

Comparative study of the role of single-dose Antibiotic versus conventional 5 Days Antibiotic in clean surgery

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Abstract

Introduction- Infection is a typical issue in surgery and is experienced by all specialists ordinarily of their art; they constantly hinder the principal line of host protection. Bacteria might enter the injury during or later the activity and might be of endogenous or exogenous beginning. It is a significant reason for morbidity in surgical patients. Antibiotics assume a vital part to forestall infection. **Objectives-** To set up the adequacy of Antibiotic prophylaxis in clean surgeries. To think about the extent of early postoperative infection in clean surgery later 3 dosages of prophylactic Antibiotics and 5 dose customary postoperative Antibiotics. **Materials and Methods-** This was a prospective study conducted on patients in General Surgery Department, IGIMS Patna from 1st June 2020 to 31st May 2021. 50 patients were selected for this review. Two groups were created based on mathematical status. Patients with even numbers (Group-A) were taken for three dose preliminaries, and those with odd numbers (Group B) were taken for five days course of antibiotic treatment. Clean procedures were incorporated. The postoperative assessment was a finished improvement of fever or wound infection. Information was gathered and investigated and a two-sided p-value was analyzed. **Observation and Results-** Mean age was 35.51+/- 20.79 years in group A and 26.17+/- 19.79 years in group B. In any case, there was a fundamentally higher extent of male patients in group B than in group A (p=0.006). Measurable examination showed no critical distinction in the extent of early postoperative infection cases between the two groups (p=0.270). Staphylococcus aureus was the commonest life form refined from the injury release in our review followed by E. coli. Five of our cases having postoperative injury infection showed development in three cases, out of which 3 were shallow and 2 were profound. There was no huge contrast between the two groups in regards to terms of stay in the clinic. **Conclusion-** Utilization of 3 dose perioperative antibiotics is adequate to forestall SSI and no compelling reason to give 5 dose course of antibiotics in clean surgery. There is massive expense decrease is accomplished.

Keywords: Preoperative infection, Antibiotic Prophylaxis, Clean surgery, Surgical site infection

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Introduction

A Surgical Site Infection (SSI) is an infection that manifests itself at or adjacent to the place of surgical incision[1]. This often happens within one month from the surgery or within a year in case an implant has been left in the site[2]. SSI is a significant complication of operative technique and is a prevailing nosocomial infection[3]. The primary components of antimicrobial prophylaxis include the choice of patients and medications, timings, costs, and duration. Consistencies with these acknowledged preventive standards might prompt a decline in the occurrence of such infections. Ideally, a prophylactic agent should be administered within half an hour since the surgical incision[4]. Despite there being no fixed timing for giving antibiotics to the patient, the primary objective is that of expanding antibiotic concentration in the body tissues as prophylactic measures, so that proper care of the incision can be taken during the surgery or its initiation.

Surgical Antibiotic Prophylaxis (SAP) is a short session of antibiotics started intently before the beginning starting operative procedures to decrease postoperative SSIs[5]. A general guideline is to give an antibiotic that covers major body parts and simultaneously deal with all potential infections. Concomitantly, different variables identifying with antibiotics as in course of administration, unfavorable impacts on

the patient, antibiotic profile, activities against bacteria, resistance patterns, costs, etc. should also be taken care of. Utilizing these variables in determining antibiotics, helps in the prevention of occurrences of SSIs[6].

SSI designates a huge weight concerning healthcare costs, mortality, and morbidity[7]. Apart from these, other consequences include expanded agony and care of a laceration for sepsis or even demise[8]. Negative effects of such sepsis are enhanced as patients lose their livelihood during hospitalization. To avoid wound infections, antibiotics are administered for a time of 7-10 days even in clean cases. This is not just high-priced but also fosters resistance from that specific antibiotic as well as other antibiotics. Numerous clinical preliminaries demonstrate systemic antibiotics as compelling when utilized during, before, or after the surgery. This review observes whether antibiotic prophylaxis develops the results in hospitals of developing countries, whether it is easily feasible and whether it is cost-effective.

