

# Single Dose Prophylaxis in Obstetrics and Gynaecological Surgeries

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**Objective:** To evaluate the effectiveness of single dose prophylaxis in elective obstetric and gynecologic surgeries.

**Study Design:** Descriptive study.

**Place and Duration of Study:** Department of obstetric and Gynae, Sharif Medical and Dental College/Hospital Lahore from January 2006 to August 2008.

**Patients and Method:** A prospective study comprising of 305 patients undergoing elective obst and Gynecologic surgery during a period of 3 years at department of obstetric and Gynae, Sharif Medical and Dental College/Hospital Lahore. All patients received 1.5 gm parental cefurexime at the time of induction of anesthesia. Hospital and post discharge surveillance for presence of surgical site wound infection was done.

**Results:** In this study, Total 305 patients were enrolled, 249 were obstetric and 56 were gynecologic patients. No intra-operative surgical complication was observed with 54.91mins mean surgical duration. Febrile morbidity was seen in 91 patients (30%) and only 10 patients were developed infectious morbidity irrespective of Hb level. The mean duration of hospital stay was 3.56 days.

**Conclusion:** The use of single dose preoperative cefurexime prophylaxis was as effective as multidose regimes for preventing serious infectious morbidity among our patients. It's the maintenance of standard sterilization techniques of operation room which counts not the nutritional status or Hb level for the prevention of surgical site wound infection. Shortening the duration of antibiotic prophylaxis also helps in reduction of medical costs.

**Key Words:** Antibiotic prophylaxis, cefurexime, gynecologic surgery, surgical site, wound infection.

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## Introduction

Despite the knowledge about preventing infection and the progress of contemporary surgery, in many hospitals, infection of surgical wound is the most common nosocomial infection (25%) and the one of the major limiting factor of successful gynecologic surgery.<sup>1,2</sup>

Perioperative antimicrobial prophylaxis has long been advocated in surgical procedures,<sup>3</sup> but recent guidelines and publications show that single dose prophylaxis is equally effective in clean, and clean contaminated surgical procedures.<sup>4,5</sup> Inappropriate and prolonged use of antibiotics is a serious problem.<sup>6</sup> It increases the morbidity and mortality of patients and also increases health care costs due to increased antibiotic resistance rates.

In Pakistan, because there are no proper prophylactic antibiotic guidelines, our antibiotic therapy is often confused with prophylaxis that's why we have to face many problems. Administration of prophylactic antibiotic in an untimely manner is one of the major problems. Over use and prolonged use of antibiotics are other problems. The use of presurgical antibiotics to prevent wound infection, in terms of amount and duration of use, has contributed to the overwhelming rate of antibiotic resistance in Pakistan and, thus, increased in surgical wound infection rates.

To address this problem, we conducted a prospective study in order to evaluate the effectiveness of single dose prophylactic antibiotic in elective obstetrics and gynecologic procedures.

## Material and Methods

The descriptive study was conducted at Sharif Medical and Dental Hospital Lahore from Jan 2006 to August 2008.

Data was collected on a prescribed proforma. A total of 305 patients who were scheduled to undergo elective vaginal or abdominal hysterectomy, diagnostic laparoscopy, lapotomy for ovarian cystectomy, elective or emergency cesarean section of booked cases, were eligible for enrollment in the study. Women who had known or suspected hypersensitivity or intolerance to cephalosporin, or had any co-existing disease like diabetes mellitus, hypertension or cardiac problem that would require antibiotics during the study, were excluded. In obstetrical patients especially Dai handled, unbooked, and the patients with PROM were also excluded. Data on demographic information, type of surgery, wound class, duration of surgery, complications, post-operative infectious morbidity and hospital stay were extracted from this record and analyzed.

Written informed consent was obtained from all selected patients. Within 24hour before surgery, a baseline assessment was performed that included measurement of vital signs (pulse rate, respiration rate, blood pressure, and body temperature), general physical, systemic and gynecological examinations. Blood and urine samples were also sent for hematology, blood chemistry, and urine analysis.

Cefurexime (2nd generation cephalosporin) was used for antibiotic prophylaxis. It is chosen because it is effective against a wide range of wound pathogens, is inexpensive,

has a sufficiently long half life and is highly concentrated in wound. All patients were assigned to receive single dose of 1.5gm cefurexime intravenously before surgery at time of induction of anesthesia. If the duration of surgery was greater than 4hours, an additional dose of 1.5 gm cefurexime was administered.

