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Original Article

Bacteriological analysis of bile in laparoscopic cholecystectomy patients

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Abstract

Background

Laparoscopic cholecystectomy is commonly performed operation for symptomatic gall stone disease. The presence of stones within the biliary system is associated with the bacterial colonization of the bile. The aim of this study is to evaluate the bacteriological profile of the bile and to determine appropriate antibiotics for preoperative prophylaxis in laparoscopic cholecystectomy patients.

Material & Methods

A prospective study was carried out in NMCTH, Biratnagar from June2017- May 2018. A total of 100 patients admitted through OPD of our hospital for laparoscopic cholecystectomy were studied. About 5ml of bile aspirated from gall bladder was transported to laboratory in sterile syringe for culture and sensitivity. All age groups and both sex were included.

Results

Bile culture was positive in 16 patients. The most common organisms isolated from bile was *Escherichia coli* (50%) followed by *Klebsiella* species (25%). Histopathological report of all 16 cases revealed chronic cholecystitis. Wound infection was seen in 5% cases and all were bile culture positive. Most sensitive drug was found to be aminoglycoside group followed by piperacilin and tazobactam.

Conclusion

Most common organism isolated from bile culture was *Escherichia coli*. Aminoglycoside group of drugs was found to be more promising compared to other group of drugs. It can be considered as a first line drug for preoperative prophylaxis for patients undergoing laparoscopic cholecystectomy for symptomatic cholelithiasis.

Key Words:

Bacteriology, Bile, Laparoscopic cholecystectomy

Introduction

Laparoscopic cholecystectomy is considered a gold standard treatment for symptomatic gall stone disease [1]. First laparoscopic cholecystectomy was performed by Philip Mouret in France on 1987 [2]. The presence of gall stones within the biliary system is associated with the bacterial colonization of the bile. The bacteria in the bile may go into the systemic circulation whenever there is stasis of bile due to obstruction or any

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surgical intervention. This may lead to sepsis and multiple organs dysfunction syndromes. Bacteria in the bile, is also associated with surgical site infection [3-5]. Therefore this study aims to evaluate the microbiological profile of the bile and to determine appropriate antibiotics for preoperative prophylaxis of the patient undergoing laparoscopic cholecystectomy for symptomatic gall stone disease.

Materials and Methods

Prospective study was conducted from June, 2017 to May, 2018 in Department of General and Minimally Invasive Surgery, Nobel Medical College and Teaching Hospital, Biratnagar after taking ethical clearance from Institutional Review committee. A total of 100 patients admitted through OPD of our hospital for laparoscopic cholecystectomy were included in the study. All the age groups and both sex were included. Patients having symptomatic gall stone disease were diagnosed on the basis of history, clinical examination and were confirmed by ultrasonography of abdomen and pelvis. About 5ml of bile was aspirated during laparoscopic cholecystectomy, in a sterile syringe and transported to laboratory for culture and sensitivity. Patient's demographic data like age, sex was noted. Data were analysed by SPSS software.

Results

Out of 100 patients, 83(83%)were female and 17(17%) were male. Therefore female to male ratio was 4.88:1. Age range of patients included in the study varied between 16 -72 years and maximum patients were found in the age group of 30-39 years (31%) as shown in Table1. Bile culture was sterile in 84 cases (84%)and positive in 16 cases(16%). Bacteria were mostly isolated in patients above 50 years of age(62.5%). *Escherichia coli* was the most common (50%) organism isolated followed by *Klebsiella* species (25%). [Figure1]

Histopathological report of 16 patients, whose bile culture was positive, revealed chronic cholecystitis. Post-operative wound infection was noted in 5 patients with bile culture positivity and most of the organisms were sensitive to drugs like gentamicin and amikacin along with piperacillin and tazobactam as depicted in figure 2.

Table 1. Distribution of age group and gender

Age group	Female	Male	Total
10-19	2	0	2
20-29	13	2	15
30-39	24	7	31
40-49	18	3	21
50-59	14	3	17
60-69	9	0	9
70-79	3	2	5
Total	83	17	100

Figure 1.

