

Comparative Study of One Day Pre - Operative Antibiotic Prophylaxis Versus Five Days Postoperative Antibiotic Coverage in Laparoscopic Cholecystectomy

Dr. Yashesh K. Mistry¹, Dr. Rajesh Chandnani²

¹R2, Department of General Surgery, SMIMER Hospital, Surat - 395010
Corresponding Author Mobile: 7802887219, 8799255020

²Associate Professor, Department of General Surgery, SMIMER Hospital, Surat - 395010

Abstract: ***Introduction:** Antimicrobial agents were considered as magic bullets and effective tools to combat infection in various therapeutic settings. In conventional antibiotic use, antimicrobials are used for a predetermined period after therapeutic procedure to combat the infection because most often in public hospitals due to lack of maintenance of environmental hygiene & overload of surgical patients fear of SSI (surgical site infection) are more. **Aims And Objectives:** To study the wound infection rate and recognition and prevention of exogenous and endogenous sources of SSI in laparoscopic cholecystectomy, whether long term antibiotics should be given or antibiotics given at the maximum time of concentration are sufficient. **Materials And Methods:** Study size and period: 50 cases, June 2023 to December 2023. Study conducted at SMIMER HOSPITAL, SURAT. Single dose of antibiotic, 1 gm ceftriaxone was administered one hour before surgery by IV route & 5 days course, 2 days IV and 3 days oral (cefixime). Study on patients with age group of 18 - 60 years both males & females with no co - morbid condition posted for laparoscopic cholecystectomy for gall bladder stones. Wound inspection done on 3rd, 5th, and 7th day. **Results:** 1 day pre - operative antibiotic is almost as effective as to multiple dose antibiotics. Hence a single - day prophylaxis is recommended to reduce the financial burdens, the emergence of resistant strains and avoid the side effects of the drugs. However, it is of utmost importance that complete asepsis be maintained during the surgery and post - operative care, irrespective of the antibiotic prophylaxis, to achieve the most desired goal of elimination of post - operative infections, thus reducing the morbidity and mortality. **Conclusion:** Single dose antibiotic is sufficient in preventing wound infection and also some other factors like proper preoperative skin preparation, sterile surgical practice & operative theatre & good postoperative nursing care to be taken care of. Prolonged administration of antibiotics is unnecessary and costlier. Prolonged use of antibiotics is associated with emergence of resistant strains and super - infections, which can be prevented by cost - effective short term antibiotic prophylaxis.*

Keywords: Prophylactic Antibiotics, Laparoscopic cholecystectomy

1. Introduction

Antimicrobial agents were considered as magic bullets and effective tools to combat infection in various therapeutic settings. In conventional antibiotic use, antimicrobials are used for a predetermined period after therapeutic procedure to combat the infection.

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. [2] Various techniques of antibiotic prophylaxis, the quantities and nature of drug use, timing of the use of the drug were studied by various cross - sectional studies and based on the data the standard protocol of antibiotic prophylaxis for each procedure were randomized and published. [3] In this era of antibiotics, the cornerstone of infection control, such as meticulous surgical skill, respectful tissues handling, inbuilt environmental sanitation, adequate preoperative preparation, congenital theatre environment, and adequate wound care, are given less priority. [4] Most often in public hospitals where the environmental hygiene is not adequately maintained and over load of surgical patients with fear of development of surgical site infections even for clean and clean - contaminated surgeries antibiotics are given for 7 - 10 days. The traditional approach for this multi dose usage

often leads to huge expenditure to the hospital and enhance emerging of resistance to the particular drug and the group to which it belong.

2. Aims and Objectives

- 1) To study the wound infection rate in laparoscopic cholecystectomy.
- 2) Whether long term antibiotics should be given or antibiotics given at the maximal time of contamination are sufficient.
- 3) If pre - operative single dose is sufficient in reducing the infection rate, hospital stay, duration of recovery and patients acceptance & developing antibiotic resistance.
- 4) Recognition and prevention of exogenous and endogenous sources of surgical site infection.
- 5) Whether prolonged course of post - operative antibiotics are necessary in reducing infection and other morbidities of wound complications.
- 6) Rationale of prophylactic antibiotics in laparoscopic cholecystectomy.
- 7) To assess the efficacy and advantages of one day pre - operative antibiotic administration versus a five day postoperative antibiotic regimen in prevention of wound infection after clean and elective laparoscopic cholecystectomy.

Volume 13 Issue 7, July 2024

Fully Refereed | Open Access | Double Blind Peer Reviewed Journal

www.ijsr.net

3. Materials and Methods

Study size and period: 50 cases. June 2023 to December 2023.

Study conducted at SMIMER HOSPITAL, SURAT

Two groups were established on the basis of numerical status. Patients with odd numbers were taken for pre-operative antibiotic trial whereas those with even numbers were taken for 5 days course of antibiotics. Initial dose of antibiotic, 1 gm Ceftriaxone was administered one hour before surgery by intravenous route. In patients with 5 days course the first was given immediately after operation and continued for five days, two days intravenously and three days oral (Cefixime).

