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Original Research Article

Comparative Study on Prophylactic Antibiotic versus Empirical Antibiotic in Prevention of Surgical Site Infection

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Abstract

The major objective of this study was to compare the effectiveness of a single dose of preventative antibiotic versus that of empirical postoperative antibiotics in lowering infection risk at the surgical site. Prospective observational research for a period of 8 months. A total of 100 patients requiring surgical intervention were chosen at random and divided into four equal groups of 50. While the control group had three to five days of empirical antibiotic treatment, the research group only received a single dosage of antibiotic prior to surgery. GraphPad Prism (trial version) was used for data analysis and statistical testing. The significance level for the paired analysis was determined using the Student t test. An infection at the surgical site, regardless of severity, was not linked to any further problems. The length of time patients spent in the hospital, their out-of-pocket expenses, and the amount of antibiotics they were prescribed all rose dramatically. Patients may save money and time by using single-dose prophylactic antibiotics instead of the more haphazard approach of using antibiotics just after surgery. The infection rate at surgical sites can only be kept to a minimum, since total eradication is impossible.

Keywords: Prophylactic Antibiotics, Surgical Site Infection, Surgical Complications, Post Operative Antibiotics.

Background

A typical consequence of surgery that manifests after 30 days is an infection at the surgical site. The epidermis, subcutaneous tissue, deep soft tissue, and any other anatomical portion might get infected at a surgical site [1,2]. The surgical site infection's clinical manifestations are determined by the kind of skin involved, the infectious agent, and the host's defenses. Infections manifest themselves via fever, redness, edema, discomfort, and impaired function at the incision site [3]. If macrophages are unable to phagocytose all dead cells during the local phase of infection, bacteria might develop in the area. The next stage of an infection is called the systemic phase and it involves the microorganism's spread throughout the body through the circulatory system [4]. Invasion and tissue damage in the host are caused by the microbe's toxins [5]. There are many different mechanisms at work throughout the wound healing process, including the inflammatory phase, the fibroblastic phase, and the remodeling phase [6].

Many surgeons, even in otherwise healthy patients, would still recommend antimicrobials for 7-10 days after surgery out of concern about surgical site infections. For patients, this might mean higher healthcare costs and an increased risk of contracting an infection while in the hospital [7]. Although some research suggests that antibiotics were incorrectly utilized to treat surgical site infections, using prophylactic antibiotics prior to surgery has been shown to lower the prevalence of wound infections and infection-related complications [8].Prevention of infection by the use of antibiotics is greatly improved by this practice. All uncontaminated patients should be given it. In order to treat wounds that are infected and unclean, antibiotics are required [9]. Antibiotics for surgical site infection prophylaxis chosen on the basis of the causative agent's identification. Both the patient's health and the budget must be protected. Antibiotics from the first and second generations are the most often used [10].

For cases of mild, uncomplicated, non-perforated acute appendicitis, Bengaru H *et al*. 2017 shown that a single dosage of prophylaxis should be enough prior to laproscopic appendectomy. According to a randomized clinical study done by Chuon Zong in 2015, antibiotic prophylaxis before skin incision and after umbilical cord clamping was equivalent for elective caesarean delivery.

The purpose of this research was to examine the efficacy of a single dosage of preventive antibiotic against post-operative antibiotics chosen on the spot. This prospective observational research aimed to assess the duration of hospital stays between patients who received either preoperative or postoperative antibiotics or single dose of prophylactic antibiotic to pr -vent surgical site infections (SSIs).

Materials and Methods

The research was done between October 2020 and August 2021 at the MGM Medical College and Hospital Jamshedpur. Information on the patient's demographics, diagnosis, and the antimicrobial treatments given, including the drugs' names, strengths, doses, routes of administration, and frequency of administration, are collected using a standard, standardized "Proforma." Patients at the MGM Medical College and Hospital Jamshedpurare included in the sample population. A total of 100 patients requiring surgical intervention were chosen at random and divided into four equal groups of 50. While the control group had three to five days of empirical antibiotic treatment, the research group only received a single dosage of antibiotic prior to surgery.

Study group: A single dosage of antibiotics was given to patients half an hour before surgery.

Control group: Five to ten days following surgery, patients were given antibiotics.

Inclusion criteria

1. Clean and clean contaminated cases in department of general surgery and gynaecology. (Local, regional, and general anaesthesia cases.)
2. Including both genders.
3. Patients admitted in the MGM Medical College & Hospital, Jamshedpur. (Inpatients admitted in the surgery ward).

