Preoperative biliary drainage and its effect on outcome of surgical obstructive jaundice

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Citation

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Abstract

The routine application of preoperative biliary decompression to patients who have surgical obstructive jaundice has a significant effect on overall morbidity and mortality by allowing selective application of the most appropriate therapeutic modality. Even though there are some complications associated with preoperative biliary drainage, they can be avoided by proper rehydration, antibiotic cover and experience of the endoscopist and these cannot preclude the beneficial effect of surgical preoperative biliary drainage. We conducted a study over a period of three years from January 2002. A total of 140 patients were encountered and randomly divided into two groups of 70 patients each by systematic random sampling. One group was taken for emergency surgery within 24 to 72 hours after diagnostic endoscopic retrograde cholangiography, while the other group was subjected to endoscopic decompression for a period of 4 to 6 weeks before taking them for definitive surgery. The results of these two modalities of management were compared with respect to overall morbidity and mortality. There were less complications and morbidity rates in the endoscopy group as compared to the surgery group. The duration of postoperative hospital stay was significantly shorter in the endoscopy group as compared to the surgery group. Overall mortality in the surgery group was 5.7%, while as it was 1.4% in the endoscopy group. Our conclusion is that patients with surgical obstructive jaundice should undergo preoperative biliary drainage and wait for improvement of overall general condition and biochemical parameters before subjecting them to definitive surgical intervention.

INTRODUCTION

Jaundice is a generic term for the yellow pigmentation of the skin, mucus membranes or sclera, caused by a heterogenous group of disorders. The clinical manifestations of jaundice are the direct result of increased serum levels of bilirubin, a normal metabolite of haemoglobin. Normal serum bilirubin concentration ranges from 0.2 to 1.0 mg/dl. Jaundice is clinically apparent when the serum bilirubin level exceeds 2.5 mg/dl ([8]).

Numerous studies have documented that surgery for severe obstructive jaundice is associated with postoperative mortality and morbidity ([6,8]). The increased risk factors following surgery are a bilirubin greater than 10 mg/dl, age more than 60 years, malignant obstruction, anaemia, leukocytosis more than 10,000/cumm, increased creatinine and hypoalbuminemia less than 3g/dl ([6]).

Surgical obstructive jaundice causes increased exposure to endotoxins by two ways. One is translocation of endotoxins through intestinal mucosa and the other is suppression of functions of the reticuloendothelial system of the liver leading to diminished clearance of endotoxins by Kupffer cells ([6]). Following internal biliary drainage, occurrence of endotoxemia and bacterial translocation to the mesenteric lymphnodes is significantly reduced and cellular immunity restored ([1]).

Till recently, surgery was the only modality for decompression of the biliary tract in surgical obstructive jaundice. But now, many studies have been published in which decompression of the biliary tract was carried by means of endoscopic biliary drainage and percutaneous drainage ([12]).

MATERIAL AND METHODS

The study was conducted in the Department of General Surgery and Gastroenterology at Sher-i-Kashmir Institute of Medical Sciences, Srinagar, Kashmir, India, over a period of three years from January 2002 with further follow-up for a period of 1½ years. A total of 140 patients of surgical obstructive jaundice were registered for the present study. The patients were divided into two groups of 70 patients each by systematic random sampling. One group was taken

for surgical decompression within 24 to 72 hours after ERCP, while the other group was taken initially for preoperative biliary drainage for a period of 4 to 6 weeks followed by surgery, after their general physical condition and other parameters improved. It was a consecutive series of patients.

All the patients were subjected to detailed history, clinical examination, laboratory investigations, ultrasound abdomen and endoscopic retrograde cholangiopancreatography (ERCP) to outline the biliary tree. MRCP was not done in any of the patients as this facility is not available in our institute.

Emergency diagnostic ERCP was performed under the antibiotic cover using local pharyngeal anaesthesia and sedation. After diagnostic evaluation of jaundice, the patients were subjected to endoscopic drainage or surgical drainage. Fifty-four of the patients assigned to surgical treatment (n=70) underwent emergency surgery within 24 hours after completion of diagnostic ERCP while 16 patients with shock, associated pancreatitis and renal failure were taken for surgery after stabilization of vital parameters and correction of physiological disturbances (up to 72 hours). The patients assigned to endoscopic drainage (n=70) were first subjected to one of the following procedures, followed by surgery later on: a) ERCP + endonasal biliary drainage (ENBD) (n=30); b) ERCP + sphincterotomy + ENBD (n=20) and, c) ERCP + sphincterotomy + internal stenting (n=16). Patients who could not be drained endoscopically underwent percutaneous transhepatic biliary drainage (PTBD) (n=4).

