

Research Article**A Study on the Operative Management of Biliary Strictures****Bikramjit Pal**

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Abstract: Biliary strictures both benign and malignant, remain one of the most difficult problem encountered by the surgeons. The vast majority of bile duct strictures are iatrogenic and occur mainly as a complication of cholecystectomy, despite greater awareness of the problem and safer techniques of dissection during biliary surgery. Malignant strictures involving the bile ducts remain a major challenge in biliary surgery and may result either from cancers afflicting the ducts, primarily or involving them by extension from the liver, the gallbladder, the pancreas, the papilla of Vater or the duodenum or from adjacent lymph nodes. In our study, this procedure was done in 10 patients (41.7%) where high biliary strictures were found. The surgical management of biliary stricture has reached a level of 66.7% successful outcome in this series due to the selection of an optimum operative procedure and its conduct by following well established principles. Our experience also suggests that an improved operative skill subsequent to greater experience is one of the important determinants of encouraging results.

Keywords: Biliary stricture, Bile duct injury, Cholangiocarcinoma, Left duct (Segment III) approach for high biliary stricture; Roux-en-Y Hepaticojejunostomy.

INTRODUCTION

Biliary strictures both benign and malignant, remain one of the most difficult problem encountered by the surgeons. The vast majority of bile duct strictures are iatrogenic and occur mainly as a complication of cholecystectomy, despite greater awareness of the problem and safer techniques of dissection during biliary surgery. Malignant strictures involving the bile ducts remain a major challenge in biliary surgery and may result either from cancers afflicting the ducts, primarily or involving them by extension from the liver, the gallbladder, the pancreas, the papilla of Vater or the duodenum or from adjacent lymph nodes.

The injuries to the main ducts are nearly always the result of misadventures during operations and therefore a serious reproach to the surgical profession. Indeed injury might occur even in the hands of highly skilled and experienced. Bile duct injury after cholecystectomy and abdominal surgery has a high mortality rate when diagnosed, and is expensive to litigate. The operations to correct strictures are associated with a significant morbidity and mortality, considerable effort has been made in the past to identify the major factors that contribute to the morbidity and mortality of these procedures. The patients are subjected to a battery of investigations leaving them not only physically but mentally and financially drained

before any definite treatment can be started. Of the numerous reconstruction employed, all have been associated with a significant recurrence rate, regardless of the type of repair and long term results are frequently disappointing. As a result, numerous surgical and non-surgical regimens of pre-operative, per-operative, post-operative and palliative management have evolved and debate still continues regarding the best approach. The investigative work up in a suspected case of biliary stricture is on the way to a standardized format with more readily availability of diagnostic aids. In a retrospective and prospective study of the management of both benign and malignant strictures, an attempt has been made to evaluate the influence of several factors on the outcome of the repair of strictures in order to identify the optimal repair techniques for different grades of biliary stricture as per Bismuth classification, with the best possible technique and good long term result and possible recurrence rates.

Claude Couinaud had first described the technique of decompression of high biliary strictures by an approach to the main hepatic ductal system in 1954. The bypass can be done by using the "round ligament" approach to the ducts draining the left lobe, lateral to the ligament teres hepatis. Currently it is the most favourite approach in dealing with difficult high biliary strictures due to good long term results.

METHODS

The study is based on a series of 24 cases over the period of two years; some of them had already undergone reconstructive surgery before this study with the diagnosis of biliary strictures and the others were admitted in the two years of the study with similar diagnosis. Accordingly, these cases are divided into (A) **Retrospective** and (B) **Prospective** groups.

The management of both benign and malignant strictures have been dealt with in this study.

(A) **Retrospective group:**

Only four patients have been included in this study. They were previously admitted for suspected iatrogenic biliary tract injuries in the hospital.

(B) **Prospective group:**

Twenty patients have been included in this study with the diagnosis of biliary stricture on admission. Both benign and malignant strictures are included in the study.

Laboratory investigations:

Apart from the normal routine investigations, liver function test, full coagulation profile, serology tests and serum electrolytes were done.

