

## ORIGINAL ARTICLE

## ROLE OF SINGLE DOSE VERSUS MULTIPLE DOSES ANTIBIOTICS IN LAPAROSCOPIC CHOLECYSTECTOMY

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**ABSTRACT**

**Introduction:** Laparoscopic cholecystectomy is clean-contaminated surgery. Prophylactic antibiotics are used to reduce SSI but there is still controversy regarding use of antibiotics in postoperative period. The aim of this study is to compare the effect of single dose versus multiple doses of antibiotics in terms of wound infection.

**Methods:** This prospective study was carried out in department of surgery of National Medical College and Teaching Hospital, Birgunj from March 2020 to March 2021. Patients with diagnosis of symptomatic cholelithiasis were divided using lottery method in single dose (SD) group and multiple doses (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 2 days.

**Results:** A total of 249 patients completed the study among which 127 patients were included in the (SD) group and 122 patients in (MD) group. The mean age of patient was 37.37±14.30 years. In single dose (SD) group, 4(3.1%) patients developed wound infection and 3(2.5%) patients in multiple (MD) group developed wound infection which was not statistically significant (p=0.437).

**Conclusions:** Single dose antibiotic was found to be as effective as multiple doses of antibiotics in terms of wound infection in laparoscopic cholecystectomy.

**Keywords:** antibiotics; cholecystectomy; laparoscopy, prophylaxis

**INTRODUCTION**

Gallstone is one of the common surgical problem encountered worldwide. The prevalence of cholelithiasis is 10-15% of adult population in developed countries and 10-20% in India,<sup>1</sup> where as in Nepal it is about 2.44% - 6.45%.<sup>2</sup> Nowadays laparoscopic cholecystectomy is the gold standard treatment for symptomatic cholelithiasis.<sup>3</sup>

Postoperative wound infection is a common problem in any surgery. Prophylactic antibiotics are used to reduce SSI. The Scottish Intercollegiate guidelines Network (SIG-Network) and American Society of Health system pharmacists guidelines (ASHP) do not recommend the use of prophylactic antibiotic in the laparoscopic surgery.<sup>4,5</sup> Also study done by Chang WT et al do not recommend the use of prophylactic antibiotics in laparoscopic cholecystectomy,<sup>6</sup> but the other studies<sup>7,8</sup> support the use of prophylactic antibiotics to reduce surgical site infection (SSI) in elective laparoscopic surgery in low-risk patients. There is still argument about the use of post-operative antibiotics in laparoscopic cholecystectomy. Over use of antibiotics results in more adverse effects,

rise in emergence of resistant organism and increase in treatment cost.<sup>9</sup> Few studies have been done in Nepal to see the effectiveness of single dose of antibiotic which rarely includes district like ours where the temperature is high.<sup>10,11</sup> As it is known that wound healing is delayed in high temperature.<sup>12</sup> The outcome of this study will also be a stepping stone for further research to see if there is any need of antibiotics in laparoscopic surgeries. Hence, we have done this study to compare single versus multiple doses of antibiotics in terms of wound infection in laparoscopic cholecystectomy.

**MATERIALS AND METHODS**

This cross-sectional comparative study was carried out in department of surgery of National Medical College and Teaching Hospital, Birgunj from March 2020 to March 2021. The study was approved by Institutional Review Committee of the college (IRC-NMC) with reference number NMC/441/075/76. All the patients with the diagnosis of symptomatic cholelithiasis, presenting with abdominal pain, bloating, loss of appetite, nausea

without any signs of infection were included in the study.<sup>13</sup> The diagnosis was made on the basis of history, clinical examination, blood workup and ultrasonography. Patients with acute calculus cholecystitis, Cholangitis, choledocholithiasis, biliary pancreatitis, associated medical conditions like diabetes, ischemic heart disease were excluded from the study as they were high risk groups. Those patients who required conversion to open cholecystectomy, and left the follow up in post-operative period were also excluded from the study. Written informed consent was taken from patient or his/her relative before operation. After admission, detailed history including demographic findings, clinical features, investigation reports, operative findings were recorded on proforma. Patients were divided into two groups by lottery using Microsoft Excel: Single dose (SD) group and multiple doses (MD) group. Sample size was calculated using the software G-power v3.1 for comparison of 2 proportions.

$p_1$  = complications in SD group = 0.19<sup>14</sup>

$p_2$  = complication in MD group = 0.067<sup>15</sup>

At 80% power and 95% CI

The sample size calculated was 232. With 10% attrition the total sample size was calculated to be 254

Cases were divided into two groups equally by lottery method

In single dose (SD) group, inj. Ceftriaxone 1 gram was given intravenously at the time of induction of anaesthesia. In multiple doses (MD) group, inj. ceftriaxone 1 gm was given intravenously at the time of induction of anaesthesia and followed by continuation of same dose twice a day for 2 days. Laparoscopic cholecystectomy was performed via routine 4-ports under aseptic condition. Gall bladder was removed via umbilical port. Wound was examined on 2<sup>nd</sup> postoperative day and findings were recorded on proforma. Post-operatively, port site redness and tenderness, wound discharge, wound gape and wound abscess were considered as Surgical site infection. After discharge, patients were asked for weekly follow up for 4 weeks. At every follow up, wounds were examined and findings were recorded on proforma. Data were entered into Microsoft Excel 2013 and were analysed with SPSS-23. Data were presented as mean, standard deviation, frequency, and percentage where applicable. Chi-square test was used to compare categorical data. P value of less than 0.05 was considered significant

## RESULTS

A total of 254 patients were included in the study. Out of 254 patients, 127 patients were in the single dose (SD) group and another 127 patients in the multiple dose (MD)

group. Postoperatively 5 patients lost the follow up in multiple dose (MD) group. Thus 5 patients were excluded from the study. Out of remaining 249 patients, 42(16.8%) were male and 207(83.2%) were female. Male: female ratio was 1:5. The mean age of patient was 37.37±14.30 years. Maximum number of patients were in the age group of 21-30 years followed by in the age group of 31-40 years. Table 1 shows age and sex distribution.

