DOI: https://doi.org/10.53350/pjmhs2216173

ORIGINAL ARTICLE

Incidence of Positive Bile Culture and Most Common Pathogen involved after Laparoscopic Cholecystectomy in patients of Cholelithiasis

ASHFAQ NASIR KHAN[1], MUHAMMAD NAJAM IQBAL[2], MUHAMMAD ARSHAD ABBAS[3], MUHAMMAD TALAL NASIR[4]
[1]*Associate Surgeon, Capital Hospital Islamabad*
[2]*Assistant Professor of Surgery, Quaid-e-Azam Medical College/ Bahawal Victoria Hospital Bahawalpur*
[3]*Associate Professor Surgery, Shahida Islam Medical College, Lodhran*
[4]*Senior Registrar, Surgical Unit-2, Department of Surgery, Services Hospital, Lahore.*
Correspondence to Dr. Ashfaq Nasir Khan, Email:drashfaqnasir@yahoo.com, Tel. 0300-8717084

ABSTRACT

Background: Laparoscopic cholecystectomy is commonly performed for cholelithiasis. In spite of strict aseptic technique and preoperative antibiotic prophylaxis, there is risk of port site wound infection.
Aim: To study the incidence of positive bile culture and the most common pathogen involved after laparoscopic cholecystectomy in patients of cholelithiasis and its correlation with port site wound infection.
Study design: Cross sectional study
Setting and duration: Bahawal Victoria Hospital Bahawalpur, from 01-01-2019 to 31-12-2020.
Method: One hundre patients of cholelithiasis between 18-75 years of age underwent laparoscopic cholecystectomy. Prophylactic antibiotic was given. Bile with gall bladder was collected and sent for culture. Bacterial growth was recorded as positive bile culture. Organism type was recorded. Stone/stones size was also measured. Data was collected on a proforma which included demographics details like name, age, gender, BMI, clinical features, size of calculi, culture report (positive bile culture if some bacteria is isolated and negative no growth) and type of bacteria isolated and frequency of port site wound infection. Data was analyzed on SPSS version 21.
Results: The mean age of the patients was 42.44±16.58 years and male to female ratio of the patients was 1:1.8. The mean BMI of the patients was 25.93±4.67 kg/m2. Bile culture for bacteria was positive in 30(30%) patients and the most common organism was E coli 13(43.33%.78%). Positive bile culture was detected in 20 (20%) male patients and 10 female patients. There was significant correlation between positive bile culture and gender (p value < 0.001). Port site wound was infected in 6 (6%) patients and in all the patients bile culture was also positive.
Conclusion: Bile culture was positive in 30% patients of cholelithiasis undergoing laparoscopic cholecystectomy and wound infection was present in 6% patients and all the 6% patients were bile culture positive .
Keywords: Cholelithiasis, Culture, Organism, Laparoscopic cholecystectomy

INTRODUCTION

Gallstones are present in about 10-15% of the adult population. Between 1-4% people become symptomatic each year. Among the digestive diseases requiring hospitalization, gallstones disease is the most common.[1] In Pakistan, prevalence of gallstones in patients above 40 and 60 years is 8% and 20% respectively.[2] Gallstones are the most common biliary pathology responsible for more than 95% of biliary tract diseases and is the commonest indication for abdominal surgery[3] . Different factors have been implicated in the causation of gallstones amongst which infection of the bile is also important factor.[4] Bacteria can be found in most pure stone (i.e. >90% cholesterol) . Commonly involved bacteria are E.coli 47.2%, klebsiella 25%, pseudomonas 16.7%, salmonella typhi 2.8%, staphylococcus aureus 5.6% and bacteroids fragalis 2.8%[5]. In an Indian study, bile culture was positive in 40%. The most common organism was E. Coli isolated in 70% cases, followed by klebseilla in 20% cases[6]. As there is risk of acute cholecystititis and pancreatitis, the treatment for gall stones disease is cholecystectomy which is most commonly performed in general surgery and laparoscopic cholecystectomy (LC) is usually considered a safe operation with decreased morbidity[7]. Removal of the gallbladder through camera port is associated with higher incidence of infection[8]. Upto 6.3% wound infection is reported following laparoscopic cholecystectomy which is the most common complication[9].

The objective of this study is to find how many patients of cholelithiasis has positive bile culture and which is the most common pathogen involved and how many patients who were bile positive developed port site wound infection. The rationale of our study is to start empirical antibiotic against the most common pathogens so that wound infection can be decreased further.

