

# Analysis Of Preoperative Risk Factors Affecting Mortality And Morbidity In Patients After Surgery Of Biliary Tract: A Retrospective Study

D Mishra, P Bhat, G Rodrigues, A Rao

## Citation

D Mishra, P Bhat, G Rodrigues, A Rao. *Analysis Of Preoperative Risk Factors Affecting Mortality And Morbidity In Patients After Surgery Of Biliary Tract: A Retrospective Study*. The Internet Journal of Surgery. 2006 Volume 13 Number 1.

## Abstract

14 preoperative risk factors were evaluated in 78 patients retrospectively which have an effect on postoperative mortality and morbidity undergoing surgery of biliary tract. Risk factors considered were 5 clinical (age, disease, fever, history of jaundice, history of diabetes) and 9 biochemical (hematocrit, total leucocyte count, raised prothrombin time, serum creatinine, serum albumin, serum bilirubin, AST, ALT, ALP). The type of surgery performed was also taken into consideration. Type 1 involved CBD exploration and T tube drainage; Type 2 involved biliary enteric anastomosis; Type 3 involved major surgeries like Whipple's procedure. Patients undergoing Type 3 surgery involving resection of pancreas were at the highest risk of mortality (p value of <0.001). Preoperative risk factors - history of jaundice >21 days (p value <0.02), hematocrit of <30% (p value <0.0005), raised prothrombin time of >1.5 times control (p value <0.05) and a serum albumin of <3.0 g/dl (p value <0.05) contributed significantly to postoperative mortality. There was a proportionately higher mortality in patients >60 years of age and having malignant disease but it was not statistically significant. The complications seen most frequently after biliary surgery in order of frequency were wound infection (21%), pulmonary complications (18%), sepsis (11%), renal failure (7%), urinary tract infection (7%), GI hemorrhage (3%) and abdominal abscess (3%). Postoperative renal failure and sepsis were highly predictive of mortality. Mortality increased as the number of risk factors increased. Surgery after treatment of correctable risk factors decreased postoperative mortality and morbidity.

## INTRODUCTION

Since ages the high mortality and morbidity of the management of jaundiced patient were due to difficulties in diagnosis and due to increased complications of surgery in jaundiced patients.<sup>1,2,3,4,5,6,7,8,9,10,11,12</sup> In present times, with the advent of modern imaging modalities, advanced techniques in surgery and perioperative care, the management of jaundiced patients is revolutionized.<sup>13,14,15,16</sup>

In this study we have tried to identify certain preoperative risk factors in jaundiced patients who undergo surgery of the biliary tract and correlate them with postoperative mortality and morbidity. With proper assessment these factors can be controlled preoperatively leading to a better outcome of surgery.

## MATERIALS AND METHODS

78 Patients were selected who underwent surgery of biliary tract from January 2003 To February 2006. The various risk factors evaluated in these patients are listed in Table 1.

## Figure 1

Table 1: List of risk factors studied.

S. No.	Risk factors	Normal range/no risk	At risk
1	Age(yrs)	< 60 yrs	>60 yrs
2	Disease	benign	malignant
3	Fever( $^{\circ}$ F)	<100	>100
4	History of jaundice	<21 days	>21 days
5	History of DM	Absent	Present
6	Hematocrit	>30%	<30%
7	TLC(/cu mm)	<10000	>10000
8	PT(% of normal)	<1.5 of control	>1.5 of control
9	S. creatinine	<1.5 mg/dl	>1.5 mg/dl
10	S. albumin	>3.0 g/dl	<3.0 g/dl
11	S. total bilirubin	<1.0 mg/dl	>6.0 mg/dl
12	AST*	0 – 35 U/L	>100 U/L
13	ALT*	0 – 35 U/L	>100 U/L
14	ALP*	30 – 120 U/L	>150 U/L

