

## ANTIBIOTIC PROPHYLAXIS IN ELECTIVE CHOLECYSTECTOMY : A RANDOMIZED, DOUBLE BLINDED STUDY COMPARING CIPROFLOXACIN AND CEFUROXIME

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**Abstract :** A prospective, randomised and double blind study was undertaken to compare the prophylactic efficacy of ciprofloxacin and cefuroxime in 155 patients undergoing elective cholecystectomy. Patients with past history of jaundice or presence of jaundice, diabetes mellitus, common bile duct stones and previous biliary tract surgery were excluded. Patients were allocated to the following groups: group A-no antibiotic (n=30); group B-ciprofloxacin (200 mg i/v before surgical incision and a second dose after 12 hrs) (n=45); group C-ciprofloxacin given only post operatively (200 mg i/v, 12 hrly X 2 days followed by oral 500 mg twice daily X 3 days) (n=35); group D-cefuroxime (750 mg i/v before surgical incision and a second dose after 12 hrs) (n=45). Efficacy of the antibiotic was defined as a patient being free of post operative wound infection. Maximum numbers of infection occurred in group A (26.67%) and group C (25.71%). The incidence of wound infection was significantly lower when ciprofloxacin was used as prophylaxis (group B) than when used post operatively (group C) only (P<0.05). Patients who received ciprofloxacin (group B) and cefuroxime (group D) as prophylaxis had significantly reduced incidence of infection (4.44% and 6/67% respectively); no statistically significant difference was found between these groups. Ciprofloxacin could be used as prophylactic antimicrobial in elective cholecystectomy in developing countries because of its effectiveness, economy and ready availability.

**Key words :** cefuroxime  
prophylaxis

cholecystectomy  
ciprofloxacin

### INTRODUCTION

In spite of the use of modern aseptic techniques, post surgical infections remain a serious problem complicating both clean surgical interventions and dirty procedures (1). The healthy human biliary tract rarely

harbors significant concentrations of bacteria. In the presence of chronic calculus cholecystitis, which is the usual indication for elective operation, bacteria have been isolated from bile in 15% to 30% of cases. The bacteria isolated are predominately the aerobic gram-negative bacilli, such as

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*Escherichia coli* (2). The benefits of pre-operative antibiotic treatment for prevention of post-operative wound sepsis are now generally accepted. It is also recognized that the antibiotic must be present in the tissues at the time when micro-organisms get "seeded" during surgery, from either an exogenous or an endogenous source (3). Second/third generation cephalosporins are the preferred agent for prophylaxis in majority of the surgical procedures (4). In a resource poor country, the high cost as well as poor and unpredictable availability of these agents are often major limitations for their use. Fluoroquinolones have emerged as an alternative and effective broad spectrum antimicrobials. They are relatively less expensive and freely available. The present study compares the efficacy of prophylactic administration of ciprofloxacin and cefuroxime in prevention of postoperative wound infection in patients undergoing elective cholecystectomy.

## METHODS

The study was designed as a prospective, randomized and double blinded study. It was carried out in patients of either sex in the age group of less than 75 years attending the Department of Surgery, B.P. Koirala Institute of Health Sciences, Dharan, Nepal for elective cholecystectomy. Patients having clinical risk factors like past history of jaundice or presence of jaundice, diabetes mellitus, common bile duct stones and previous biliary tract surgery were excluded from the study. The study protocol was approved by the Institute Research Committee. All patients/guardians gave informed consent.

All patients were admitted one day prior to surgery after they underwent routine pre-surgical investigations and pre-anaesthetic check-up. Patients were randomly allocated by the admitting Senior Resident to receive either of the following group treatment: group A (n=30)-no antibiotics; group B (n=45)-ciprofloxacin (200 mg intravenously just before surgical incision and second dose after 12 hours); group C (n=35)-ciprofloxacin given only post-operatively (200 mg intravenously 12 hourly X 2 days followed by 500 mg twice daily X 3 days orally); group D (n=45)-cefuroxime (750 mg intravenously just before surgical incision and second dose after 12 hours). Each wound was inspected for the presence of infection; i.e. a frank discharge of pus or microbiological evidence of infection for at least 14 days following surgery. The surgeon who examined the wound postoperatively was unaware of the treatment groups unless he felt that antibiotic treatment was indicated and made specific inquiry. Efficacy of the antibiotic was defined as a patient being free of post operative wound infection. The statistical analysis was done by chi-square test and variance analysis.

