THE PERIOPERATIVE FACTORS AFFECTING MORTALITY AND MORBIDITY IN PATIENTS UNDERGOING BILIARY SURGERIES

S. Senthilvel¹, S. S. Abhinand², Thangamani³

¹Associate Professor, Department of General Surgery, Pudukkottai Medical College, Tamilnadu.

²Postgraduate Student, Department of General Surgery, KAPV Government Medical College, Trichy.

³Postgraduate Student, Department of General Surgery, KAPV Government Medical College, Trichy.

ABSTRACT

BACKGROUND

Biliary tract surgeries are one of the most common surgeries done by general and laparoscopic surgeons, but mortality and morbidity among the patients undergoing these procedures remains high.

MATERIALS AND METHODS

This is a study of 150 cases of biliary tract disorders diagnosed and treated at KAPV Government Medical College and Mahatma Gandhi Memorial Government Hospital, Tiruchirapalli, Tamilnadu.

RESULTS

The morbidity and mortality remains high among patients with high bilirubin value, preoperative diabetes, raised renal parameters, absence of preoperative biliary drainage and longer duration of surgery.

CONCLUSION

The morbidity and mortality of the patients undergoing biliary surgeries, especially jaundiced patients can be controlled by preoperative biliary drainage, correcting renal parameters and choosing correct mode of surgical technique. Even then biliary tract surgeries are challenging to surgeons.

KEYWORDS

Biliary Tract Surgery, Jaundice, Morbidity and Mortality.

HOW TO CITE THIS ARTICLE: Senthilvel S, Abhinand SS, Thangamani. The perioperative factors affecting mortality and morbidity in patients undergoing biliary surgeries. J. Evolution Med. Dent. Sci. 2017;6(27):2236-2243, DOI: 10.14260/Jemds/2017/482

BACKGROUND

Biliary surgeries especially in patients with perioperative jaundice are challenging¹ even though laparoscopic and endoscopic techniques have improved the visualisation of operative field. The modern investigations delineate the anatomy, but morbidity and mortality remains high for biliary surgeries.

This can be prevented to an extent by proper perioperative care and assessment. With proper assessment, some, if not all, of these factors can be controlled preoperatively leading to a better outcome of surgery. This study tries to identify certain preoperative risk factors in jaundiced patients who undergo surgery of the biliary tract and correlate them with postoperative mortality and morbidity. Around 18 preoperative factors are used to assess the outcome of biliary surgeries.

MATERIALS AND METHODS

Data Collection

This is a study of 150 Cases of biliary tract disease diagnosed and treated at KAPV Government Medical College and

Mahatma Gandhi Memorial Government Hospital, Tiruchirapalli, Tamilnadu for a period of 2 years.

RESULTS

Research Design

Hospital based cross sectional study.

Inclusion Criteria

Only those who consent to enrol in the study and those undergoing surgery in the biliary tract only, with a biliary drainage procedure.

Exclusion Criteria

Those who do not give consent and those undergoing surgery of biliary tract along with some other surgeries in the abdomen and those undergoing emergency biliary surgery following trauma. Cases with surgeries on biliary tract without a biliary drainage procedure are also excluded.

Method of Data Collection

Hospital records, interviewing the patients and also from investigation reports and lab results.

Statistical Analysis

Prevalence of each risk factor is expressed in terms of frequencies and percentages. Morbidity and mortality also is expressed in a similar manner. The relation between the primary and secondary objectives was studied using the Chi square test, with the help of Software, SPSS. Binary logistic

Financial or Other, Competing Interest: None.

Submission 30-01-2016, Peer Review 16-03-2017,

Acceptance 22-03-2017, Published 03-04-2017.

Corresponding Author:

Dr. S. S. Abhinand,

JR Surgery,

KAPV Government Medical College,

Junior Resident Quarters L Block Room No 22,

Trichy- 620001.

E-mail: abhinandss@gmail.com

DOI: 10.14260/Jemds/2017/482

regression was done to find out factors independently predicting the occurrence of morbidity and mortality.

Aims and Objectives

1. **Primary Objective-** To find out the prevalence of preoperative risk factors present in patients undergoing biliary tract surgeries.
2. **Secondary Objective-** To find out the morbidity and mortality among patients undergoing biliary tract surgeries within a followup period of 30 days.

