e-ISSN: 0976-822X, p-ISSN:2961-6042

Available online on http://www.ijcpr.com/

International Journal of Current Pharmaceutical Review and Research 2024; 16(3); 247-251

Original Research Article

Evaluation of Prophylactic Antibiotics in Women Undergoing Elective Caesarean Section: a Comparative Study

Mamta Singh[1], Amar Kumar Singh[2], Rajrani Chaudhary[3], Renu Rohatgi[4]

[1]Assistant Professor, Department of Obstetrics and Gynecology, Nalanda Medical College and Hospital, Patna, Bihar, India

[2]Assistant Professor, Department of Radiology, Patna Medical College and Hospital, Patna, Bihar, India

[3]Associate Professor, Department of Obstetrics and Gynecology, Nalanda Medical College and Hospital, Patna, Bihar, India

Professor and HOD, Department of Obstetrics and Gynecology, Nalanda Medical College and Hospital, Patna, Bihar, India

Received: 14-01-2024 / Revised: 16-02-2024 / Accepted: 26-03-2024
Corresponding Author: Dr. Amar Kumar Singh
Conflict of interest: Nil

Abstract

Aim: The objectives of the study were to audit and implement the use of prophylactic antibiotics in women undergoing elective caesarean section.

Methods: This comparative, prospective, hospital-based study was conducted in the department of Gynaecology and Obstetrics, for the period of Jan 2020 to Dec 2022.

Results: Mean age was 25.5±3.9 years in group A & 24.6±3.4 years in group B. BMI at the time of admission was 26.4±6.3 kg/m² & 27.3± 5.6 kg/m² in group A & B respectively. Mean duration of surgery was 42.8±7.3 min in group A & 45.5±5.5 in group B. Average blood loss in both groups was comparable. Mean days of hospitalisation was 4.8±3.7 days & 5.7±2.9 days in group A & B respectively. Most common indication for elective LSCS was previous LSCS followed by primi with CPD. In the group A prophylactic antibiotic prophylaxis was given to 45 women (45%) and was not given to 55 women (55%). In group B, out of 100 women of this 90 (90%) of women received prophylactic antibiotic before elective LSCS. Out of 24 women who received antibiotic in group A, 10 received antibiotic within 1 hour and 12 cases received more than 1 hour before procedure. Out of 90 women in group B, 45 women received antibiotic within 1 hour, 5 received more than 1 hour. In the group A, majority of the women received amoxicillin clavulunic 1.2 gm IV /Inj cefotaxime based on the policy formulated based on the antibiogram of the hospital.

Conclusion: This study showed single dose antibiotic prophylaxis is as effective as conventional multi dose antibiotic therapy. It is cost effective, antibiotic resistance of microorganisms can be prevented, reduces patient side effects, nursing staff work.

Keywords: prophylactic antibiotic, caesarian delivery, ceftriaxone, ampicillin and metronidazole

Introduction

Infectious morbidity is the most common complication following caesarean section with reported rates ranging from 18% to 83% [1], while that for vaginal delivery is less than 10%. [2] The potential of antibiotic prophylaxis has been studied extensively since the first controlled trial, reported by Miller and Crichton. [3] Over the last few decades a consistent increase has been observed in the rate of ceasarean deliveries is noted worldwide & India. It is often argued that obstetricians also increasingly prefer for surgical birth than a normal birth due to multiple reasons as women not opting for vaginal delivery, medicolegal issues, precious pregnancies, etc.

Women undergoing caesarean section have an increased risk of postoperative infection and infectious morbidity compared with women giving birth vaginally. [4] Caesarean sections have been shown to have nearly five times the risk of postpartum infection as vaginal births (and this is with a policy of antibiotics at caesarean section) and just over 75% occur after hospital discharge. [5] Infectious morbidity for the mother, consisting primarily of endomyometritis and wound infection remains a leading cause of post-operative complications. [6] Prophylactic antibiotic treatment is use of antibiotics before, during, or after a

diagnostic, therapeutic, or surgical procedure to prevent infectious complications.