## DEFINITION OF BILIARY TRACT SURGERY

All the operations on the biliary tract planned for relieving obstruction of bile flow and to relieve jaundice were included in the study. Simple cholecystectomy (laparoscopic/open) and liver resections when no biliary anastomosis was undertaken were not taken into study. The

## Analysis Of Preoperative Risk Factors Affecting Mortality And Morbidity In Patients After Surgery Of Biliary Tract: A Retrospective Study

surgeries were classified as three types. Type 1 involved choledochotomy and tube drainage of biliary tree (usually following exploration of CBD and cholecystectomy). Type 2 involved enterotomy, in most cases with biliary enteric anastomosis. Type 3 involved those operations involving major resection of liver or pancreas.

### Type 1

- Cholecystectomy and CBD exploration
- T tube drainage of CBD

### Type 2

- Cholecystojejunostomy
- Choledochoduodenostomy
- Hepaticojejunostomy
- Sphincteroplasty +/- CBD exploration
- Local excision of periampullary tumor

### Type 3

- Pancreaticoduodenectomy (Whipple's procedure)
- Pancreaticoduodenectomy (Total)
- Liver resection + hepaticojejunostomy

Mortality was defined as death in hospital within 30 days of surgery or in the same hospital admission.<sup>1,7,17,18,19,20</sup>

## DEFINITION OF COMPLICATIONS

**RENAL FAILURE:** Patients with normal renal function before surgery (serum creatinine <1.3 mg/dl) in whom it doubled its preoperative value or exceeded > 1.8 mg/dl in postoperative period were taken as having renal failure.

**SEPSIS:** Patients with wound infection or septicemia confirmed by culture or intra abdominal sepsis at subsequent surgery are considered to have sepsis.

**WOUND INFECTION:** Clinically evident by redness, wound discharge and confirmed by culture were taken to have wound infection.

**GASTRO INTESTINAL**

**HEMORRHAGE:** Patients having hematemesis, melena (>500 ml) or significant blood loss (>500 ml) from abdominal wound or drainage sites occurring after day 2 requiring transfusion of 2 or more units of blood.

**ABDOMINAL ABSCESS:** Patients having intra abdominal collection postoperatively demonstrated clinically or by ultrasonography (USG), and on USG guided aspiration confirmed by culture.

**PULMONARY COMPLICATIONS:** Patients developing any respiratory complications like pulmonary thromboembolism, pneumonia, pleural effusion, ARDS, lower lobe atelectasis etc.

**URINARY TRACT INFECTION:** As evident by urine routine/microscopic examination.<sup>20,21,22,23,24,25,26</sup>

## RESULTS

The mean age of the patients undergoing surgery of biliary tract for obstructive jaundice was 53.03 years. Patients who were more than 50 years of age were more prone to develop complications and mortality. Patients who harbor a malignant disease and undergo surgery are at a proportionately higher risk of mortality (14% vs 5%; relative risk of 2.8), (Table 2) though this was not significant as per the p value <0.1.

### Figure 2

Table 2

Diagnosis	No. of cases (n=78)	Mortality	p value*
Benign	35	2 (5%)	<0.1
Malignant	43	6 (14%)	<0.1

\*not significant as per p value

Patients undergoing Type 3 surgery involving resection of pancreas were at the highest risk of mortality (40%) and this association was highly significant as per p value of <0.001 (Table 3).

### Figure 3

Table 3

Type of surgery	No. of patients (n=78)	Mortality (%)	p value
Type 1	17	0 (0%)	-
Type 2	46	2 (4.3%)	<0.1, n.s.
Type 3	15	6 (40%)	<0.001*

\*highly significant as per p value

It was observed that history of jaundice >21 days, preoperative hematocrit of <30%, raised prothrombin time of >1.5 times control and a preoperative serum albumin of <3.0 g/dl contributed significantly to postoperative mortality. Though there was a proportionately higher mortality in patients >60 yrs of age and having malignant disease, it was not statistically significant as compared to other studies.<sup>1,4,8,27,28</sup> the reason for this difference may be

## Analysis Of Preoperative Risk Factors Affecting Mortality And Morbidity In Patients After Surgery Of Biliary Tract: A Retrospective Study

attributed to less number of cases and more proportion of malignant cases (Table 4).

