

Original Research Article

Pre-operative anti-microbial administration for prevention of post-operative infections in patients with open cholecystectomy and laparoscopic cholecystectomy

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ABSTRACT

Background: Prophylactic antibiotics are used in many elective surgeries by the surgeons to prevent postoperative wound infections. The present study was done with the aim to find out the efficacy of antibiotics to reduce the bacterial load.

Methods: This prospective study was done in KPC Medical College from January 2015-December 2015. A total number of 56 patients with symptomatic gall stone disease were included in the study. Of them, 36 patients underwent laparoscopic cholecystectomy (group A) and 20 patients underwent open cholecystectomy (group B). 18 cases who underwent laparoscopic procedure and 10 cases who underwent open procedures were given preoperative antibiotics while the other half did not receive preoperative antibiotics. Postoperative wound infection was analysed by wound swab culture.

Results: Female preponderance was seen in the study (M:F-1:7). Majority of them belongs to 21-30 years of age. Postoperatively wound infection was seen in 6 cases in group A and in 4 cases in group B and the difference was statistically significant ($p < 0.05$). The positive rate of bacteria by wound swab culture was higher in NPTG cases in both group A ($n=7$) and group B ($n=4$) and the difference was statistically significant among two groups. No complications and mortality were reported in the study.

Conclusions: This study document that administration of prophylactic antibiotics before cholecystectomy will reduces the incidence of postoperative wound infections.

Keywords: Laparoscopic cholecystectomy, Open cholecystectomy, Prophylactic antimicrobials, Postoperative infections

INTRODUCTION

Cholecystitis is the inflammation of gallbladder which is one of the commonest abdominal pathologies encountered by the surgeons. Chronic cholecystitis is a long-standing disability suffered by patients to a great extent. It is caused by mechanical or functional dysfunction of the emptying of the gall bladder.¹

The incidence of cholecystitis is more common in females compared to males primarily child bearing age group. Sex hormones mainly estrogens are most likely to be responsible for the increased risk.²

The incidence of wound infection and postoperative complications greatly depends on the particular causative organisms responsible for the occurrence of chronic

cholecystitis. The isolation of the specific offending agent especially during operative interference is an essential tool.³ In order to identify these causative organisms, several methods have been advocated. In the present study, bile culture technique was adopted as the sensitivity test apart from detailed history taking and thorough clinical examinations.

Preventing postoperative infection is crucial in improving the outcome of surgical procedures. For surgery, it is recommended that antimicrobials be administered 30 minutes before surgery to maintain serum drug concentration at its maximal level during surgery.

For cholecystitis, it is important to remember that bacteria are normally present in 10% to 20% of gallbladder bile. Hence, the present study was done with the aim to find out the efficacy of antibiotics to reduce the bacterial load.

METHODS

The present prospective study was conducted at KPC Medical College and Hospital, Kolkata during the study period from January 2015-December 2015. A total number of 56 patients with symptomatic gall stone disease of age group 12-60 years attending the OPD were included in the study.

Patients with existing severe COPD problems, advanced cardiovascular disease, end stage renal disease, coagulopathies, patients with presence of advanced liver cirrhosis with portal hypertension, patients with acute cholecystitis or one of its complications, suspected gall bladder malignancy cases, pregnant women and patients with presence of concurrent common bile duct (CBD) stones as suggested by history of recurrent jaundice, cholangitis, sonographic evidence of CBD stones or at ERCP, raised alkaline phosphates with CBD diameter >1cm, etc. were excluded from the study.

During their OPD visit the patients were given the free option to choose either of the procedures open cholecystectomy (OC) and laparoscopic cholecystectomy (LC). For the patients who are undergoing LC procedure the probability of possible conversion was explained.

Out of 56 patients, 36 patients underwent laparoscopic cholecystectomy (group A) and 20 patients underwent open cholecystectomy (group B).

Eighteen cases who underwent laparoscopic procedure and 10 cases who underwent open procedures were given preoperative antibiotics sulbactam/cefoperazone for the prevention of postoperative infection one hour before the procedure (i.e. cholecystectomy) while the other half i.e. 28 cases (18 laparoscopic and 10 open) did not receive preoperative antibiotics. Detailed history and complete physical examination and relevant laboratory investigations were done to all the patients. Baseline

investigations were called for and the patient enlisted after taking 2 doses of tetanus toxoid.