Following Factors are Studied

	Risk Factors	Normal/ No Risk	At Risk
1	AGE	< 60 years	>60 years
2	Disease type	Benign	Malignant
3	Fever	Absent	Present
4	Duration of Jaundice	< 3 weeks	>3 weeks
5	Amount of Bilirubin	<10 mg/dL	>10 mg/dL
6	Hypertension	Absent	Present
7	Diabetes mellitus	Absent	Present
8	Preoperative biliary drainage	Not done	Done
9	Haematocrit	>30%	<30%
10	TLC	<10,000/mm ³	>10,000/mm ³
11	PT-INR	<1.5	>1.5
12	S. Urea	<40 mg/dL	>40 mg/dL
13	S. Creatinine	<1.5 mg/dL	>1.5 mg/dL
14	AST	<100 IU/L	>100 IU/L
15	ALT	<100 IU/L	>100 IU/L
16	ALP	<100 IU/L	>150 IU/L
17	HBV/HCV infection	Absent	Present
18	Ascites	Absent	Present
19	BMI	17.5 – 24	<17.5
20	Operation time	<3 hours	>3 hours
21	Type of surgery	Type 1	Type 2
		Type 3	

Table 1

RESULTS

Interpretation

Out of the 150 patients studied, 80 (53.3%) were male and 70 (46.7.1%) were female. 42.81% had benign and 57.19% had malignant cause for obstruction. 32.5% had fever in the preoperative period and 63.1% had jaundice for more than 3 weeks. 40% of patients had a serum bilirubin level more than 10 mg/dL. 15% had systemic hypertension and 30% had

diabetes mellitus. 31.24% of patients underwent preoperative biliary drainage by endoscopic routes. 20.2% had a haematocrit less than 30 and 30.2% had a total leucocyte count more than 10,000/mm³. PT- INR value was more than 1.5 in 10.1%. 11% of patients had a blood urea value more than 40 mg/dL and 5.2% had serum creatinine levels higher than 1.5 mg/dL in the preoperative period. AST and ALT elevation above 100 IU/L were observed in 34% and 29.8% of patients respectively. Alkaline phosphatase levels in serum was elevated above 150 IU/L in 80.2% of patients. 33.5% had a BMI less than 17.5 and 14.9% had ascites. 66% of the surgeries took more than three hours to complete. 13% of the patients had postoperative renal failure. Surgical site infection occurred in 34% of patients. 9.6% had gastrointestinal haemorrhage and 7.2% patients developed intra-abdominal abscess. Infection and sepsis was observed in 20% and pulmonary complication in 25.6%. The overall mortality observed is 9.4%.

Figure 1

Figure 2

	Patients' Frequency	% Percent	Cumulative Percentage
Absent	127	85.0	85.0
Present	23	15.0	100.0
Total	150	100.0	

Table 2. Frequency and Percentage of Patients with Systemic Hypertension

	Frequency	% Percent	Cumulative Percentage
Absent	105	70.0	70.0
Present	45	30.0	30
Total	150	100.0	100.0

Table 3. Diabetes

Frequency and percentage of patients with diabetes mellitus

Type of Surgery

- Drainage procedure alone- 19%.
- Drainage procedure plus biliary enteric anastomosis- 41%.
- Drainage plus biliary enteric anastomosis plus liver/biliary resection.
- 40% Morbidity.

Figure 3 **Figure 4****Bivariate Analysis**

Bivariate analysis was done using Chi squared test to establish the effect (if any) of each risk factor on the outcome variables (morbidity and mortality). The statistical significance of the effect of each factor on outcome can be determined by the Pearson Chi square value. A value less than 0.05 is taken as statistically significant. Contingency tables were generated between each of the risk factors and outcome variables (morbidity and mortality). Pearson Chi squared test and Fisher's exact test (where numbers were small) were done. Odds ratio was also calculated. The following tables show the statistical significance of association between morbidity/mortality and the risk factors evaluated.