Methodology

In this study, a comparative review has been conducted in the Department Of General Surgery, IGIMS, during the period 1st June 2020 to 31st May 2021. The review conceded 50 patients, equally divided into two groups, aged 18 years and undergoing clean operations. To achieve the goal of this study, two groups were made based on numerical status i.e. patients with even numbers as the last digit of their IPD number were placed in Group A. Likewise, arbitrary choices of patients were made for Group B by choosing patients with odd numbers in their IPD number.

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Group (A) - Patients were taken for three dose assessments

Group (B) - Patients were taken for five days antibiotics course

Wide range cephalosporin group of antibiotic (Ceftriaxone) 1gm (50mg/kg body weight) BD was directed intravenously in patients. In Group A, the first dose was given an hour prior to the surgery intravenously and the second dose was given immediately after the patient had been shifted to the ward. The third dose was given twelve hours following the previous dose. In Group B, the first dose was given after the surgery for five days, wherein two days it was given intravenously and for the next three days oral tablets were given (Cefixime 200 mg bd). Ceftriaxone was chosen for antibiotic prophylaxis on account of its low poisonousness, wide range, and long half-life. Patients who went through an appendectomy also preoperatively got a single dose of Metronidazole (1.5cc/kg body weight).

Inclusion Criteria

Clean elective surgical cases from the Department of general surgery were incorporated.

Exclusive Criteria

- Patients with simultaneous or past treatment with antibiotics.
- Patients with a history of unfriendly medication reactions or hypersensitivity to the cephalosporin group.
- Patients under 18 years.
- Patients with a critical level of renal weakness.
- Patients with serious hepatic sickness.
- Patients on steroid treatment.
- Patient experiencing diabetes mellitus, tuberculosis.
- Immunocompromised patients
- Patients with danger
- Patients who do not give assent were rejected.
- The assessment was done utilizing the endorsed proforma.
- A temperature diagramming was done to notice the systemic infection.
- Checking of dressing was done for soakage after 48 hours of surgery and the following parameters were recorded.
- Local Temperature
- Indication of aggravation over the skin like induration, redness, release from the wound, and expansion.

- Wound infection (redness and seepage from the injury requiring the opening of incision and packing)[9].

A Surgical injury was determined as infected when it met the accompanying criterion:

- Purulent material from the surgery wound
- The surgery wound immediately opened and depleted purulent liquid
- The surgery wound depleted liquid that was gram stain positive or culture positive for bacteria
- The specialist noted erythema or waste of discharge and opened the injury in the wake of considering it to be contaminated.
- Hospital stay time recorded from day of operation to release.
- Follow-up: Patients were requested to visit again after five days from wound assessment. In case purulent release was present, patients were sent for culture and sensitivity so that suitable antibiotics could be started according to the sensitivity. A further visit was done on the tenth day of surgery for stitch evacuation and wound appraisal. The last visit was on the 28th day from surgery day to determine any late intricacy like scar delicacy, wound infection.
- Cost adequacy: In this review cost of a surgery incorporates activity charge, intravenous liquid, drugs charge (intravenous antibiotics, pain-relieving, proton siphon inhibitors), and bed charge according to clinic evaluating strategy. on the off chance that there was wound infection then, at that point, every day dressing charge likewise included.

The information was gathered and factors were compared between Group A and Group B utilizing Chi-Square trial of importance and p esteem <0.01 was viewed as exceptionally critical.

Ethical considerations

Consent from all the patients had been taken through the help of ethical forms which were provided to them before the study. These forms were submitted to the ethical committee of the Indira Gandhi Institute of Medical Sciences, Patna.

Results

50 patients were included in this review. Group A was given 3 doses of antibiotics preoperatively and Group B were given 5 days regular antibiotics. Number of patients in the groups were 25 each, were taken as 100%. All the findings were communicated in % additionally in contrast with the outcomes and accessible literature.

TABLE 1: Age distribution

S. No	Age group in years	GROUP A	GROUP B	Total	Chi-Square test	P value
1	18-30	6(24%)	11(44%)	17(34%)	3.137	0.20
2	31-60	9(36%)	9(36%)	18(36%)		
3	>61	10(40%)	5(25%)	15(30%)		
TOTAL		25(100%)	25(100%)	50(100%)		

Table 1 shows the age occurrence of conceded patients. Table 1 shows age dispersion between both Groups. There were 6 (24%) cases in Group A and 11 (44%) cases in Group B lie somewhere in the range of 18 and 30 years old. There were 9(36%) cases in Group A and 9 (36%) cases in Group B in the 31 to 60 years old group. There were 10 (40%) cases in Group A and 5 (25%) cases in Group B over 61 years old. All age groups by and large were found to have equivalent portrayals in the current review.