**Figure 4**

Table 4: Risk Factors-Mortality Correlation

S.No.	Risk Factor	No. of cases (%)	Mortality (%)	p value*
1	Age > 60 yrs	26 (33%)	4 (15%)	<0.1, n.s
	< 60 yrs	52 (67%)	4 (07%)	
2	Disease Malignant	43 (55%)	6 (13%)	<0.1, n.s
	Benign	35 (45%)	2 (05%)	
3	Fever >100 F	30 (38%)	3 (10%)	<0.5, n.s
	<100 F	48 (62%)	5 (10%)	
4	H/o Jaundice >21 days	31 (39%)	6 (19%)	<0.02 significant
	< 21 days	47 (61%)	2 (04%)	
5	DM Present	20 (25%)	1 (05%)	<0.5, n.s
	Absent	58 (75%)	7 (12%)	
6	Hematocrit <30%	14 (17%)	5 (35%)	<0.0005 very significant
	>30%	64 (83%)	3 (04%)	
7	TLC >10,000/cu.mm	27 (34%)	3 (11%)	<0.5, n.s
	<10,000/cu.mm	51 (66%)	5 (09%)	
8	PT >1.5 x control	07 (08%)	2 (28%)	<0.05 significant
	<1.5 x control	71 (92%)	6 (08%)	
9	S. Creatinine >1.5 g/dl	07 (08%)	1 (14%)	<0.1, n.s
	< 1.5 mg/dl	71 (92%)	7 (09%)	
10	S. Albumin <3.0 g/dl	27 (34%)	5 (18%)	<0.05 significant
	>3.0 g/dl	51 (66%)	3 (05%)	
11	S. Bilirubin >6.0 mg/dl	44 (56%)	5 (11%)	<0.5, n.s.
	<6.0 mg/dl	34 (44%)	3 (08%)	
12	AST >100 U/L	31 (39%)	3 (09%)	<0.5, n.s.
	<100 U/L	47 (61%)	5 (10%)	
13	ALT >100 U/L	38 (48%)	1 (02%)	<0.5, n.s.
	<100 U/L	40 (52%)	7 (17%)	
14	ALP >150 U/L	64 (82%)	7 (10%)	<0.5, n.s.
	<150 U/L	14 (18%)	1 (07%)	

\*n.s. - not significant

Taking patients individually on the basis of the no of risk factors present and defining them into groups, the mortality in each group was found to be increasing as the number of risk factors associated increased concluding that the more the risk factors present in a patient, the higher is the mortality, (Table 5).

**Figure 5**

Table 5

No. of risk factors	No. of cases (n=78)	Mortality	Percent (%)	p value*
0-2	11	0	0	--
3	5	0	0	--
4	10	0	0	--
5	15	1	6%	<0.1, n.s.
6	12	3	25%	<0.05
7	13	2	15%	<0.1, n.s.
8+	12	2	16%	<0.1, n.s.

\*patients with >2 risk factors versus <2 risk factors, n.s. - not significant

Patients of >60 yrs of age had a higher incidence of postoperative sepsis and pulmonary complications, the reason being reduced immune status and reduced pulmonary compliance. Patients who had fever preoperatively were more prone to develop sepsis, wound infection and pulmonary complications. Patients who had jaundice for >

30 days duration preoperatively were more prone to develop sepsis, renal failure, pulmonary complications and UTI. Patients with a low hematocrit of <30% preoperatively had a higher incidence of sepsis and renal failure. Patients with a higher TLC (>10,000/cumm) had a higher incidence of sepsis and renal failure in postoperative period. Patients with a raised PT >1.5 times of control were more prone to develop sepsis and GI hemorrhage. Patients with a higher serum creatinine preoperatively had a higher incidence of renal failure in the postoperative period. Patients having low serum albumin preoperatively had a higher incidence of renal failure and UTI. Patients with a higher serum bilirubin preoperatively were more prone to develop renal failure, wound infection and UTI. It was seen that raised levels of liver enzymes (AST, ALT and ALP) were not associated with any increased postoperative complications.

