Original Article

Antibiotic Prophylaxis in Gynaecologic and Obstetric Surgeries in Pakistan: results of a Multicenter National Study

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Abstract

Objective: the objectives of this study were to document the use of antibiotics for surgical prophylaxis in elective gynaecologic and obstetric surgeries in Pakistan and the therapeutic class of prophylactic agents administered.

Study Design: cross-sectional, observational study.

Place and Duration: between August 2010 and January 2011. Based on convenience sampling from 37 hospitals (17 Public and 20 Private) in secondary and tertiary settings from nine cities of Pakistan participated.

Methodology: the patients >18 years of age, undergoing elective gynecologic and obstetric surgeries, were included. Patient's information was recorded on standardized data collection form after informed consent.

Results: data of 937 out of the 1006 patients enrolled was analyzed as 69 patients did not meet the inclusion/exclusion criteria. The mean (±SD) age of the patients was 30.9 (± 8.8) years. In 88.5% (799/903) of the patients prophylactic antibiotic was administered as a routine practice. Prophylactic dose was administered within one hour in 68.5% patients and at the time of incision in 4.0% patients. On an average, antibiotics were administered for 3.8 (±1.9) days.

Conclusion: surgical antibiotic prophylaxis administration is almost universal irrespective of the type of gyneacologic or obstetric surgery. Third generation cephalosporin are the most common class of

Authorship Contribution: *[1]Conceptualized, designed and authored the study, [2] Conceived the idea & Reviewed the Study, [3]Data Analysis,[4] Data Collection*

antibiotic administered. There is a need to frame surgical guidelines contextual to the clinical setting in Pakistan.

Keywords: antibiotic prophylaxis. Cephalosporin, Elective, Gynecologic and obstetric surgery.

Introduction

Surgical site infections (SSIs) are important modulators of outcomes in surgical interventions and are known to be associated with adverse clinical outcomes and increased costs.[1] SSIs being the most common nosocomial infections, are the cause of 77% of all deaths in patients with nosocomial infections.[2] The frequency of SSIs is reported to be significantly higher in developing nations (5.6%) than in developed countries like USA (2.6%), Europe (2.9%) and Germany (1.6%).[3] A pilot study in Pakistan in 2008 reported a high rate of SSI (13.0%) in patients who underwent elective surgery.[4] Prevalence of SSIs in these surgeries ranges from 1.1−25% for caesarean sections and 2−21% for hysterectomy.[5,6]

Published reports on the prevalence rates of SSIs in gynecologic and obstetric surgeries in Pakistan are scarce, but available studies point to high incidence. Data from these reports are higher than those from other Asian countries like China (SSIs-0.7% after caesarean sections),[7] but are similar to some developing countries like Ethiopia (SSIs after hysterectomy−11.4%).[8]

The use of appropriate prophylactic antibiotics is associated with significantly improved outcomes. Current guidelines and recommendations from obstetric and gynecologic associations, call for the application of antibiotic prophylaxis in all cases of abdominal or vaginal hysterectomy/pelvic organ prolapse and/or stress urinary incontinence or suction curettage abortion. Even in cases of laparoscopic hysterectomy, antibiotic prophylaxis has been recommended by the Society of Canadian Obstetricians and Gynaecologists (SCOG).[9] Important considerations affecting the application of antibiotic prophylaxis include the number of doses, time of administration and the type of surgical wound.[9,10]

Currently, there is scant literature on antibiotic prophylaxis usage in gynecologic and obstetric surgeries in Pakistan. This study aims to document the use of antibiotic prophylaxis in gynecologic and obstetric surgeries in Pakistan and the associated guidelines which affect clinical practice. The primary objective is to determine the rate of surgical prophylaxis with antibiotics in patients undergoing elective gynecologic and obstetric surgeries. Secondary objectives are to determine the rate of appropriate surgical prophylaxis amongst patients receiving prophylaxis and document the therapeutic class of surgical antimicrobial prophylaxis administered.