Inclusion Criteria:

Patients with the age group of 18 - 60 both male and female with no comorbid conditions and posted for laparoscopic cholecystectomy for gall bladder stones.

Exclusion Criteria:

- Antibiotic intake in the 7 days before surgery.
- Active or acute cholecystitis in the 6 months prior to admission.
- ERCP treated choledocholithiasis.
- Laparoscopy was replaced by laparotomy
- History of hypersensitivity to cephalosporine group of antibiotics.
- Patients with co-morbid renal, cardiac, hepatic damages.
- Patients on steroid or having immune deficiency.
- Non-willing patients.
- Patients on long-term medications for diabetes, hypertension or psychiatry problems.

Pre Operative Preparation and Care:

All the patients posted for elective surgery were admitted on the day prior to surgery. All necessary investigations are done and anaesthetic fitness obtained. The operative site was cleaned with aseptic precaution and asked to take body bath with soap on the day of surgery. Sterile techniques also maintained during operation and meticulous dissection was done.

Post Operative Care:

The patients were kept in the post-operative ward for 1 day and shifted to general ward on day 2. Temperature and vitals are monitored periodically, and the charts are maintained dedicated staff followed up with the drugs to be administered and ensured the antibiotics are given at appropriate time as per the protocol. Wound inspection was done on 3rd, 5th and 7th day.

The Results of Other Similar Studies:

Serial No.	Workers	% of Infection
1	Sanchez ubeda [10] (1958)	5.6%
2	Johnstone [11] (1962)	8.7%
3	Snider [12] (1968)	2.3%
4	Present study	4.0%

All of the above studies support the results of the present study that a 1-day pre-operative antibiotic is almost as effective as to multiple dose antibiotics. Hence, a single-day prophylaxis is recommended to reduce the financial burdens, the emergence of resistant strains and avoid the side effects of the drugs.

However, it is of utmost importance that complete asepsis be maintained during the surgery and post-operative care, irrespective of the antibiotic prophylaxis, to achieve the much desired goal of elimination of post-operative infections, thus reducing the morbidity and mortality.

Observation:

Total of 50 patients undergoing elective laparoscopic cholecystectomy were included in this study and 25 were given single preoperative antibiotic (Group A) and 25 were given 5 days conventional course of antibiotics (Group B). In our study there were 16 males and 34 females. This infers that gall stone disease is more common in females.

The following table shows age distribution in the study.

Age Distribution:

Sr. no.	Age group	Group A	Group B	Total
1	18 - 30	6	5	11
2	30 - 50	11	13	24
3	>50	8	7	15
	TOTAL	25	25	50

In our study, patients were included from 18 to 60 years of age with mean age of 40.2 years. Maximum incidence is in the age group of 30 to 50 years.

Infection Grading:

Grade of Infection	Group A 7 th Day	Group A 10 th Day	Group B 7 th Day	Group B 10 th Day
Grade 1	2	0	0	1
Grade 2	0	0	1	0
Grade 3	0	0	0	1
Grade 4	0	0	1	0

- 2 patients in group A developed grade I infection on 7th post-operative day.
- 1 patient in group B developed grade I infection on 10th post-operative day.
- 1 patient in group B developed grade II infection on 7th post-operative day.
- 1 patient in group B developed grade III infection on 10th post-operative day.
- 1 patient in group B developed grade IV infection on 7th post-operative day.

Statistical Analysis Data for Fisher's Test - 1:

Infection (Yes/No)	Group A	Group B	Total
Yes	2	4	6
No	23	21	44
Total	25	25	50

The above table indicates number of patients infected in group A is 2 and that in Group B is 4. The fisher test statistical p-value is 0.6671. So the result is statistically insignificant.

Statistical Analysis Data for Fisher's Test - 2:

Infection (Yes/No)	Group A	Group B	Total
Yes	4%	8%	12%
No	46%	42%	88%
Total	50%	50%	100%

The above table indicates percentage of patients infected in Group A is 4% and that in Group B is 8%.

The following table shows bile spillage and stone spillage in both the groups:

Bile Spillage and Stone Spillage:

	Group A	Group B	Total
Bile spillage	10	11	21
Stone spillage	4	5	9

The above table indicates total 21 patients had bile spillage among which 10 in Group A and 11 in Group B.

Total 9 patients had stone spillage, out of which 4 were in Group A and 5 were in Group B.

Relation of Drain and SSI:

Drain		Drain Kept	No Drain	Total	
No. of Patients	Group A	Total cases	15	10	25
		Infected cases	2	0	2
		Infection rate%	13.3%	0%	8%
	Group B	Total cases	18	7	25
		Infected cases	4	0	4
		Infection rate%	22%	0%	16%
	Total	Total cases	33	17	50
		Infected cases	6	0	6
		Infection rate%	18.2%	0%	12%

From above table we can see that in group A the infection rate for drain group is 13.3% while in group B it is 22%. There was no infection in no drain group in group A and group B. In study by Byrne D. J. et al [13], the infection rate with drain was 13.3% (153 patients had SSI out of the 1149 patients in whom drains were inserted). On the other hand study 54 out of 2317 patients in whom drain was not kept were infected (2.3%). Our observation is comparable with the above observation.