TABLE 2: Sex distribution

Sex	Group A	Group B	Total	Chi-Square test	P value
Male	20(80%)	16(64%)	36(72%)	1.5873	0.20
Female	5(20%)	9(36%)	14(28%)		
Total	25(100%)	25(100%)	50(100%)		

Table 2 shows men were more i.e., 36 (72%) when contrasted with 1(28%) females in the current review. This distinction was viewed as measurably huge (p esteem 0.57). There were 20(80%) men in Group A and 16(64%) men in Group B which is not a measurably critical distinction.

Table 3: Types of surgery in each group

S.N	Cases	GROUP A	GROUP B
1	Hernioplasty	6(24%)	7(28%)
2	Lap Appendectomy	2(8%)	3(12%)
3	Lap Cholecystectomy	10(40%)	8(32%)
4	Breast lump (benign)	3(12%)	4(16%)

5	Thyroid swelling (benign)	2(8%)	2(8%)
6	Varicose vein	2(8%)	1(4%)
TOTAL		25(100%)	25(100%)

Table 3 shows the conveyance of study subjects according to determination. Most normal surgeries in the current review were laparoscopic cholecystectomy (40% and 32%) in the two groups individually. This is trailed by hernioplasty (24% and 28%) and bosom protuberance surgery (12% and 16%) separately.

Table 4: Presence of fever in two groups

FEVER	Group A	Group B	Total	Chi-Square Test	P value
Present	6(24%)	5(20%)	11(22%)	0.125	0.78
Absent	19(76%)	20(80%)	39(78%)		
Total	25(100%)	25(100%)	50 (100%)		

Table 4 shows the presence of fever in two groups. There were 6 (24%) patients in Group A and 5(20%) patients in Group B who created fever later activity which is an indication of wound infection however distinction was not seen as genuinely huge. 19(76%) cases in Group A and 20(80%) cases in Group B did not foster fever later surgery was recorded from follow-up visits.

Table 5: Presence of redness at the site of incision in two groups

Redness	Group A	Group B	TOTAL	Chi-Square Test	P value
Present	5(20%)	4(16%)	9(18%)	0.135	0.71
Absent	20(80%)	21(84%)	41(82%)		
TOTAL	25(100%)	25(100%)	50(100%)		

Table 5 shows the presence of redness at the site of the cut in the two groups. 5(20%) patients in Group A and 4(16%) patients in Group B created redness later activity which is an indication of wound infection. Be that as it may, the distinction in both groups was not viewed as measurably huge. 20 (80%) cases in Group A and 21(84%) cases in Group B did not foster redness later activity as was recorded from the subsequent visits.

Table 6: Presence of swelling at the site of incision in two groups

SWELLING	Group A	Group B	TOTAL	Chi-Square Test	P value
Present	3(12%)	2(8%)	5(10%)	0.222	0.63
Absent	22(88%)	23(92%)	45(90%)		
TOTAL	25(100%)	25(100%)	50(100%)		

Table 6 shows the presence of expansion at the site of the entry point in both groups. 3 (12%) patients in Group A and 2 (8%) patients in Group B created enlarging at the activity site which is an indication of wound infection however distinction was measurably unimportant. 22 (88%) patients in Group A and 23 (92%) patients in Group B did not foster expanding later activity as was recorded from follow-up visits.

Table 7: Presence of wound discharge in two groups

Wound Discharge	Group A	Group B	TOTAL	Chi-Square Test	P value
Present	3(12%)	2(8%)	5(10%)	0.222	0.63
Absent	22(88%)	23(92%)	45(90%)		
TOTAL	25(100%)	25(100%)	50(100%)		

Table 7 shows 3(12%) patients in Group A and 2 (8%) patients in Group B created twisted release later activity which is an indication of SSI. However, the distinction between the two groups was not viewed as genuinely huge. 22(88%) cases in group A and 23(92%) cases in group B did not foster injury release later a surgery as was recorded from the subsequent visits.