Methodology

It was a national, multicenter, cross-sectional, study conducted in 37 hospitals (17 public, 20 private) from nine cities of Pakistan. The study was conducted according to the guidelines of Good Epidemiology Practice (IEA European Federation, 2004) and the principles of the Declaration of Helsinki (1964). Written informed consent was obtained from all the patients recruited in the study.

A total of 49 investigators were selected via convenience sampling to be a part of the study and

each investigator recruited 20 consecutive patients who met the eligibility criteria.

Eligibility Criteria: adult women who were to undergo surgeries including elective lower segment caesarean section (LSCS), benign abdominal and vaginal hysterectomies, laparoscopic tubal ligation with or without termination of pregnancy, myomectomy, cystectomy, ectopic pregnancy, retrieval of lost intra-uterine contraceptive devices (IUCD), dilatation and curettage (D&C), evacuation and curettage (E&C) and genitourinary fistula surgeries were considered eligible for the study.

Exclusion Criteria: patients were excluded if they were to undergo emergency surgeries, oncologic gynecologic surgeries or had a tubo-ovarian abscess or any infection before surgery or any underlying heart disease. The recruitment of the patients was accompanied by a screening log to limit the biases of selection.

Data pertaining to each patient was collected in a standardized data collection form within 24 hours of completion of surgery by the investigator/surgeon. The information recorded for each patient included age, diagnosis necessitating surgery, type and duration of surgery, whether or not antimicrobial prophylaxis was used and duration, timings, type and dosage of the antibiotic given (either for prophylactic purposes or post-operatively.

Data from 1006 patients across Pakistan was considered likely to provide a sufficiently accurate estimate of prophylactic use in surgical patients. The main variable was whether or not antimicrobial prophylaxis was administered and this was analyzed as a binary categorical variable. Other variables included timing and duration of prophylaxis, and choice of antibiotics. Mean with standard deviation and median with interquartile range was calculated for continuous variables. Categorical variables were reported as frequency and proportion (%). P value was calculated by applying chi-square test for significance of two groups.

Results

The study was conducted between August 2010 and January 2011. The study enrolled 1006 patients. Data on 937 (93.1%) patients was evaluable. Data from 44 (4.4%) patients could not be analyzed because they did not meet inclusion criteria and 25 (2.5%) met exclusion criteria. The mean age of the enrolled patients was 30.9 ± 8.8 years. Elective LSCS section (n=564, 60.2%) and benign abdominal or vaginal hysterectomy (n=157, 16.8%) were the two most common types of surgeries performed constituting three fourths of all types of surgeries. While the mean duration of surgery was 45.2 ± 24.0 minutes, 16.9% (n=158) of the patients underwent surgery for <30 minutes. For a majority of the patients (n=606, 64.7%) the duration of surgery was between 30 to 60 minutes.

Prophylactic antibiotics were administered to 96.4% (n=903) of the patients, the two most common reasons being, its use as routine practice (n=799, 88.5%) and its requirement for clean surgery (n=129, 14.3%). On an average, antibiotics were administered for 3.8 ± 1.9 days and prolonged use of antibiotics was observed for D & C and ectopic pregnancy surgeries. Longer than average duration of administration was also seen in patients undergoing contaminated surgery with a mean duration of 4.1 ± 2.0 days. Patients were managed in a relatively non-sterile environment for surgery, were administered antibiotics for the shortest duration of

2.2 ± 0.6 days. A summary of the clinical parameters is presented in Table I.

