

SURGICAL TREATMENT OF CICATRICAL BILIARY STRICTURES

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Background/Aims: Cicatricial biliary strictures are usually associated with high morbidity and mortality rates, frequently related to technical difficulties of their surgical repair, mainly in hilar lesions. Interference with bile duct blood supply during surgical attempts for correction is a major factor for unsuccessful results.

The aim of this study is to evaluate, after an extended follow-up period, the results obtained with a modified technique for surgical correction of cicatricial biliary strictures.

Material and Methods: The medical records of 57 patients surgically treated for cicatricial biliary strictures between January 1984 and July 1995 were reviewed and the immediate and long term results retrospectively analyzed.

There were 46 females and 11 males. The average age was 43 years. The etiology of the biliary lesion was: cholecystectomy alone (23); cholecystectomy with duct exploration (8); T tube CBD drainage (6); Biliary-enteric anastomosis stricture (16); choledochoplasty (2) and trauma (2). In 28 cases (49.1%) the stricture was located at the upper third of the bile duct, in 28 (49.1%) at the middle third and in one case (1.7%) it was low. All patients were submitted to longitudinal Roux-en-Y hepaticojejunostomy with mucosa apposition after dissection of the anterior aspect of the bil-

iary tract. No transanastomotic stents were used.

Results: Ten patients (17.5%) presented 11 postoperative complications: biliary fistula (4); duodenal fistula (1) wound infection (5) and acute pancreatitis (1). Average hospital stay was 11 days and there was no postoperative mortality. The follow-up study was possible in 54 patients and ranged from one to ten years, with an average of 2.9 years. Four patients of 28 (14%) with hilar lesions developed stricture recurrence and cholangitis episodes, whereas no patients bearing lesions below the biliary junction had such complications.

Conclusion: Roux-en-Y hepaticojejunostomy with mucosa apposition without transanastomotic stent performed after minimal dissection of the biliary duct, thus avoiding major interference with the bile duct blood supply, is a safe and efficient method for the surgical repair of cicatricial biliary strictures. Using this technique excellent results can be obtained in the lesions below the biliary junction and acceptable results may be achieved in patients with hilar lesions.

Key Words: Biliary strictures. Surgical repair. Success factors.

Background

Iatrogenic lesions of the extrahepatic biliary tract still represent one of the major causes of benign biliary strictures. Bismuth, in a multicenter trial, reports a 0.2% incidence of biliary lesions following open cholecystectomy. In the advent of laparoscopic cholecystectomy injury to extrahepatic bile ducts became a cause of serious long-term patient morbidity. Recent reviews of results of this technique report a major bile duct injury rate between 0.3 and 0.6 percent. Yet bile duct strictures due to LC are frequently located in the proximal bile ducts what makes them technically difficult to repair. Biliary reconstruction with Roux-en Y anastomosis still remains the treatment of choice of such lesions despite some favorable results reported with

endoscopic or percutaneous stenting. However, the location of the biliary lesion, related to the confluence of the right and left hepatic ducts, appear to be an important factor influencing the outcome of the stricture repair in the long-term follow-up.

In order to make an assessment of the long-term results of the surgical treatment of cicatricial biliary strictures related to their location and to evaluate the long-term results obtained with a modified technique of Roux-en-Y hepaticojejunostomy this report makes a retrospective review of our series.

Material and Methods

The medical records of 57 patients surgically treated for cicatricial biliary strictures between January 1984 and July 1995 were reviewed and the

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Abbreviations: *Laparoscopic cholecystectomy (LC).*

immediate and long term results retrospectively analyzed. There were 46 females and 11 males. The mean age was 43 years (11-72). The causes of the biliary lesions are depicted on **table 1**. All but one of these operations had been done at other institutions. The patient operated on at our department had been submitted to a cholecystectomy with common duct exploration. On 16 occasions attempts of stricture repair had been done elsewhere by means of biliary-enteric anastomosis and secondary strictures of the anastomosis occurred in all the cases. Biliary strictures also occurred in two patients referred to us after attempts of choledocolasty. Fifty-one patients (89.5%) presented episodes of jaundice after the lesion and 38 (66.6%) presented bouts of cholangitis. Plasma bilirubin levels were elevated in 40/55 patients (72.7%) and alkaline phosphatase was above normal values in 44/50 (88%). White blood cell count was elevated in 18 patients (34%). Diagnosis of the biliary obstruction was possible by ecography (US) in 32/38 cases with a sensitivity (S) of 84.2%, by ERCP in 15/16 (S=93.8%) and by percutaneous cholangiogram (PTC) in 21/22 (S=95.4%). In six patients the radiologic study of the biliary tract was obtained through T tube cholangiograms. Despite the high sensitivity of ERCP and PTC the final diagnosis of the biliary stricture was made, in most cases, with the association of the various imaging diagnostic methods.