The endoscopic drainage group was taken for definitive surgery after subsidence of cholangitis, reduction of bilirubin level, improvement of general conditions and stabilization of liver functions. Bile and blood was sent for culture and sensitivity before and after biliary drainage. The patients were subjected to various surgical procedures depending on underlying cause for surgical obstructive jaundice.

The aim of the study was to compare the results of emergency surgical decompression after ERCP diagnosis with initial endoscopic biliary decompression and delayed surgery for the treatment of surgical obstructive jaundice; a) to know the effect of preoperative biliary drainage on surgical obstructive jaundice viz-a-viz morbidity and mortality; b) to evaluate the complications and morbidity associated with preoperative biliary drainage.

RESULTS

A total of 70 patients were randomly assigned to receive the immediate surgical treatment. Fifty-four patients were taken for surgery within 24 hours and the remaining 16 patients within 72 hours. Seventy patients received endoscopic decompression prior to surgery for a period of 4 to 6 weeks. Both study groups were similar with respect to demographic features, clinical features, prevalence of co-existing medical diseases and prevalence of previous biliary surgeries (Table 1). Thirty-two patients had previously undergone biliary tract surgeries (19 in the endoscopic group and 13 in the surgery group). Sixty-eight patients had associated medical diseases (33 in the surgery group and 35 in the endoscopic decompression group). In the surgery group, 48 (70%) patients had cholelithiasis with CBD and intrahepatic stones. Out of these 48 patients, CBD stones were removed in 21 (30%) patients by ERCP followed by cholecystectomy within 24 to 72 hours, while in the endoscopy group, 51 (74%) had cholelithiasis with CBD and intrahepatic stones. Out of these 51 patients, CBD stones were removed in 19 (29%) patients by ERCP followed by cholecstectomy after 6 weeks. During these 6 weeks, these patients were put on either endonasal biliary drainage tube or internal stent. Sixteen patients had CBD stricture (7 in the surgery group and 9 in the endoscopy group). Three patients had a CBD growth (2 in the surgery group and one in the endoscopy group). Sixteen patients had a periampullary growth (10 in the surgery group and 6 in the endoscopy group). A gall bladder growth was seen in one patient each in the endoscopy and in the surgery group. The laboratory parameters in both groups were comparable at the time of admission (Table 2). ERCP findings in the endoscopy group are shown in table 3.

Figure 1

Table 1: Patient characteristics

	Surgery group (n=70)	Endoscopy group (n=70)
Age (yrs)	42.5±15.1	43.9±16.2
Mean (range)	(16 -73)	(26 -75)
Sex		
Male/female	29/41	25/45
Duration of illness (days)		
Mean (range)	19.5±5.2	17.0±5.0
	(7-39)	(9-43)
Previous biliary surgery	13	19
Clinical features		
Fever	53	49
Abdominal pain	61	58
Jaundice	70	60
Shock at presentation	5	3
Mental confusion	9	7
Associated pancreatitis	3	5
Associated renal failure	8	6
Associated medical diseases	33	35
Pulmonary disease	3	2
Diabetes mellitus	9	14
Cardiac disorder	3	2
Renal disorder	-	1
Hypertension	18	16

Figure 2

Table 2: Laboratory data

	Surgery group (n=70)	Endoscopy group (n=70)
Haemoglobin (mg/dl)	9.3±2.3	9.8±1.8
White blood cell count (10^9)	14.3±5.6	15.1±5.7
Platelet count	140± 71	137 ±67
Blood urea (mg/dl)	73±12	78±14
Sr. Creatinine (mg/dl)	1.4±0.8	1.5±0.6
Sr. Bilirubin (mg/dl)	16.3±21	16.2±25
Sr. Alkaline phosphatase (IU/L)	873±30	746±30
SGOT (IU/L)	258±25	294±27
SGPT (IU/L)	205±18	297±18
Sr. Amylase		
Total protein (g/L)	6.7±0.6	6.9±0.5
Sr. Albumin, (g/dl)	3.1±0.9	3.5±1.2
Coagulation status		
PT	14±1.5	13.7±1.9
Arterial pH	7.4±0.2	7.37±0.2
Positive cultures	48	46
Bile	29	32
Blood	19	14

