

**Original article****18 A STUDY ON EFFECTIVENESS OF SINGLE DOSE ANTIBIOTIC THERAPY IN LAPAROSCOPIC CHOLECYSTECTOMY TO PREVENT SURGICAL SITE INFECTIONS** Dr. Brijesh D Parekh, Dr. Yogesh N Modiya

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**Introduction:-**

The prophylactic use of antimicrobial agents to reduce the postoperative infection is widely practiced<sup>1</sup>. The objective of preoperative antibiotic prophylaxis is to prevent postoperative infections. Rational use of antibiotic is extremely important as injudicious use can adversely affect the patient, cause emergence of antibiotic resistance and increase the cost of health care<sup>2,3</sup>.

Antibiotic resistance has become a global menace, and WHO in 2012 had given a clear call to reduce the antibiotic use and prevent resistance to antibiotics<sup>4</sup>.

Several evidences have shown that strict aseptic technique alone could decrease but not eliminate the contamination of the surgical field completely. Therefore, the need for antibiotics to complement aseptic technique is now being widely recognized and accepted<sup>5</sup>.

In spite of wide knowledge about the effectiveness of antibiotic prophylaxis, administrative regimens are often inappropriately practiced. Main concern is the duration of prophylaxis, which is often longer than recommended<sup>6,7</sup>. Antibiotic prophylaxis is a preventive method in which antimicrobial agents are used prophylactically to combat the infectious complications in a therapeutic procedure. In conventional practice, antimicrobials are used for a predetermined period after therapeutic procedure to combat the infection<sup>8</sup>.

Most often in government hospitals, where the environmental hygiene is not adequately maintained and over load of surgical patients with the fear of development of surgical site infection even for clean and clean-contaminated surgeries; antibiotics are usually given for 7-10 days. The traditional approach for this multi dose usage often leads to huge

expenditure to the hospital and enhance emergence of resistance to the particular drug and the group to which it belong<sup>9</sup>. This study is thus intended to study the effect of single-dose antibiotic prophylaxis given 30 min prior to surgery with the standard chosen antibiotic versus the conventional use of the same antibiotic for 7 days.

### **Aims & Objectives:-**

- ✓ To compare proportion of early post-operative infection in clean surgeries after single dose of prophylactic antibiotic and multiple dose post-operative antibiotics.
- ✓ To assess cost-effectiveness of single dose antibiotic regimen versus conventional multi-dose regimen.

### **Methodology:-**

This study was conducted as a prospective study in the Department of General Surgery in LG General Hospital, Maninagar from June 2016 to December 2017.

Totally 50 patients admitted for Laparoscopic Cholecystectomy in our hospital were included in this study. All the surgeries were carried out in the same operation theatre environment and same preoperative safety protocol, and post-operative care was followed for all patients

### **Inclusion criteria:**

- Patients with no comorbid conditions and medically as well as anesthetically fit for surgery.

### **Exclusion criteria:**

- Patient with co-morbid renal, cardiac, hepatic damages.
- Surgeries which had to be converted into Open Cholecystectomy.
- Surgeries in which any intra-operative complication was encountered.
- Patient on steroid or having immune deficiency.
- Non-willing patients

### **Pre-operative preparation and care:**

All the patients posted for these elective surgeries were admitted on the day prior to surgery. All necessary investigations were done and anesthetic fitness obtained. The operative site was cleaned/shaved with aseptic precaution. All patients were asked to take body wash with soap on the day of surgery.

### **Aseptic precautions in the operation theater:**

Asepsis is maintained, and checklists were verified. All the instruments were sterilized. Standard surgical scrub for 5-10 min was mandatorily followed by the surgical team

### **Post-operative care:**

Temperature and vitals were monitored periodically, and the charts were maintained strictly. Wound inspection was done on 1<sup>st</sup>, 3<sup>rd</sup> and 7<sup>th</sup> day. All patients were followed up upto 7 days and ensured that antibiotics were given at appropriate time as per the protocol.

### **Result:-**

Total 50 patients undergoing Laparoscopic Cholecystectomy for cholelithiasis were divided into two groups. Patients in the control group were given, 7 days of antibiotics. Study group patients got only one dose of prophylactic antibiotic 30 minute before surgery.

### **Demographic profile:**

The mean age, weight, hemoglobin level, duration of surgery and duration of hospital stay for each group of patients were measured. The Demographic profile of all the patients in both the groups were studied and tabulated as follows

Sex	Study Group	Control Group
Male	8	6
Female	17	19
Total	25	25

Mean Age Range	Study Group	Control Group
<20 Years	1	1
20-30 Years	3	4
30-40 Years	8	7
40-50 Years	8	8
>50 Years	5	5

Demographic Profile	Study Group	Control Group
Mean Age	44.5 Years	46 Years
Mean Weight	74 kg	78 kg
Hemoglobin	12.5 g/dl	13 g/dl
Duration Of Surgery	1 hour & 10 mins	1 hour
Duration of Hospital Stay	1 and half days	3 days

### **Antibiotic profile:**

The use of antibiotics were predetermined as follows

### **Study group:**

- One dose of Inj. Ceftriaxone 1 g IV given 30 min prior to surgery and no more antibiotics were prescribed.
- 2<sup>nd</sup> day dressing changed and checked for infection on 3<sup>rd</sup>, 5<sup>th</sup> and 7<sup>th</sup> day.
- Suture removed on the 10<sup>th</sup> day.

