

“Antimicrobial Prophylaxis in Cesarean Section”

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Submitted: 10-11-2021

Revised: 24-11-2021

Accepted: 27-11-2021

ABSTRACT

Background: Infectious morbidity remains a leading cause of postoperative complications following caesarean delivery. Prophylactic use of antibiotics has become an accepted practice to minimize the incidence of post-operative complications,

but adherence to proper timing guidelines remains problematic. Judicious use of antibiotics in the hospital through effective antibiotic policy and guideline development is then essential.

Objectives : 1. To evaluate the pattern of Antimicrobial prophylaxis in Lower segment Cesarean section. 2. To assess the frequency of post operative morbidity.

Methods : A prospective study was conducted over a period of one year on patients undergoing lower segment caesarean section. 250 cases were included in the study. The patients who underwent lower segment caesarean section (elective and emergency) was observed from the period of 1st dose of antimicrobial prophylaxis till the patient is discharged. Relevant information on each patient was collected according to the proformadesigned for the study. Antibiotics used, their dose dosage schedule were recorded. Investigations like pus, blood and urine culture and sensitivity was done for patients with postoperative complications.

Results : In our study, most of the patients came from low socioeconomic status. We observed the use of third generation cephalosporins like ceftriaxone or cefotaxime and metronidazole and gentamycin in most of the patients. Two drug or three drug combinations were used which commonly included third generation cephalosporins and metronidazole with gentamicin being added in three drug combinations. Fifty six patients in caesarean section had post operative complications which included wound infection, UTI and fever. There was no post operative mortality in this study.

Conclusion :

Use of prophylactic antibiotics in women undergoing caesarean section substantially reduced the incidence of episodes of fever, endometritis,

wound infection, urinary tract infection and serious infection after caesarean section. Our study revealed that all the antibiotics used were broad spectrum and bactericidal. Hence, a proper guideline is required for optimum antibiotic prophylaxis in CS.

Key words: Antimicrobial prophylaxis, Lower segment Cesarean section

I. INTRODUCTION

Caesarean section is a major operation, with great potential benefit, but also with substantial risks for both mother and baby.1 Maternal mortality and morbidity are higher than for vaginal delivery, although rates are becoming lower with advances in technology.2 Infectious morbidity remains a leading cause of postoperative complications following caesarean delivery.3

Infectious complications includes fever, wound infection, endometritis, bacteremia, UTI and other serious infections (including pelvic abscess, septic shock, necrotizing fasciitis, and septic pelvic vein thrombophlebitis).4 These complications not only results in increased hospital stay but also increase in the cost of care. Antibiotics administered prior to the contamination of previously sterile tissues or fluids are deemed “prophylactic antibiotics”.

The major objective in using prophylactic antibiotic is to reduce the incidence of post-caesarean endometritis. A second objective of prophylaxis is to reduce the incidence of these life threatening complications. The third objective of prophylaxis is to reduce the incidence of major wound infections.5

Prophylactic antimicrobials are proved to be effective in lowering postoperative infections both in women at high risk (in labour after membrane rupture), and low risk (non-labouring with intact membrane). The current debate focuses on the choice of antimicrobials and the timing of administration.

Choice Of Antibiotics:

The choice of a particular regimen is the product of scientific principles, practical

considerations, empiricism and cost.⁶ Although more than 20 different drugs have been used alone or in combination for antimicrobial prophylaxis during cesarean delivery.⁸⁶ Most obstetricians currently use either penicillin or a cephalosporin. One obvious principle is that the antibiotic should be active against organisms most likely to cause infection. The risk of postoperative febrile morbidity is reduced by a comparable amount by both broad spectrum penicillins & cephalosporins. In one trial most striking risk reduction in postoperative febrile morbidity was achieved when a combination of broad spectrum penicillins and aminoglycosides were used for prophylaxis. The evidence from the trials in which broad spectrum penicillins and cephalosporins have been compared directly suggest that they have similar effects on the risks of postoperative febrile morbidity.⁷

Timing Of Administration:

Timing of antibiotic administration is critical to its efficacy. The first dose should always be given before the procedure, preferably within 30 minutes before incision.⁸ The timing of administration is one of the most important aspects of prophylaxis regimens. Unlike other surgical procedures for which an antimicrobial is ideally administered just before incision, administration of antimicrobials in cesarean delivery is delayed after cord clamping.⁷ This is done principally to avoid suppression of the infants normal bacterial flora. Although toxicity in the infant is of potential concern, a majority of drugs used for this procedure have a documented record of safety in the treatment of infections during pregnancy, & many are used in the treatment of neonatal sepsis. ACOG & American Academy of Paediatrics recommend administration of prophylactic antibiotics after cord clamping.⁷

