



BJP

Bangladesh Journal of Pharmacology

Research Article

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Impact of prophylactic use of antimicrobials in abdominal surgery in two tertiary level hospitals

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Article Info

Received: 9 May 2008
Accepted: 15 June 2008
Available Online: 16 June 2008

DOI: 10.3329/bjp.v3i2.837

Cite this article:

Saha S, Ashrafuzzaman S. Impact of prophylactic use of antimicrobials in abdominal surgery in two tertiary level hospitals. Bangladesh J Pharmacol. 2018; 13: 80-82.

Abstract

Post-surgical infections are polymicrobial and it is an important cause of morbidity and mortality. The combination of ciprofloxacin plus metronidazole as well as several β -lactam based regimens are commonly used regimens for the treatment of patients with such infections. Three hundred patients (age range 25-40 years) were taken from two teaching hospitals for interventional study. When patients were selected for appendectomy or cholecystectomy, either ciprofloxacin plus metronidazole or cephalosporin plus metronidazole were given intravenously. The patients were then divided into 4 groups. Group I and II received drugs ciprofloxacin plus metronidazole and cephalosporin plus metronidazole in SSMC respectively and Group III and IV received drugs ciprofloxacin plus metronidazole and cephalosporin plus metronidazole in DNMC respectively. There were 33 cases of infections out of total 300 study subjects. It was observed that in SSMC among ciprofloxacin plus metronidazole; the rate of infection was 10.6% and cephalosporin plus metronidazole group was 14.6% while that in DNMC the rate were 8 and 10.6% respectively. The overall rate of infection was 11%.

Introduction

In surgery antibiotic prophylaxis refers to the administration of antimicrobial agents to patients without evidence of established infection with the objective of reducing subsequent post-operative septic complications (Nichols, 1981). The antimicrobial is given intravenously just prior to or 1 hour before induction of anesthesia.

The general principles of antimicrobial chemoprophylaxis should be directed towards specific pathogen and there should be no development of drug resistance during the period of therapy and it should be used for a limited duration as well. Moreover, conventional therapeutic doses should be employed and prophylaxis should be employed only in situations of documented drug efficacy (Trevor, 2002). Prophylactic antibiotics

exert their greater effect in clean-contaminated surgical procedures (Relman, 1982).

Metronidazole has been found to be effective in general and gynecologic surgery, in which anaerobes constitute a large part of the colonizing bacterial flora (Kaiser, 1986). Cefazolin penetrates well in most tissues. It is a drug of choice for surgical prophylaxis (Chambers, 2007). Ciprofloxacin and metronidazole are also used as prophylaxis in abdominal hysterectomy (Rahman, 2005).

The most critical factors in the prevention of post-operative infections, although difficult are the sound judgment and proper technique of the surgeon and surgical team, as well as the general health and disease state of the patient (Nichols, 2001).

Intra-abdominal infections are polymicrobial and result



in substantial morbidity and mortality. The combination of ciprofloxacin/metronidazole as well as several β -lactam based regimens are among the commonly used regimens for the treatment of patients with such infections. The ciprofloxacin and metronidazole combination may be superior to β -lactam based therapeutic regimens in the treatment of intra-abdominal infections with regard to cure of infections although no difference in mortality was found (Mathaiou, 2006).

The choice of an antibiotic depends on the expected spectrum of organisms likely to be encountered, the cost and local hospital policies, which are based on experience of local resistance trends (Koch, 2004)

Materials and Methods

In this study, 300 patients of two teaching hospitals (150 from Sir Salimullah Medical College and 150 from Dhaka National Medical College) were taken for interventional study. Once patients were selected for appendectomy or cholecystectomy either ciprofloxacin plus metronidazole or cephalosporin plus metronidazole were given intravenously. Age of the patients range from 25-40 years. The patients were then divided into four groups: Group I received drugs ciprofloxacin plus metronidazole in SSMC, Group II received drugs cephalosporin plus metronidazole in SSMC, Group III received drugs ciprofloxacin plus metronidazole in DNMC and Group IV received drugs cephalosporin plus metronidazole in DNMC. After surgery each patient was visited to check any sign of infection till discharge.

Information regarding antimicrobials prescribed, name of antibiotics, duration of antimicrobial therapy, indications for which patients underwent surgery and incidence of post-operative infection were recorded in a data collection form. Variable recorded in the study were age of the patient, gender, monthly income, diagnosis, duration of hospital stay and occurrence of infection. All analysis was done using the statistical package for social science (SPSS) software for windows. To compare the differences between groups, Chi-square tests were performed.

Results

There were 33 cases of infection out of total 300 study subjects.

Among the study subjects, the rate of infection in Group I (received ciprofloxacin plus metronidazole in SSMC), Group II (received cephalosporin plus metronidazole in SSMC), Group III (received ciprofloxacin plus metronidazole in DNMC) and Group IV (received cephalosporin plus metronidazole in DNMC) were 8

(10.6%), 11 (14.6%), 6 (8%), 8 (10.6%) respectively (Table I).

The overall rate of infection is 11%. But the rate of infection is relatively higher in SSMC than DNMC.

Table I

Proportion of subjects had wound infection in the study subjects

Group	Outcome	
	No infection n (%)	Infection n (%)
I	67 (89.3)	8 (10.6)
II	64 (85.3)	11 (14.6)
III	69 (92.0)	6 (8.0)
IV	67 (89.3)	8 (10.6)

Discussion

Appendicitis and cholecystitis are more common diseases in our country. For treatment of these diseases surgical intervention is usually required. Cephalosporin, ciprofloxacin, metronidazole are used as surgical prophylaxis in the hospitals. In this study data was taken from cephalosporin plus metronidazole group and ciprofloxacin plus metronidazole group as abdominal surgical prophylaxis. There were 300 subjects who were divided in four groups in two hospitals.

Now-a-days ciprofloxacin-metronidazole and cephalosporin-metronidazole combination are chosen by surgeon to prevent wound infection following major abdominal surgical procedures.

In the present study the overall rate of infection is 11% which seemed to be relatively higher compared to other studies. However, in one study carried out in SSMC, rate of infection was 8% where abdominal hysterectomy was performed in a group of middle aged patients (Rahman, 2005). This figure is closely similar to the present finding.

In SSMC, the rate of infection is relatively higher than DNMC because of less cleanliness and presence of more attendants in the ward. In DNMC, the ward was almost clean and attendants of the patient were low.

Low infection rates in clean cases are best obtained by strict adherence to the principles of good surgical technique. Other factors which help to keep the infection rate at a minimum include - a short pre-operative

stay in the hospital, avoidance of shaving just prior to operation and pre-operative bathing with an antiseptic soap, moreover the cleanliness of the post-operative room (Nichols, 1981).

The infection rate could be reduced if sterilization procedure of the operation theater and general condition of the patients were improved. If these risk factors could be minimized, single dose prophylactic antibiotic can be effectively practiced in our country.

Conclusion

The prophylactic antibiotic will be effective in reducing post-operative infection if the proper drug is chosen.

Financial Support

Self-funded

Conflict of Interest

Authors declare no conflict of interest

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