A Cochrane review from 2014 compared antibiotic prophylaxis with no prophylaxis and concluded that antibiotic prophylaxis decreased the risk for postpartal wound infection, endometritis and severe infectious complications by 60–70%. Prophylactic antibiotics are expected to work in conjunction with the antiseptic measures taken before and during surgery. Around 40%–60% of SSIs can be prevented with the use of proper antibiotic prophylaxis. The most commonly used types of antibiotics are penicillins, cephalosporins, fluoroquinolones, tetracyclines and macrolides, with each class including many drugs. [7] Around 40%–60% of SSIs can be prevented with the use of proper antibiotic prophylaxis. The most commonly used types of antibiotics are penicillins, cephalosporins, fluoroquinolones, tetracyclines and macrolides, with each class including many drugs. [7]

WHO has concluded that has adequate randomised trials are not available the choice of such antibiotic class should be informed by the local bacteriologic patterns of post caesarean infectious morbidity, the availability of such antibiotic class, the woman's allergy history, the clinician's experience with that particular class of antibiotics, and its cost, however it has also recommended the use of penicillins or first generation cephalosporins 5. In spite of the guidelines several studies have shown that the hospital practices varies from no preoperative antibiotic to various different classes of antibiotics. The timing of the antibiotic also varied depending on physician preference with no uniform protocols across hospital [6,7]

The objectives of the study were to audit and implement the use of prophylactic antibiotics in women undergoing elective caesarean section.

Materials and Methods

This comparative, prospective, hospital-based study was conducted in the department of Gynaecology and Obstetrics, Nalanda Medical College and Hospital, Patna, Bihar, India for the period of Jan 2020 to Dec 2022

Inclusion Criteria

- Patients posted for elective LSCS, BMI <30, willing to participate in study & follow up for 3 months.
- The caesarean was considered elective when the procedure was performed in the absence of labor and before rupture of membrane.

Exclusion Criteria

- Women who had known or suspected hypersensitivity to cephalosporins
- Any co-existing diseases like diabetes mellitus, hypertension or cardiac problem that will require multi dose antibiotics
- Surgical procedure exceedingly more than 90 minutes and if blood loss was more than 1500ml.

Patients received information about objective of present study prior to surgery and a written informed consent was obtained. Baseline assessment including vital signs, general physical, systemic and obstetric examination was performed. Routine blood (CBC, RBS, RFT) and urine analysis & if required urine culture and sensitivity, high vaginal swab culture and sensitivity was carried out. Patients were randomly divided on alternate number basis in 2 groups (Group A and Group B) each consisted of 100 patients.

Group A - patients received injection Ceftriaxone 1gm. intravenous stat at the time of induction of anesthesia.

Group B - patients received intravenous ampicillin and metronidazole for 1 day followed by oral for next 4 days.

Temperature monitoring, vital signs, abdominal, perineal examinations were performed daily till 7 days. If body temperature was more than 1010 F on 2 occasions 4 hours or more apart, excluding the night of surgery, it was considered as febrile morbidity and appropriate investigations were performed including urine culture, blood culture, high vaginal swab culture before starting appropriate multi dose antibiotics. Wound was inspected for superficial or deep infection, any pus discharge, surgical site abscess formation, wound dehiscence, vault haematoma and pelvic abscess. At discharge, patients were instructed to contact if they have any signs and symptoms of infection. All patients were followed up to 3 months at monthly intervals. Incidence of postoperative morbidity (febrile morbidity and infectious morbidity such as wound infection, chest infection, UTI, pelvic abscess and dehiscence of scar) was primary outcome.

Data was collected in pre-designed proforma & entered in SPSS for descriptive and analytical study. A p value of <0.05 was considered significant.

Results

Table 1: Characteristics of patients in two groups

	Group A	Group B
Mean age in years	25.5±3.9	24.6±3.4
BMI in kg/m²	26.4±6.3	27.3± 5.6
Mean duration of surgery (min)	42.8±7.3	45.5±5.5
Mean blood loss (ml.)	632±58	655±65
Mean days of catheterisation	1	1
Mean days of hospitalisation (days)	4.8±3.7	5.7±2.9

Mean age was 25.5±3.9 years in group A & 24.6±3.4 years in group B. BMI at the time of admission was 26.4±6.3 kg/m² & 27.3± 5.6 kg/m² in group A & B respectively. Mean duration of surgery was 42.8±7.3 min in group A & 45.5±5.5 in group B. Average blood loss in both groups was comparable. Mean days of hospitalisation was 4.8±3.7 days & 5.7±2.9 days in group A & B respectively.

Table 2: Indication for CS

Parameters	Group A	Group B
Previous LSCS	42 (42%)	39 (39%)
CPD	21 (21%)	20 (20%)
BREECH	10 (10%)	10 (10%)
Fetal distress	12 (12%)	12 (12%)
PROM	11 (11%)	11 (11%)
Others	3 (3%)	8 (8%)

Most common indication for elective LSCS was previous LSCS followed by primi with CPD.