Route Of Administration:

The oral route tends to suffer from variable absorption, especially in presence of anaesthetic pre-medication, and this also makes it unsatisfactory prophylactic antibiotics are usually given intravenously as a bolus on induction of anaesthesia to ensure adequate tissue concentrations at the time of surgical incision.⁸

Protocol for antibiotic prophylaxis in Cesarean section:⁹

Single dose after cord clamping of- Cefazolin 2 g iv

Ampicillin/Sulbactam- 1g/0.5g IV

Clindamycin

600mg IV (if β lactam allergy)

The objective of this study was to evaluate the pattern of Antimicrobial prophylaxis in Lower segment Cesarean section and to assess the frequency of post operative morbidity.

II. MATERIALS AND METHODS

A prospective study was conducted over a period of one year on patients undergoing lower segment cesarean section. 250 cases were included in the study.

Location of study:

The study was conducted on patients admitted in the obstetrics and gynecology department of Rajarajeswari Medical College & hospital, Bangalore

Data collection:

A proforma containing detailed information on each patient was prepared according to the protocol designed for the study. Informed consent was taken from all the patients included in the study. Ethical clearance was obtained from institutional ethics committee.

Inclusion criteria:

1. Patients undergoing emergency cesarean section
2. Patients undergoing elective cesarean section

Exclusion criteria:

1. Patients who received any antibiotics in the preceding two weeks of surgery
2. Patients with co-morbid conditions like diabetes mellitus, autoimmune disease, tuberculosis, HIV infection or prophylaxis for rheumatic fever
3. Patients on cancer chemotherapy, radiotherapy, long term steroids or immunosuppressants

Relevant data was taken from the patients undergoing lower segment cesarean section while they were admitted in the hospital and also from the hospital records. The data included name and age of the patient, socioeconomic status (Modified Kuppaswamy's classification) [86], date of admission and discharge, type of surgery performed. It also included details of the use of antibiotic prophylaxis such as choice of antibiotic, dose and dosage schedule, route of administration and also any change in the antibiotic following culture and sensitivity report.

Patients were followed up during the postoperative period till the day of discharge. Postoperative complications and investigations relevant to the postoperative complications were also recorded. In patients who developed wound infection, which was characterized by erythema, induration, serous and purulent discharge from the site of incision pus culture and sensitivity was done by the department of microbiology.

The patients presenting with burning micturition and fever were considered to be suffering from UTI and urine culture and sensitivity was done. Patients presenting with oral temperature of more than 38°C on two occasions at an interval of six hours, 24 hours after surgery

were considered to be suffering from fever. Blood sample was collected from these patients and culture sensitivity was done.

Statistical Method

The data collected was analyzed statistically using descriptive statistics. Wherever necessary, the results are depicted in the form of percentages and graphs.

III. RESULT

A total of 250 patients were included in our study with age group ranging from 19 years to 36 years.

Demographic data.

TABLE 1 :DISTRIBUTION OF AGE IN PATIENTS UNDERGOING CAESAREAN SECTION

Age in years	No of patients	Percentage
19-21	67	26.8%
22-24	95	38%
25-27	41	16.4%
28-30	40	16%
31-33	4	1.6%
34-36	3	1.2%

In our study highest number patients undergoing cesarean section was found in the age group of 22 – 24 years of age (38 %) followed by 19-21 years (26.8%)[Table 1].

TABLE 2: DISTRIBUTION OF PATIENTS BASED ON SOCIO-ECONOMIC STATUS (KUPPUSWAMY CLASSIFICATION)

Socio-economic status	No of patients	Percentage
Lower	89	35.6
Lower –middle	106	42.4
Upper- middle	55	22
Upper	0	0

Out of 250 patients, 42.4%(106) were from Lower-middle class, 35.6%(89) were from Lower class. None of the patients were from Upper class[table 3] as per Kuppusswamy's classification.

TABLE 3 : TYPE OF CESAREAN SECTION IN PATIENTS

Type of Surgery	No of patients	Percentage
Elective	91	36.4
Emergency	159	63.6

63.6%(159) patients underwent Emergency cesarean section, which was preferred over Elective cesarean section(36.4%).

