports of Bittner, 75% in reports of Ardiles et al and 80% in reports of Ibrahim et al.[31,38,39] Those patients showed excellent final results as symptoms were relieved and liver function tests showed normal results. One patient had good result as mild cholangitis occurred in 1 patient (4.4%) compared with 10% in reports of Bittner, 9% in reports of Ardiles et al and 7% in reports of Ibrahim et al.[31,38,39] No poor results compared with 10% in reports of Bittner, 16% in reports of Ardiles et al and 13% in reports of Ibrahim et al.[31,38,39]

CONCLUSION

In conclusion, side-to-side jejunoduodenal anastomosis is a very useful technique as it provides good endoscopic access to hepaticojejunostomy and the intrahepatic ducts and needs more application and further evaluation.

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