

Assessment of Microbiological Profile of Bile in Cholecystectomy Patients: A Microbiological Study

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ABSTRACT

Background: Calculus disease of biliary is one of the most common disorders affecting the gastrointestinal tract constituting a major cause of morbidity. Antimicrobial therapy recommendations state that antibiotics should be administered as soon as the diagnosis of acute cholangitis is suspected or established. Hence; we planned the present study to assess the microbiological profile of bile in cholecystectomy patients.

Materials & Methods: A total of 50 laparoscopic cholecystectomy (LC) patients were included in the present study. 4 cubic cm of bile was aspirated with use of sterile 20 No. spinal needle with 10cc sterile syringe in laparoscopic cholecystectomy. This collected bile from gallbladder during cholecystectomy was transported to the microbiology laboratory in sterile vial. Inoculation of bile for a culture in culture media like brain heart infusion agar, Mac-Conkey agar and blood agar, was done and identification of the organism was done using different biochemical tests.

Results: Escherichia coli, Enterococcus spp., Staphylococcus aureus, Salmonella spp., and Pseudomonas spp. were the

common microorganisms observed in the bile samples in the present study.

Conclusion: Bile infection often complicates gall stone diseases.

Key words: Bile, Microbiological, Cholecystectomy.


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INTRODUCTION

Calculus disease of biliary is one of the most common disorders affecting the gastrointestinal tract constituting a major cause of morbidity. There has been a marked rise in the incidence of gallstone disease in the west during the past century.¹⁻³ Blood cultures provide an opportunity to detect the causative organism but, even in febrile patients with cholangitis, blood cultures remain negative in more than half of the cases. Although definitive management of cholangitis involves the relief of bile stasis, effective empiric antibiotic therapy is an indispensable part of the treatment.⁴ Antimicrobial therapy recommendations state that antibiotics should be administered as soon as the diagnosis of acute cholangitis is suspected or established.⁵⁻⁷

Hence; we planned the present study to assess the microbiological profile of bile in cholecystectomy patients.

MATERIALS & METHODS

The present study was conducted in the Department of Microbiology, Vardhman Institute of Medical sciences; Pawapuri, Nalanda, Bihar (India) and it included assessment of microbiological profile of bile of patients undergoing laparoscopic cholecystectomy (LC).

Ethical approval was obtained from institutional ethical committee and written consent was obtained after explaining in detail the entire research protocol. A total of 50 LC patients were included in the present study. Inclusion criteria for the present study included:

- Patients between the age group of 28 to 60 years,
- Patients with negative history of any other systemic illness,
- Patients with negative history of any known source of sepsis,
- Patients with negative history of ascending cholangitis

Detailed demographic and clinical data of all the patients was obtained.

4 cubic cm of bile was aspirated with use of sterile 20 No. spinal needle with 10cc sterile syringe in laparoscopic cholecystectomy. This collected bile from gallbladder during cholecystectomy was transported to the microbiology laboratory in sterile vial. Inoculation of bile for a culture in culture media like brain heart infusion agar, Mac-Conkey agar and blood agar, was done and identification of the organism was done using different biochemical tests. All the results were summarized in Microsoft excel sheet and were analyzed by SPSS software.

RESULTS

A total of 50 subjects were included in the present study. Mean age of the patients of the present study was 44.5 years. There were 15 males and 35 females in the present study. In 5, 10 and 35 patients, pigmented, cholesterol and mixed type of stones were present respectively. In 15 subjects, microorganisms were present in the bile samples. *Escherichia coli*, *Enterococcus* spps., *Staphylococcus aureus*, *Salmonella* spps., and *Pseudomonas* spp. were the common microorganisms observed in the bile samples in the present study. Non- significant results were obtained while comparing the distribution of type of stones in patients divided on the basis of type of microorganisms in bile samples.

Table 1: Age-wise distribution of subjects

Age group (years)	Number of subjects (n)
18- 30	2
31- 40	6
41- 50	25
51- 60	5
60 and above	12
Total	50

Table 2: Gender-wise distribution of patients

Gender	n
Male	15
Female	35

Table 3: Distribution of patients according to type of stones

Type of stone	n
Pigment	5
Cholesterol	10
Mixed or combined	35

Table 4: Distribution of patients according to presence of microorganisms in bile samples

Microorganisms present in bile samples	n
Yes	15
No	35

Table 5: Type of Bacteria Grown in the positive samples

Bacteria	n
<i>Escherichia coli</i>	6
<i>Enterococcus</i> spps.	3
<i>Staphylococcus aureus</i>	3
<i>Salmonella</i> spps.	2
<i>Pseudomonas</i> spp.	1
Total	15