## RESULTS

Out of the 155 patients included in the study 11 were males (7.09%) and 144 were females (92.91%). The age of the patients ranged from 18 to 74 years. The four treatment groups were comparable in age. The incidence of post surgical infection events are shown in (Table I). Maximum number of wound infection events occurred in group A, followed by group C, D and B. Patients who received ciprofloxacin (group B) and cefuroxime (group D) as prophylaxis

TABLE I : Efficacy of different prophylactic treatment regimens.

Group	A	B	C	D
	30	45	35	45
Age (years)				
Range	21-68	21-70	18-70	18-65
Mean±SD.	40.7±13.6	40.5±13.1	38.8±14.1	39.0±13.7
No. of infection events	8 (26.7%)	2 (4.4%)*	9 (25.7%)	3 (6.6%)*

\*P<0.05 All groups compared with A

had a significantly lower incidence of wound infection when compared with no antibiotic group (group A) ( $P<0.05$ ). No statistical differences in the incidence of wound infection were found in the group B (ciprofloxacin prophylaxis) and group D (cefuroxime prophylaxis) ( $P>0.05$ ). A statistically significant difference ( $P<0.05$ ) was observed in incidence of wound infection in group B (ciprofloxacin prophylaxis) and group C (ciprofloxacin used post operatively).

## DISCUSSION

Post surgery infection is the most frequent complication after surgical interventions. The use of prophylactic antibiotic in elective cholecystectomy without clinical risk factor is still controversial (5, 6). Murray and Bradley revealed 18% of wound infection rate following the intra operative administration of an antibiotic when organism were seen in gram stains of bile in those patients without clinical risk factors. They recommend a single dose of cephalosporin as prophylaxis in all patients undergoing cholecystectomy, regardless of clinical risk factors or Gram stain results (7). In this study, the infection rate was 26.67% when

antibiotics were not used. The result of this study is favourably comparable with the results of Murray and Bradley. We also recommend prophylactic use of antibiotic in all patients undergoing elective cholecystectomy.

Worldwide, cephalosporins are the most widely used antibiotics for surgical prophylaxis (4). Fluoroquinolones have emerged as an effective broad spectrum antimicrobials. The result of this study showed almost equal incidence of reduced wound infection when ciprofloxacin and cefuroxime were used as prophylactic antibiotic. Ciprofloxacin offers certain inherent advantages: (i) It is available freely even in remote areas of Nepal, (ii) It is cost effective as the prophylaxis would cost about NRs. 84 (equivalent to US\$ 1.5) as against NRs. 320 (equivalent to US\$ 6) for cefuroxime in Nepal.

When the result of ciprofloxacin prophylaxis was compared with ciprofloxacin used post operatively, statistically significant difference was found in the incidence of wound infection. Post operative administration of ciprofloxacin was not equally effective in prevention of wound infection. This may be because following closure of wound, its environment is sealed by local intravascular coagulation and the events of early inflammation which initiate wound healing. Antibiotics administered preoperatively diffuse into the peripheral compartment, the wound fluid; since the wound is saturated with antimicrobials at the time it becomes contaminated, potentially invading bacteria are inhibited from multiplying and many are killed (8).

Because of economy, availability and equal efficacy as cefuroxime, ciprofloxacin could be recommended as a prophylactic antimicrobial for elective cholecystectomy in developing countries. However, the cautious

use of this group of drugs is important as the development of resistance to fluoroquinolones due to their widespread use in diverse condition could be a limitation (9, 10).

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