Table I. A Summary of Clinical Parameters

Variables	n (%), N = 903
Duration of surgical procedures, N = 937	
<30 min	158 (16.9)
30 to 60 min	606 (64.7)
>60 min	132 (14.1)
Antibiotic administration	
IV route	890 (98.6)
Mean duration of first dose prior to surgery, min	63.9
Pre-operative (≤60 min)	619 (68.5)
At the time of incision	36 (4.0)
Continued post-operative	842 (93.2)
Reason for prophylaxis	
Routine practice	799 (88.5)
Clean surgery	129 (14.3)
Clean contaminated surgery	42 (4.7)
Non sterile environment	35 (3.9)
Poor nutritional status	32 (3.5)
Co-morbidity	12 (1.3)
Contaminated surgery	10 (1.1)
Antibiotics prescribed for prophylaxis	
Cephalosporins	
1st generation	104 (11.5)
2nd generation	83 (9.2)
3rd generation	593 (65.7)
Metronidazole	293 (32.4)
Amoxicillin/Clavulanate	69 (7.6)
Aminoglycoside	51 (5.6)
Quinolone	42 (4.7)
Penicillin	15 (1.7)
Others	44 (4.9)

The most common therapeutic class used for prophylaxis was cephalosporin as seen in 86.4% (780/903) of patients; of these patients, third-generation cephalosporin were administered in 65.7% (n=593) of the patients.

Although, third generation cephalosporin were most commonly used in cases of myomectomy (54.3% [25/46]), their rate of administration across different surgeries remained at least above 25%. Table II summarizes the pattern of antibiotic prophylaxis by the type of surgery performed in patients. Prophylactic antibiotics were administered in combination in 35.6% (322/903) of the patients, mostly in patients undergoing LSCS (n=89, 9.9%). The most commonly administered combination was

Table II. The pattern of antibiotic therapy depending upon the type of surgery performed.

Type of surgery	Number of patients, N (%)	Duration of antibiotic use (days), mean ± SD	Patients prescribed with 3rd generation cephalosporins, N (%) *	Patients with post-operative continuation of antibiotics, n (%), N = 903
Total	937 (100)	4 ± 2	416 (44.4)	842 (93.2)
LSCS	564 (60.2)	3.1 ± 3.3	266 (47.2)	521(57.7)
Hysterectomy Abdominal / Vaginal	157 (16.8)	4.6 ± 1.9	60 (38.2)	137 (15.2)
DandC	62 (6.6)	4.5 ± 2.3	24 (38.7)	46 (5.1)
EandC	48 (5.1)	4.9 ± 1.8	12 (25.0)	36 (4.0)
Myomectomy	46 (5.0)	3.5 ± 1.8	25 (54.3)	44 (4.9)
Cystectomy	28 (3.0)	3.9 ± 1.9	14 (50.0)	27 (3.0)
Ectopic Pregnancy	20 (2.1)	4.9 ± 1.8	9 (45.0)	20 (2.2)
Others	10 (1.1)	4.5 ± 2.4	6 (60.0)	9 (1.0)
Missing information	02 (0.2)	–	–	2 (0.2)

** = Percentage of patients calculated from number of patients undergoing that surgery. LSCS=Lower segment caesarean section, DandC = Dilatation and curettage, EandC = Evacuation and curettage.*

a third generation cephalosporin and metronidazole in 16.3% (147/903) of patients. Metronidazole was the preferred adjunct therapy (89.4%, 288/322) for use in combinations. Almost 98.6% (n=890) patients were administered antibiotic doses through the intravenous route. The mean duration of administration of first dose of antibiotic was 63.9 minutes prior to surgery. More than 68.5% (n=619) patients received the prophylactic dose within one hour prior to surgery and 4.0% (n=36) received at the time of incision. Administration of prophylactic

antibiotics continued post-operatively in 93.2% (n=842) of patients with the average duration of administration being 4 ± 2 days.

Figure I shows the utilization of surgical antibiotic prophylaxis guidelines by obstetricians and gynaecologists in Pakistan.

