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COMPARISON OF SINGLE DOSE AND THREE DOSE ANTIBIOTIC PROPHYLAXIS WITH CEFOTAXIME SODIUM IN CHOLECYSTECTOMY

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Background: This study was conducted in Surgical Unit-I at Pakistan Institute of Medical Sciences (PIMS), Islamabad from October 2000 to March 2002. The objective of the study was to compare the results of single dose versus three-dose prophylaxis by cefotaxime sodium in patients undergoing elective cholecystectomy. **Method:** Intravenous Cefotaxime sodium as a prophylaxis was used in 150 patients who underwent elective cholecystectomy. Half of the patients were given single dose one hour before surgery (Group A) while the other half (Group B) was given three doses, first one hour before surgery, second and third were given at 8 hour interval after surgery. Postoperative hospital stay of all but two patients was not more than three days. Evidence of wound infection was observed for 4 weeks post-operative in surgical out patient department in both groups. **Results:** Three patients in group A and four in group B got wound infection. The difference was not statistically significant. **Conclusion:** Single preoperative dose can be recommended in cholecystectomy as it is less costly and has the same prophylactic benefits as of single dose.

Keywords: Antibiotic Prophylaxis, Cefotaxime

INTRODUCTION

Although surgical infection rate has decreased dramatically during last 25 years, morbidity and mortality of these infections in surgical treatment remains substantial[1]. The incidence of infections in general surgery is related to many factors, and the main risk factors for developing infections are: endogenous, host-related, exogenous, produce related, and environment related[2]. Therefore, antibiotics have long been used in surgery, for prevention and treatment of infections. Antibiotic prophylaxis has been an established policy for major surgical operations for many years[3]. Wide spread use of antibacterial agents for prophylaxis has altered surgical practice over the last 20 years, and now represents one of the most frequent use of antibiotics[4]. Peri-operative antibiotic prophylaxis is safe[5] and its effectiveness is proven[6].

Inappropriate use of surgical antibiotic prophylaxis is common, e.g., incorrect timing, duration, and use of oral antibiotics[7]. The timing of first dose is very important[2], and improper timing is one of the most common problems in surgical prophylaxis[8]. The agent selected should be the one to which the expected organisms are highly sensitive[9], and should have large volume of distribution, lower toxicity, and longer half-life, allowing single dose administration. We report the use of Cefotaxime sodium for prophylaxis of infections in our patients undergoing cholecystectomy. Objective of the study was to

compare single dose and three doses of cefotaxime for wound infection and cost effectiveness.

MaterialS and methods

This study was conducted at surgical unit one, Pakistan Institute of Medical Sciences, Islamabad, from October 2000 to March 2002. During the study period, 150 patients were operated for cholecystectomy. These patients were admitted to surgical ward from out door clinics. All of these patients were thoroughly examined, and formal consent for inclusion in the study was obtained. Inclusion and exclusion criteria were defined. The study included all the patients operated electively for cholelithiasis, between 18–65 years of age, without any regard to sex. Patients excluded were lactating ladies, the ones that were already on antibiotics, and patients using steroids, or those hypersensitive to cephalosporins.

The patients were divided into two groups Group A and Group B by convenience method. In group A, patients were given 1 gram of Cefotaxime sodium intravenously, one hour before induction of anaesthesia. In group B, three doses of 1 gram Cefotaxime sodium were given intravenously: first dose at 1 hour before induction of anaesthesia, and subsequent doses were given at an interval of 8 hours after surgery. These cases underwent open or laparoscopic cholecystectomy. Bile specimen was collected for culture sensitivity during surgery; Mean duration of surgery was one hour. Drain was placed in 15 patients, and was taken out on 2nd post-op day. The distribution of cases is given in table-1.

After operation, the patients were observed for postoperative sepsis in the ward for three days. Daily record of pulse, temperature, respiratory rate, abdominal tenderness, and bowel sounds was maintained. Blood complete picture was done on third post op day and wound was examined before discharging the patient. Subsequently, the patients were observed on the 5th, 7th, 15th, 21st and 30th day, in surgical outpatient department, for wound infection and fever. Wound infection was categorized into three grades depending on severity:

Grade-I infection:

Slight reddening and induration of wound edges requiring no intervention.

