USE OF PROPHYLACTIC ANTIBIOTIC IN CLEAN SURGICAL CASES - A PROSPECT WE TRIAL OF VARIOUS REGIMENS

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Abstract

In a randomised controlled prospective trial, different antibiotic regimens were evaluated as prophylaxis in wound infection following elective surgical procedures. Four hundred and four consecutive cases were divided in four groups. Two groups were allotted two different conventional postoperative antibiotic regimens while the fourth group received short term perioperative antibiotic; group one served as control. A higher frequency of postoperative wound infection was observed in the controls. Results showed reduction in gross infection in only group III where short term perioperative antibiotic was used. Combination of penicillin and streptomycin were not found effective, and low infection rate was observed with Cephamendole used perioperatively (JPMA 39: 9, 1989).

INTRODUCTION

Incidence of postoperative surgical wound infection is well recognised. Morbidity and mortality is directly related to inadequate hospital facilities, poor health standards of masses and inadequate personal hygiene. These factors make the need for routine and effective prophylactic antibiotic therapy necessary during surgery. History of antibiotic prophylaxis for wound infection was traced back to approximately fifty years[1]. A variety of antibiotic regimens have since been used routinely in the postoperative period. [2] In the early seventies prophylactic use of antibiotics for clean surgical procedures was considered unnecessary. However, in the recent past the use of routine antibiotic prophylaxis for all sorts of surgical wounds has been considered an essential step in the reduction of postoperative wound infections. [3-5] A trial was therefore conducted at the DHQ Hospital, Abbottabad to compare various conventional antibiotic regimens as well as a short term perioperative prophylaxis in different elective surgical procedures. The effect of prophylactic use of antibiotics, nature of infecting organisms and their sensitivity and duration of hospital stay were also determined.

MATERIAL AND METHODS

Four hundred and four cases admitted in the surgical unit of DHQ Hospital, Abbottabad between October 1984 to October 1986, were included in the study. All operations were elective and fell in the category of “clean or “ clean-contaminated cases according to clinical categorisation of surgical procedures[2]. Patients were divided in four groups. Three were allocated different prophylactic antibiotics regimens and the fourth group used as control where no prophylaxis was used (Table 1).

TABLE I. Antibiotic Regimen for different Groups.

Group	Regimen
I	No antibiotics used (Control).
II	Injection Combiotics (pencillin + streptomycin) one injection daily for five days starting immediately after operation.
III	Injection cefamendol (a second generation cephalosporins).One hour preoperatively and one injection 4 – 6 hours postoperatively.
IV	Injection Gentamycin or Kanamycin. For five days starting immediately after operation.

Selection of conventional regimens in two groups was based on the survey of prescribing regimens in various centres of the country. Choice of Cafamendal (a second generation cephalosporin) in group four was made on existing evidence of successful use of cephalosporins in similar trials[2-6]. Patients were randomly selected (for each group of pathology) in chronological order of hospitalization. Acceptable similarities in the sizes of different groups and pathologies were ensured by retrospective data analysis from time to time. Doses of antibiotics used were calculated according to age and weight of the patient. All wounds were tightly sealed at the completion of operation. Wounds were inspected on 4th postoperative day and then followed up accordingly. Infection was categorised as below:—

1) Mild infection: Evidence of celulitis, oedema or stitch abcess.
2) Gross infection: Subfacial or deeper collection of pus.

Cases with gross infection had culturel sensitivity tests for the pus. Appropriate antibiotics were started only if infection did not settle after sufficient period of simple drainage. Mean hospital stay for each group was calculated.

RESULTS

All the cases were divided into 4 groups. Groups II, III and IV were treated, while group I served as control. Their distribution according to pathological categories is shown in Table II.

TABLE II. Distribution of Procedures according to Pathological Categories.

Operative Procedures	Group I	Group II	Group III	Group IV	Total
Hernia	39	28	33	35	135
Thyroid	10	12	9	8	39
Gastric+Biliary	7	11	15	12	45
Clean Laparotomies	8	9	6	13	36
Pyelolithotomies	8	8	5	4	25
Stone Lower Urinary Tract	9	9	9	7	34
Breast (Malignant)	4	3	5	4	16
Miscellaneous	18	25	14	17	74

The frequency of infection in treated groups was compared with the control group (Table III).

TABLE III. Comparison of infection in various Groups.

Infection	Control Group (n = 103) I	Treated Groups (n=105) II	(n=96) III	(n=100) IV
Mild	4	2 (N.S)	1 (N.S)	9 (N.S)
Gross	14	15 (N.S)	4 ($P<0.05$)	16 (N.S)

N.S: Not significant.

The frequency of mild infection was almost similar but gross infection was significantly more in group

III. Gross infection (pus formation) in treated and non-treated groups was similar in both the sexes. Forty two patients developed gross infection and the discharging pus was sent for culture and sensitivity. Growth pattern of organisms is shown in Table IV.

TABLE IV. Pathogens in 42 infected Cases.

Organisms	I	II	III	IV	Total	Percentage
	Control		Treated			
Staph. Aureus	6	6	2	5	19	45.2
E. Coli	4	4	–	2	10	23.8
Proteus	–	–	1	–	1	2.4
Pseudomonas	–	1	–	–	1	2.4
Mixed Growth	2	–	–	1	3	7.2
No Growth	2	3	–	3	8	19.0

Staph aureus was the commonest infecting organism followed by E. Coil which was equally frequent in Group I and II but not in Group III. Negative culture were presumed to be due to infection with bacteroides. Culture facilities for anaerobes not being available, further study was not possible. Average postoperative hospital stay was 17.7 days and 11.1 days for infected and non-infected cases, respectively.

DISCUSSION

Place of antibiotic prophylaxis to mini-mise postoperative wound infection in elective surgical cases has been widely discussed[1,6,9]. Although the efficacy of the prophylaxis is admitted by many yet there is no consensus on the selection of regimens. Recently, several workers have shown the superiority of short term perioperative systemic antibiotic prophylaxis over conventional prolonged medication used postoperatively. [6,7,10,11] The findings of the present trials showed that higher frequency of postoperative wound infection in group I is in accordance with other reported series[11-13]. Incidence as high as 50% has been reported when no antibiotic was used. [14] In group II where combination therapy of Penicfflin and Streptomycin was used postoperatively, the results were not different from those of controls. Although penicillin prophylaxis was effective in cases of thoracic surgery[1], in this study it was not found effective, by others possibly due to infection by resistant organisms like staph aureus or E. Coli for which broader spectrum antibiotics are needed[1-3]. Poor results of Group IV in the present study are rather discouraging because arninogiycosides were found effective in prophylaxis of wound

infection in many similar trials[15,16] resulting in the reduction of infection rate by 1/3 with these drugs. It is speculated that failure of Aminoglycoside group of drugs in this trial might be due to factors like local resistance pattern against common hospital bacteria and ineffectiveness of the drug against resistant bacteria (Bacteroides), or due to excessive use of these antibiotics in our hospitals producing resistant bacterial strains. Very low rate of infection obtained after perioperative short term prophylactic use of Cephamendol is in accordance with other trials[2,3]. Newly introduced second or third generation of cephalosporins have additional advantages of having wider range of aerobic and anaerobic anti-microbial activity with very low toxicity and quicker achievement. All these factors eventually lead to better economical implications on the patients.

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