Imaging studies:

- (a) Ultrasound scan revealed moderate to gross dilatation of both extrahepatic and intrahepatic bile ducts.
- (b) Contrast enhanced CT scan was done in all cases of malignant strictures with successful demonstration of the metastases.
- (c) Endoscopic Retrograde Pancreato-Cholangiogram (ERCP) could be done successfully in twenty cases with demonstration of the lower level of the stricture and in some cases the probable aetiology of the strictures.
- (d) Percutaneous Transhepatic Cholangiogram (PTC) was done in eight cases with successful demonstration of the upper level of the stricture.

In eight patients who had undergone both PTC and ERCP, the site and extent of the biliary stricture were determined specifically.

Intensive pre-operative preparation is the key to success of the treatment of biliary stricture. Adequate time was spent for preparing the patients before subjecting the patients to surgery.

- (a) In the presence of recurrent cholangitis, appropriate antibiotics were selected. The organisms isolated from bile are predominantly bowel commensals and Ampicillin with Sulbactam and Metronidazole are effective against the organisms commonly isolated from bile cultures (5).

In the absence of cholangitis, antibiotic cover was started at least twenty four hours prior to surgery. The same antibiotic regimen was extended to the post-operative period and in some cases switched over to other classes of antimicrobials depending upon the bile culture and sensitivity reports.

- (b) Nutritional status was assessed carefully. The serum albumin level is crucial. Twenty percent salt free albumen was infused pre-operatively in five patients with albumin level less than 2.5 gm/dl. Total Parenteral Nutrition (TPN) was started in 16 patients at least one day prior to surgery.
- (c) Nine patients were detected with anaemia (below 10 gm/dl) and transfused with two units of fresh blood prior to operation.
- (d) All patients received parenteral Vitamin K for consecutive 6 days prior to surgery. The Prothrombin Index was kept above 80%.
- (e) The renal status was assessed carefully in all cases and pre-operative 10% Mannitol was used in fifteen patients.
- (f) Lactulose in combination with Metronidazole and Neomycin or Erythromycin were used for bowel preparation in all cases. Pre-operative oral bile salts and lactulose have been used to reduce the systemic endotoxaemia resulting from increased absorption of intestinal endotoxins into the portal blood and thus, protects post-operative renal functions in obstructive jaundice cases (6).
- (g) All patients were hydrated carefully with correction of serum electrolytes.
- (h) Full pre-operative anaesthetic check-up was performed in all patients.

OPERATIONS

- (a) **Retrospective group:** Out of three patients with iatrogenic strictures (after cholecystectomy), Roux-en-Y choledochojejunostomy with jejunojunostomy was done in one case (PTC revealed a stricture in the supraduodenal part of CBD) while hepaticodochojejunostomy with jejunojunostomy was done in other two cases (PTC revealed Bismuth type I biliary strictures in these patients).

The remaining one patient where PTC revealed Bismuth type III biliary stricture, was managed by the left duct approach (7) to allow a tension free biliary enteric anastomosis.

- (b) **Prospective group:**

Twenty patients with biliary strictures had undergone the following surgical procedures:

1. End to side choledochoduodenostomy in one patient with low down biliary stricture (5%).

2. End to side choledochojejunostomy (Roux-en-Y) with jejunostomy in one case with low down biliary stricture (5%).
3. Side to side choledochojejunostomy with jejunostomy in two cases with mid CBD stricture (10%)
4. End to side hepaticodochojejunostomy (Roux-en-Y) with jejunostomy in two cases of Bismuth II biliary strictures (10%).
5. Side to side hepaticodochojejunostomy (Roux-en-Y) with jejunostomy in three cases of Bismuth type I and II biliary strictures (15%).
6. Left duct (Segment III) approach: Roux-en-Y hepaticojejunostomy followed by

jejunostomy in Bismuth type III and IV biliary strictures; end to side Roux-en-Y in two patients (10%) and side to side Roux-en-Y biliary enteric anastomosis in the remaining nine cases (45%).

The tension free biliary enteric anastomoses were done with interrupted 00 Polyglactin sutures in all cases. Stoma had been at least 3 cm in diameter in all cases. Stents were not used. No attempts were made to do a liver biopsy in any case.