PT - Prothrombin time

Figure 3

Table 3: ERCP findings in the endoscopy group

ERCP findings	Surgery group (n=70) n (%)	Endoscopy group (n=70) n (%)
Papilla normal	27 (40%)	31 (33.2%)
Papilla bulging	10 (14.2%)	13 (18.5%)
Papilla patulous	12 (17.0%)	11 (15.7%)
Papilla small	10 (14.2%)	7 (10.0%)
Papillary diverticulum	7 (10.0%)	4 (5.7%)
Papillary growth	1 (1.4%)	2 (2.8%)
Ulcerative lesion at papilla	3 (4.2%)	2 (2.8%)
CBD stones with dilated CBD + R & L hepatic ducts	48 (70%)	51 (74%)
Ascaris worms with OCH changes	19 (27%)	21 (30.0%)
Stones impacted at ampulla	5 (7.1%)	7 (10.0%)
CBD strictures	7 (10.0%)	9 (12.85%)
Chronic duodenal ulcers	2 (2.8%)	5 (7.1 %)
Fistula opening	2 (2.8%)	2 (2.8%)

CBD - common bile duct

OCH - oriental cholangiohepatitis

All the patients were put on broad-spectrum antibiotics at the time of hospitalization for a mean period of 5-21 days which were later on changed as per bile and blood cultures. Various organisms which were cultured from bile and blood are

depicted in table 4.

Figure 4

Table 4: Results of blood and bile cultures

	Blood cultures		Bile cultures	
	Surgery group (n=70)	Endoscopy group (n=70)	Surgery group (n=70)	Endoscopy group (n=70)
Positive culture	19(27.1%)	14(20%)	29(41.4%)	32(45.7%)
E.coli	13(68.4%)	11(78.5%)	24(82.7%)	27(84.3%)
Klebsiella	4(25.05%)	3(21.4%)	5(17.2%)	3(9.3%)
Streptococcus fecalis	1(5.2%)	-	-	1(3%)
Citrobacter	1(5.2%)	-	-	1(3%)

A total of 116 patients were taken for a definitive procedure, 52 in the surgery group and 64 in the endoscopy group. Twenty-four patients had only palliative procedures (18 in the surgery group and 6 in the endoscopy group). The operative findings and various procedures done are shown in table 5 and 6, respectively.

Figure 5

Table 5: Intraoperative findings

Intraoperative finding	Surgery group (n=70) (%)	Endoscopy group (n=70) (%)
CBD stones with gall stones	17(24.2%)	23(32.9%)
Gall stones alone	21(30.0%)	19(27.1%)
Rt. and Lt. hepatic duct stones	10(14.2%)	9(17.85)
Worms (dead and alive ascaris worms)	19(27.1%)	21(30.0%)
Hepatolithiasis	3(4.2%)	5(7.1%)
CBD stricture	7(10%)	9(17.8%)
CBD growth (cholangio-ca.)	2(2.8%)	1(1.4%)
Ampullary growth	2(2.8%)	1(1.4%)
Periampullary growth	10(14.2%)	6(8.5%)
Stricture of left hepatic duct with atrophy of left lobe	1(1.4%)	-
Liver cirrhosis	3(4.2%)	2(2.8%)
GB growth	2(2.8%)	1(1.4%)
Duodenal fistula	2(2.8%)	3(4.2%)
Biliary peritonitis	3(4.2%)	1 (1.4%)
Duodenum scarred	1(1.4%)	5(7.1%)
Ascites	3(4.2%)	1 (1.4%)
Collection (Morrison's pouch)	1(1.4%)	-
Liver abscess	3(4.2%)	1(1.4%)
Hepatomegaly	3(4.2%)	1(1.4%)
Cholecystoduodenal fistula	2(2.8%)	5(7.1%)
Mirrizi's syndrome	1(1.4%)	2(2.8%)
Postcholecystectomy CBD ligature	1 (1.4%)	-