Received on 29-07-2021
Accepted on 19-12-2021

MATERIAL AND METHODS

This cross sectional study was conducted in surgical unit -2 Bahawal Victoria Hospital Bahawalpur from 01-01-2019 to 31-12-2020 after the approval from Institutional Ethical Review Board. This study consisted of 100 patients. All patients of cholelithiasis diagnosed on ultrasonography between 18 -76 years of age were admitted from outpatient department and included in the study. Patients who had preoperative diagnosis of acute cholecystitis, empyma, mucocele, perforated gallbladder and patients with history of instrumentation of biliary tree (e.g. ERCP, PTBD, PTC, Stenting etc) were excluded from the study. Data was collected on a proforma which included demographics details like name, age, gender, BMI, clinical features, size of calculi, culture report (positive bile culture if some bacteria is isolated and negative no growth) and type of bacteria isolated and frequency of port site wound infection. All patients underwent laproscopic cholecystectomy .Gall bladder with bile was sent for culture. Patients with positive bile culture were managed as per hospital protocol. Statistical analysis was done using Statistical package for Social Sciences (SPSS) version 21 and p value <0.05 was considered significant.

RESULTS

This study consisted of total 100 patients. Minimum age was 18 years and maximum age was 70 years with the mean age of the patients was 42.44±16.58 years. In this study 36(36%) patients were male whereas 64(64%) patients were females. Male to female ratio of the patients was 1:18.

Mean BMI of the patients was 25.93±4.67kg/m^2. The positive bile culture was found in 30(30%) patients. E coli organism was found in 13(43.33%) patients followed by Pseudomonas 7(23.33%), Klebsiella 5(16.66%), S. aureus 2(6.66%) patients, and Salmonella, enterobacter and proteus were found in 1,1 and 1 (3.33%) patients respectively as shown in table No.1

Fig. 1:

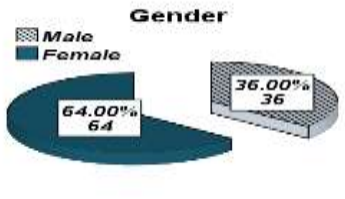

Table 1: Frequency of organisms found in culture

Organism isolated	Frequency	%age
Ecoli	13	43.33%
Pseudomonas	7	23.33%
Klebsiella	5	16.66%
S. aureus	2	6.66%
Salmonella	1	3.33%
enterobacter	1	3.33%
proteus	1	3.33%

According to this study in those patients whose age was ≤ 50 years, the positive bile culture was found in 14(22.22%) out of 63 patients whereas in patients with age >50 years, the positive bile culture was found in 16(43.24%) out of 37patients but there was no significant correlation between age and bile culture as shown in table 2

Table 2: Comparison of bile culture between age groups

Age groups	Bile Culture		Total
	Positive	Negative	
≤ 50	14	49	63
	22.22%	77.78%	100.0%
>50	16	21	37
	43.24%	56.76%	100.0%
Total	30	70	100
	30.0%	70.0%	100.0%

P value 0.884

The study results showed that among male patients, the positive bile culture was found in 20(55.56%) patients whereas among female patients, the positive bile culture was found in 10(15.62%) patients and statistically there is significant correlation between the gender and bile culture of the patients as shown in table 3.

Table 3: Comparison of bile culture between gender

Gender	Bile Culture		Total
	Positive	Negative	
Male	20	16	36
	55.56%	44.44%	100.0%
Female	10	54	64
	15.62%	84.38%	100.0%
Total	30	70	100
	30.0%	70.0%	100.0%

P value <0.001

In this study among patients with normal BMI, the positive bile culture was found in 12(27.9%) patients whereas among overweight & obese patients according to BMI, the positive bile culture was found in 18(31.57%) patients. Statistically there is no significant correlation between the BMI and bile culture of the patients as shown in table 4

Table 4: Comparison of bile culture and BMI

BMI	Bile Culture		Total
	Positive	Negative	
Normal	12	31	43
	27.90%	72.10%	100.0%
Overweight & obese	18	49	57
	31.57%	68.43%	100.0%
Total	30	70	100
	30.0%	55.0%	100.0%

P value 0.584

Bile culture was positive in 12 patients where duration of disease was ≤ 5 years and in 18 patients where duration of disease was >5 years but there was no significant correlation between the two as shown in table No 5.