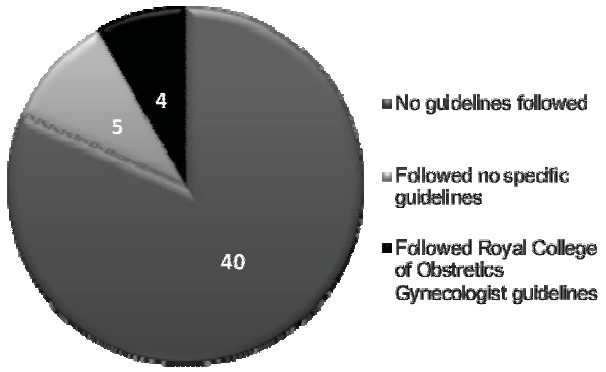

Figure 1. Adherence to antibiotic prophylaxis in obstetrics and gynaecology in Pakistan. (N = 49)

Discussion

Healthcare-related infections increase the length of hospital stay with the need for more aggressive treatment, and morbidity in patients.[1,7,9] Post-operative infections may include febrile illness, wound infection, vaginal cuff infection and urinary tract infection.[9] Risk factors identified for post-operative infections after hysterectomy include patient's age, blood loss during surgery, length and type of surgery, underlying comorbid conditions and preoperative bacterial vaginosis or any other infection.[11,12,13]

A public sector hospital in Pakistan showed 7.9% rate of wound infection after caesarean section,[14] whereas Ahmed and Wasti reported a post-operative infection rate of 22% with 6% in patients developing operative site infections (including wound and vaginal cuff infections and pelvic abscesses) after hysterectomy.[15]

In this study, the rate of surgical prophylaxis before incision was assessed. As shown by the results, prophylaxis was administered as a part of routine practice based on clinical experiences of investigators in 88.5% of cases without reference to any specific guideline. In patients who were treated in private sector hospitals, healthcare providers' adherence to prophylactic protocols against hospital acquired infections was variable. Public sector hospitals administered prophylaxis according to their own working guidelines to control SSIs. The 49 investigators, who were part of this study administered prophylactic antimicrobial administration to ensure smooth recovery of patients and reduce the length of hospital stay.

This study also investigated the choice of prophylactic antibiotics, time of first dose, duration of surgery and continuation of treatment in post-operative period. The first dose of antibiotic was given one hour before surgery in 68.5% of cases. This was in accordance to an advisory statement from the National Surgical Infection Prevention Project (NSIP), which recommends the closest possible time before incision as the ideal time of prophylactic antibiotic administration.[16] Reports show that the administration of antimicrobials at the time of anaesthesia induction is safe and results in adequate serum and tissue drug levels at the time of incision.[16] The workgroup which formulated the advisory statement endorsed the national performance measure that "first antimicrobial infusion should begin within 60 minutes before incision", as recommended by an expert group of the Surgical Infection Project in USA.[16]

In this study, prophylaxis was administered by intravenous route in most cases (98.6%). The duration of surgery was between 30-60 mints in 64.7% of cases. The NSIP workgroup recommends that the drug should be given in adequate dose adjusted to body mass index, and administration should be repeated intra-operatively if surgery lasts for more than two half-hours after first dose, to ensure adequate antimicrobial concentration at the site of incision.[16]

The administration of prophylactic antibiotics during caesarean section in this study was based on the rationale of antibiotic administration 30-60 mins prior to incision. In US, antimicrobial administration is not recommended until the cord is clamped after caesarean delivery due to concerns of masking septic manifestations in neonates.[17] Similarly, the most recent Cochrane systematic review, involving over 80 clinical trials, recommended administration of antibiotics after cord clamping.[18] However, a meta-analysis comparing pre-incision and post-clamping administration of antibiotics in 749 patients from 3 studies, showed significant reduction in wound infection and endometritis rates when prophylactic antibiotic was administered before incision. Neonatal sepsis was comparable in two out of three studies.[19] In this study third generation cephalosporin, cefotaxime was the drug of choice in 65.7% of patients who underwent major and minor obstetrical and gynaecological procedures. In the study conducted by Won Suk Choi and Joon Young Song, 3rd generation cephalosporins were the most frequently used drugs for prophylaxis in hysterectomy patients.[20] Furthermore, in the same study antibiotics were frequently administered intravenously, but intramuscular and oral administrations were also reported.[20] The first dose was given within one hour before surgery in 11.2% of patients, and the mean duration of post-operative prophylaxis in hysterectomy patients was 141.7 ± 71.3 hours.[20]