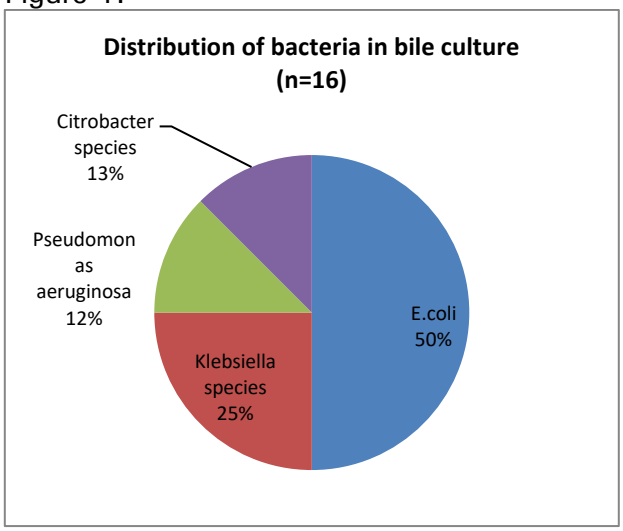
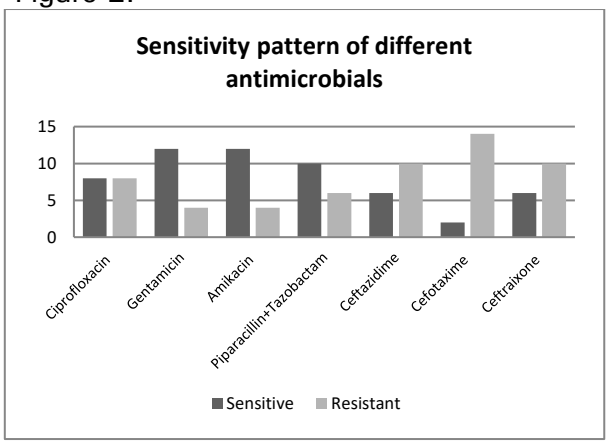


Figure 2.



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Discussion

Bile in biliary system is normally sterile but in the presence of gall stones or biliary tract disease, colonization of bacteria may occur with subsequent infection [6]. In the present study gall stones disease was commonly seen in female patients (83%) compared to male (17%). Maximum numbers of patients were found in 30-39 years' age group (31%).The similar findings were observed in different studies conducted by Bhandari TR et al and Trotman BW et al [7, 8].

Out of 100 patients 16(16%) patients had bile culture positive in our study. Maximum patients (62.5%) with bile culture positivity belonged to age groups of 50-79 years. In different studies bile culture positivity among patients with symptomatic gallstone ranges from 11-30% and it was more significantly seen in elderly patients. [6,9]. Van Leeuren et al found 16.4% positive bile culture which was similar to our study [10]. However in contrast Parekh et al showed 24.3% bile culture positivity with most of the patients belonging to 3rd and 4th decade of life [11].

Gram negative organisms like *Escherichia coli*, *Klebsiella* species, *Proteus* species and *Pseudomonas* species are commonly isolated from infected bile while gram positive bacteria are less commonly encountered [11]. In our study *Escherichia coli* was most common organisms (50%) isolated followed by *Klebsiella* species (25%). Similar findings were seen in the study conducted by Parekh et al and Sahayam et al. But unlike our study these studies also found gram positive organisms like *Staphylococcus aureus* and Coagulase negative staphylococci [11, 12].

In all 16 patients whose bile culture was positive for bacteria, gall bladder histopathological report revealed chronic cholecystitis (100%). Therefore, in our study it was found that incidence of positive bile culture is common in patients with chronic cholecystitis. A study conducted by Alaattin et al also showed the highest incidence of positive culture in patients with chronic cholecystitis (66.7%) [13].

Different studies have concluded that prophylactic antibiotics can prevent post-operative wound infection. Reports show that decreased rates of postoperative wound infection have been seen in patients receiving prophylactic antibiotics than in controls not receiving any treatment. In most of the studies infections was shown to develop only in 5-15% of cases with positive bile culture receiving prophylactic antibiotics [14, 15]. In the present study wound infection was seen only in 5% of cases whose bile culture was positive as prophylactic antibiotic was given to all the patients before surgery.

In our study, sensitivity of the organisms grown (n=16) were tested against different antimicrobials like ciprofloxacin, gentamicin, amikacin, piperacillin and tazobactam, cefotaxime, ceftriaxone and ceftazidime. Most effective drug was amikacin and gentamicin. It was found that sensitivity to aminoglycoside groups of drugs was higher (75%) compared to cephalosporins (30%) in symptomatic gall stone disease. Piperacilin and tazobactam also showed good sensitivity against isolated organisms from bile (62%). Whereas, a study done in India shows good efficacy of cephalosporins as compared to aminoglycosides against organisms isolated from bile, although, sensitivity of the organism to piperacillin and tazobactam is comparable to our study. [11]

Conclusion

It can be concluded that most of patient's bile was sterile, only 16% patient's bile culture showed the growth of bacteria. Most common organisms isolated was *Escherichia* coli(50%). The chance of wound infections was higher in patients

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with positive bile culture. Aminoglycoside group of drugs and Piperacillin and tazobactum showed better sensitivity against isolated organisms and can be considered for first line therapy for preoperative prophylaxis for symptomatic gall stone diseases. There is limitation which has to be considered for future as the study had small sample size and done in single center.

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