Strictures of the biliary tree were classified into three different types related to their level (**Table 2**). The results were analyzed after grouping low and mid-level lesions (Group I) which were then compared with the results obtained for the upper level lesion patients (Group II). All patients were submitted to Roux-en-Y hepaticojejunostomy with mucosa apposition according to a technique previously published (10). Only the anterior aspect of the biliary duct was dissected and incised longitudinally above the site of the stricture. The main feature of this technique is that, by avoiding thorough dissection of the injured biliary duct, it does not jeopardize its blood supply. No transanastomotic stents were used. The time elapsed between the biliary lesions and their final correction was, in average, 29.6 months for group I and 25.9 months for group II. No patients of group I presented with portal hypertension and only one patient (3.4 %) had biliary cirrhosis. In group II the incidences of these complications were 1/28 (3.6%) and 3/28 (10.7%), respectively. Statistical analyses were made using the Fisher exact test and the Student's t test. A p value of less than 0.05 was considered to be significant.

Results

There was no postoperative mortality in this series and the average hospital stay was 10.3 * 3.2 days for group I and 12.2 * 6.1 days for group II. The over-

all postoperative morbidity rate was 19.3 percent. There were four biliary fistulas, two in each group, and one duodenal fistula in a patient of group II. All these fistulas healed spontaneously after varied periods of conservative treatment. Five patients, three of group I and two of group II, developed wound infections and one patient of group I presented an acute pancreatitis of mild degree that responded favorably to medical management.

The follow-up study was possible in 54 patients and ranged from one to ten years, with an average of 2.9 years. After 1987 the evaluation of results was made through review of medical records and personal interview of patients or relatives.

Long-term results were considered good when there was no signs of cholestasis and/or biliary infection and poor when any evidence of these complications could be determined clinically, biochemically or by imaging techniques (echography, CT scan, DISIDA scintiscan or percutaneous transhepatic cholangiography). Patients developing secondary biliary cirrhosis were also classified as poor results.

Good results were obtained in 47 patients or 87 percent of the whole series. Though the difference in results of groups I and II is not statistically significant, twenty-seven patients of group I, bearing low or mid stenosis presented favorable outcome (96.4 percent), whereas only 20 of 26 patients in group II, with hilar stenosis, had good long-term results (76.9 percent). No

patients of group I presented signs of late cholestasis or recurrent infection, but four patients of group II did so. In two of them stenosis of the biliary-enteric anastomosis could be demonstrated and were corrected at reoperations. The preoperative cirrhotic patients (one patient in group I and three in group II) kept this condition unchanged at follow-up. No patients without preoperative cirrhosis developed this complication in the post-operative period. There was no statistically significant difference between the time delay from injury to reconstruction in patients with good results of stricture repair (25.2 months) and the seven patients with poor final outcome (34.1 months). **Table 3** summarizes the results in both groups of patients.

Discussion

The importance of cicatricial strictures of the biliary tree is related not only to the severity of these lesions and to their high

morbidity and mortality rates but mainly to the technical problems associated to the surgical management, mainly if the stricture is situated near or at the confluence of the hepatic ducts (5,6,11). Moreover, the incidence of high level bile duct strictures after cholecystectomy has been reported to be over 50 percent of such lesions (7). In the present series it occurred in 49.1 percent of the patients. The previous knowledge of the site of the biliary lesion is of

Tables

Cholecystectomy	23
Cholecystectomy plus CBD exploration	8
CBD external T tube drainage	6
Biliary-enteric anastomosis stricture	16
Choledocolasty	2
Trauma	2

Level	Bismuth type	N
Low stricture	I	1
Mid stricture	II	28
High stricture	III and IV	28

Groups	N	Good	Poor	
			Cholestasis/ Infection	Cirrhosis
I- Low + mid stenosis	28	27	0	1
II- High stenosis	26	20	4*	3*
* One patient of group II had both cholestasis and cirrhosis				

utmost importance for the adequate planning of its surgical repair and the evaluation of the final outcome. Preoperative percutaneous transhepatic cholangiogram should be done routinely to determine the nature and the site of the biliary stricture in relation of the hepatic ducts confluence. The patients with low and mid-level strictures usually have the best prognosis while high-level lesions lead to worse results. Frattaroli et al.(12) recently reported 82.6 percent of

good results after correction of low and mid-level bile duct strictures by bilioenteric anastomosis as opposed to a 70 percent success rate in patients with high-level lesions. These results are in accordance with the present series as we could obtain 96.4 percent and 76.9 percent of good results after correction of medium-level and high-level strictures respectively. The best results obtained in this series for the correction of mid-level strictures could be related to the sur-

gical technique that, avoiding thorough dissection of the biliary duct does not interfere with the duct blood supply.