In this study, metronidazole in combination with a 3rd generation cephalosporin was used in 16.3% patients and was the most common antibiotic used for adjunct therapy (89.4%). First and 2nd generation cephalosporin used in many studies, have been found to provide good antibiotic activity against ureaplasma and mycoplasma infections; however they may possibly cause resistance against anaerobes.[21,22]

This study demonstrated that 4.0% of the investigators administered antibiotics just prior to incision, followed by prolonged post-operative administration of antibiotics. Published guidelines recommended discontinuation of prophylaxis within 24-48 hours.[16,23,24] However, in Pakistani healthcare scenario where general health condition of patients and the status of hygiene are unsatisfactory, a prolonged post-operative antimicrobial cover is likely to help lower the risk of SSI and other infections. Surgical antibiotic prophylaxis reduces the incidences of wound infections, vaginal cuff cellulitis, endometritis and urinary tract infection by more than 50%. Also, 18.4% of investigators used some guideline, out of which 4.0% followed Royal College of Obstetricians and Gynaecologists (RCOG) guidelines.

Conclusion

In our study, more than 95% patients were administered prophylaxis, generally 3rd generation cephalosporin prior to surgery. It is highly

recommended that local guidelines for the prophylactic use of antibiotics to prevent SSIs in gynaecological and obstetrical patients should be developed. It is suggested that National guidelines should be formulated, regarding the use of antibiotic prophylaxis in obstetrics and gynaecology.

Conflict of Interest : nil

Funding: Sanofi Pakistan Ltd.

Acknowledgements

The authors would like to thank the following physicians who participated in this study: From Peshawar - Dr. Abida, Prof. Dr. Anwer Sultana, Dr. Farnaz, Dr. Ilyaas Siddiqui, and Dr. Summaya; From Islamabad - Dr. Kausar Bangash, Dr. Rubina Javed Bhali, and Dr. Salma Kayani;; From Rawalpindi Prof. Dr. Rizwana Chaudhry, From Lahore Dr. Asma Sarwat, Dr. Fareeha Khaliq Khan, Dr. Farhat Naz, Dr. Rafat Sultana, Dr. Razia Ashraf, Dr. Razia Ehsanullah, Dr. Rubina Nightat, Dr. Rukhsana Sarwat, Dr. Sara Ejaz, and Dr. Zaib-un-Nisa; . From Faisalabad - Dr. Aisha Shaikh, Dr. Amber Ikram, Dr. Rahat Rashid, Dr. Ruqqaiya Ashfaq, and Dr. Sadia Anwar; From Multan - Dr. Mahnaz Ahwani, Dr. Sami Akhter, Dr. Shahida, and Dr. Shahid Rao; -; From Sukkur - Dr. Saima Arshad, Dr. Shazia, Dr. Sunita, Dr. Khairunnisa, and Dr. Kulsoom From Hyderabad - Dr. Chandra Madhudas, Dr. Firdous Mumtaz, Dr. Mehrunisa Khaskhaili, Dr. Pushpa Sirichand, and Dr. Shaista Farooq; From Karachi - Dr. Anjum Sami, Dr. Bushra Zulfiqar, Dr. Iffat Javed, Dr. Irshad Moin, Dr. Khalida Nasreen, Dr. Mussarat, Dr. Rauf-un-Nisa, Dr. Sajda, Dr. Shagufta Tahir, Dr. Yasmeen Nauman, and Dr. Yasmeen Taufeeq Iqbal Mujtaba from Sanofi (Pakistan) conducted statistical analysis.

The author acknowledges the help of Jeevan Scientific Technology Limited (Hyderabad, India), and Anahita Gouri and Dr Jai Tilak-Jain of Sanofi (India) for providing writing and editing assistance in developing this manuscript.

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