(International Print/Online Journal)

SJIF IMPACT FACTOR: 5.565
PUBMED-National Library of Medicine ID-101739732

ISSN (Print): 2209-2870
ISSN (Online): 2209-2862

International Journal of Medical Science and Current Research (IJMSCR)
Available online at: www.ijmscr.com
Volume 4, Issue 4, Page No: 215-220
July-August 2021

IJMSCR

Prospective study on Pre- and Post-operative use of antibiotic prophylaxis in elective surgery

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Type of Publication: Original Research Paper
Conflicts of Interest: Nil

Abstract

Keywords: NIL

INTRODUCTION

Antibiotics are the substances produced by microorganism which suppress the growth or kill other microorganisms at very low concentrations. The principle of administering antibiotics pre operatively as prophylaxis was established in the early sixties by Burke and Polk [1,2]It was shown that prophylactic antibiotics reduce the incidence of post-operative infections provided they were administered before surgery. To avoid the post-operative wound infection golden principles have been correctly brought out by A.V. Pollock [3] in form of reduction in exogenous as well as endogenous contaminations along with enhancement of host defenses.

It has been reported that 30–40% of patients experience post-operative Surgical site infection when a prophylactic antibiotic is not administered. [4, 5]although several recent studies have indicated that single-dose administration may be as effective as multiple-dose, [6]controversies still exists concerning the frequency and appropriate combination of antibiotics. In adults of all ages, surgical site infections represent a significant financial burden and are associated with increased length of hospitalization, re-admission, and mortality. It has been reported that patients who develop infections have a mortality rate that is 2–11 times higher than that of patients who do not develop it, and the mortality rate for surgical site infections is up to 6%.[7,8] Preventive measures in the preoperative period have changed rapidly over the past few decades. A large volume of research has established the importance of a host of preventive measures in the operative period. Examples include skin decontamination, perioperative warming, and antimicrobial prophylaxis.[9,10] Surgical antibiotic prophylaxis given at induction of anesthesia is recommended for any surgery apart from clean procedures not involving an implant or prosthesis. Antibiotics should be specific and targeted to the likely causative organisms and appropriate for the patient taking account of allergies and comorbidities.The administration of the dose should occur no earlier than120 minutes prior to the incision being made (WHO).Prolongation of prophylactic antibiotics after the operation is not recommended in the prevention of surgical site infection. [11]

So we have conducted this study to evaluate the efficacy of minimal antibiotic use as prophylactic agent in clean elective operation against the conventional routine use of antibiotic given in the hospital.

Material and Methods

The present study was conducted on 65 patients. Age range of patients was 2 to 70 years, admitted in LLR hospital, Kanpur for various elective surgeries under general, spinal or local anaesthesia as required from January 2003 to October 2005. This study was prospective, randomized and single blind case control study. A complete physical examination of patients was under taken to make provisional diagnosis. Routine laboratory investigation and any special investigation which was considered essential for diagnosis was done, and all the investigations were send to department of pathology, GSVM medical college, Kanpur. The cases were one of the following groups of antibiotics and used in prophylaxis. Group I (Ampicillin 1 gm+Gentamycin 80 mg), Group II (Ampicillin 1 gm + Gentamycin 80 mg + Metronidazole 400 mg), Group III (Ampicillin 1 gm + Sulbactum 0.5gm / Sulbacin 1.5 g m), Group IV (Amoxycillin 1 gm + Clavulanate 0.2 gm), Group V (Cefotaxim 1 gm + Metronidazole 400 mg), Group VI (Cefparazone 1 gm). All thes antibiotics were given according to standard regime and intravenously. Single shot of antibiotic was given at the time of induction of anesthesia or half to one hour prior to beginning of operation up to 24 hours according to 6 hourly, 8 hourly, or 12 hourly doses. All the patients in control group were given antibiotics similar to case group but it was given post operatively for longer period till date of stitch removal. Antibiotics were given intravenously for five days then switch over to same drugs of oral regime.

Sample was collected from operative wounds and was sent for gram's staining and culture and sensitivity in the department of microbiology, GSVM medical college, Kanpur. The samples were sent to department immediately after collection.