RESULTS

The majority of the cases undergoing repair belong to the two age groups of 20 – 30 years and 40 – 50 years. The mean age of this series is 42.75 years.

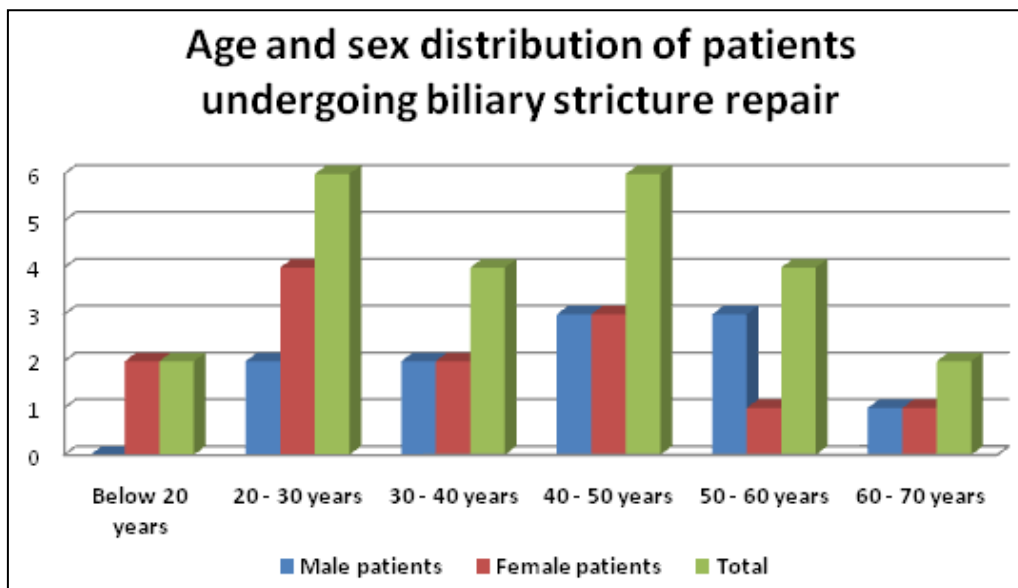


Fig-1: Age and Sex distribution of patients undergoing biliary stricture repair.

The incidence of carcinoma gall bladder was 50% which was confirmed by histopathological examination of bits of gall bladder tissue removed during operation.

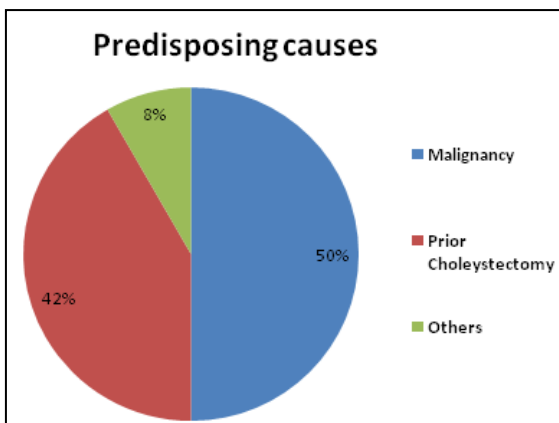


Fig-2: Predisposing causes of biliary strictures.

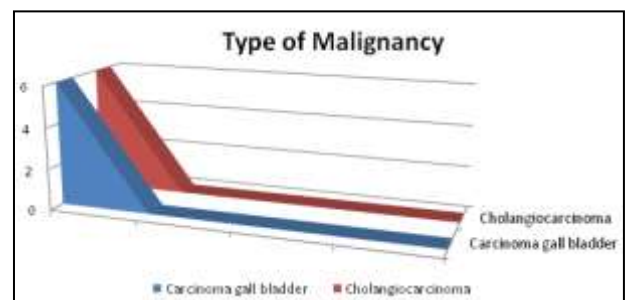


Fig-3: Incidence of malignant strictures.

Types of injury encountered during repair:

In 3 cases, the common bile duct was found to be ligated.

In 3 cases, the common bile duct was found to be transected.

