Laparoscopic Cholecystectomy Without Prophylactic Antibiotics: A Prospective Study

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Abstract Laparoscopic cholecystectomy has become the new gold standard for management of symptomatic gallstones. Prophylactic antibiotics are used in elective surgery by the majority of surgeons, and their role in biliary tract surgery has been well established for a subpopulation of high-risk patients. This consensus has been derived from multiple studies involving biliary tract surgery before and in the era of laparoscopic cholecystectomy. But the use of prophylactic antibiotics in laparoscopic cholecystectomy especially in the low-risk group is now controversial and varied among the surgeons all over the world. To study the role of prophylactic antibiotics in laparoscopic cholecystectomy in different risk groups of patients, a prospective study was conducted in the Department of Surgery of Bankura Sammilani Medical College and Hospital from January 2010 to July 2011. All patients with symptomatic gallstones who underwent elective laparoscopic cholecystectomy during this period are included in this study. One hundred and two patients with symptomatic gallstones were operated on by laparoscopic technique without receiving preoperative antibiotics and studied over a period of 1.5 years. Ages ranged from 11 to 70 years (mean age of 33 years). There were 14 males (13.72 % of the patients) and 88 females (86.27 % of the patients). There was no wound infection (class I) in

99 patients, and class II type of wound infection, i.e., surgical site infection, occurred in three patients (i.e., 2.94 %) out of a total of 102 patients. Swabs were taken for culture and sensitivity; *Staphylococcus aureus* was found in two patients and *Streptococcus viridans* in one patient. In all three patients, infection occurred at the umbilical port sites, detected on the 3rd and 4th postoperative days. Antibiotic prophylaxis is not necessary in low-risk patients with symptomatic gallstone disease undergoing elective laparoscopic cholecystectomy to prevent postoperative infection-related complications. Preoperative skin preparation with chlorhexidine gluconate scrub may replace the use of prophylactic antibiotics for prevention of infection-related complications in patients undergoing elective laparoscopic cholecystectomy.

Keywords Laparoscopic cholecystectomy · Preoperative antibiotics · Wound infection

Introduction

Laparoscopic cholecystectomy has become the new gold standard for management of symptomatic gallstones [1]. Frantzides and Sykes [2] suggested that antiseptic skin cleansing with chlorhexidine gluconate scrub in the evening before surgery is as effective in the prevention of postoperative wound infection as a single-dose prophylaxis with a second-generation cephalosporin. Watkin et al. [3] performed a prospective analysis of 253 patients, each having been administered a single dose of prophylactic antibiotics,

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and reported a postoperative wound infection rate of 0.8 %. This rate of infection is comparable with the wound infection rate in previous studies, and they suggested that the role of antibiotic prophylaxis in low-risk patients undergoing laparoscopic cholecystectomy is unclear and associated with unpleasant side effects of the drug and it increases the treatment expenditure.

Materials and Methods

This study was conducted prospectively over a period of 1.5 years, from January 2010 to July 2011, in the department of surgery at a tertiary level teaching hospital. One hundred and two patients were included in this study. All patients had symptomatic gallstones and underwent laparoscopic cholecystectomy.

The patients were interviewed for detailed clinical history. All the patients were examined and underwent complete blood count, PP blood sugar, blood urea nitrogen and serum creatinine, liver function test, electrocardiogram, chest x-ray (PA view), and urine for RE, ME, and C/S.

The patients were selected, obeying exclusion criteria. All patients were kept in nothing per mouth overnight prior to surgery. All patients were prepared with chlorhexidine gluconate scrub from mid-chest to mid-thigh including the umbilicus in the evening before the day of operation and were administered a proton pump inhibitor and anxiolytic (alprazolam or lorazepam) the night before the day of operation. Antiseptic skin shaving was done the morning of the day of operation. No prophylactic antibiotics were used. Perioperatively, the gallbladder was removed through the umbilical port without using any extraction bag. A swab from the gallbladder mucosa was not sent for culture–sensitivity. On the second postoperative day, patients' wounds were inspected, and specific significant symptoms of infections were also noted. Related investigations were done, and the results were analyzed. Follow-up of all postoperative patients was done weekly for 1 month.

Results

A total of 102 patients were included in the study. Table 1 shows the sex distribution of the study population. There

Table 1 Frequency distribution of patients according to sex

Sex	No. of patients
Male	14
Female	88

were 14 males (13.72 % of the patients) and 88 females (86.27 % of the patients). This was represented graphically in Fig. 1.

Table 2 shows the number of patients in each age group: 13 patients are within 11–20 years, 31 patients are within 21–30 years, 33 patients are within 31–40 years, 12 patients are within 41–50 years, 11 patients are within 51–60 years, and 2 patients are within 61–70 years. The median age of this study was 33 and mode is 35. The youngest one was 11 years, and the oldest was 69 years. Most patients were in the 31–40-year age group. This age distribution is represented graphically in Fig. 2.