During postoperative period of hospitalization, record of 4 hourly temperature was maintained along with other vital signs, abdominal and perineal examinations were performed daily. If body temperature was greater than 38.5c, the patients were assessed for signs and symptoms of infection. If there was evidence of primary infection than appropriate investigations were sent before initiating antimicrobial therapy. The blood and urine examination were performed the next day after surgery, if post operative white blood cells count was greater than 12000/ul and body temperature was greater than 38.5c on two occasions 4 hours or more apart, excluding the night of surgery, blood cultures were collected and patients were considered to have febrile morbidity with underlying infection. Wound was inspected for superficial or deep infection, pus discharge, abscess formation, wound dehiscence, vault hematoma and pelvic abscess. Patients were also assessed for respiratory or urinary tract infection.

At discharge, patients were instructed to contact if they experienced signs and symptoms of infection. All patients were monitored for 90 days post operatively. At the first, second and third months after surgery, vitals signs, physical examination and pelvic sonography were performed when patients returned to hospital for evaluation.

The outcome measures were the febrile morbidity and infectious morbidity including wound infection, chest infection, UTI and dehiscence of scar.

The results were analyzed and expressed in percentages for categorical data. Calculations were made by using SPSS version 10 and p-value < 0.05 was considered as statistically significant.

## Results

During a study period of 3 years, total 305 patients were enrolled. Out of these 305, 249 patients were obstetrics and 56 were gynecological patients. Only 10 emergency c-sections were performed out of 249 patients. Among the 56 gynecological patients, TAH was done on 20 patients, along with 20 laparotomies, 7 vaginal hysterectomies and 9 diagnostic laparoscopies (Table 1).

**Table 2:** Means of study variables.

Study variables (± mean)	Age (years)	Hb (g/dl)	Duration of surgery (minutes)	Duration of hospital stay (days)
Gynaecological patients	38.01	11.5	79.82	3.99
Obstetric patients	26.80	9.6	30.12	2.90

**Table 1:** Distribution of patients according to the Type of Surgery (n-305).

Surgical type	No of patients N-305	%age
Caesarean section	249	81.6
TAH	20	6.55
Vaginal hysterectomy	07	2.29
laproscopy	09	2.95
laporotomy	20	6.55

A single dose of 1.5 gm cefurexime were given to all patients at the time of induction of anesthesia and second dose was not required in any patient. The mean duration of surgery among obstetrical patients was 30.12 mins and 79.82 mins was the mean surgical duration of gynecological patients (Table 2).

No intraoperative surgical complication was observed but regarding post operative complications, out of 305, febrile morbidity was developed in 91 patients (30%) and among them only 10 patients had underlying infectious morbidity irrespective of Hb level (Table 3). And 11.1 g/dl was the mean Hb level. Out of these 10 patients (3.27%) of infectious morbidity, 9 patients had superficial wound infection and only 01 vault hematoma was observed. No urinary tract or respiratory tract infection was detected (Table 3).

The mean duration of hospital stay was ± 3.56 days.

## Discussion

Wound infection remains an important post operative complication. Its occurrence is associated with readmission, repeat surgery or intervention, prolonged hospitalization and significant clinical and economic consequences.<sup>7-9</sup> The risk is particularly high in developing countries because of malnutrition, illiteracy, improper surgical technique, substandard sterilization of operation theatres and inadequate or over burdened health facilities.

To over come this, prophylactic antibiotics have been recommended by many research workers.<sup>10-13</sup> Several antibiotics have been used in various combinations, single dose or multiple dose regimes given preoperatively or over the course of several days. Many studies showed that properly administered prophylactic antibiotic can prevent post operative infection. Appropriate choice, its timing of administration and proper duration of antibiotic therapy are the factors influencing successful prophylaxis.<sup>14-16</sup>

As far as the choice of antibiotic is concerned, we were used single intravenous dose of 1.5 gm cefurexime (2nd generation cephalosporin) which is generally accepted as an appropriate antibiotic for infection prophylaxis. The timing of prophylactic antibiotic administration is also very important. For prophylactic therapy to be effective, the antimicrobial must