Table 5: Comparison of bile culture and duration of diagnosis

Duration of disease	Bile Culture		Total
	Positive	Negative	
≤5 Years	12	36	48
	30.005%	40.00%	100.0%
>5 Years	18	34	52
	34.61%	65.39%	100.0%
Total	30	70	100
	30.0%	70.0%	100.0%

P value: 0.148

There was no significant correlation between size of stone and bile culture. As shown in table No.6.

Table 6: Comparison of bile culture and stone size (MM)

Stone size (mm)	Bile Culture		Total
	Positive	Negative	
≤5	6	7	13
	46.15%	53.85%	100.0%
>5	24	63	87
	27.58%	72.42%	100.0%
Total	30	70	100
	30.0%	70.0%	100.0%

P value: 0.199

There were 6 patients who suffered from port site wound infection and bile culture was positive in all 6 patients. Table No.7

Table 7: Frequency of wound infection

Gender	Wound infection	%age	Positive bile culture
Male	**3**	**3%**	**3**
Female	**3**	**3%**	**3**
Total	**6**	**6%**	**6**

DISCUSSION

Gallbladder disease is the commonest indication for abdominal surgery and is the second most common intra-abdominal operation performed in the western countries. Gall stones are responsible for more than 95% of biliary tract disease. Cholecystitis and cholelithiasis are prevalent in certain regions of the world and has been reported in 54% of the adults above 21 years of age[10,11]. In our study patients age ranged between 18-70 years and mean age was 42.44 years. Mir M et al also described mean age of 43 years[12]. The positive bile culture was found in 16(43.24%) out of 37patients in more than 50 years of age patients in our study. Gill et al. also stated that patients older than 60 years had a bactobilia ratio of 63%, whereas only 14% of the patients under 30 years had positivity in their bile culture.[13]In our study 36(36%) patients were male whereas 64(64%) patients were females. Male to female ratio of the patients was 1:1.8. Similar results were also reported by other study that prevalence of cholelithiasis is higher in female than in male.[14]In our study the positive bile culture was found in 30(30%) patients. Same results were documented by Martin LF et al[15]. In an Indian study, positive bile culture reported in 40% patients[6]. TS Malatani et al[16] in their study observed positive culture in 41 patients (27%) but here 9 out of those 41 patients (22%) had acute cholecystitis . In our study E coli organism was found in 13(43.33%) patients followed by Pseudomonas 7(23.33%), Klebsiella 5(16.66%), S. aureus 2(6.66%) patients, and Salmonella, enterobacter and proteus were found in 1,1 and 1(3.33%) patients respectively. Cheslyn-Curtis S et al[17] also presented that the E. coli was the most common isolate 13(26%) and Enterobacter was the second one 9(18%) followed by Salmonella Typhi 7(14%), Coagolase-negative staphylococcus 6(12%), Klebsiella pneumoniae 2(4%) and Proteus 2(4%) in their study. Eslami et al.'s work conducted in Iran indicated E. coli (25%)

as the most prevalent isolated bacterium, and the prevalence of Klebsiella, Aerobacter, Pseudomonas, Enterococci, and Proteus was 12%, 10%, 9%, 8% and 3% respectively[18]. In a study conducted by L Cen et al, bacteria isolated from bile culture were mostly aerobic bacteria especially Gram stain-negative Enterobacteriaceae, such as Escherichia coli, Klebsiella spp., Enterobacter spp., and less frequently anaerobic bacteria, including Bacteroides, Clostridium spp. and Helicobacter pylori[19] . Contrary to our study, in another study conducted by Moazeni Bistgani et al, they stated that bile was usually sterile in people in absence of hepatobiliary disease and was infected in the presence of gallstones but microbiological growth in the bile could not always be detected in patients who underwent LC for cholelithiasis[20]. In our study port site wound infection was seen in 6(6%) patients and in all patients bile culture was positive. In a study conducted by Kim HJ et al, up to 6.3% wound infection is reported following laparoscopic cholecystectomy which is the most common complication[7]. There were 3 male and 3 female patients with wound infection in our study. But in a study conducted at Al-Basrah Hospital, female were more commonly affected by wound infection than man[21].

Our study had several limitations including small sample size and limited duration of time. However this will encourage others to conduct a larger study to find the incidence of positive bile culture and its relation with wound infection.

CONCLUSION

Bile culture was positive in 30% patients of cholelithiasis undergoing laparoscopic cholecystectomy and wound infection was present in 6% patients and all the 6% patients were bile culture positive.