Table 8: Presence of common pathogens present in wound discharge

	Group A	Group B
Staphylococcus aureus	2	1
Pseudomonas aeruginosa	0	0
E. coli	1	1

Table 8 shows normal microbes refined from wound release. Staphylococcus aureus was the commonest organism refined from the injury swab followed by E. coli.

Table 9: Distribution of patients according to confirmed surgical site infection among group A and group B

Surgical Site Infection	Group A	Group B	TOTAL	Chi -Square Test	P value
Yes	3(12%)	2(8%)	5(10%)	0.222	0.63
No	22(88%)	23(92%)	45(90%)		
TOTAL	25(100%)	25(100%)	50(100%)		

Table 9 showed that affirmed surgical site infection was viewed as in 3 (12%) patients among the group A and 2 (8%) patients among the group B. Henceforth, the frequency pace of infection among the patients were gotten preoperative single-dose antibiotic was viewed as 10% (5/50). Be that as it may, the distinction between the two groups was not viewed as genuinely critical.

Table 10: Comparison of treatment modalities between the groups

Treatment modalities	Group A	Group B	TOTAL	Chi-Square Test	P-value
Patient with healthy scar	20(80%)	21(84%)	41(82%)	0.357	0.83
Conservative	3(12%)	3(12%)	6(12%)		
Incision and Drainage	2(8%)	1(4%)	3(6%)		
TOTAL	25(100%)	25(100%)	50(100%)		

Table 10 showed that in the two groups the greater part of the patients did not require any extra clinical treatment. 3 (12%) patients of group A and 3(12%) patients of group B were overseen by antibiotics and dressing. Albeit 2 (8%) patients of group A and 1 (4%) patient of group B needs cut and seepage. In any case, the distinction between the two groups was not viewed as genuinely critical.

Table 11: Post-operative stay in hospital in both groups

Hospital Stay	Group A	Group B	TOTAL	Chi-Square Test	P-value
2-3 days	20(80%)	21(84%)	41(82%)	0.357	0.83
4-5 days	3(12%)	3(12%)	6(12%)		
More than 6 days	2(8%)	1(4%)	3(6%)		
TOTAL	25(100%)	25(100%)	50(100%)		

Table 11 showed that most extreme patients 20 (80%) and 21 (84%) among group A and group B separately were stays 2-3 days. 2 (8%) patients in group A and 1 (4%) patient in group B stay for over 6 days since they grew profound injury infection. So this Table shows that the term of medical clinic stay was practically the same among the patients of the two groups. It was genuinely demonstrated immaterial (p=0.83).

Table 12: Cost-effectiveness between the groups

S. No	Groups	Average expenditure per patient without complication (In Rupees)	Average expenditure per patient with complications (In Rupees)
1	Group A	5515	7212
2	Group B	7567	9875
	MEAN	6541	8543.5

In Group A, the normal use (per patient) without entanglement and with difficulty was Rs 5515 and Rs 7212 individually. The MEAN use of Group A was Rs 6541. In Group B, the normal consumption (per patient) without entanglement and with intricacy was Rs 7567 and Rs 9875 separately. The MEAN consumption of Group B was Rs 8543.5.

Discussion

Surgical Site Infections are the genuine risk related to any surgical strategy and address a huge weight as far as tolerant morbidity and mortality and cost to wellbeing administrations all over the planet[10]. The rate of infection changes from one specialist to another, emergency clinic to medical clinic, starting with one surgical method then onto the next, and above all starting with one patient then onto the next[11]. Four principle wellsprings of infection are faculty, hardware, climate, and patient's danger factors[12]. With great advancement in strict asepsis and hygiene followed during surgeries and in post-operative management, there was a question of debate whether prophylactic antibiotics were warranted in clean surgical and clean-contaminated surgical cases. This fact was also supported by a study done by Vaze et al who showed no statistically significant difference in postoperative wound infection among those who received a single dose of prophylactic antibiotic to those without antibiotics[13].

In this review, a large dose of the patients of group A has a place with over 61 years old i.e. 10 (40%) yet in group B the vast majority of the patient has a place with age between 31-60 years i.e. 9 (36%). In the present review, men were more i.e. 36 (72%) when contrasted with 14 (28%) females. There were 20 (80%) men in Group A and 16 (64%) men in Group B. It was practically identical to concentrate by Ranjan et al[14] in which out of 100 patients, 64 were men and 36 were females.