Morbidity

	Risk Factors	Pearson Chi Square	df	P Value	Significance
1	Age more than 60 years	0.527	1	0.487	
2	Malignant disease	6.957	1	0.005	Significant
3	Type of surgery	1.906	2	0.312	
4	Body mass index less than 17.5	0.701	1	0.297	

Table 4. Factors Affecting Renal Failure, Results of Chi-squared test

	Risk Factors	Pearson Chi Square	df	P value	Significance
1	Presence of systemic hypertension	0.077	1	0.678	
2	Presence of diabetes mellitus	5.176	1	0.024	Significant
3	Presence of fever	0.019	1	0.763	

Table 5. Factors Affecting Renal Failure, Results of Chi-squared test

	Risk Factors	Pearson Chi Square	df	P value	Significance
1	Haematocrit less than 30%	4.278	1	0.018	Significant
2	T L C more than 10,000	4.780	1	0.022	Significant
3	PT-INR more than 1.5	0.074	1	0.692	
4	S. Creatinine more than 1.5	2.943	1	0.069	
5	S. Urea more than 40 mg%	4.241	1	0.023	Significant

Table 7. Factors Affecting Renal Failure, Results of Chi-squared test

	Risk Factors	Pearson Chi Square	df	P value	Significance
1	AST more than 100 IU/L	1.071	1	0.301	
2	ALT more than 100 IU/L	0.122	1	0.727	
3	ALP more than 150 IU/L	4.583	1	0.032	Significant

Table 8. Factors Affecting Renal Failure, Results of Chi-squared test

	Risk Factors	Pearson Chi Square	df	P value	Significance
1	Presence of HBV/HCV infection	0.436	1	0.502	
2	Presence of ascites	2.735	1	0.077	
3	Operation time more than 3 hours	5.108	1	0.014	Significant

Table 9. Factors Affecting Renal Failure, Results of Chi-squared test

From Tables 4 - 9, according to Pearson Chi-square test, the factors significantly affecting the development of renal failure are more than 10 mg/dL bilirubin level, duration of jaundice more than 3 weeks, malignant disease, diabetes mellitus, operation time more than 3 hours, high total leucocyte count, low haematocrit, elevated creatinine and a high alkaline phosphatase level. Binary logistic regression was done to identify risk factors which are independent predictors of post-operative renal failure.

Pre-operative bilirubin levels more than 10 mg/dL was the only significant variable which independently predicted renal failure. None of the other factors had any significant independent association

	Risk Factors	Pearson Chi square	Df	P value	Significance
1	Age more than 60 years	0.281	1	0.543	
2	Malignant disease	0.207	1	0.634	
3	Type of surgery	6.241	1	0.014	Significant
4	Body mass index less than 17.5	0.429	2	0.715	

Table 10. Factors Affecting Surgical Site Infection, Results of Chi-squared test

	Risk factors	Pearson Chi square	Df	P value	Significance
1	Presence of systemic hypertension	1.730	1	0.154	
2	Presence of diabetes mellitus	3.546	1	0.029	Significant
3	Presence of fever	0.394	1	0.328	

Table 11. Factors Affecting Surgical Site Infection, Results of Chi-squared test

	Risk Factors	Pearson Chi square	df	P value	Significance
1	Duration of Jaundice more than 3 months	2.920	1	0.140	
2	Amount of Bilirubin more than 10 mg/dL	3.872	1	0.039	Significant
3	Preoperative biliary drainage done	0.204	1	0.577	

Table 12. Factors Affecting Surgical Site Infection, Results of Chi-squared test

	Risk Factors	Pearson Chi Square	Df	P Value	Significance
1	Haematocrit less than 30%	1.993	1	0.174	
2	T L C more than 10,000	10.847	1	0.001	Significant
3	PT-INR more than 1.5	0.037	1	0.895	
4	S. Urea more than 40 mg%	3.959	1	0.036	Significant
5	S. Creatinine more than 1.5	1.974	1	0.181	

Table 13. Factors Affecting Surgical Site Infection, Results of Chi-squared test

	Risk Factors	Pearson Chi square	df	P value	Significance
1	AST more than 100 IU/L	2.769	1	0.076	
2	ALT more than 100 IU/L	3.247	1	0.049	Significant
3	ALP more than 150 IU/L	6.845	1	0.008	Significant