Results

In our study maximum number of cases are of 20 to 40 years age group. 35 patients are in the study who were kept in minimal antibiotic prophylaxis and 30 patients were in control group who were given routine post-operative antibiotic for usual schedule period. (Table 1) Maximum number of patients were of inguinal hernia (Table 2). In the study group per operative antibiotic was not given because duration of surgery not exceeded 1 to 2 hours in any operation. In two patients of control group antibiotic treatment continued beyond 10 days because they got infected. (Table 3) Minor complications like serosanguinous discharge and erythema in study group subsided without treatment in two to four days before stitch removal. Major infection observed was purulent discharge, wound dehiscence and deep wound infection. (Table 4) Infection rate in case group was 0 percent while that in control group was 6.6% (Table 5). There is marked cost difference between two study group. The cost of antibiotics being about 5 times more in the control group than the study group. (Table 6)

Table 1- Age distribution of case and control group

Age (Years)	Study group (Number of patients)	Control group (Number of patients)	Total (Number of patients)
1 to 10	2	2	4
11 to 20	4	1	5
21 to 30	10	10	20
31 to 40	8	9	17
41 to 50	3	3	6
51 to 60	5	3	8
61 to 70	3	2	5
Total	35	30	65

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Table 2- Patients of various surgical procedure

Area of surgery	Case	Control	Total
Inguinal hernia	17	11	28
Breast diseases	4	4	8
Gall bladder stone	4	7	11
Head and neck swelling	2	1	3
Spinal surgery	2	1	3
Hydrocele	6	6	12

Table 3- Total duration of antibiotic administration

Duration	No. of patient in study group	No. of patient in control group
Preoperative	35	-
Post operative for 24 hours	35	-
Post operative for 5 days	-	2
Post operative for 7 days	-	9
Post operative for 8 days	-	17
Post operative beyond 10 days	-	2

Table 4- Distribution of wound infection

Study group	Total patients	Number of patients infected	
		Minor infection (%)	Major infection (%)
Study group	35	13 (37.14%)	0 (0%)
Control group	30	13 (43.44%)	2 (6.66%)

Table 5- Comparison of infection rate in case and control group

Area of surgery	Study Group		Control Group	
	No. of patient	Infection (%)	No. of patient	Infection (%)
Inguinal hernia	17	0 (0%)	11	1 (9%)
Breast	4	0 (0%)	4	0 (0%)
Head and Neck	2	0 (0%)	1	0 (0%)
Spinal	2	0 (0%)	1	0 (0%)
Biliary	6	0 (0%)	6	1 (16.6%)
Hydrocele	4	0 (0%)	4	0 (0%)

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Total	35	0 (0%)	30	1 (6.6%)

Table 6- Cost difference in antibiotics of cases and control groups

Antibiotics	Study Group		Control Group		Difference of cost (in Rs.)
	No. of doses	Cost (in Rs.)	No. of doses	Cost (in Rs.)	
Augmentin	3	570	15	2850	2280
Ampi+Genta	3+2	91	15+10	455	364
Ampi+Genta+Metro	3+2+3	166	15+10+15	830	664
Cefotaxim+Metro	2+3	141	10+15	705	564
Sulbacin	3	300	15	1500	1200
Cefoparazone	2	590	10	2950	2360

Discussion

The results of the study were comparable to previous studies which are mentioned as follows.

The timing of preoperative prophylactic antibiotic administration in our study ranged from the induction of anaesthesia to two hours before operation. T Bates at al 40 also gave similar antibiotic prophylaxis preoperatively as routine medication. The duration of antibiotic therapy was similar to study of Harlone Stone et al [12] in which they stated that in the absence of infection, antibiotic should not be continued beyond the operative day. Beyiha et al [13] in his paper stated that when indicated prophylactic antibiotic therapy must be of short duration not exceeding 24 to 48 hours, habitually in monotherapy.

In our study infection in study group was not found. The discharge was sterile on culture and sensitivity. The wound infection rate in study group was comparable to study done in India by Ramamoorthy[14] in which no infection was encountered. Study of Col. Lt. etal[15] single dose antibiotic prophylaxis showed infection rate 1.6% in which clean contaminated patients were included also. In our study only clean cases were taken and antibiotic was given for 24 hours and then infection rate was zero. The result regarding rate of infection were comparatively better in our study.

Table 7- Comparison of infection rate in our study with others.

Area of surgery	Name of study	Infection in study	Infection in our study	
		Preop Antibiotic and Postop Placebo (Infection / Patients)	Study Group (Infection/Patients)	Control group (Infection/Patients)
Inguinal hernia	Evon and Pollock[17]	1/48 (2.08%)	0/17(0%)	1/11(9%)

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Breast	H Harlon Stone[12]	0/45 (0%)	0/4 (0%)	0/4 (0%)
Head and neck	Evon and Pollock[17]	0/11(0%)	0/2 (0%)	0/1 (0%)
	Ketcham etal[18]	0/11(0%)	" "	" "
	Brown etal[19]	0/7(0%)	" "	" "
Spinal	Saviz and Malis[20]	0/3(Pre and Postop placebo)	0/2 (0%)	0/1 (0%)
Biliary	H Harlon Stone[12]	0/45 (0%)	0/4 (0%)	1/7 (14.2%)
	Evon and Pollock[17]	1/12 (8%)	" "	" "
	RN Jones[16]	0/60 (0%)	" "	" "
Hydrocele			0/6 (0%)	0/6 (0%)
Clean surgery	Evon and Pollock[17]	3/164(1.8%)	0/35(0%)	2/30(6.6%)

Cost factor in surgery has been enlightened by a number of authors in most of their works. There is marked cost difference between the two-study group. By reducing the wound infection rate hospital stay is reduced which in turn further reduces the cost factor. As a matter of fact this regime helps in achieving better patients compliance.

