ISSN: 0975-833X

Available online at http://www.journalcra.com

International Journal of Current Research
Vol. 8, Issue, 07, pp.35297-35299, July, 2016

INTERNATIONAL JOURNAL OF CURRENT RESEARCH

RESEARCH ARTICLE

MICRO FLORAL ASSESSMENT OF BILE DURING ELECTIVE CHOLECYSTECTOMY AND ITS CORRELATION WITH SURGICAL SITE INFECTION: A STUDY OF 104 PATIENTS

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ARTICLE INFO

Article History:
Received 22nd April, 2016
Received in revised form
25th May, 2016
Accepted 10th June, 2016
Published online 31st July, 2016

Key words:

Infected bile,
Bactibilia,
Bile culture.

ABSTRACT

Background: Presence of viable bacteria obtained from gall bladder during elective cholecystectomy can be decisive in the outcome of gall bladder surgeries with reference to surgical site infection.
Materials and Methods: 104 patients with symptomatic gall stone disease underwent elective cholecystectomy. Bile sample was taken intra operatively from gallbladder using a size 22 spinal needle before beginning gallbladder dissection in both open and laparoscopic procedures and sent for culture and sensitivity examination. The patients were then divided into two groups depending on the presence or absence of bacterial growth on bile culture.
Results: No bacterial growth was observed on bile culture in 76 patients (73.1%). This supports that in majority of the cases the bile was sterile. In rest 26.9 % *E. Coli* was grown in 18.26 % and *Klebsiella pneumonia* in 8.66 % patients. On correlation of bile culture and surgical site infection, it was observed that positive bile culture had higher incidence of surgical site infection i.e. 14.2% which was statistically significant.
Conclusion: There is increased incidence of surgical site infection in patients with infected bile than with sterile bile. A routine bile culture during cholecystectomy can be predictor of surgical site infection.

Citation: Dr. Divish Saxena, Dr. Murtaza Akhtar, Dr. Arpit Bansal and Dr. Gayatri Deshpande, 2016. "Micro floral assessment of bile during elective cholecystectomy and its correlation with surgical site infection: A study of 104 patients", *International Journal of Current Research*, 8, (07), 35297-35299.

INTRODUCTION

Gallstone disease still contributes for a significant cause of abdominal morbidity (Heaton *et al.,* 1991). Surgical site infection due to bactibilia or biliary contamination due to biliary spillage in either open or laparoscopic elective cholecystectomy still remains one of the commonest post operative complications (Nikhar Jain *et al.,* 2015). The present study analyses bile culture obtained from aspiration of bile from gall bladder during elective cholecystectomy and its correlation with surgical site infection after surgery in rural population in central India. Impaired motility of the gallbladder has been cited as one of the contributing factor in the development of gallstones mainly due to biliary stasis. These gall stones may cause acute or chronic cholecystitis, biliary colic, pancreatitis or obstructive jaundice (Festi *et al.,* 1999; Berhane *et al.,* 2006). Biliary obstruction also causes an increase in ductal pressure, resulting in bacterial proliferation and dissemination. Gram negative bacterial infection in bile dominates in causing cholecystitis or cholangitis.

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Gram-positive and anaerobic bacterial infections are relatively uncommon causative agents and viral and fungal agents are even rare (Greenberger *et al.,* 1998). In an enteric fever endemic country like India, *Salmonella enterica* serovar *Typhi* and *S. Paratyphi* A are among the major biliary pathogens (Vaishnavi *et al.,* 2005). Therefore, to determine the prevalence of bactibilia and to document the type of organism cultured with subsequent outcome in the form of surgical site infection, this study has been conducted.

MATERIALS AND METHODS

The study was carried out in the Department of Surgery of a tertiary care rural hospital in central India under the care of single general surgeon consultant. A total number of 104 ultrasound diagnosed symptomatic patients of "Cholelithiasis" with gallstone alone or with C.B.D. stones were included in the study. Patients who did not give consent, patients with acalculus cholecystitis and patients with primary CBD stones were excluded from the study. Baseline investigations like Complete Blood Count, random blood sugar and liver function test were performed in all patients. Ultrasonography of abdomen was done in all patients. M.R.C.P. was done in

patients with cholelithiasis and dilated common bile duct (> 7mm) on Ultrasonography and in patients with raised alkaline phosphatase levels. E.R.C.P. was done in cases of suspected C.B.D calculus or malignancy or for therapeutic stenting or stone removal in obstructive jaundice prior to surgical intervention. All 104 patients underwent surgery. 56 patients had laparoscopic cholecystectomy & 43 patients underwent open cholecystectomy. A total of 7 patients had CBD calculus, of which 5 patients underwent open cholecystectomy with C.B.D. exploration and 2 patients had E.R.C.P. guided stone removal followed by Laparoscopic cholecystectomy. Bile sample was taken intra operatively from gallbladder using a size 22 spinal needle before beginning gallbladder dissection in both open and laparoscopic procedures and sent for culture and sensitivity examination. All cholecystectomy specimens were sent for routine histopathology and the results were complied and compared to clinical presentation of the disease. A prophylactic antibiotic dose of 1gm of Ceftriaxone and 0.5 gm Metronidazole was given in all patients which was continued for 2 days postoperatively in patients operated either by laparoscopic or open method. Post operative complications in the form of surgical site infections, biliary leakage and post cholecystectomy syndrome were noted.

Statistical Analysis

Categorical variable were analysed using Fisher's exact test and Chi-square test. Comparison of values of biochemical analysis was done using Kruskel Wallis one way ANOVA.