Table 14. Factors Affecting Surgical Site Infection, Results of Chi-squared test

	Risk Factors	Pearson Chi Square	df	P value	Significance
1	Presence of HBV/HCV infection	0.482	1	0.480	
2	Presence of ascites	5.259	1	0.022	Significant
3	Operation time more than 3 hours	1.270	1	0.260	

Table 15. Factors Affecting Surgical Site Infection, Results of Chi-squared test

From the results of Pearson Chi-squared test, it can be interpreted that the factors significantly affecting the occurrence of surgical site infections are alkaline phosphate levels above 150 IU/L, body mass index less than 17.5, WBC count more than 10000, presence of ascites, serum urea levels higher than 40 mg/dL, presence of diabetes mellitus, amount of bilirubin more than 10 mg/dL and ALT levels more than 100 IU/L.

Binary logistic regression identified a single significant independent predictor of surgical site infection, preoperative bilirubin levels more than 10 mg/dL. None of the other factors were independently associated with the development of surgical site infection.

Factors Affecting Gastrointestinal Haemorrhage, Results of Chi-Squared Test

	Risk Factors	Pearson Chi square	df	P value	Significance
1	Age more than 60 years	1.081	1	0.108	
2	Malignant disease	1.002	1	0.292	
3	Type of surgery	2.206	2	0.332	
4	Body mass index less than 17.5	0.781	1	0.362	

Table 16. Factors Affecting Gastrointestinal Haemorrhage, Results of Chi-squared test

	Risk Factors	Pearson Chi square	df	P value	Significance
1	Presence of systemic hypertension	0.320	1	0.491	
2	Presence of diabetes mellitus	0.049	1	0.781	
3	Presence of fever	1.065	1	0.167	

Table 17. Factors Affecting Gastrointestinal Haemorrhage, Results of Chi-squared test

	Risk Factors	Pearson Chi Square	df	P Value	Significance
1	Duration of Jaundice more than 3 months	0.681	1	0.398	
2	Amount of Bilirubin more than 10 mg/dL	5.201	1	0.014	Significant
3	Preoperative biliary drainage done	1.23	1	0.247	

Table 18: Factors Affecting Gastrointestinal Haemorrhage, Results of Chi-squared test

	Risk Factors	Pearson Chi Square	df	P value	Significance
1	Haematocrit less than 30 %	0.587	1	0.391	
2	T L C more than 10,000	12.679	1	0.001	Significant
3	PT-INR more than 1.5	14.632	1	0.001	Significant
4	S. Creatinine more than 1.5	0.129	1	0.472	
5	S. Urea more than 40 mg%	0.385	1	0.535	

Table 19. Factors Affecting Gastrointestinal Haemorrhage, Results of Chi-squared test

	Risk Factors	Pearson Chi Square	df	P Value	Significance
1	AST more than 100 IU/L	0.947	1	0.330	
2	ALT more than 100 IU/L	3.345	1	0.067	
3	ALP more than 150 IU/L	3.966	1	0.046	Significant

Table 20. Factors Affecting Gastrointestinal Haemorrhage, Results of Chi-squared test

	Risk Factors	Pearson Chi Square	df	P Value	Significance
1	Presence of HBV/HCV infection	0.114	1	0.736	
2	Presence of ascites	0.005	1	0.942	
3	Operation time more than 3 hours	1.256	1	0.262	

Table 21. Factors Affecting Gastrointestinal Haemorrhage, Results of Chi-squared test

From the P – values in Chi-squared test, it can be interpreted that the factors associated with the occurrence of gastrointestinal haemorrhage are total leucocyte count more than 10,000/mm³, PT-INR more than 1.5, amount of bilirubin more than 10 mg/dL and alkaline phosphatase level more than 150 IU.

Binary logistic regression was done and found that total leucocyte count above 10,000/mm³ and PT-INR above 1.5 are independently associated with the occurrence of gastrointestinal bleeding.