In 4 cases, there was either partial or total transaction of common hepatic duct.

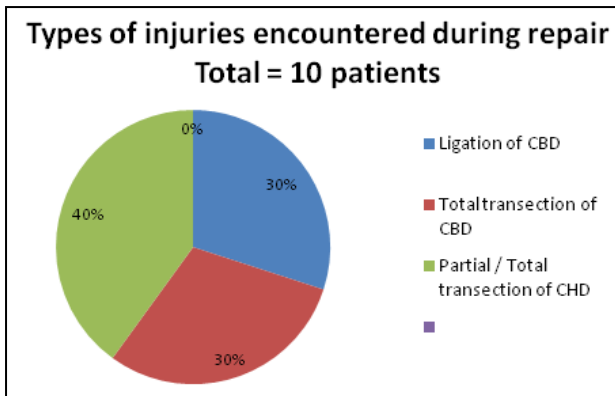


Fig-4: Types of injuries found during repair of the biliary strictures.

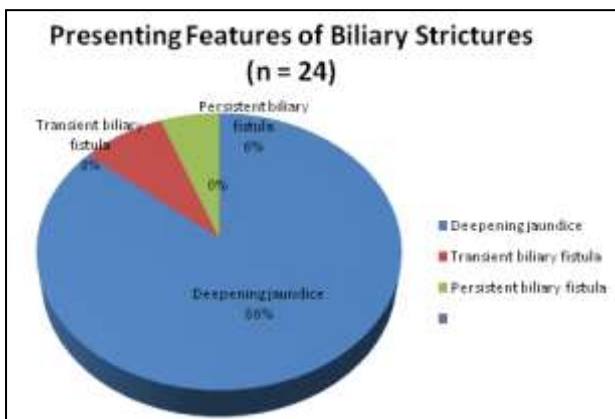


Fig-5: The presenting features of the biliary strictures.

In 21 patients (87.5%), deepening jaundice was the presenting feature; transient leak preceding the stricture was 8.3% and permanent biliary fistula in 4.2% cases. In 80% of cases, there were occasional episodes of cholangitis, which however, was never the presenting feature.

DISCUSSION

The Age and Sex incidence: The mean age of various reported series of benign biliary strictures varies from 42-49 years with a range from the second to eight decade [1,2,3,4]. In our study, the mean age was 42.75 years with the patients concentrated in two age groups; 20-30 years and 40-50 years. A higher concentration of symptomatic gall bladder disease in the latter age group who came for elective or emergency surgery could be the possible explanation [3].

In our series, malignant biliary strictures were mainly concentrated in 50-60 years age group. The mean age group is 50-70 years [5].

Age is considered an important factor in the ultimate outcome of reconstructive surgery [1]. Small ductal anomaly is mainly responsible for injury in patients of age below 30 years [3]. But better results are expected in these patients after reconstructive

procedures [1]. Good results were seen in the four patients less than 30 years in our study.

A high female to male ratio (3:1) was seen in case of benign biliary stricture but in case of malignant strictures, men outnumbered women (2:1) in our study. Males are more frequently affected than females [5] in case of malignant strictures.

The age of sex on the outcome of biliary stricture repair could not be studied. Sex did not influence the outcome [1,6].

Causes of biliary strictures:

80 to 90% of iatrogenic strictures follow elective cholecystectomy and uneventful surgery [7]. In our study, the surgeon was at loss to explain the likely mechanism of injury in most cases.

Peroperative cholangiography was not done in any case during the initial operation. Most series report their use in only 21 to 29% of cases with often inadequate views[3,8].

There are eight deaths in this series – a mortality ratio of 33.3%.

All the deaths that occurred in the post-operative period, were the patients suffering from malignant biliary strictures. One of the patient died within first twenty four hours, four of them died within first week and the rest between two to four weeks after surgery. The last patient died on 82nd post-operative day.