Exclusion criteria

1. Contaminated cases are excluded.
2. Those patients who do not consent are excluded.
3. Patients below 10 yrs age were excluded.
4. Pregnant patients were excluded.
5. Emergency cases were excluded.

Graph pad prism trial program was used to do statistical analysis and data analysis.

For the purpose of determining the significance level (P value), a Student t test was conducted for the paired analysis.

Results

Gender

Table 1: This section briefly compares the study group to the control group based on the participants' genders. Twenty-two male patients (7% of the total) and twenty eight female patients (14%) made up the control group. A total of 35 males (20 %) and 15 females were treated (56percent).

Table 1

Gender	Control	Percentage%	Study	Percentage%	P value
Male	22	7%	35	20 %	0.81(NS)
Female	28	14%	15	56 %	

SSI

Table 2: As a quick summary of the SSI patient comparison, out of 50 patients in the control group, only 10 (10%) had SSI, whereas 45 (90%) did not. Ten percent, or six people, out of fifty in the research group got SSI, whereas the other forty-four did not.

Table 2

SSI	Control	Percentage%	Study	Percentage%	p value
Yes	10	20%	10	20%	0.88(NS)
No	40	80%	40	80%	

Hospital Stay

Table 3: provides a brief overview of the inpatient stays of patients in the control and research groups (100). Of the 50 patients in the control group, 25 (50% of the total) spent more than 7 days in the hospital, while 5 (10%) spent between 1 and 3 days there. Out of the total number of patients in the research group of 50, 40 spent between 1 and 3 days in the hospital, 6 spent between 4 and 7 days, and 5 spent more than 7 days in the hospital.

Table 3

Hospitalstay	Control	Percentage%	Study	Percentage%	pvalue
1-3days	5	10%	40	80%	0.03(*)
4-7days	20	40%	5	10%	0.01(*)
>7days	25	50%	5	10%	0.018(*)

Number of antibiotic used in patients

Table 4: Compiles data on the variety of antibiotics prescribed to patients (100), A total of 45 of patients in the control group were given cephalosporins, 40 were given aminoglycosides, 5 were given fluoroquinolones, 30 were given antihelmintic medicines, and 2 were given penicillins. 40 patients (82%) in the study group were given cephalosporins, whereas 25 were given aminoglycosides, 9 were given fluoroquinolones, 3 was given an antihelmintic antibiotic, and 1 was given penicillin.

Table 4

Antibioticused	Control	Study	P value
Cephalosporins	45	40	
Aminoglycosides	40	25	
Fluroquinolones	5	9	0.0001

Antihelminthetics	30	3	(*)
Penicillins	2	1	

Discussion

Infection at the site of operation is called a surgical site infection. Infections at surgical sites are not always deep infections, but might instead be surface infections. More severe surgical site infections may spread to subcutaneous tissues, internal organs, or implanted materials.

It is an observational research that looked at patients on the surgical ward over time. To conduct the research, a total of 100 patients were enrolled and randomly assigned to either a control group or a treatment group (50 in each). Patients in the placebo group received both preoperative and postoperative antibiotics. Patients in the control group were given antibiotics before surgery.

This study set out to compare the effectiveness of a single dose of preventative antibiotic to that of an empirical post-operative antibiotic in lowering the risk of infection at the surgical site.

Similar to the study of Bangaru *et al.*, this one also showed no significant gender differences. Here, we find that BMI (0.4681) is unrelated to SSI, which is consistent with the findings of the study by Bangaru *et al* [11].

All three of these symptoms were present in both the study and control groups, although there was no statistically significant difference between them (0.9729 for pain, 0.9691 for swelling, and 0.9674 for wound discharge). The similar finding was reached by The jeswi *et al*. (2012) [12,13].

This confirms the findings of Rejab *et al*. (2012) 14, who also reported no statistically significant difference in the incidence of surgical site infection between the two groups (p = 0.400).

The severity of the infection did not vary significantly (P = 0.8167) between the two groups. The findings of a study by Bangaru *et al*. were consistent with these findings (2017).

Similar results were found in a research by Shah *et al*. 2015 [8] (P values for postoperative hospital stays of 1-3 days were P = 0.04(*), 4-7 days were P = 0.02/*, and >7 days were P = 0.0198(*).

In the control group, medical expenses are much higher. Possible explanation: more time spent in the hospital by those assigned to the control group. The results of the research mirrored those of previous investigations by Shah *et al* [15].