**Table 3:** *Post operative complications.*

Febrile morbidity (n-91) due to	No of patients
1. underlying infection	10
2. non specific pyrexia	81
Infectious morbidity (n-10) due to	
1. Superficial/deep infection	09
2. Wound dehiscence	00
3. Vault hematoma	01
4. Wound abscess	00
5. Pelvic abscess	00
6. UTI / chest infection	00

be present in an adequate concentration while the surgical wound is opened.<sup>17,18</sup> The most important factor in pathogenesis of wound sepsis is the presence of bacteria at the time of wound closure, thus too early or too late administration of antibiotic therapy cannot produce adequate tissue drug levels while surgery is going on.<sup>19,20</sup> Many researchers suggest that responsibility for prophylactic antibiotic should be assigned to the anesthesiologist at the induction of anesthesia. Armstrong et al.<sup>21</sup> Showed that under experimental conditions, antibiotics were effective only if given within 4 hours of inoculating bacteria into a wound. If the surgical incision lasted longer than 4 hours, an additional antibiotic must be given to maintain an adequate wound drug level for infection prevention. Our procedures were designed accordingly.

In Pakistan, surgeons surmised that prolonged antibiotic use would lower the incidence of postoperative infections, including wound space, and organ infections. However, a 14 year study group pointed out that prolonged use of antibiotics did not reduce the rate of superficial incision or organ/space surgical site infections or pneumonia. Prolonged antibacterial coverage changed the bacterial flora from susceptible species to resistant species; thus it contributed to the increase in resistant species outbreaks, for example, of methicillin-resistant *Staphylococcus aureus*<sup>22</sup>. Results of a series of three double blind controlled clinical studies by McGregar JA<sup>8</sup> has shown that single dose Ceftriaxone was as effective as adjunctive chemotherapy in patients at risk of post operative infection after hysterectomy.

Postoperative fever remains one of the common morbidities of gynecologic surgeries. Gynecologists often equate postoperative fever with postoperative bacterial infections and initiate antibiotic therapy. Multiple studies have evaluated the incidence of postoperative febrile morbidity after major gynecologic surgeries, with rates of 32-52%<sup>23</sup>. Our postoperative febrile morbidity rate 30%, was similar to these studies. However, in our study, only ten patients had a postoperative wound infection. Mc Nally et al.<sup>24</sup> also showed postoperative fever in the first 72 hours after major gynecologic surgery was common and nonspecific, and required no treatment. Even routine laboratory studies were not recommended if the patient did not show any other signs

or symptoms of infection. Nisa M has shown 5% wound infection in their study.<sup>25</sup>

Most of the studies in the United States and Europe showed that effective prophylaxis can be achieved by administering a single dose of an appropriate antibiotic intravenously just before incision. We prospectively reviewed 305 patients undergoing similar gynecologic and obstetric surgeries between January 2006 to December 2008<sup>26</sup>. Ten of 305 patients had postoperative wound infections. The mean hospital stay was 3.56 days. There was also no post operative respiratory tract or urinary tract infection. Broodt JP<sup>26</sup> reported reduction in the number of urinary tract infection in his study with single dose regimen. In our study, there was obvious reduction in wound infection and mean hospital stay. Itskovitz J<sup>27</sup> was concluded in his study that short course of prophylaxis effectively decreases the febrile morbidity, serious post operative infection and hospital stay. Tchabo JG<sup>28</sup> was also reported non significant difference in the incidence of post operative infection and mean duration of hospital stay, when comparing single dose antibiotic versus multiple dose. The single dose regimen also resulted in an obvious reduction in the costs of antibiotic used, without an increase in morbidity.<sup>29,31</sup> A study conducted by Her-Young<sup>32</sup> has shown that single dose of antibiotic prophylaxis can reduce the antibiotic cost by 75-80%. Additional cost savings were also found and were related to decrease resistant organism outbreaks, decreased postoperative wound infections, decrease length of hospital stay, readmissions, repeated surgeries, and retreatments.

One important contributing factor for prevention of surgical site wound infection along with prophylaxis, is the maintenance of standard of sterilization techniques of operation rooms. And our study negate the myth of contribution of hemoglobin level in the presence of infection.

## Conclusion

In conclusion, our study showed that use of a single dose of cefuroxime is as effective as multidose prophylaxis in prevention of serious infectious morbidity associated with gynecologic surgeries. Shortening the duration of antibiotic prophylaxis may reduce medical costs, resistant micro-organism, and gynecologic postoperative complications. It's the maintenance of standard sterilization techniques of operation room which counts not the nutritional status or Hb level for the prevention of surgical site wound infection.

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