The results of primary repair of accidental injuries to the biliary ducts that occur during cholecystectomy are generally dismal. Csendes et al. reported a 78 percent rate of strictures following attempts of end to end repair in accidental operative section of the common bile duct (13).

Some reports on percutaneous and endoscopic management of benign biliary strictures have shown high success rates (6,14,15). The Amsterdam group, in a nonrandomized retrospective study showed 83 percent of good results of endoscopic stenting of 66 benign biliary strictures (8). However, in the experience of the Johns Hopkins Medical Institutions a successful outcome was achieved in only 55 percent of balloon dilated strictures as opposed to 88 percent in the surgically treated patients (16). This and other reports conclude that surgical reconstruction by means of biliary enteric anastomosis remains the standard therapy for patients with primary bile duct strictures (6,7), keeping balloon dilatation as an alternative for patients that are at high risk or for those with anastomotic strictures (15,16).

Several techniques of biliary enteric anastomosis have been proposed for repair of postsurgical biliary strictures. The achievement of good results depends upon the fulfillment of the following technical principles: 1. avoid interference to the

vascular supply of the bile duct during the maneuvers to expose its healthy portion above the stricture site; 2. perform a watertight mucomucosal anastomosis without tension between the bile duct and the intestinal loop and 3. perform wide anastomosis of, at least, three to four centimeters.

The proposed modification for the hepaticojejunostomy fully attains all these principles. Featuring minimal dissection of just the anterior aspect of the biliary tract it prevents the duct ischemia that may eventually occur when a thorough dissection of this structure is attempted. Yet it provides an adequate duct exposure making it possible to perform a wide and watertight mucomucosal anastomosis. The Hepp-Couinaud technique (17) provides superior anastomotic durability in the repair of iatrogenic proximal biliary strictures in which the hepatic duct confluence is preserved. Excellent and good results have been reported for this technique in up to 87 percent of the operated cases (18).

In the Bismuth type IV lesions, when the right and the left hepatic ducts are separated by the stricture, a double anastomosis of each duct to the same jejunal loop must be performed as adequate biliary drainage of both liver lobes is essential for elimination of biliary stasis and to prevent postoperative cholangitis (12,19). Discontinuity of the right and left ducts, however, is a major factor influencing failure of the stricture repair in long-term follow-up. In cases

when the approach to the hepatic ducts confluence is unfeasible due to hilar fibrous tissue scarring, drainage of the left lobe through the duct to segment III, approached at the implantation of the round ligament (20), and drainage of the right lobe after partial resection of segment VI (21) are possible alternatives. However, cholangiojejunostomies and bilateral right and left hepatic drainage are difficult and tedious procedures offering less satisfactory results (12).

Besides the site of the biliary lesion other factors interfere with the final outcome of benign biliary strictures repair. The role of transanastomotic stents is still debatable. While some reports suggest that prolonged postoperative biliary stenting may be of value in optimizing the results (6), other groups, in agreement with the findings of the present study, demonstrate that biliary enteric anastomosis for bile duct strictures can be performed without stenting, yielding low postoperative morbidity and excellent long-term patency (22). Moreover, in the early experience of our service prolonged stenting after biliary enteric anastomosis for benign biliary strictures was associated with poor results (23).

The influence of timing of the reconstructive surgery related to the time of the lesion is also frequently discussed. As others (18) we could not demonstrate any influence of time delay from injury to reconstruction in the final patient outcome.

The number of previous attempts at operative repair is

directly related to results achieved (7). In a previous report we were able to demonstrate that satisfactory results after surgical management of benign biliary strictures dropped from 71.4 percent to 30 percent when more than two repair attempts had been tried (23). Prognosis of surgical repair of cicatricial biliary strictures is negatively influenced by highly

located lesions of the biliary tract, the number of previous attempts at surgical repair, prolonged postoperative biliary stenting and interference with the bile duct blood supply. The results of the present study suggest that Roux-en-Y hepaticojejunostomy with mucosa apposition performed after minimal dissection of the injured biliary duct is a safe and efficient

method for the surgical repair of cicatricial biliary strictures. Using this technique excellent results can be obtained in the lesions below the biliary junction and acceptable results may be achieved in patients with hilar lesions. The management of this latter difficult situation still require other surgical techniques yet to be developed.

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