The most common complaint was pain in the right upper abdomen (100 %), followed by vomiting, dyspepsia, fever, and nausea. Most patients (75) had multiple gallstones.

The duration of operations ranged from 40 to 90 min. The time taken for the operation depended on operative difficulties, for example dense adhesion, which is related with duration symptoms as well as after acute attack.

Intraoperative blood loss was less than 100 mL in 42 and more than 100 mL in 60 patients. It was related with adhesions surrounding the gallbladder. Drains were inserted in 62 patients. It was removed after 24–72 h. In most cases, it was removed after 48 h. Hospital stay ranged from 3 to 10 days. Return to normal work ranged from 5 to 12 days.

Table 3 shows different classes of wound infection. Wound infection occurred in three cases, that is, 2.94 %. It was class II type (infections involving skin and subcutaneous tissue), two by *Staphylococcus aureus* and one by *Streptococcus viridans*; all these infections developed in the gallbladder extraction ports (umbilical port). The frequency of wound infections is represented graphically in Fig. 3. All were treated by removal of superficial (skin) stitches, cleaning with normal saline, and local applications of Mupirocin-containing ointment. *S. aureus* is a normal skin flora. *S. viridans* is present on the oral mucous membrane and in bile of some biliary tract diseases.

Wound infection involved umbilical port sites and was found in the patients with relatively prolonged duration (6 months) of symptoms, multiple gallstones with thick

Fig. 1 Frequency distribution of patients according to sex

Table 2 Frequency distribution of patients according to age

Age group	Number of patients
11–20	13
21–30	31
31–40	33
41–50	12
51–60	11
61–70	2

gallbladder wall with adhesion requiring a relatively long time of operation (75–90 min). Intraoperative blood loss was also more (>100 mL) in cases of surgical site infection.

Discussion

Though open cholecystectomy procedure is the most important part of surgical training, laparoscopic cholecystectomy is now the gold standard. Laparoscopic surgery opened a new era in surgery. It is a minimally invasive surgery, thereby there is less tissue handling as well as damage, which helps in early return to normal work. Regarding cosmetic ground, it is much superior to traditional open procedures. At present, open cholecystectomy is reserved only for the patients having contraindication for laparoscopic procedure. Antibiotic prophylaxis is a standard component of biliary tract surgery, and there is about 50 % decrease in the incidence of postoperative wound infection with the use of prophylactic antibiotics [7]. However, these data cannot be extrapolated to include laparoscopic surgeries. Laparoscopic surgery is a most significant advancement in the last two decades. It has been proved that laparoscopic surgery minimizes surgical trauma, shortens hospital stay, minimizes use of analgesics, and increases early return to work [4–6]. As laparoscopic cholecystectomy is now the gold standard of management of patients with gallstones, evaluation of antibiotic prophylaxis and its indication for minimal invasive surgeries is warranted.

Fig. 2 Frequency distribution of patients according to age**Table 3** Different types of wound infections and their frequency

Postoperative outcome	Number of cases
Wound infection	
(a) Class I (no infection)	99
(b) Class II	3
(c) Class III	Nil
(d) Class IV	Nil

Bold font value is the number of patients suffered from wound infection

Koc et al. [8] observed 2.04 % of infections in the antibiotic prophylaxis group (Gr. A, $n=49$) and 2.32 % of infections in the non-antibiotic prophylaxis group (Gr. B, $n=43$) in their prospective double-blinded randomized study of over 92 patients undergoing elective laparoscopic cholecystectomy.

Kuthe et al. [9] observed 2.5 % of postoperative wound infections in the antibiotic prophylaxis group (Gr. A, $n=40$) and 3.80 % of postoperative wound infections in the non-antibiotic prophylaxis group (Gr. B, $n=53$) in their prospective randomized trial of over 93 patients undergoing elective laparoscopic cholecystectomy.

Yildiz B et al. [10] observed 4 of 105 patients, that is, 3.80 % of postoperative infections in the antibiotic prophylaxis group, and 3 of 103 patients, that is, 2.91 % in the non-antibiotic prophylaxis group, in their randomized double-blind study to evaluate determinants of postoperative infection of over 208 patients undergoing elective laparoscopic cholecystectomy. Therefore, postoperative wound infection rate, that is, 2.94 %, in our prospective study for elective laparoscopic cholecystectomy without prophylactic antibiotics in over 102 patients is acceptable and fulfills the aims and objectives of the study.

Conclusion

Antibiotic prophylaxis is not necessary in low-risk patients with symptomatic gallstone disease undergoing elective laparoscopic cholecystectomy to prevent postoperative infection-related complications. Preoperative skin preparation with chlorhexidine gluconate scrub may replace the use of prophylactic antibiotics for prevention of infection-related complications in patients undergoing elective laparoscopic cholecystectomy.

Fig. 3 Different wound infections and their frequency

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