Figure 6

Table 6: Procedures performed

Procedure	Surgery group (n=70)	Endoscopy group (n=70)
Cholecystectomy alone	21(30.0%)	19(27.0%)
Choledocholithotomy with T-tube drainage	8 (11.4%)	10(14.2%)
Cholecystectomy with choledochoduodenostomy	9(12.8%)	13(18.6%)
Choledochoduodenostomy	10(14.2%)	9(12.8%)
Pylorus preserving pancreaticoduodenectomy	2(2.8%)	4(5.7%)
Segment III bypass Roux-en-Y-anastomosis	1(1.4%)	2(2.8%)
Hepaticojejunostomy with jejunojejunostomy	11(15.7%)	7(10.0%)
Primary closure of CBD	-	2(2.8%)
Ampullectomy	1 (1.4%)	2(2.8%)
Cholecystojejunostomy with jejunojejunostomy	6(8.5%)	1(1.4%)
Cholecystectomy with choledochostomy with TTD with left hepatic lobectomy	-	1(1.4%)
Transduodenal excision of periamullary tumor	1 (1.4%)	-

TTD = T- tube drainage

CBD=common bile duct

The total duration of drainage in the endoscopy group was 4 to 6 weeks. All these patients had deranged liver functions. The liver function tests were performed before drainage and after drainage. The further evaluation of liver functions was done on day 4, day 7, in the 2nd week, the 4th week and the 6th week and then postoperatively. There was a significant and constant decline in serum bilirubin level by day 4. But the decline in serum bilirubin was not uniform in 37 patients. The decline in serum alkaline phosphatase was uniform and progressive reaching a significant level by day 4. Serum transaminase levels showed an initial rise followed by a rapid fall. Serum albumin initially fell, but remained static thereafter. The liver function returned to almost normal levels by 6 weeks.

The duration of postoperative hospital stay was significantly shorter in the endoscopy group as compared to the surgery group. Ten percent of patients needed ventilatory support for 24 to 96 hours in the surgery group while only 4.2% patients needed ventilatory support for 12 to 48 hours in the endoscopy group. There were fewer complications and lower morbidity rates in the endoscopy group as compared to the

surgery group (Table 7,8,9). Complications occurred in 33 patients (47%) assigned to receive surgery and 19 patients (27%) assigned to receive endoscopic treatment with an overall mortality of 4 (5.7%) in the surgery group and 1 (1.45%) in the endoscopy group.

Figure 7

Table 7: Postoperative complications

	Surgery group (n=70) n(%)	Endoscopy group (n=70) n(%)	p value
Pneumonia	8(11.4%)	5(7.1%)	NS
Basal atelectasis	5(7.1%)	4(5.7%)	NS
Pleural effusion	4(5.7%)	3(4.2%)	NS
Renal failure	5(7.1%)	3(4.2%)	NS
Upper GI bleeding	3(4.2%)	2(2.8%)	NS
Septicemia	5(7.1%)	2(2.8%)	NS
Bleeding from wound site	2(2.8%)	-	NS
Incisional hernia	1 (1.4%)	-	NS

NS - not significant

Figure 8

Table 8: Clinical course and hospitalization

Parameters	Surgery group	Endoscopy group	p value
Ventilatory support	7	3	<0.05 (Sig.)
Time for ventilatory support (hrs)	74±10 (24-96)	38±6 (12-48)	<0.05(Sig.)
Time for stabilization of temperature (hrs)	42±5 (35-36)	36±4 (28-54)	NS
Time for stabilization of BP (hrs)	15±2 (10-20)	14±2 (9-18)	NS
Duration of hospital stay	41.2±14.8	14.8±5.4	<0.5(Sig.)
Mortality	4(5.7%)	1(1.45)	<0.05 (Sig.)

NS - not significant

Figure 9

Table 9: Cause of death

Cause of death	Surgery group n(%)	Endoscopy group n(%)
Continued sepsis	1(1.4%)	1(1.4%)
Pneumonia	1(1.4%)	0
DIC	1(1.4%)	0
Hepatic failure	1(1.4%)	0
Total	4(5.7%)	1(1.4%)

p<0.05

DIC - Disseminated intravascular coagulation

DISCUSSION

Obstructive jaundice is characterised by gradual obstruction of the common bile duct over a period of weeks or months with the resultant increase in bilirubin level with or without pruritis, biliary colic and cholangitis. Painless jaundice occurs in patients with malignancy of the head of the pancreas, bile duct or ampulla of Vater.