### **Control group:**

- In the post-operative ward for the first 3 days Inj. Ceftriaxone 1 g IV was given twice a day.
- For next 4 days Tablet Cefexime 200 mg was given twice a day.
- 2<sup>nd</sup> day dressing changed and checked for infection on 3<sup>rd</sup>, 5<sup>th</sup> and 7<sup>th</sup> day.
- Suture removed on the 10<sup>th</sup> day.

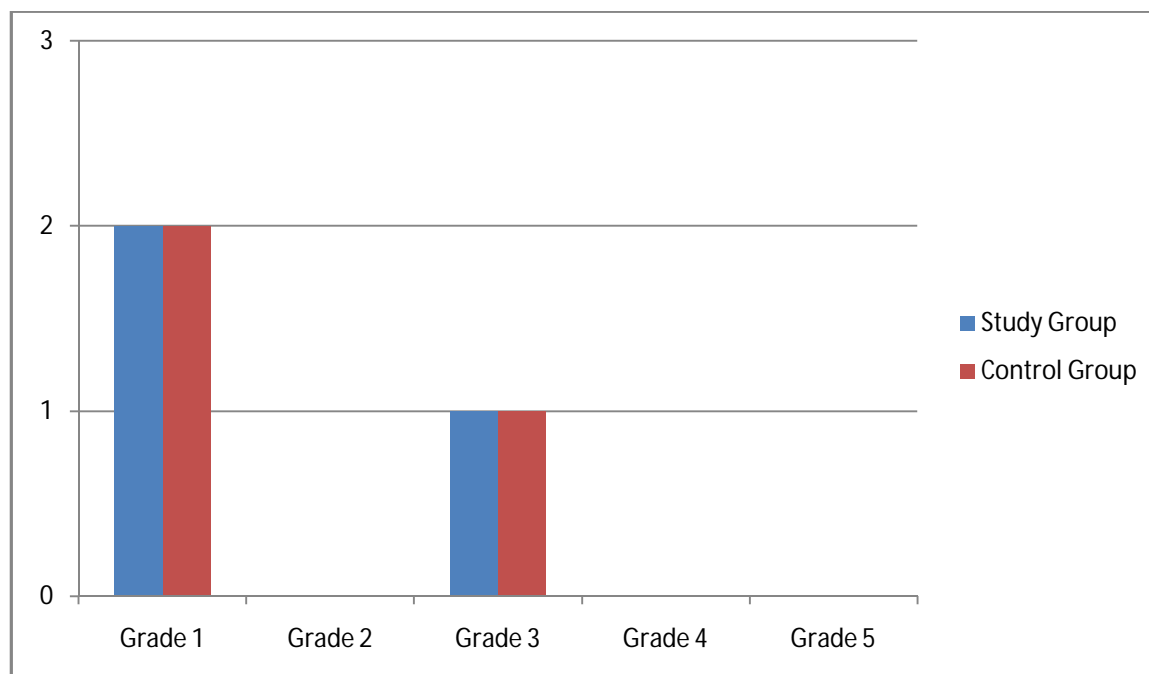
### **Infection Grading:**

In the ward, based on the **Southampton scoring system** on the 3rd, 5th, and 7th post-operative period the wounds were inspected and the infection grades were documented.

<b>Southampton scoring system</b>	
<b>Score</b>	<b>Condition of the wound</b>
0	Normal Healing
1	Bruising and mild erythema
2	Erythema and signs of inflammation
3	Clear (or) serous discharge
4	Pus Formation
5	Deep, severe wound infection.

Out of the 50 patients, only 6 patients, 3 in each group developed infection in the post-operative period. No change in the management protocol was done. On appropriate local wound management, infections were controlled. No statistically significant difference with respect to infection prolife was noted in both the groups. The results are tabulated below.

<b>Grade of Infection</b>	<b>Study Group</b>			<b>Control Group</b>		
	<b>3<sup>rd</sup> Day</b>	<b>5<sup>th</sup> Day</b>	<b>7<sup>th</sup> Day</b>	<b>3<sup>rd</sup> Day</b>	<b>5<sup>th</sup> Day</b>	<b>7<sup>th</sup> Day</b>
Grade 1	1	1	-	-	2	-
Grade 2	-	-	-	-	-	-
Grade 3	1	-	-	-	1	-
Grade 4	-	-	-	-	-	-
Grade 5	-	-	-	-	-	-