It was observed that postoperative renal failure, sepsis and UTI were highly predictive of mortality. The complications seen most frequently after biliary surgery in order of frequency are wound infection (21%), pulmonary complications (18%), sepsis (11%), renal failure (7%), UTI (7%), GI hemorrhage (3%) and abdominal abscess (3%), Table 6.

**Figure 6**

Table 6: Complications-Mortality correlation

Complications	Incidence		Mortality		p value
	No.	%	No.	%	
Renal failure	6	7%	4	66%	<0.00001
Sepsis	9	11%	7	77%	<0.00001
Wound infection	17	21%	4	23%	<0.02
G I Hemorrhage	3	3%	1	33%	<0.1, n.s.*
Abdominal abscess	3	3%	1	33%	<0.1, n.s.*
Pulmonary complications	14	18%	4	28%	<0.01
UTI	6	7%	4	66%	<0.00001

\*n.s. - not significant

## CONCLUSIONS

Patients undergoing type 3 surgery involving resection of pancreas were at the highest risk of mortality and this association was highly significant as per p value of <0.001. It was observed in this study that the preoperative risk factors, i.e., history of jaundice >21 days, preoperative hematocrit of <30%, raised prothrombin time of >1.5 times control and a preoperative serum albumin of <3.0 g/dl contributed significantly to postoperative mortality. Though there was a proportionately higher mortality in patients >60

years of age and having malignant disease, it was not statistically significant as compared to other studies; the reason for this difference may be attributed to less number of cases and more proportion of malignant cases. The complications seen most frequently after biliary surgery in order of frequency were wound infection (21%), pulmonary complications (18%), sepsis (11%), renal failure (7%), UTI (7%), GI hemorrhage (3%) and abdominal abscess (3%). It was observed that postoperative renal failure, sepsis and UTI were highly predictive of postoperative mortality.

## **CORRESPONDENCE TO**

Dr. Gabriel Rodrigues, MS, DNB. Associate Professor of Surgery 0157, KMC Quarters Madhav Nagar Manipal – 576 104, Karnataka, India. Tel: 00919448501301 Fax: 00918202570061 Email: rodricks-gaby@yahoo.co.in