Location of the operative injuries to the biliary tract:

Similar to the earlier reports [4,9,10], the most frequent location of injury as seen during reconstructive surgery was the cystic duct – common bile duct junction. Prof. Henry Bismuth in 1982[11] proposed a classification of biliary strictures based on the length of the superior biliary stump, which he considered an important variable in the successful outcome of reconstructive surgery. The shorter the stump, the more will be the difficulties in repair and worse the prognosis.

The incidence of post-operative complications in relation to mortality:

The overall morbidity rate ranges from 22 – 37% in the difficult group of patients [3,12]. In our study, it was 50%, mostly in patients with malignant biliary strictures. The reported early mortality ranges from 3-18% [12,13]. The overall early mortality rate within first week our series is 25% (6 patients) and all of them were suffering from malignant biliary obstructions. No mortality is recorded in patients with benign biliary strictures.

Period of postoperative follow up:

There is a controversy in the literature as to what constitutes an ideal length of follow up and what

constitutes an ideal repair. Advocated follow up vary from 2 years [14], 3 years [15], 5 years [16]. Prof. J. S. Bolton [7] have shown a 2 years follow up for benign biliary stricture repair to be adequate as most of the recurrences occur in the first two years indicated by attacks of cholangitis. For the purpose of this study we have used a two year follow up. Follow up has been done in 12 out of 24 patients (4 patients lost to follow up and 8 die within 4 weeks of postoperative period). The mean follow up has been 8.2 months with a range of 2 years 1 month to 1 month.

Long term results of Roux-en-Y Hepaticojejunostomy:

The left duct approach was carried out in 10 patients in this series (41.7%) accounting for all high biliary stricture repair. Accounting for 70% of the reconstructive procedure in various series [2,3], it has faced criticism on many points including high operative mortality, technical difficulty and inadequate long term patency of the anastomosis[6,7]. With refined operative technique, this procedure has proved to be an excellent mode of bypass operation.

CONCLUSIONS

The series comprises of 24 patients. Twelve cases were due to benign biliary strictures (Elective Cholecystectomy in 10 cases, 1 due to tuberculous granuloma and 1 due to non-specific inflammatory changes). The likely mechanism of injury was inexplicable in the majority of cases. The most common site of injury was the cystic – common bile duct junction in 4 patients (40%). The presenting feature in all cases of malignant biliary strictures was progressive deepening jaundice.

Alkaline phosphatase elevation was an early and specific indicator in 100% of our cases. Surgical reconstruction of the biliary tree is the main stay of the treatment. Roux-en-Y Hepaticojejunostomy by the left duct approach, is the operation of choice in all cases of high strictures (Types II and IV). It has given good results in surviving two patients. Of the seven deaths following this operation, only two can be due to the procedure itself. Very high mortality rates has been recorded in this procedure as 8 of the 10 patients who had undergone this procedure were suffering from malignant biliary strictures.

Difficult choledochoduodenostomies for Type I strictures is best avoided in favour of Roux-en-Y Hepaticoduchojejunostomy or Choledochojejunostomy.

In our series, Choledochojejunostomy gave excellent results for low strictures in 100% of patients. Other procedures like mucosal graft, liver splits or resections were not done in any case.

Overall successful outcome was seen in 66.7% of the operated cases with 50% morbidity (mostly in

repair for malignant cases) and 33% mortality (in all cases of malignant biliary strictures).

Evaluation of the factors affecting the outcome indicates that:

1. Improved operative techniques gave better results.
2. Lower the age, better is the success rate.
3. Level of stricture: High strictures were managed by left duct approach.
4. Type of operation: Roux-en-Y Hepaticojejunostomy was the operation of first choice.
5. Infection, fluid and electrolyte imbalance, malnutrition, low serum albumin – all adversely influence the outcome.
6. Malignant biliary strictures due to carcinoma gallbladder showed worst results.

For the purpose of this study, follow up by clinical check-up and laboratory investigations has been restricted to two years. There have been no recurrences, so far, in repairs for benign biliary strictures and one patient with cholangiocarcinoma. Recurrence has been reported from one patient who was suffering from cholangiocarcinoma. In conclusion, careful surgery is the only way to avoid iatrogenic biliary strictures and prompt early diagnosis and treatment may be of help in some cases of malignant biliary strictures.

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