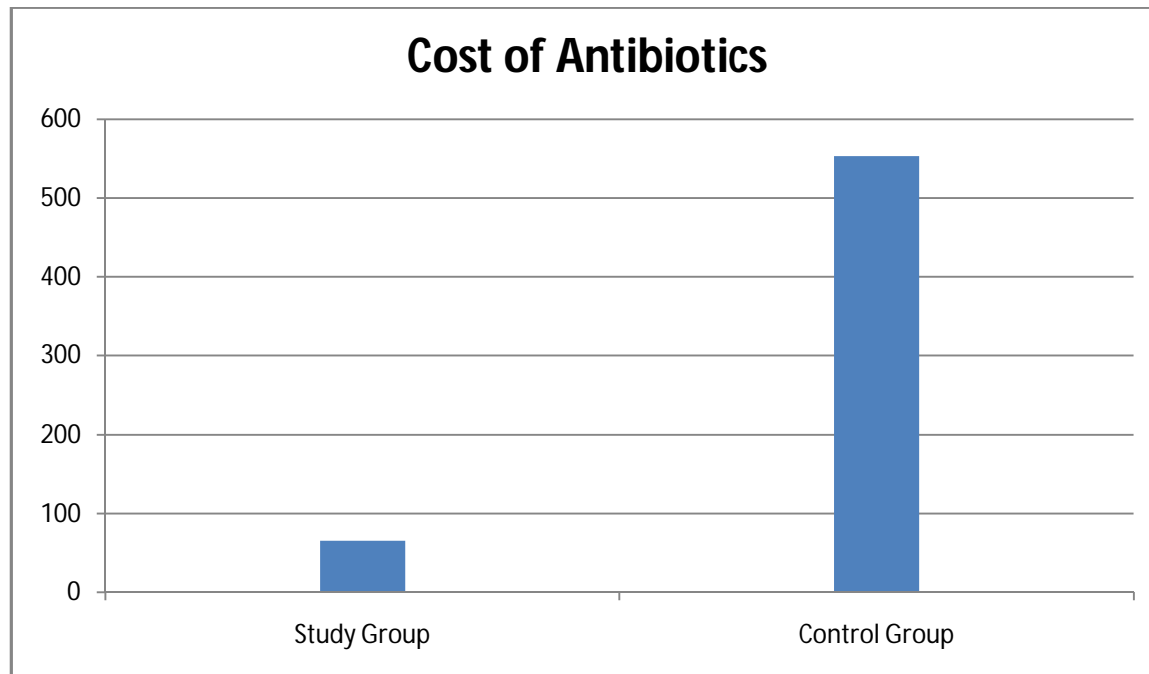


### **Side effects of antibiotic treatment:**

All patients were observed for the known side effects of the drugs used. None developed antibiotic side effects in the study group. However in control group, four patients had gastrointestinal symptoms i.e. nausea, vomiting and diarrhea.

### **Mean cost of antibiotics used:**

Mean cost of antibiotic was Rs. 65.80 in case group and Rs. 553.60 in control group, showing a cost reduction of 88.11%.



#### **DISCUSSION:-**

Our study which was done to assess the effectiveness of a single dose of prophylactic antibiotic versus the traditional use of 7 days antibiotics has shown no significant difference in the wound infection rate in both the studied groups. However, there is a significant increase in the cost and side effects of antibiotics in the control group using conventional 7 days antibiotics.

The use of prophylactic antibiotic in all surgical cases are advocated ever since, the concept of use of antibiotic preoperatively to curtain and prevent wound infection was postulated by Bernard and Cole in 1964<sup>10</sup>.

With so much advancement in the strict asepsis of the environment and hygiene of the operation theatres which is being practiced widely, it was questioned in many surgical settings on the need of antibiotic at all for clean and clean-contaminated surgical cases. However, in high turnover hospitals especially in government run hospitals, even while all the sterile precautions are practiced, the surgical procedures can imbibe bacteria or other microbial agents in the blood and lead to bacteremia. Thus the use of long-acting antibiotic to cover the perioperative period is recommended<sup>11</sup>.

Several studies have been conducted on the choice of antibiotic and timing of use of antibiotics. Most of the studies have recommended the first dose to be given 30- 60 min prior to surgery, and long-acting antibiotic must be selected<sup>12</sup>.

Arjona F et al had conducted a study to find out the economic advantages following use of prophylactic antibiotic rather than traditional 7 days antibiotics, using 5260 patients in a medical Centre in Southern Taiwan and stated that use of prophylactic antibiotic alone for the surgical patients had resulted in gain of 1.5 million dollars for the public<sup>13</sup>. So, our study also concludes that, there is a significant advantage of economic gain when only prophylactic antibiotic is used.

Inadvertent and over use of antibiotics can cause side effects and also can lead to the development of drug resistance bacteria. In our study, it is also noted that a significant number of the patients had developed side effects of antibiotic during this period.

Along with prophylactic antibiotics, clean surgical environment, adequate hand washing, adequate preparation of patients and following universal precautions will improve the wound healing and prevent the infection in the patient<sup>14</sup>.

### **CONCLUSION:-**

Our study concludes that the judicious use of prophylactic antibiotic by itself can prevent any wound infections which will lead to potential economic benefits and prevent the development of resistant strains of bacteria. Hence, single dose prophylactic antibiotic will be effective in reducing postoperative infection if proper aseptic precautions during surgery are undertaken along with.

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