Conflict of interest: nil

Author contribution: ANK: Literature Review, **MNA:** Data collection, **MAB:** Data Analysis, **TN:** Design and drafting work

REFERENCES

1. Da Costa DW, Bouwense SA, Schepers NJ, Besselink MG, van Santvoort HC, Van Brunschot S, et al. Same-admission versus interval cholecystectomy for mild gallstone pancreatitis (PONCHO): a multicentre randomised controlled trial. The Lancet 2015;386(10000):1261-8.
2. Hayat N, Duja B, Ahmed T, Rehan AG. To determine the importance of age and sex in the clinical presentation and subsequent outcome in cholelithiasis. JUMDC. 2013; 4:36-41
3. Kumar V, Abbas AK, Aster JC. Robbins basic pathology e-book: Elsevier Health Sciences; 2017.
4. Hill MV, Stucke RS, McMahon ML, Beeman JL, Barth Jr RJ. An educational intervention decreases opioid prescribing after general surgical operations. Annals of surgery 2018;267(3):468-72.
5. Sattar I, Aziz A, Rasul S, Mehmood Z, Khan A. Frequency of infection in cholelithiasis. J Coll Physicians Surg Pak 2007;17(1):48-50.
6. Gupta A, Ramteke S, Kanwar KS, Soni P. Study of morphological spectrum of gallstone and bacteriology of bile in cholelithiasis. International Surgery Journal 2016;4(1):177-80.
7. Kim HJ, Kang SH, Roh YH, Kim MC, Kim KW. Are prophylactic antibiotics necessary in elective laparoscopic cholecystectomy, regardless of patient risk? Ann Surg Treat Res 2017; 93:76-81.
8. Taj MN, Iqbal Y, Akbar Z. Frequency and prevention of laparoscopic port site infection. J Ayub Med Coll Abbottabad. 2012; 24:197-9
9. Radunovic M, Lazovic R, Popovic N, Magdelinic M, Bulajic M, Radunovic L, et al. Complications of laparoscopic cholecystectomy: Our experience from a retrospective analysis. Open Access Maced J Med Sci 2016; 4:641-646.
10. Cotran R, Kumar V, Robbins S. Pathologic Basic of Disease, 5th edit. Philadelphia, PA: WB Saunders Company; 1994.
11. Ananthakrishnan N, Kapur B. Chronic cholecystitis and biliary infection. Indian Journal of Surgery 1983;45(7):411-4.
12. Mir M, Khursheed U, Bali B. Frequency and risk factor assessment of port site infection after elective laparoscopic cholecystectomy in low risk patients at tertiary care hospital of Kashmir. Internet J Surg. 2012; 28:1-5.
13. Gill HS, Sandhu GS, Luna A, Gill AK. Bacteriological profile of bile in patients undergoing cholecystectomy. Sch. Acad. J. Biosci 2016; 4:520-525
14. 14.Kim SB, Kim KH, Kim TN, et al. Sex differences in prevalence and risk factors of asymptomatic cholelithiasis in Korean health screening examinee: A retrospective analysis of a multicenter study. Medicine (Baltimore). 2017;96(13):e6477
15. Martin L, Zinner S, Kagan J, Zametkin A, Garrity F, Fry D. Bacteriology of the human gallbladder in cholelithiasis and cholecystitis. The American surgeon 1983;49(3):151.
16. Malatani TS, Bobo RA, Al-Kassab AS, Al-Saigh AS, Ajao OG, Jastaniah S, et al. Gallbladder stones analyzes, bile and wound cultures in cholelithiasis. Saudi Journal of Gastroenterology 1996;2(3):146.
17. Cheslyn-Curtis S, Russell R. New trends in gallstone management. British journal of surgery 1991;78(2):143-9.
18. Eslami G, NOUROUZI J, FALAH F, Goudarzi H, HAKEMI VM, Jahangiri S. Detection of bacteria responsible for gallbladder inflammation and gallstones. 2007.
19. Cen, L., Pan, J., Zhou, B., Yu, C., Li, Y., Chen, W., et al. (2018). Helicobacter
20. Pylori infection of the gallbladder and the risk of chronic cholecystitis and cholelithiasis: a systematic review and meta-analysis. Helicobacter 23:e12457.
21. doi: 10.1111/hel.12457
22. Moazeni Bistgani M, Imani R. Bacteria isolated from patients with cholelithiasis and their antibacterial susceptibility pattern. Iran Red Crescent Med J 2013; 15:759-761
23. Jasim D saud, Mushtaq Ch Abu Al-Hail. “Surgical site infection after laparoscopic cholecystectomy.” Basrah J Surg.2017; 16: 119-21.