	Risk Factors	Pearson Chi Square	df	P value	Significance
1	Age more than 60 years	0.327	1	0.519	
2	Malignant disease	0.026	1	0.851	
3	Type of surgery	0.968	2	0.436	
4	Body mass index less than 17.5	0.144	1	0.544	

Table 22. Factors Affecting the Development of Intra-Abdominal Abscess, Results of Chi- squared test

	Risk Factors	Pearson Chi Square	df	P value	Significance
1	Presence of systemic hypertension	0.094	1	0.759	
2	Presence of diabetes mellitus	1.343	1	0.246	
3	Presence of fever	0.500	1	0.986	

Table 23. Factors Affecting the Development of Intra-Abdominal Abscess, Results of Chi- squared test

	Risk Factors	Pearson Chi square	df	P value	Significance
1	Duration of Jaundice more than 3 months	0.279	1	0.597	
2	Amount of Bilirubin more than 10 mg/dL	0.146	1	0.702	
3	Preoperative biliary drainage done	0.278	1	0.598	

Table 24. Factors Affecting the Development of Intra-Abdominal Abscess, Results of Chi- squared test

	Risk Factors	Pearson Chi Square	df	P value	Significance
1	Haematocrit less than 30%	1.451	1	0.228	
2	T L C more than 10,000	1.796	1	0.180	
3	PT-INR more than 1.5	1.045	1	0.307	
4	S. Creatinine more than 1.5	0.043	1	0.836	
5	S. Urea more than 40 mg%	2.870	1	0.090	

Table 25. Factors affecting the development of intra-abdominal abscess, results of Chi- squared test

	Risk Factors	Pearson Chi Square	df	P value	Significance
1	AST more than 100 IU/L	0.786	1	0.375	
2	ALT more than 100 IU/L	2.299	1	0.135	
3	ALP more than 150 IU/L	0.025	1	0.874	

Table 26. Factors Affecting the Development of Intra-Abdominal Abscess, Results of Chi- squared test

	Risk Factors	Pearson Chi Square	df	P value	Significance
1	Presence of HBV/HCV infection	1.600	1	0.206	
2	Presence of ascites	1.592	1	0.207	
3	Operation time more than 3 hours	0.797	1	0.372	

Table 27: Factors Affecting the Development of Intra-Abdominal Abscess, Results of Chi- squared test

From Tables 22 – 27, after performing Chi-squared test, none of the tested factors show any statistically significant association with the occurrence of intra-abdominal abscess.

Factors Affecting Infection and Sepsis, Results of Chi-Squared Test

	Risk Factors	Pearson Chi Square	df	P value	Significance
1	Age more than 60 years	0.029	1	0.745	
2	Malignant disease	5.965	1	0.009	Significant
3	Type of surgery	7.980	2	0.012	Significant
4	Body mass index less than 17.5	8.358	1	0.001	Significant

Table 28. Factors Affecting Infection and Sepsis, Results of Chi-squared test

	Risk Factors	Pearson Chi Square	df	P value	Significance
1	Presence of systemic hypertension	4.404	1	0.019	Significant
2	Presence of diabetes mellitus	12.325	1	0.001	Significant
3	Presence of fever	4.098	1	0.021	Significant

Table 29. Factors Affecting Infection and Sepsis, Results of Chi-squared test

	Risk Factors	Pearson Chi Square	df	P value	Significance
1	Duration of Jaundice more than 3 months	13.686	1	0.001	Significant
2	Amount of Bilirubin more than 10 mg/dL	5.257	1	0.011	Significant
3	Preoperative biliary drainage done	2.240	1	0.108	

Table 30. Factors Affecting Infection and Sepsis, Results of Chi-squared test

	Risk Factors	Pearson Chi Square	df	P value	Significance
1	Haematocrit less than 30%	3.412	1	0.046	
2	T L C more than 10,000	5.270	1	0.029	Significant
3	PT-INR more than 1.5	0.074	1	0.619	
4	S. Creatinine more than 1.5	3.306	1	0.051	
5	S. Urea more than 40 mg%	5.80	1	0.019	Significant

Table 31. Factors Affecting Infection and Sepsis, Results of Chi-squared test

	Risk Factors	Pearson Chi Square	df	P Value	Significance
1	Presence of HBV/HCV infection	0.926	1	0.291	
2	Presence of ascites	6.381	1	0.010	Significant
3	Operation time more than 3 hours	7.226	1	0.006	Significant