Table 3: Antibiotic prophylaxis and Antibiotic prophylaxis type and duration

Categories	Group A	Group B	P Value
Received antibiotics	45 (45%)	90 (90%)	<0.00001
Did not receive antibiotics	55 (55%)	10 (10%)	
Antibiotic prophylaxis type and duration			
Within 1 hour 15	10	45	<0.00001
More than1hour	12	5	
Inj amoxicillin - clavulunic acid/ inj cefotaxime	12	35	
Others	11	5	

In the group A prophylactic antibiotic prophylaxis was given to 45 women (45%) and was not given to 55 women (55%). In group B, out of 100 women of this 90 (90%) of women received prophylactic antibiotic before elective LSCS. Out of 24 women who received antibiotic in group A, 10 received antibiotic within 1 hour and 12 cases received more than 1 hour before procedure. Out of 90 women in group B, 45 women received antibiotic within 1 hour, 5 received more than 1 hour. In the group A, majority of the women received amoxicillin clavulunic 1.2 gm IV /Inj cefotaxime based on the policy formulated based on the antibiogram of the hospital.

Discussion

Caesarean section is one of the commonly performed obstetric procedures. Following caesarean delivery (CD), maternal mortality and morbidity may result from a number of infections including endometritis, urinary tract infection (UTI) and surgical site infection (SSI). [11] The use of prophylactic antibiotics in women undergoing cesarean section reduced the incidence of wound infection, endometritis and serious infectious complications by 60% to 70%. [12] ACOG has recommended that antibiotic be given within 1 hour before the caesarean section for maternal benefit. [13] In spite of the guidelines several studies have shown that the hospital practices varies from no preoperative antibiotic to various different classes of antibiotics. The timing of the antibiotic also varied depending on physician preference with no uniform protocols across hospital. [14,15]

Mean age was 25.5±3.9 years in group A & 24.6±3.4 years in group B. BMI at the time of admission was 26.4±6.3 kg/m² & 27.3± 5.6 kg/m² in group A & B respectively. Mean duration of surgery was 42.8±7.3 min in group A & 45.5±5.5 in group B. Average blood loss in both groups was comparable. Mean days of hospitalisation was 4.8±3.7 days & 5.7±2.9 days in group A & B respectively. Most common indication for elective LSCS was previous LSCS followed by primi with CPD. Across the globe, SSIs are associated with increased morbidity and

mortality; sequelae include revision surgeries, poor quality of life, prolonged antibiotic treatment and rehabilitation, and associated lost work and productivity. Moreover, SSIs are associated with a substantial economic burden to the healthcare system as a result of increased length of hospital stay and increased risk of readmission. [16] Current strategies aimed at preventing SSIs include improved hygiene, aseptic surgical techniques, carrier screening, decolonization, application of antibiotics to the surgical site prior to wound closure, and intravenous antibiotic prophylaxis. [17]

Most common indication for elective LSCS was previous LSCS followed by primi with CPD. In the group A prophylactic antibiotic prophylaxis was given to 45 women (45%) and was not given to 55 women (55%). In group B, out of 100 women of this 90 (90%) of women received prophylactic antibiotic before elective LSCS. Out of 24 women who received antibiotic in group A, 10 received antibiotic within 1 hour and 12 cases received more than 1 hour before procedure. Out of 90 women in group B, 45 women received antibiotic within 1 hour, 5 received more than 1 hour. In the group A, majority of the women received amoxicillin clavulunic 1.2 gm IV /Inj cefotaxime based on the policy formulated based on the antibiogram of the hospital. Single dose antibiotic prophylaxis is well-established for abdominal and vaginal hysterectomy and cumulative meta-analysis data indicate the same. Perioperative antimicrobial prophylaxis has been advocated in surgical procedures, but recent guidelines and publications showed that single dose antibiotic prophylaxis is equally effective in clean, and clean contaminated surgical procedures. Following elective surgery, wound infection in patients who receive perioperative antibiotics (within 3 hours following skin incision) occurs in 1.4% compared to 0.6% in those who receive antibiotics within the 2 hours before skin incision. [18]

The randomized, non-blinding clinical trial of 500 eligible participants compared IV single dose of gentamicin (3 mg/kg) plus metronidazole (500 mg) 30-60 minutes prior to CS with same regimen prior to the operation but continued for 24 hours. Pre-operative single dose antibiotic prophylaxis for emergency caesarean showed a lower cumulative incidence of surgical-site infection, a reduced staff workload and a minimized medication cost compared to multiple doses till 24 hours. [19] While one meta-analysis, which was based solely on elective cesarean delivery, did not find a risk reduction for any maternal outcome in favor of preoperative in comparison with postoperative antibiotic prophylaxis. [20]

Conclusion

This study showed single dose antibiotic prophylaxis is as effective as conventional multi dose antibiotic therapy. It is cost effective, antibiotic resistance of microorganisms can be prevented, reduces patient side effects, nursing staff work. Further knowledge of antibiotic susceptibility and resistant strains is to be considered while choosing antibiotic.