## **References**

1. Pitt HA, Cameron JL, Postier RG, Gadacz TR. Factors affecting mortality in biliary tract surgery. *Am J Surg* 1981; 141: 66-72.
2. Blamey SL, Fearon KCH, Gilmour WH, et al. Prediction of risk in biliary surgery. *Br J Surg* 1983; 70: 535-8.
3. Dixon JM, Armstrong CP, Duffy SW, et al. Factors affecting mortality and morbidity after surgery for obstructive jaundice: a review of 373 patients. *Gut* 1983; 24: 845-52.
4. Gonan JJ, Mueller PR. Ultrasound in obstructive jaundice. Prospective evaluation of site and cause. *Radiology* 1983; 146: 467-9.
5. Elias E, Hamlyn AN. A randomized trial of PTC with Chiba needle v/s ERCP for bile duct visualization in jaundice. *Gastroenterology* 1976; 71: 439-3.
6. Harbin WP. Transhepatic cholangiography complications and use patterns of the fine needle technique. *Radiology* 1980; 135: 15-22.
7. Kriek MJ, Baline JA. 'Skinny needle' cholangiography results of pilot study of a voluntary respective method for gathering risk data on new procedures. *Gastroenterology* 1980; 78: 598-602.
8. Cotton PB. Cannulation of papilla of Vater by endoscopy and retrograde cholangiopancreatography. *Gut* 1972; 13:1014-25.
9. Bilbao MK, Doltes C. Complications of ERCP. *Gastroenterology* 1976; 70: 314-20.
10. Shah H, Deshpande A. Ultrasonography for hepatobiliary disease. *Indian Journal of Surgery* 1985; 47: 7-11.
11. Clements DB, Diamond T, McCrory DC, Rowlands BJ. Biliary drainage in obstructive jaundice: experimental and clinical aspects. *Br J Surg* 1993; 80: 834-42.
12. Fogarty BJM, Parks RW, Rowlands RW, Diamond T. Renal dysfunction in obstructive jaundice. *Br J Surg* 1995; 82: 877-84.
13. Rege RW. Adverse effects of biliary obstruction: implications for treatment of patients with obstructive jaundice. *Am J Roentgenol* 1995; 164: 287-93.
14. Jackman FR, Hilson GRF, Smith R. Bile bacteria in patients with benign bile duct strictures. *Br J Surg* 1980; 67: 329-32.
15. Hunt DR. Identification of risk factors and their application to the management of obstructive jaundice. *Aust NZJ Surg* 1980; 50: 476-80.
16. Bose SM, Lokanadham S, Malani A. Pre and peri operative management of obstructive jaundice. *Ann GI Surg* 1995; 115: 1123-6.
17. Cahill CJ. Prevention of post operative renal failure in patients with obstructive jaundice: the role of bile salts. *Br J Surg* 1983; 70: 590-5.
18. Pain JA, Bailey ME. Experimental and clinical study of lactulose in obstructive jaundice. *Br J Surg* 1986; 73: 775-8.
19. Evans HJR, Torrealba V, Hudd C, et al. The effect of operative bile salt administration on post operative renal failure in patients with obstructive jaundice. *Br J Surg* 1982; 69:706-10.
20. Thompson JN, Cohen J, McConell JS, et al. A random controlled trial of preoperative oral ursodeoxycholic acid in obstructive jaundice. *Br J Surg* 1985; 72: 1027-32.
21. Zigler EJ. Treatment of gram negative bacteremia and shock with human antiserum to mutant E coli. *N Eng J Med* 1982; 307: 1125-30.
22. Ingoldy CJH. Value of polymixin B in endotoxaemia due to experimental obstructive jaundice and mesenteric ischaemia. *Br J Surg* 1980; 67: 565-7.
23. Maitra SK. Properties of binding of E.coli endotoxin to various matrices. *J Clin Microbiol* 1981; 13: 49-53.
24. Suresh Babu J, Bose SM, Wig JD, et al. Biliary bacterial flora in surgical patients with biliary tract disease. *Indian J Gastroenterol* 1988; 7: 93-4.
25. Armstrong CP, Dixon JM, Taylor TV. Wound healing in obstructive jaundice. *Br J Surg* 1984; 71: 267-70.
26. Keighley MR, Razay G, Fitzgerald MG. Influence of diabetes on mortality and morbidity following operations for obstructive jaundice. *Ann R Coll Surg Engl* 1984; 66: 49-51.
27. Bose SM, Babu JS, Wig JD, et al. Relationship of bacteria and other risk factors to complications following biliary tract surgery. *Indian J Surg* 1990;52:579-84
28. Parks RW, Diamond T, McCrory DC, et al. Prospective study of postoperative renal function in obstructive and the effect of perioperative dopamine. *Br J Surg* 1994; 81: 437-9.

**Author Information**

**Dilip Mishra, MBBS, MS**

Department Of General Surgery, Kasturba Medical College

**Padbhanabh Bhat, MS, FRCS**

Department Of General Surgery, Kasturba Medical College

**Gabriel Rodrigues, MS, DNB**

Department Of General Surgery, Kasturba Medical College

**Anand Rao, MS**

Department Of General Surgery, Kasturba Medical College