Table 32. Factors Affecting Infection and Sepsis, Results of Chi-squared test

From Tables 28-32, according to Pearson Chi-squared test, the factors significantly affecting infective and septic complications are total leucocyte count more than 10000, amount of bilirubin more than 10 mg/dL, body mass index less than 17.5, an operation time more than 3 hours, presence of diabetes mellitus, alkaline phosphatase levels

above 150 IU, the type of surgical procedure, fever, serum creatinine levels higher than 1.5, malignant cause for biliary obstruction, duration of jaundice more than 3 weeks. After applying binary logistic regression, the factors found to have independent association with infective and septic complications are duration of jaundice more than three weeks, diabetes mellitus, elevated serum creatinine value and the type of surgery done.

RESULTS

In our study, it has been interpreted that

1. Renal failure is more common in patients with malignancy, diabetes mellitus, low haematocrit, total leucocyte count more than 10000, urea >40, ALP >150.
2. Surgical site infection varies with type of surgery and its duration, bilirubin >10 mg%, urea >40 mg%.
3. Sepsis is more commonly seen in patients with malignant condition, patients with BMI less than 17.5, systemic hypertension, diabetes mellitus, fever, total leucocyte count >10000, urea >40 mg%, alkaline phosphatase >150, with ascites, duration of surgery >3 hrs.

DISCUSSION

Prevalence of each risk factor in the study population is expressed and compared with morbidity and mortality in postoperative period. Most of the risk factors are non-modifiable. Certain modifiable factors include a low haematocrit and BMI. These can be addressed by giving extra care to the nutrition of the patient in the preoperative period. Even total parenteral nutrition is justified in selected patients, since the concerns regarding mucosal atrophy and bacterial translocation limited its use. Nutritional problems can also be due to anomalous hepatic and biliary dysfunction which should also be cared off.

Renal failure remains an important postoperative problem in surgeries for biliary obstruction.² The percentage of renal failure in current study is 10%. Single most important factor with independent effect on renal failure identified in present study is a preoperative bilirubin level more than 10 mg/dL³. Thus, preoperative biliary drainage may play a significant role in decreasing postoperative renal failure as well.⁴ But here again, careful patient selection is warranted.

The incidence of surgical site in percentage in the present study is 30. The single most important independent predictor of surgical site infection identified by regression analysis is an amount of bilirubin more than 10 mg/dL.⁵ Measures to reduce pre-operative bilirubin values to less than ten percentage should be taken if this potentially serious complication is to be prevented.

Incidence of infection and sepsis in present study is 20%, which is in excess compared to other surgeries and in literature, probably because of the small sample size and in part because of the late presentation of most of our patients to the surgeon. Independent predictors of sepsis identified in regression analysis are duration of jaundice more than three weeks, diabetes mellitus, elevated serum creatinine value and the type of surgery done.⁶ Sepsis is the only complication in the present study which has association with the type of surgery.

Prevention of this complication includes prompt biliary drainage in selected patients, control of infections and reduction of hepatic ascites by medical management. Mortality rates varying between 8 and 33% had been reported in literature for surgeries to relieve biliary obstruction. Mortality rate observed in the present study is 9.4% which is comparable to older studies.⁽¹⁾ The malignant causes for biliary obstruction,⁷ duration of jaundice more than 3 weeks,⁸ amount of bilirubin more than 10 mg/dL⁹ presence of diabetes mellitus, total leucocyte count more than 10000, serum creatinine levels higher than 1.5, alkaline phosphate levels above 150 IU/L, body mass index less than 17.5 and an operation time more than 3 hours were all found significant in the bivariate analysis.

But while taking the inter-relationship of these factors into account and after performing a regression analysis, it was found that operating time more than 3 hours, elevated total leucocyte count (more than 10,000/mm³) and a bilirubin level more than 10 mg/dL are independently associated with a high mortality rate.