The utility of preoperative biliary drainage for patients with surgical obstructive jaundice is controversial. Despite advances in surgical and endoscopic techniques, surgical obstructive jaundice continues to be accompanied by considerable morbidity ([6,12]). Although therapeutic biliary drainage using percutaneous and endoscopic techniques is universally available, their efficacy has not been established. Some studies show that preoperative biliary drainage (PBD) decreases morbidity and mortality rates in patients with surgical obstructive jaundice, but others do not ([5,8,14]). Patients with obstructive jaundice may have renal insufficiency, coagulation defects, hepatic failure, increased endotoxemia, suppressed immunity and increased inflammatory response to operative trauma. These complications have been recently associated with pre-inflammatory state resulting from portal and systemic endotoxemia, bacterial translocation and subsequent activation of the inflammatory cascade leading to a sepsis syndrome ([16]).

The initial experience with preoperative external biliary drainage seemed promising. The concept was that preoperative reduction of serum bilirubin would reduce complications and also influence endotoxemia and intravascular coagulation ([7,9]).

Ruckert et al. (1980) studied the outcome of preoperative biliary drainage in malignant obstructive jaundice and reported that bilirubin level went to normal values within 12

days ([13]). Denning et al. (1981) carried out biliary drainage in 25 patients before definitive pancreatic surgery and concluded that percutaneous transhepatic biliary decompression is a safe and potentially helpful procedure ([4]).

Most of the complications in the preoperative, per-operative and postoperative period in obstructive jaundice have been attributed to hyperbilirubinemia. However, no uniform and universal drop in serum bilirubin has been observed in patients undergoing preoperative biliary drainage ([15]). The time taken for achieving a significant drop in serum bilirubin levels may vary from 4 days to 3 weeks ([15]). Although hepatic function recovery starts immediately after biliary decompression, it may take up to 6 weeks, for complete recovery ([9]). This is in agreement to the results of our study. In our series there was a significant fall in serum bilirubin by day 4, with the liver functions returning to normal by 6 weeks. Inspite of the fact, that endotoxemia decreases following preoperative biliary drainage, low levels of endotoxemia still persist ([15]). An increased incidence of postoperative infective complications like positive cultures, hepatic abscess, biliary subcapsular cysts, pulmonary complications and even death (1-49%) has been reported after preoperative biliary drainage ([9]). These results are not in agreement with the results of our study, as only 19 of our patients managed with endoscopic biliary drainage developed complications with an overall mortality of 1.45%, while 33 of the patients managed with emergency surgery developed complications with an overall mortality of 5.71%. In one of the controlled trials, it has been found that preoperative biliary drainage not only increases morbidity and mortality, but also results in significant dropping of the patients from trial ([8]). This is in contrast to the results of our study, as the patients managed by preoperative biliary drainage in our series had low morbidity and mortality rates as compared to patients managed by emergency surgical decompression. One of the randomized studies has shown that if for any reason surgery needs to be delayed for obstructive jaundice, preoperative biliary drainage can be used without fear of adversely influencing the outcome ([10]). Dos Santos et al. (2005) have reported that presence of an endoscopic biliary drain provokes bacterial colonization, possibly due to combination of residual cholestasis and duodenal reflux to the bile duct, thereby increasing the rate of infective complications during the postoperative period such as cholangitis, liver abscess and pneumonia ([2]). Montano-Loza et al. (2005) analysed a series of 109 patients undergoing pancreatoduodenectomy in order to determine the association between preoperative biliary drainage and postoperative outcome. They concluded that preoperative drainage should not be considered as a routine procedure in patients undergoing pancreato-duodenectomy. But this procedure decreases the risk of postoperative morbidity in patients with cholestasis by about seven times mainly by reducing surgical complications ([11]). This is again in agreement with the results of our study.

From the results of this prospective study, we have found that preoperative biliary decompression has significant effect on overall mortality and morbidity of the patients with surgical obstructive jaundice. When major surgery is required in a patient with surgical obstructive jaundice, biliary drainage should be carried out first for 4-6 weeks, before performing major surgery, to give time for improvement of overall general condition and biochemical parameters. Emergency decompression should be undertaken when endoscopic treatment fails or there is no response to endoscopic decompression.

CONCLUSION

We conclude that preoperative biliary drainage should be performed as a routine procedure in patients with surgical obstructive jaundice and is particularly helpful in patients with poor general condition, deranged liver function, deranged renal functions, immunocompromised state and in malnourished patients. Preoperative biliary drainage should be performed as a two stage procedure to gain time for improvement in general condition and other biochemical parameters, followed by definitive surgery with the resultant decrease in overall morbidity and mortality. Preoperative biliary drainage is safe, effective and easy to perform as compared to surgical decompression of the biliary tract.

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