Patient with concurrent medical disease like diabetes, hypertension or obstructive airway disease were sent, to the appropriate departments for evaluations and assessment of fitness for General anaesthesia (GA). Once anaesthetic checkup was done, patients were enlisted.

Procedure

The basic surgical technique was identical in all cases. Skin was shaved and clean dressing applied of prior to surgery, operative site cleaned with antiseptic solution.

After incision careful attention was paid to haemostasis to prevent postoperative collection of blood. Tissue handling was gentle and kept to minimum. During the time of operation, sample of bile was collected before removal of gall bladder and stored in sterile test tube.

The collected samples of bile were sent to the Department of Microbiology, for the isolation and identification of the causative organisms. Drains were given as a routine.

Following cholecystectomy, the specimen of gall bladder in all cases were sent for histopathological examination. After completion of operation, the sutured wound was covered with a few layers of sterile gauze and micropore applied over it.

Postoperatively, patients were observed carefully and examined twice in a day for their general condition, occurrence of thrombophlebitis at I.V. drip site, for any symptoms of respiratory distress such as cough, difficulty in breathing, crepitations etc. or any other relevant finding referred to postoperative infection. Wound swab was taken from the incision of wound or discharge if any 48hrs after opening the dressing. Assessment was done by the consultant.

Wound infection was defined as the discharge of pus, irrespective of culture results or of non-purulent material if it contained pathogenic bacteria. The wound swab was sent for culture and sensitivity. Local treatment was given for healing of the wound infection.

Data collected were entered in MS excel and analysed. The observations were presented in numbers and percentages.

RESULTS

Total number of 56 cases suggestive of chronic cholecystitis was studied. 18 cases who underwent laparoscopic procedure and 10 cases who underwent open procedures were given preoperative antibiotics (preoperative treatment group-PTG) while the other half did not receive preoperative antibiotics (non-preoperative

treatment group-NPTG). Male:female ratio was 1:7. Female preponderance was observed in both the groups.

In group A, average age of females in two groups are 32.23 and 34.56years respectively and average age of male in two groups are 43 and 39.5years respectively.

Most of the participants (n=14) belong to the age group 21-30years. In group-B, average age of females in two groups was 37 and 37.6years respectively and average age of males were 42 and 46years respectively. Most of them (n=5) belongs to 31-40years of age. Average

operative time in group A in both the group undergoing laparoscopic procedure was 56.67min and 58min whereas for the group undergoing open cholecystectomy was 59min and 61min each (Table 2). In group A, the positive rate of bacteria in gall bladder bile was more in NPTG (n=9) i.e. almost 50% with statistically significant difference (p<0.001).

In Group-B, the positive rate of bacteria in bile in the treatment groups was 10% (n=1) and in the non-preoperative treatment group was 40% (n=4) and difference was statistically significant (p<0.05).

Table 1: Age and sex wise distribution of study participants in group A and group B.

Age group (years)	Group A (n=36)				Group B (n=20)			
	Female		Males		Female		Males	
	PTG (N=16)	NPTG (N=16)	PTG (N=2)	NPTG (N=2)	PTG (N=8)	NPTG (N=8)	PTG (N=2)	NPTG (N=2)
11-20	2	1			1	1		
21-30	7	7			2	1		
31-40	4	4	1	1	2	3	1	1
41-50	2	2		1	2	1	1	
51-60	1	2	1		1	2		1

Group A: Laparoscopic cholecystectomy, Group B: Open cholecystectomy, PTG: Preoperative treatment group, NPTG: Non-preoperative treatment group.

Table 2: Duration of operation in minutes in both groups.

Time (min)	Group A (n=36)		Group B (n=20)	
	PTG (N=18)	NPTG (N=18)	PTG (N=10)	NPTG (N=10)
31-40	3	0	0	0
41-50	6	4	2	2
51-60	3	10	5	4
61-70	4	3	3	3
71-80	2	1	0	1

Group A: Laparoscopic cholecystectomy, Group B: Open cholecystectomy, PTG: Preoperative treatment group, NPTG: Non-preoperative treatment group.

As given in Table 4, after surgery wound infection was noticed in about 6 cases in group A and in 4 cases in group B and the difference between the two preoperative and non-preoperative groups in group A and group B are statistically significant (p<0.05).

The positive rate of bacteria by wound swab culture was higher in NPTG cases in both group A (n=7) and group B (n=4) and the difference was statistically significant among two groups (i.e. PTG and NPTG).

