European Journal of Molecular & Clinical Medicine

ISSN 2515-8260 Volume 09, Issue 07, 2022

Original Research Article

Single dose versus multiple dose antibiotic in laparoscopic cholecystectomy

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Abstract

Introduction: Laparoscopic cholecystectomy is one of the most commonly performed operation by General surgeon. It falls under the Class 2 clean contaminated surgery. The aim of our study is to compare the outcomes of single dose vs multiple dose antibiotic treatment in terms of surgical site infection.

Methods: This is a prospective observational study conducted in the department of general surgery. Patients undergoing elective cholecystectomy were randomly classified into two groups a single dose (SD) group and a multi-dose (MD) group. SD group were given injection ceftriaxone 1gm at the time of induction of anaesthesia and MD group received injection ceftriaxone 1gm at the time induction of anaesthesia and followed by continuation of same dose twice a day for 1 day.

Results: A total of 200 patients completed the study among which 100 patients were included in the (SD) group and 100 patients in (MD) group. The mean age of patient was 44 years. In single dose (SD) group, 4% patients developed wound infection and 3% patients in multiple (MD) group developed wound infection which was not statistically significant (p=0.437).

Conclusion: The rate of post-operative SSI after single dose antibiotic intravenously at induction of anaesthesia is comparable with that of multiple dose antibiotics. So single dose antibiotic regimen can be safely practiced in elective laparoscopic cholecystectomy.

Introduction

Cholelithiasis has a prevalence of 10-15% in the developed countries and 10-22% in India.[1]

ISSN 2515-8260 Volume 09, Issue 07, 2022

Today, laparoscopic cholecystectomy (LC) is a standard procedure done for gall stones as it is less invasive, associated with less tissue trauma, less post-operative pain, less hospital stay and reduced cost of the hospital as compared to open cholecystectomy [2, 3, 4, 5].
SSIs are the most common infection and they are one of the most significant complications that can occur in patients undergoing surgery, carrying high rates of morbidity and mortality. According to reports from the Centers for Disease Control and Prevention's (CDC), SSI is the third most often diagnosed infection related to healthcare [6].
Although antimicrobial prophylaxis plays an important role in reducing the rate of SSI, the issue still remains controversial and unanswered in many aspects i.e, prophylactic antibiotic is needed or not, single dose Vs multiple dose, choice of drugs like beta-lactum antibiotics or cephalosporins, narrow spectrum or wide spectrum, preventive and therapeutic treatment vs only preventive Treatment is required in preventing SSIs etc.
But, frequently, antibiotics are used irrationally for unduly long period in an attempt to reduce the SSI, which will increase the financial burden to the hospital and probable emergence of drug resistance and drug related adverse effects. So a systematic predefined approach is to be followed to prevent it.
In light of various unanswered questions stated above and scarcity of data from literature, it was of great surgical practice interest to compare SINGLE DOSE VS MULTIPLE DOSE ANTIBIOTIC in preventing SSIs in patients undergoing Laparoscopic Cholecystectomy (LC).

Methods

The study was a prospective comparative randomized trial conducted at MMMCH Kumarhatti Solan from September 2020 to January 2021. Patients undergoing elective laparoscopic cholecystectomy were included in the study.
Patients with acute cholecystitis, choledocholithiasis, or associated medical pathology such as diabetes, hypertension, immunosuppression, or patients undergoing open surgery were excluded from the study. After obtaining informed written consent, 200 patients were included in the study.
All patients underwent standard four-port laparoscopic cholecystectomy. Patients were randomly assigned to one of the following groups with hundreds of patients in each group. Patients in the single-dose group received 1 g of ceftriaxone intravenously one hour before induction of anesthesia. The patient in the multiple dose group received ceftriaxone 1 g one hour before induction of anesthesia and continued twice daily for 24 hours after surgery.
Patients were followed up on postoperative day 8 for suture removal. Erythema at the port site, discharge and fever were noted. In the case of discharge, pus culture was sent and antibiotics were given. The patient was then followed up after 3 weeks.

Results

After meeting all the inclusion criteria, 200 patients undergoing elective laparoscopic cholecystectomy were included in the study.100 patients were in single dose group and 100 patients were in multiple dose group.
Out of 200 patients, 164 (82%) were females and 36(18%) were males. The mean age of patients with symptomatic cholelithiasis was 44 yrs with minimum age of 18 yrs and maximum age of 72 yrs.
All the patients were discharged on 1st post-operative day. At one week follow up, amongst the single dose group, 2 out of 100 patients presented with umbilical port site redness and tenderness. 1 patient from SD group was having wound discharge. 1 patient had developed

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wound gape. At 3 week follow up all patients were found asymptomatic.
Out of 100 patients of multi dose group, 2 patient was having redness and tenderness. At 3 week follow up none of them was having signs of SSI.

Table 1: Single Dose Group

	AT 1 Week	AT 3 Weeks
Fever	0	0
Port site redness/ tenderness	2	0
Wound discharge	1	0
Wound abscess	0	0
Wound gape	1	0

Table 2: Multiple Drug Group

	AT 1 Week	AT 3 Week
Fever	0	0
Port site tenderness	2	0
Wound discharge	1	0
Wound abscess	0	0
Wound gape	0	0

Discussion

Surgical site infection is a postoperative complication. SSI leads to increased patient hospitalization, burden, morbidity, and mortality. Antibiotics are used to reduce the rate of SSIs and proper asepsis should be maintained. The use of antibiotics in laparoscopic cholecystectomy is still controversial, as some studies still suggest that higher doses of antibiotics have better postoperative outcomes [7].

In our study, out of 100 patients from the SD group, 4 developed SSI. Among them, 2 patients showed redness and tenderness at the umbilical port site and 1 wound discharge after the first week of surgery. Of the 100 MD group 3 patients who developed SSI, 2 patients presented with redness and tenderness at the port site and 1 patient with wound discharge at one week of surgery. Patients who developed SSI were treated appropriately and were asymptomatic by the fourth week of surgery. Our study showed that the overall SSI was 2.8%, which was comparable to the study by Sutariya and Thekdi1 (3.3%) and Koc *et al*., [8] (2%-3%). But the study conducted by Chaudhary *et al*., [9] showed a higher rate of SSI (12.76%) than our study. The difference in the result may be that they included both open and laparoscopic cholecystectomy in their study. While we excluded all patients with acute infection, as well as any medical pathology that may change the outcome of our study.

In our study, the rate of SSI in SD group (3.1%) and MD group (2.5%) was analyzed by Chi-square test, and the result showed that the rate was statistically insignificant (p=0.437). This shows that a single dose of antibiotic is as effective as multiple doses of antibiotics when it comes to wound infection. Various studies 15,16,1718,19 have revealed that a single dose of antibiotic is as effective as multiple doses of antibiotics A randomized, controlled, double-blind, multicenter study was conducted by Meijer WS *et al*., [21] which concluded that there was no significant difference in outcomes with the use of SD or MD antibiotics. Surgical site infection can occur even in clean surgery, as a number of microbial factors play a role. Antibiotic prophylaxis within 24 hours is sufficient to prevent surgical site infection, concluded Wald Vogel FA *et al*. [22] This study was performed in a single institution, for a better understanding, a multicenter with a similar setting should be performed to determine the effectiveness of antibiotic prophylaxis that can be used when performing laparoscopic

cholecystectomy.

Conclusion

There is no statistically significant difference between the incidence of port site infection in the single-dose group and the multi-dose group. A single-dose prophylactic antibiotic is therefore safe during laparoscopic cholecystectomy.

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