References

1. Henderson E, Love EJ. Incidence of hospital-acquired infections associated with caesarean section. Journal of hospital infection. 1995 Apr 1;29(4):245-55.
2. GIBBS RS. Clinical risk factors for puerperal infection. Obstetrics & Gynecology. 1980 Mar 1;55(3):178S-83S.
3. Miller RD, Crichton D. Ampicillin prophylaxis in cesarean section. S Afr J Obstet Gynecol. 19 68;6:69.
4. Declercq E, Barger M, Cabral HJ, Evans SR, Kotelchuck M, Simon C et al. Maternal outcomes associated with planned primary cesarean births compared with planned vaginal births. Obstetrics and Gynecology. 2007;109 (3):669-77.
5. Leth RA, Møller JK, Thomsen RW, Uldbjerg N, Nørgaard M. Risk of selected postpartum infections aKer cesarean section compared with vaginal birth: a five-year cohort study of 32,468 women. Acta Obstetricia et Gynecol ogica Scandinavica. 2009;88(9):976-83.
6. Reichman DE, Greenberg JA. Reducing surgical site infections: a review. Rev Obstet Gynecol. 2009;2:212-21.
7. Green, Salah Gammouh Amman. Current International Evidence and Recommendations for Antibiotic Prophylaxis in Gynecological Procedures Review of the Cesarean Section Antibiotic Prophylaxis Program in Jordan and Workshop on Rational Medicine Use and Infection Control, 2012, 28.
8. WHO recommendation on antibiotic prophylaxis for caesarean section using a single dose of first-generation cephalosporin or penicillin in preference to other classes of antibiotics RHL [Internet].
9. Pedersen TK, Blaakær J. Antibiotic prophylaxis in cesarean section. Acta obstetric cia et gynecologica scandinavica. 1996 Jan 1; 75(6):537-9.
10. Dhar H, Al-Busaidi I, Rathi B, Nimre EA, Sachdeva V, Hamdi I. A study of post-caesarean section wound infections in a regional referral hospital, Oman. Sultan Qaboos University Medical Journal. 2014 May ;14(2):e211.
11. Berg CJ, Chang J, Callaghan WM, Whitehead SJ. Pregnancy-related mortality in the United

States, 1991–1997. Obstetrics & Gynecology. 2003 Feb 1;101(2):289-96.
12. Smaill FM, Grivell RM. Antibiotic prophylaxis versus no prophylaxis for preventing infection after cesarean section. Cochrane database of systematic reviews. 2014(10).
13. ACOG Guidance: Antibiotic Prophylaxis during Labor and Delivery [Internet].
14. Pedersen TK, Blaakær J. Antibiotic prophylaxis in cesarean section. Acta obstetricia et gynecologica scandinavica. 1996 Jan 1;75(6):537-9.
15. Dhar H, Al-Busaidi I, Rathi B, Nimre EA, Sachdeva V, Hamdi I. A study of post-caesarean section wound infections in a regional referral hospital, Oman. Sultan Qaboos University Medical Journal. 2014 May;14(2):e211.
16. Patel H, Khoury H, Girgenti D, Welner S, Yu H. Burden of surgical site infections associated with select spine operations and involvement of Staphylococcus aureus. Surg Infect. 2017; 18(4)461-73.
17. Weiser MC, Moucha CS. The current state of screening and decolonization for the prevention of Staphylococcus aureus surgical site infection after total hip and knee arthroplasty. JBJS. 2015;97(17):1449-58.
18. Lamont RF, Sobel JD, Kusanovic JP, Vaisbuch E, Mazaki-Tovi S, Kim SK, Uldbjerg N, Romero R. Current debate on the use of antibiotic prophylaxis for caesarean section. BJOG: An International Journal of Obstetrics & Gynaecology. 2011 Jan;118(2):193-201.
19. Lyimo FM, Massinde AN, Kidenya BR, Konje ET, Mshana SE. Single dose of gentamicin in combination with metronidazole versus multiple doses for prevention of post-caesarean infection at Bugando Medical Centre in Mwanza, Tanzania: a randomized, equivalence, controlled trial. BMC pregnancy and childbirth. 2013 Dec;13(1):1-7.
20. Zhang C, Zhang L, Liu X, Zhang L, Zeng Z, Li L, Liu G, Jiang H. Timing of antibiotic prophylaxis in elective caesarean delivery: a multi-center randomized controlled trial and meta-analysis. PLoS One. 2015 Jul 6;10(7):e01 29434.