Conclusion

We can safely conclude that timely given pre-operative and 24 hours post-operative antibiotics reduces the infection rate in clean elective surgery significantly. It decreases the side effect of prolonged with antibiotic, decreases the prevalence of antibiotic resistant bacteria in the hospital environment. Last but not least it reduces the economic burden on patients as well as hospital.

References

1. Burke JF: The effective period of preventive antibiotic action in experimental incisions and dermal lesions. Surgery 1961, 50: 161-168.
2. Polk HC Jr. Lopez-Mayer JF: Post-operative wound infection – a prospective study of determinant factors and prevention. Surgery 1969, 66:97-103.
3. Pollock AV. Prophylactic antibiotics in surgery. In recent advances in surgery-11:ed.Rusell RG. Churchill Livingston Edinburg, 1982, P. 27-37.
4. Jeong WK, Park JW, Lim SB, Choi HS, Jeong SY. Cefotetan versus conventional triple antibiotic prophylaxis in elective colorectal cancer surgery. J. Korean Med. Sci. 2010; 25(2): 429–34.
5. Platell C, Hall JC. The prevention of wound infection in patients undergoing colorectal surgery. J. Hosp. Infect. 2001; 49(4): 233–8.
6. Fujita S, Saito N, Yamada T et al. Randomized, multicenter trial of antibiotic prophylaxis in elective colorectal surgery. Arch. Surg. 2007; 142(6): 657–61.
7. Korol E, Johnston K, Waser N, Sifakis F, Jafri HS, Lo M, Kyaw MH. A systematic review of risk factors associated with surgical site infections among surgical patients. PLoS One. 2013;8(12):e83743.

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8. Teillant A, Gandra S, Barter D, Morgan DJ, Laxminarayan R. Potential burden of antibiotic resistance on surgery and cancer chemotherapy antibiotic prophylaxis in the USA: a literature review and modelling study. Lancet Infect Dis. 2015;15(12):1429–37.
9. Mangram AJ, Horan TC, Pearson ML, et al. Guideline for prevention of surgical site infection, 1999. Hospital Infection Control Practices Advisory Committee. Infect Control Hosp Epidemiol 1999;20(4):250–78 [quiz: 279–80].
10. Alexander JW, Solomkin JS, Edwards MJ. Updated recommendations for control of surgical site infections. Ann Surg 2011;253(6):1082–93.
11. Surgical site infections: prevention and treatment. Updated February 2017. NICE, https://www.nice.org. uk/guidance/CG74/ chapter/1-Guidance (accessed 29 Dec 2018).
12. Stone HH, Bonnie BH, Lama RN, Carol BS, Hooper CA. Prophylactic and preventive antibiotic therapy. Ann Surg June 1979; Vol. 189 No. 6 : 691-699.
13. Beyiha G, Manelli JC. Antibiotic use and prevention of infection in surgery. Cash Anaesthsiol. 1994:42(1):41-6.
14. Ramamoorthy N. Surgical prophylaxis of intra abdominal post-operative infections. Apollo Hosp. Madras.
15. Col. Lt., Hota PK. Single dose antibiotic prophylaxis in surgery: A prospective study. Indian Journal of surgery December 1997 volume 59 No. 12, P. 363-366.
16. Jones RN, William W, John B etal. Antibiotic prophylaxis of 1036 patients undergoing elective surgical procedures. Am. J. Surg. 1987; 153:341-5.
17. Mary Evans, Alan V Pollock. Trials on trials. A review of antibiotic prophylaxis. Arch Surg Vol 119, Jan 1984:109-11.
18. Ketcham E, Wildfever A. Perioperative systemic antibioticsfor prophylaxis of infections in breast surgery. Intl. J. GynaecolObstet, 1989; 2:29-34.
19. J. Brown , M. Thompson , S. Sinnyaetal. Pre-incision antibiotic prophylaxis reduces the incidence of post-caesarean surgical site infection. / Journal of Hospital Infection:83 (2013), 68-70.
20. Saviz DF, Malis N, et al. Prophylaxis of postoperative endophthalmitis after cataract surgery: results of the 2007 ASCRS member survey. J Cataract Refract Surg. 2007; 33:1801–5. 698.

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