Table 6: Distribution of type of gall stones in patients divided according to presence of microorganisms in bile samples

Type of stone	Microorganisms		P- value
	Present	Absent	
Pigment	2	3	0.55
Cholesterol	5	5	
Mixed or combined	10	25	
Total	15	35	

DISCUSSION

The presence of bacteria in bile at the time of surgery or invasive diagnostic procedures predisposes to septic complications like septicaemia, liver abscess, hepatic and renal failure, endotoxaemia and disseminated intravascular coagulation and hence the judicious use of prophylactic antibiotics reduce morbidity and mortality due to infection.^{8,9}

A total of 50 subjects were included in the present study. Mean age of the patients of the present study was 44.5 years. There were 15 males and 35 females in the present study. In 5, 10 and 35 patients, pigmented, cholesterol and mixed type of stones were present respectively. Kaya M et al identified the frequency of bacterial growth, the most commonly grown bacteria and their antibiotic susceptibility, and risk factors for bacterial colonization in bile collected from patients with different biliary diseases. Patients with various biliary disorders were included. Bile was aspirated by placing a single-use, 5F, standard sphincterotome catheter into the bile duct before the injection of contrast agent during endoscopic retrograde cholangiopancreatography (ERCP). Bile specimens were transported to the microbiology laboratory in blood culture bottles within an anaerobic transport system. Bacteria were cultured and identified according to the standard protocol used in our clinical microbiology laboratory. The susceptibilities of the organisms recovered were identified using antimicrobial disks, chosen according to the initial gram stain of the positive cultures. Ninety-one patients (27% male, mean age 53.7 ± 17.5 years, range: 17-86 years) were included in the study. The main indication for ERCP was benign biliary disease in 79 patients and malignant disease in 12 patients. The bile culture was positive for bacterial growth in 46 out of 91 (50.5%) patients. The most frequently encountered organisms were Gram-negative bacteria including *Escherichia coli* (28.2%), *Pseudomonas* (17.3%) and *Stenotrophomonas maltophilia* (15.2%). There were no significant differences between patients with malignant and benign disease (58% vs 49%, $P = 0.474$), patients with acute cholangitis and without acute cholangitis (52.9% vs 50%, $P = 0.827$), patients who were empirically administered antibiotics before intervention and not administered (51.4% vs 60.7%, $P = 0.384$), with regard to the bacteriobilia. They observed a large covering spectrum or low resistance to meropenem, amikacin and imipenem. They did not find a significant risk factor for bacteriobilia in patients with biliary obstruction.⁹

In the present study, in 15 subjects, microorganisms were present in the bile samples. *Escherichia coli*, *Enterococcus* spps., *Staphylococcus aureus*, *Salmonella* spps., and *Pseudomonas* spp. were the common microorganisms observed in the bile samples in the present study. Non- significant results were obtained while comparing the distribution of type of stones in patients divided on the basis of type of microorganisms in bile samples. Mahafzah AM et al studied the bacteriological profile, and to determine predictors of bile infection and septic complications following laparoscopic cholecystectomy. This cross-sectional study reviewed 1248 laparoscopic cholecystectomy cases performed between January 1994 and December 2007 by one surgical team at the Jordan University Hospital, Amman, Jordan. Bile cultures were performed for all patients and statistical analysis was performed on culture results and postoperative complications as well as, on the possible predictors of bile infection including age, gender, associated diseases, preoperative

retrograde cholangiopancreatography (ERCP), and indications for surgery. Uncomplicated gallstone disease was diagnosed in 993 patients (79.6%), 221 patients (17.7%) had acute cholecystitis, and 34 patients (2.7%) had jaundice. Associated morbidities were present in 513 patients (41.1%), preoperative ERCP was performed for 132 patients (10.6%), and postoperative septic complications developed in 25 patients (2%). Bile culture was positive in 250 patients (20%), 134 (53.6%) of whom had gram negative bacteria, 73 (29.2%) had gram positive bacteria, and 43 (17.2%) had mixed cultures. The chi-square test has shown that positive bile culture is significantly associated with age, gender, preoperative ERCP, associated morbidities, and complicated gallbladder disease, whereas multinomial regression analysis has shown that age and preoperative ERCP were the only significant predictors of bile infection. Bile infection commonly complicates gallstone disease, and it can be influenced by age and preoperative endoscopic interventions, but it does not influence the occurrence of postoperative septic complications.¹⁰

CONCLUSION

From the above results, the authors conclude that bile infection often complicates gall stone diseases. Hence; special considerations should be given to microorganism susceptibility pattern while prescribing antibiotics in such patients.

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