Summary

In this hospital based cross sectional study, conducted in a tertiary care centre, over a period of 24 months, a total of 150 cases of biliary obstructions were studied. All of them underwent surgery to relieve biliary obstruction. The prevalence of 21 different risk factors in this study population was identified. The relationship between these 21 clinical, laboratory, and operative parameters to postoperative morbidity and mortality was analysed. Prevalence of the proposed risk factors are expressed in percentage. The relationship of preoperative factors and postoperative complications were analysed using Chi-squared tests and Fisher's exact test where numbers were small. Binary logistic regression was used to test the relationship between the preoperative factors and postoperative mortality. The overall mortality observed is 9.4%. After performing Chi-square tests and binary logistic regression, the factors with independent effect on morbidity and mortality were listed. An operating time more than 3 hours,¹⁰ elevated total leucocyte count (more than 10,000/mm³)¹¹ and a bilirubin level more than 10 mg/dL are independently associated with a high mortality rate. Pre-operative bilirubin levels of more than 10 mg/dL is independently associated with higher incidence of postoperative renal failure and surgical site infection.

Duration of jaundice more than three weeks,¹² diabetes mellitus,¹³ elevated serum creatinine value above 1.5 mg%¹⁴ and the type of surgery done are the independent factors affecting post-operative sepsis. None of the tested variables showed any statistically significant relation with the development of intra-abdominal abscess formation.

CONCLUSION

The morbidity and mortality of the patients undergoing biliary surgeries especially jaundiced patients can be controlled by preoperative biliary drainage, correcting renal parameters and choosing correct mode of surgical technique. Even then biliary tract surgeries are challenging to surgeons.

REFERENCES

- [1] Cherqui D, Benoist S, Malassagne B, et al. Major liver resection for carcinoma in jaundiced patients without preoperative biliary drainage. *Arch Surg* 2000;135(3):302-8.
- [2] Dixon JM, Armstrong CP, Duffy SW, et al. Factors affecting morbidity and mortality after surgery for obstructive jaundice: a review of 373 patients. *Gut* 1983;24(9):845-52.
- [3] de Mendonça A, Vincent JL, Suter PM, et al. Acute renal failure in the ICU: risk factors and outcome evaluated by the SOFA score. *Intensive Care Medicine* 2000;26(7):915-21.
- [4] Poon RT, Fan ST, Lo CM, et al. Improving perioperative outcome expands the role of hepatectomy in management of benign and malignant hepatobiliary diseases: analysis of 1222 consecutive patients from a prospective database. *Ann Surg* 2004;240(4):698-708.
- [5] Collins LA, Samore MH, Roberts MS, et al. Risk factors for invasive fungal infections complicating orthotopic liver transplantation. *J Infect Dis* 1994;170(3):644-52.
- [6] Pérez AJA, González JJ, Baldonado RF, et al. Clinical course, treatment and multivariate analysis of risk factors for pyogenic liver abscess. *Am J Surg* 2001;181(2):177-86.
- [7] Schmassmann A, von Gunten E, Knuchel J, et al. Wallstents versus plastic stents in malignant biliary obstruction: effects of stent patency of the first and second stent on patient compliance and survival. *Am J Gastroenterol* 1996;91(4):654-9.
- [8] Burris HA, Moore MJ, Andersen J, et al. Improvements in survival and clinical benefit with gemcitabine as first-line therapy for patients with advanced pancreas cancer: a randomized trial. *J clin oncol* 1997;15(6):2403-13.
- [9] Goris RJ, te Boekhorst TP, Nuytinck JK, et al. Multiple-organ failure: generalized autodestructive inflammation? *Arch Surg* 1985;120(10):1109-15.
- [10] Trede MI, Schwall G, Saeger HD. Survival after pancreaticoduodenectomy. 118 consecutive resections without an operative mortality. *Ann Surg* 1990;211(4):447-58.
- [11] Pitt HA, Cameron JL, Postier RG, et al. Factors affecting mortality in biliary tract surgery. *Am J Surg* 1981;141(1):66-72.
- [12] Maisels MJ, Kring E. Length of stay, jaundice and hospital readmission. *Pediatrics* 1998;101(6):995-8.
- [13] Pories WJ, Swanson MS, MacDonald KG, et al. Who would have thought it? An operation proves to be the most effective therapy for adult-onset diabetes mellitus. *Ann Surg* 1995;222(3):339-52.
- [14] Gallardo LM, Gutierrez HME, Pérez SG, et al. Risk factors for renal dysfunction in the postoperative course of liver transplant. *Liver transpl* 2004;10(11):1379-85.