A greater number of antibiotics were used in the control group than in the study group, according to our data (p = 0.0225). Postoperative patients using multiple antibiotics are more common than those using just preoperative antibiotics, as shown by the Wanjare VS 2014 [16] study.

The results of this research indicate that prophylactic antibiotic use before to surgery is more cost-effective than taking antibiotics as needed during surgery. Both sets of patients had similar adverse events. Patients are less likely to develop resistance to antibiotics if they are only exposed to the drug for a short length of time, making this approach preferable.

Misuse of this tool has far-reaching consequences for both the individual patient and the healthcare facility as a whole. Only one or two doses of an appropriate prophylactic antibiotic should be taken before surgery, and that antibiotic should never be taken more than 24 hours before surgery.

Conclusion

A surgical site infection is a frequent

postoperative complication that may result in prolonged hospital stays and higher patient expenses. Our research shows that the use of preventive antibiotics administered in a single dosage is superior to empirical post-operative treatment for minimizing patients' length of stay and financial burden. Because eliminating surgical site infections entirely is unrealistic, best we can hope for is to keep their prevalence to a minimum.

References

1. Global guidelines for the prevention of surgical site infection, world health organization 2016.
2. Nandi PL ,Rajan SS , Mak KC, Chan SC, So YC, Surgical wound infection. Hong Kong Medical Journal. 1999; 5 (1):82-86.
3. Jonathan N, Meakins, M.D, D.S.C, F. A.G.S, and Byron F, Master son, F.D,G.S, Prevention of post operative infection. ACS surgery: Principle and practise 2005.
4. Mangram AJ, MD; Teresa C. Horan, MPH, CIC; Michele L. Pearson, MD; Silver LC, BS; Jarvis WR, MD; Guideline for prevention of surgical site infection. 1999; 251-266.
5. The Biochemical scientist, Mechanisms involved in wound healing 2008:609-615.
6. Anderson DK ,Billiar TR, Dunn DL , Hunter JG ,Mathews JB, Pollock RE, Schwartz’s Principles of Surgery:135.
7. Thejeswi P, Shenoy D,Tauro L, Ram S,Comparative Study Of One-Day Perioperative Antibiotic Prophylaxis Versus Seven Day Postoperative Antibiotic Coverage In Elective Surgical Cases. The Internet Journal of Surgery. 2012; 28(2):1-7
8. NICE clinical guideline 74. NHS Surgical site infection Prevention and treatment of surgical site infection 2008; 74:1- 27
9. Centers for Disease Control and Prevention Guideline for the Prevention of Surgical Site Infection. JAMA Surg. 2017; 152(8):784-791.
10. Bangaru H, Gaiki VV, Reddy MVR. Comparative study of single dose preoperative antibiotics versus both preoperative and postoperative antibiotics in laparoscopic appendicectomy for nonperforated appendicitis. International Surgery Journal. September 2017; 4(9):3092
11. Zhang C, Zhang L, Liu X, Zhang L, Zeng Z, Li L, Liu G, Jiang H. Timing of Antibiotic Prophylaxis in Elective Caesarean Delivery: A Multi-Center Randomized Controlled Trial land Meta Analysis, PLOSONE 2015; 10:1371.
12. Malik AZ, Ali Q, Surgical Site Infections after Elective Surgery in Pakistan. Surgipak Study. Journal of Rawalpindi Medical College (JRMC) 2015; 19(3):209-214.
13. Thejeswi P, Shenoy D, Tauro L, Ram S, Comparative Study of One-Day Perioperative Antibiotic Prophylaxis Versus Seven Day Postoperative Antibiotic Coverage In Elective Surgical Cases. The Internet Journal of Surgery. 2012; 28 (2):1-7
14. Rejab AF, Hassouni MK. The use of single versus multiple doses cefotaxime as a Prophylactic Antibiotic in maxillofacial fractures. Al-Rafidain Dent J. 2012; 12(1):96-101.
15. Shah Z, Kshirsagar N S, Shah S. “Comparison of Single Dose Prophylactic Antibiotics versus five days Antibiotic in Cesarean Section”. Journal of Evolution of Medical and Dental Sciences 2014; 3(12):3123-3129.
16. Wanjare VS, Wanjare SW, Akulwar SL, Tabhane MK, Rahule AS. A Study of Postoperative Wounds Infections with Special Reference to Pseudomonas. J Cont Med A Dent 2014; 2(2):17- 21.