OBSERVATIONS AND RESULTS

In total of 104 patients, 36 were males and 68 were females. All patients presented with pain in the upper abdomen,of which 74 patients (71.1%) presented with chronic upper abdominal pain while 30 patients (28.9%) had acute upper abdominal pain. 72 patients (69.2%) presented with dyspepsia and flatulence, 67 patients (64.4%) with Nausea or Vomiting, only 7 patients (6.7%) had jaundice. 14 patients had fever, of these 7 patients were diagnosed as C.B.D. calculus and in rest fever was due to acute cholecystitis. Abdominal ultrasound of 104 patients revealed solitary calculus in 38 patients (36.5%) and multiple calculi in 66 patients (63.5%). Abdominal ultrasound diagnosed C.B.D. calculus in 5 patients while a total of 7 patients had C.B.D. calculus on intraoperative correlation. All 104 patients underwent surgery. 56 patients had laparoscopic cholecystectomy & 43 patients underwent open cholecystectomy. A total of 7 patients had CBD calculus, of which 5 patients underwent open cholecystectomy with C.B.D. exploration and 2 patients had E.R.C.P. guided stone removal followed by Laparoscopic cholecystectomy. Intra operative bile sample was taken from gallbladder and sent for culture and sensitivity examination. No bacterial growth was observed on bile culture in 76 patients (73.1%).

This supports that in majority of the cases the bile was sterile. In rest 26.9 % *E. Coli* was grown in 18.26% and *Klebsiella pneumoniae* in 8.66% of patients (Table 1). Postoperatively, 5 out of 104 patients had surgical site infection which was managed by regular dressings and antibiotics. On correlation of bile culture and surgical site infection, it was observed that positive bile culture had higher incidence of surgical site infection i.e. 14.2% which was statistically significant (Table 2). Thus, there is increased incidence of surgical site infection in patients with infected bile than with sterile bile. A routine bile culture during cholecystectomy can be predictor of surgical site infection. In our study the correlation between the type of operation and occurrence of surgical site infection was found to be insignificant (Table 3).Although most of the patients were operated as elective cases, histopathology reports came to be acute cholecystitis in 25 % patients and chronic cholecystitis in 75% of patients.

Table 1. Table showing bile culture findings in all cases of elective cholecystectomy.

Organism	Number of Cases	Percentage
No Growth	76	69.23%
Escherichia coli	19	18.26%
Klebsiella pneumoniae	9	8.65%

Table 2. Correlation of infected bile with wound infection

S. No	Bile Culture	Incidence of Wound Infection
1	Positive Growth on Bile Culture in 28 cases	4 (14.2%)
2	No Growth on Bile Culture in 76 cases	1 (1.3%)
	Total = 104 cases	5 (4.8%)

Chi-square value = 4.954 with one degree of freedom; p value < 0.01

Table 3. Correlation between the type of operation and occurrence of surgical site infection

Type of complication	Open cholecystectomy + CBD exploration	Laparoscopic cholecystectomy	Correlation (p value by Fischer's Exact test)	Remarks
Surgical site infection	04/48	1/56	0.1786	Insignificant

Table 4. Comparison of various studies

Organism Isolated	Mathur et al [n=25] 1990	Wen-Tsan Chang et al [n=277] 2006	Present Study [n=104]
No Growth	52%	82.3%	69.23%
E.coli	16%	07.2%	18.26%
K.pneumoniae	0%	02.1%	08.65%

DISCUSSION

Surgical site infections continued to be a major cause of morbidity in any operative procedure. The present study analyses bile culture obtained from aspiration of bile from gall bladder during elective cholecystectomy and its correlation with surgical site infection after surgery in rural population in central India. Bacterial colonisation occurs in patients with gallstone disease and biliary obstruction, age > 70 years, cholecystitis, CBD stones, cholangitis and non-functioning gallbladders (Wells *et al.,* 1989; Landau *et al.,* 1992). However, there are relatively few data on the prevalence of bactibilia in patients undergoing cholecystectomy for simple cholelithiasis. In the present study, there was no growth in bile culture in 73% patients (76 out of 104) while 18% patients (19 out of 104) showed *E.coli.* and 8% patients (9 out of 104) showed *Klebsiella pneumoniae.* The results were similar to studies of (Mathur *et al.,* 1990; Wen-Tsan Chang et al., 2010) (Table 4).

Out of 28 patients of positive bile culture, 14.2% patients (4out of 28) had wound infections. On the other hand, out of 76 patients of no growth on bile culture, only 1.3% patients (1 out of 76) had wound infections The results were similar to surgical site infections (5.3%) documented by Den Hoed *et al.,* (1998) Rate of wound infections varies greatly from 1.08% to 14.5% in the studies conducted by (Jawien *et al.* 2008 and Malatani *et al.,* 1996). Our organism profile in bile culture is similar to other studies such as Suri et al. and Valceanu et al., E. coli being the commonest organism (Suri *et al.,* 2010; Valceanu *et al.,* 2005). Although, in an enteric fever endemic country like India, *Salmonella enterica* serovar *Typhi* and *S. Paratyphi* A are among the major biliary pathogens (Vaishnavi *et al.,* 2006).

Conclusion

From the present study it can be concluded that wound infection was the most common postoperative complication for elective cholecystectomy and increased incidence of wound infection was found in the patients with infected bile. All patients should be administered antibiotics with good gram negative bacterial coverage and a routine bile culture during cholecystectomy, therefore, may predict surgical site infection.

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