Our review showed that the commonest surgery performed was Laparoscopic cholecystectomy followed by Hernioplasty in the two groups. It is a direct result of a high predominance of gall bladder infection in northern India justified a populace review into natural danger factors [Sayeed Unisa et al.[14]. When contrasted with the review done by Ranjan et al[14] and Subramaniyan SG et al[15], the commonest elective activity performed was hernioplasty while in our review it was laparoscopic cholecystectomy.

In our review, Group A has affirmed SSI of 12% while 8% in group B which was not seen as measurably critical. The commonest organism was Staphylococcus aureus followed by E.coli. Likewise, Mathur et al did a randomized imminent review and partitioned the patients into two groups. They saw that main two patients from group 2 and two patients from group 1 were found to foster the infection. The strain separated was methicillin-safe Staphylococcus aureus in three cases and Acinetobacter baumannii in one case. In this manner, the authors inferred that short-course antibiotic before surgery is comparable to ordinary treatment with antibiotics. Subsequently to diminish the weight of the patient as far as cost, antagonistic occasions and so forth, single-shot antibiotic prophylaxis before surgery ought to be finished. This finding is as per the finding of the present study[16]. In different examinations according to the reference table [table no.13], the commonest living being found in SSI was staphylococcus aureus.

Table 13: Incidence of SSI among different studies

Study Name	Total study patients (received single-dose antibiotics)	Number of SSI	Incidence of SSI
Our study	50		
Ranjan et al[14]	100	10	10%
Madhu et al[17]	50	3	6%
Rayamajhi et al[18]	100	3	3%
Aufenacker et al[19]	504	8	1.6%
Ahn et al[20]	48	3	6.3%
Ali et al[21]	121	7	5.78%
Mehrabi et al[22]	237	6	2.53%

5 patients of group A and 4 patients of group B created wound infection. Out of 5 of group A, 3 patients created shallow injury infection and 2 patients grew profound injury infection yet out of 4, 3 patients created shallow injury infections and 1 patient grew profound injury infection. Wound infections were for the most part evolved in patients who go through hernioplasty and laparoscopic cholecystectomy in the two groups which comprise significant surgeries in our review.

Thejeswi PC et al, tracked down that the thyroidectomy and hernioplasty patients established the significant group in their review, while they led a study on various sorts of surgeries. The rate of twisted infection in the concentrate on group patients was 2.66% and in the control group, it was 4.66%, which was not genuinely significant[23].

In the present review, 20(80%) patients of group A remained for 2-3days, 3(12%) for 4-5days while 2(8%) remained over 6 days; while

in group B, 21(84%) were released inside 2-3days, 3(12%) were released on 4-5days and 1(4%) remained in emergency clinic for 6days or more. In the two groups just those patients who created SSI remained delayed, this distinction of emergency clinic stay span were likewise seen as measurably immaterial (p-0.83), it was equivalent to the review completed by Maratib Ali et al[24] in which they concentrated on the job of single-dose prophylactic antibiotic to various dosages of prophylactic antibiotic where they observed no huge contrast between two groups in regards to the length of clinic stay.

In our review which is done in a paid emergency clinic (semiautonomous), the mean use of absolute quiet without confusion was Rs 6541 while the mean use of complete patients with entanglement was Rs.8543.5 with an expense distinction of Rs 2002.5. A comparable review was finished by Raj Kumar Basant et al[25], in which they observed that the patients who created SSI had more monetary weight which was measurably huge in their review.

Conclusion

Our current review uncovered that in clean elective surgery, the three-dose antibiotic is pretty much as compelling as five days of regular antibiotic treatment. Subsequently, to decrease the SSI and monetary weight, a three-dose antibiotic is preferred. The first conclusion that was made was that single-dose antibiotic prophylaxis is a sufficient procedure for clean-contaminated surgeries. No difference between usages of five days postoperative antibiotic therapy and single-dose preoperative antibiotic prophylaxis was determined. The second conclusion that was found was that hospital stay could be reduced with a single dose. The third conclusion is that with the help of single-dose, costs of treatments can also be reduced.

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