Grade-II infection:

Slight serous discharge from wound, requiring no intervention.

Grade-III infection:

Obvious infection or purulent discharge from wound, requiring repeated change of dressings and institution of antibiotics.

Table-1: Distribution of cases

Parameters	Group A	Group B
Sex:		
Male	12	9
Female	63	66
Total	75	75
Procedure:		
Open cholecystectomy	60	59
Laparoscopic cholecystectomy	15	16

RESULTS

Only 3 cases in group A and 4 in group B had grade-I infection that was managed by simple monitoring without any intervention. No case was observed to develop grade-II or III infection. These results are shown in table-2.

Table-2: Frequency of wound infection

	Group A	Group B
Grade-I	3	4*
Grade-II	Nil	Nil
Grade-III	Nil	Nil

**The difference was non-significant on chi square test.*

In Group-A, 6 patients had growth of E. Coli on bile culture, while in Group-B, 6 have grown E. Coli and one had Pseudomonas (Table-3). However, additional antibiotics were not required for these cases because of smooth postoperative recovery.

Table-3: Case with positive bile culture

Group	Positive cases	Organism grown
Group-A	6	E. coli
Group-B	7	E. coli=6, Pseudomonas=1

DISCUSSION

Antibiotics have been commonly used in low dose for prevention of recurrent urinary tract infections[10]. This encouraged the use of these drugs for prevention of infections in general surgery. Ideally, antibiotics should not be required in clean and elective surgical cases, if the steps are followed and ensured for absolute sterilization. In such procedures, antibiotics are suggested if operation involves use of prosthesis or implants, or if potential infection is expected to cause serious morbidity or mortality[11]. While the use of antimicrobial agents in clean implant surgery is undisputed, it is still controversial in clean non-implant surgery[12].

The success of antibiotic prophylaxis is assured only when the chosen drug with a targeted spectrum is available at the critical moment, at the correct site and in sufficiently high concentration, to prevent the bacterial contamination of surgical field. Cost is another consideration in most of the settings. One cannot predict with certainty when bacterial contamination at the operation site may occur during surgery. Therefore, the selected agent should ideally cover the entire peri-operative period of risk for post-operative infection, which may extend longer than the actual surgical procedure. Duration of this risk period also depends on a number of other factors, namely age and general condition of the patient, presence of concomitant disease, amount of blood loss and need for blood transfusion[13]. It should also be remembered that the prophylactic antibiotics cannot compensate for correction of any coexisting medical problem or meticulous surgical technique.

There are many reports in literature indicating successful use of prophylactic antibiotics in surgery and allied disciplines, using a variety of drugs including first generation cephalosporins[14, 15], third or fourth generation cephalosporin[16], ciprofloxacin[17], and ceftriaxone[18]. We have used intravenous Cefotaxime sodium, a member of third generation cephalosporins, in our cases undergoing elective cholecystectomy. This is a clean-contaminated type of procedure as mucosa of the biliary tract is opened, and there is a potential for developing septic complications. As there was no significant difference in wound infection or other complications between the two groups of patients, single shot of drug was found to be equally effective as the multiple dose regimen, as has been reported in literature[13]. Esposito has also reported that 'single-shot' prophylaxis is as effective as multiple-dose prophylaxis[18]. Both these works are in accordance with the findings of our study.

The incidence of wound infection and presence of positive bile culture in our study was quiet comparable to the findings of Tocchi A *et al*, who has suggested that the need for antibiotic prophylaxis when performing elective cholecystectomy may not be as important as it is thought[19]. In some other international trials, where first or third generation cephalosporins were used no significant difference was observed between the prophylaxis offered by these two groups in biliary surgery[20].

The continuation of prophylactic antibiotics in post-operative period was considered unnecessary in many other reports as well[21, 22, 23].

Conclusion

In conclusion single preoperative dose of cefatoxime sodium is a cost effective and reliable method of prophylaxis in cholecystectomy to prevent wound infection

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