The average postoperative stay in laparoscopic cholecystectomy in was 4days and open cholecystectomy was 8days without complications. None of this patient in

the study suffered from intra-abdominal abscess, pneumonia, urinary tract infection and none of them died.

Table 3: Isolated microorganisms from bile in both the groups.

Organisms	Group A (n=36)		Group B (n=20)	
	PTG (N=18)	NPTG (N=18)	PTG (N=10)	NPTG (N=10)
Gram -ve bacilli	<i>E. coli</i> 2	4	1	2
	<i>Klebsiella</i> species 1	3	-	2
Gram +ve cocci	<i>Staphylococci</i> 0	2	-	-
Sterile	15	9	9	6

Group A: Laparoscopic cholecystectomy, Group B: Open cholecystectomy; PTG: Preoperative treatment group; NPTG: Non-preoperative treatment group.

Table 4: Wound infection in both the groups.

Wound infection cases	Group A (n=36)		Group B (n=20)	
	PTG (N=18)	NPTG (N=18)	PTG (N=10)	NPTG (N=10)
	1	6	0	4

Group A: Laparoscopic cholecystectomy, Group B: Open cholecystectomy.

Table 5: Wound swab culture of infected wound in both the groups.

Organisms		Group A (n=36)		Group B (n=20)	
		PTG (N=18)	NPTG (N=18)	PTG (N=10)	NPTG (N=10)
Gram negative bacilli	<i>E. coli</i>	1	3	-	2
	<i>Klebsiella</i> species	-	1	-	2
Gram positive cocci	<i>Staphylococci</i>		2	-	-

DISCUSSION

The disease process of chronic cholecystitis mostly results with the development of gall stones. These stones block the bile in the gall bladder leading to inflammation. The presence of gall stones increases the pressure, irritation and may lead to bacterial infections.⁴

Initially management of acute cholecystitis can be done by antibiotics. But in chronic cases, surgery is the mainstay of the treatment. Open cholecystectomy is the most important technique, but laparoscopic cholecystectomy is now the gold standards due to its advantages like less invasive and less tissue involvement.⁵ Prophylactic use of antibiotics is an important component of biliary tract surgery, and there is about 50% decrease in the incidence of postoperative wound infection with the use of preoperative antibiotics.⁶

Many studies revealed that women of age group above 20 years are most likely affected with cholecystitis.^{3,5} This was in accordance with the present study findings. About 14 females of age group between 21-30years were affected in this study.

In this series, of 56 cases the organisms obtained on culture were *E. coli*, *Klebsiella pneumoniae* and *Staphylococcus aureus* in order of decreasing frequency. Uludag M et al, also suggested *E. coli* to be the most common organism present in the bile.⁷ In his study, out of 68 patients, 10 cases showed presence of different bacterial pathogens in the bile culture. Of them 4 had shown the presence of *E. coli* followed by *Klebsiella* in 2 cases.

Postoperative recovery in this series was most commonly uneventful only. 11 cases suffered from postoperative wound sepsis. About 6 cases from NPTG and 1 case from PTG of Group A and 4 cases from NPTG of Group B showed wound infection (6 from *E. coli* and 3 from *Klebsiella* and 2 from *S. aureus*).

Therefore 81.4% patients had smooth recovery following surgery and remaining 19.6% of patients had wound sepsis. It was managed with dressing and topical agents without any systemic antibiotics. Koc M et al, in his series observed 2.04% of infections in the antibiotic prophylaxis group (n=49) and 2.32% of infections in the

non-antibiotic prophylaxis group (n=43) out of 92 patients undergoing elective laparoscopic cholecystectomy.⁸ In the present study, postoperative wound infection was significantly reduced in prophylactic treatment groups compared to non-prophylactic groups in both surgeries.

The most significance finding was the reduction of wound infection from 33.33% in the non-preoperative treatment group to 5.5%v in the preoperative treatment group who underwent laparoscopic cholecystectomy.

In open cholecystectomy rate of wound infection in non-preoperative treatment group was 22.22% and no wound infection in preoperative treatment group. These findings were in accordance with the observations of Uludag M et al.⁷

CONCLUSION

The findings of the present study concluded that patients treated prophylactically with antibiotics (cefoperazone-sulbactam) before cholecystectomy had reduced the prevalence of postoperative wound infections.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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