4. Discussion

Pre - Operative administration of antibiotics to prevent post - operative infection represents a cornerstone in modern medicine. Controlled clinical trials have shown that antimicrobial prophylaxis can lower the incidence of infection after certain operations, thus reducing morbidity, hospital stay, antibiotic usage and mortality due to sepsis. [5] A single dose prophylaxis before surgery was found to be sufficient. If surgery is delayed or prolonged, often a second dose is advisable if antimicrobial agent with short life is used. Post - operative administration is unnecessary and harmful.

Pre - operative use of antibiotics to prevent wound infection was demonstrated by Bernard and Cole (1964). [6]. A study conducted by Classen et al. has shown that patients who received pre - operative antibiotics early developed 3.8%

wound infections. Patients who received antibiotics pre - operatively developed 1.45% infections compared to those who received antibiotic postoperatively and developed 3.3% wound infections. [7] The administration of antibiotics 2 to 24 hours before the surgical incision was defined as early, that during the 2 hours before incision as preoperative, that during the three hours after the incision as peri - operative and that more than 3 hours but less than 24 hours after the incision as postoperative. This study concludes that in surgical practice there is considerable variation in the timing of administration of antibiotics and the administration in the 2 hours before surgery reduces the risk of wound infection.

The American guidelines [8] for surgical prophylaxis, worked out recently by the CDC, have not modified their general structure and have strongly influenced the protocols and the prescriptive behavior of for countries. These guidelines, however, are probably no longer adequate for the situation in question. The evaluation of bacterial epidemiology and bacterial resistance and the contemporary availability of new antibiotic have removed the fear of the post - antibiotic era. Incidence of wound infection following clean surgery is 1.8% as claimed by Curse and Foord. [9].

5. Conclusion

Single dose antibiotic is sufficient in preventing wound infection. Prolonged administration of antibiotics is unnecessary and costlier. Prolonged use of antibiotics is associated with emergence of resistant strains and super - infections, which can be prevented by cost - effective short term antibiotic prophylaxis.

Along with prophylactic antibiotics there are also other factors which are associated with wound infection prevention that should also be taken care of, these are:

- 1) Proper pre - operative skin preparation.
- 2) Sterile techniques throughout the surgery.
- 3) Sterile operative theatre.
- 4) Proper surgical scrub.
- 5) Minimum use of diathermy with meticulous dissection and maintaining good hemostasis.
- 6) Good postoperative nursing care.

References

- [1] Bratzler DW, Dellinger EP, Olsen KM, Perl TM, Auwaerter PG, Bolon MK, et al Clinical practice guidelines for antimicrobial prophylaxis in surgery. *Am J Health Sys Pharm* 2013; 70: 195 - 283.
- [2] WHO - Surveillance of Antimicrobial resistance. Available from: <http://www.who.int/drugresistance/surveillance/en>.
- [3] Ghafur A. Jayalal et al JA. The Chennai declaration. *Indian J Cancer* 2012; 49: 71.
- [4] Leuva et al HL. Role of antibiotics in clean surgeries prophylaxis vs conventional. Available from: <http://www.medind.nic.in/gaa/t14/i2/gaat14i2p96.pdf>.
- [5] Geroulanos SMK, KRIRAJ J, Kadas B: Cephalosporins in surgical prophylaxis. *J CHEMOTHER*; 2001; 13 spec. no.1 (1): 23 - 6.
- [6] Bernard HR, Cole WR: The prophylaxis of surgical infection: the effect of prophylactic antimicrobial

drugs on the incidence of infection following potentially contaminated operations. *Surgery*; 1964; 56: 151 - 7.

- [7] David Classen et al: The timing of prophylactic administration of antibiotics and the risk of surgical wound infection *Engl J Med*; 1992; 326 (5); 337 - 9.
- [8] Esposito S, Novelli A, de Lalla F: Antibiotic prophylaxis in surgery; news and controversies. *Infez Med*; 2002; 10 (3): 131 - 44.
- [9] Cruse PJ, Foord R. The epidemiology of wound infection: a 10 –year prospective study of 62, 939 wounds. *Surg Clin North Am*1980; 60 (1): 27 - 40.
- [10] Sanchez UR, Fernand E, Rousselof Lm: Complication rate in general surgical cases. The value of Penicillin and streptomycin as post - operative prophylaxis. A study of 511 cases. *NEJM*; 1958; 259; 1045 - 1050.
- [11] Johnstone FRC: An assessment of prophylactic antibiotics in general surgery, *Surg Gyn Obstet*; 1962; 116; 1 - 10.
- [12] Snider SR: Clean wound infections, *Epidemiology and Bacteriology*. *Surgery* 1968; 64; 728 - 735.