**Table 1: Age and gender of SD group and MD group**

	Gender		Age
	Male	Female	
Single Dose (SD Group)	19	108	38.213±15.498
Multiple Dose (MD Group)	23	99	36.508±13.014

The patients were categorised in different age group as shown in table 2.

**Table 2: Distribution of patients in different age groups**

Age Group (in Years)	No of Patients		
	SD (127)	MD (122)	Total (249)
11-20	7 (5.5%)	14 (11%)	21 (8%)
21-30	46 (36%)	33 (27%)	79 (32%)
31-40	26 (20.5%)	35 (29%)	61(24%)
41-50	20 (16%)	24 (20%)	44 (18%)
51-60	14 (11%)	10 (8%)	24 (10%)
Above 61	14 (11%)	6 (5%)	20 (8%)

Out of 127 patients in SD group, 2 (1.5%) patients had redness and tenderness over umbilical port site after first week of surgery. Wound discharge was seen in 2 (1.5%), one after first week and next after second week of surgery. Wound gape and wound abscess were not seen in any patients.

Out of 122 patients in MD group, none of the patients had any complaint till second post-operative day. After one-week of follow up, 2 (1.6%) patients were having port-site redness and tenderness and 1 (0.8%) patients had wound discharge. Wound gape and wound abscess were not seen in any patients. Among all the patients 7(2.8%) developed SSI.

In comparison of wound infection in both groups, 4(3.1%) patient developed SSI in SD group whereas in MD group 3(2.5%) patients developed SSI which was statistically insignificant as shown in table 5.

**Table 5: Distribution of infection rates**

Dose regimen	Wound Infection n (%)	Without Wound Infection n (%)	p-Value
Single Dose (SD Group)	4 (3.1)	123 (96.9)	0.437
Multiple Dose (MD Group)	3 (2.5)	119 (98.5)	

## DISCUSSION

Postoperative surgical site infection is a common problem encountered in many surgical procedures. To avoid this problem preoperative and postoperative use of antibiotics is a common practice among surgeons. Use of single dose antibiotic and multiple doses of antibiotics are highly dependent on the outcome of surgery and the surgeon himself. The use of antibiotics in laparoscopic cholecystectomy is still arguable as some study still suggest that multiple doses of antibiotics have better outcome postoperatively.<sup>15</sup>

In our study, the mean age of the patients was 37.37±14.3 years where 79(32%) were in the age group of 21 – 30 years which was similar to the observation made by Shah YD et al.<sup>14</sup> Out of total cases, 207 (83.2%) were female patients. This was similar to studies done by Chaudhary et al<sup>8</sup>, Shukla et al<sup>16</sup> Abu-Eshy et al<sup>17</sup> and Sutariya and Thekdi<sup>1</sup> where female predominance of 91.48%, 82%, 50.85% and 64.4% respectively was observed.

In our study, out of 127 patients of SD group, 4(3.1%) developed SSI. Among them 2 (1.5%) patients presented with redness and tenderness over umbilical port site and 2 (1.5%) with wound discharge after first week of surgery. Out of 122 patients of MD group 3(2.5%) developed SSI among which 2 (1.6%) patients presented with port-site redness and tenderness and 1 (0.8%) patient with wound discharge after one week of surgery. The patients who developed SSI were treated accordingly and were asymptomatic by the fourth week of surgery. Our study showed that the total SSI was 2.8% which was comparable with study done by Sutariya and Thekdi<sup>1</sup> (3.3%) and Koc et al.<sup>18</sup> (2%-3%). But the study done by Chaudhary et al.<sup>8</sup> showed higher rate of SSI (12.76%) than our study. The difference in the outcome might be because they included both open as well as laparoscopic cholecystectomy in their study. Whereas we excluded all the patients with acute infection as well as any medical pathology that can change the outcome of our study.

In our study, SSI rate in SD group (3.1%) and in MD group (2.5%) was analysed using Chi-square test and the result showed that the rate was statistically insignificant (p=0.437). This shows that single dose antibiotic is equally effective as multi dose of antibiotics in terms of wound infection. Various studies<sup>1,8,14,19</sup> revealed that

single dose of antibiotic is as effective as the multiple dose of antibiotics

A randomized, controlled, double-blind, multicenter trial was conducted by Meijer WS et al.<sup>20</sup> which concluded that there was no significant difference in outcome with SD or MD antibiotics use. Surgical site infection may occur even in clean surgery as numerous microbial factors play role in that. Antibiotic prophylaxis up to 24 hour is sufficient to prevent surgical site infection was concluded by Waldvogel FA et al.<sup>21</sup>

This study was conducted in a single institute, for better understanding multicentre with similar setting has to be done to see the effectiveness of the antibiotic prophylaxis that can be used while performing Laparoscopic cholecystectomy.

## CONCLUSION

This study concludes that there is no difference in rate of surgical site infection (SSI) in patients receiving either single dose or multiple doses of antibiotics in laparoscopic cholecystectomy.

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