GRAPH 1 : TYPE OF CESAREAN SECTION IN PATIENTS

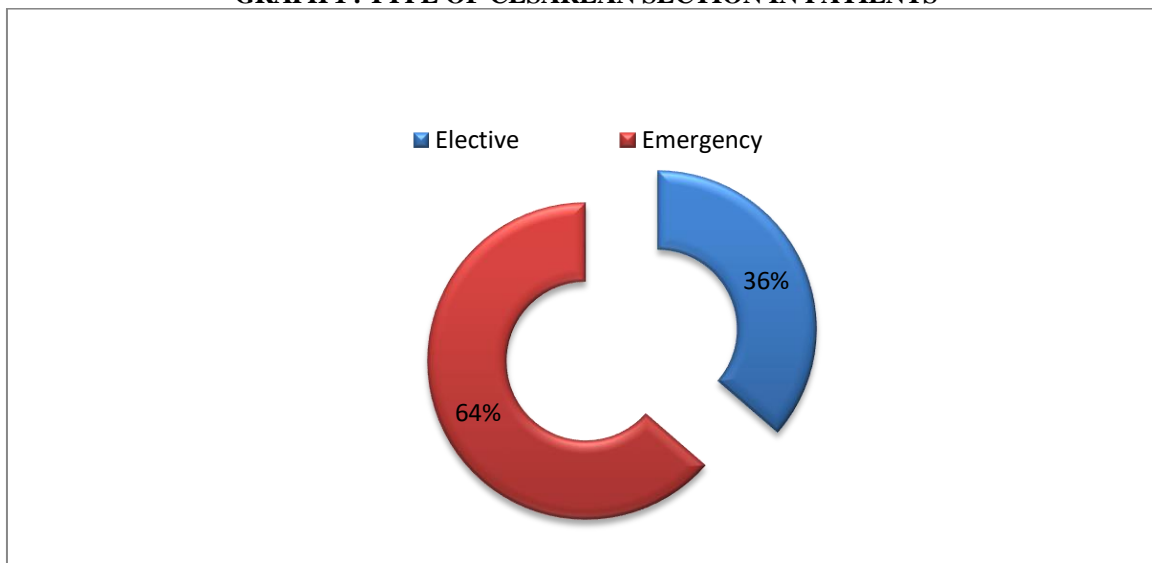


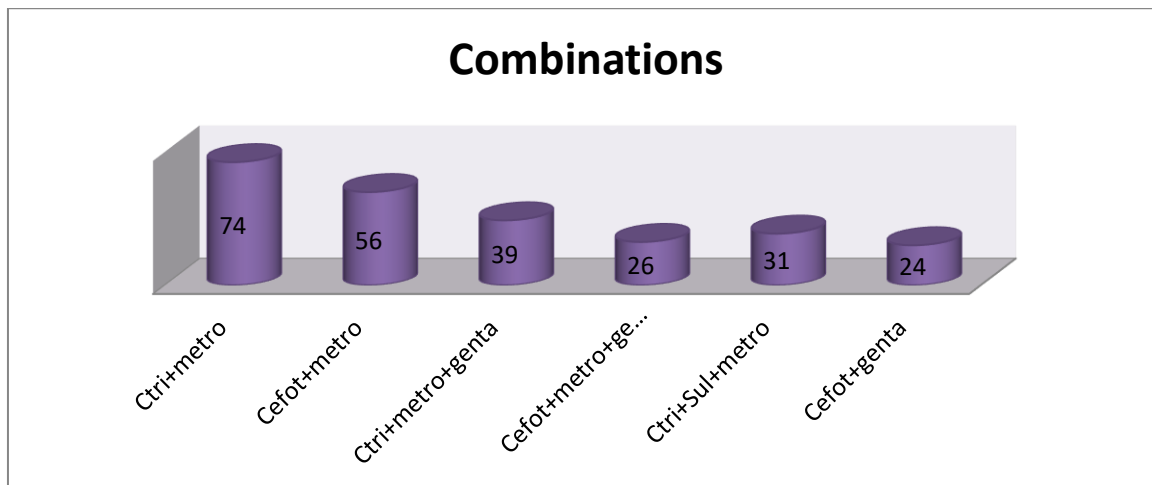
TABLE 4 :THE ANTIMICROBIAL AGENTS USED IN THE PROPHYLAXIS OF CESAREAN SECTION AND THEIR DOSAGE

Drugs used	Dose
Ceftriaxone	1g twice daily
Cefotaxime	1g twice daily
Metronidazole	400mg thrice daily
Gentamicin	80mg twice daily
Sulbactam	500g twice daily

TABLE 5 : COMBINATION OF DRUGS USED IN CESAREAN SECTION

Combinations	No of patients	Percentage
Ceftriaxone+metronidazole	74	29.6%
Cefotaxime+metronidazole	56	22.4%
Ceftriaxone+metronidazole+gentamycin	39	15.6%
Cefotaxime+metronidazole+gentamycin	26	10.4%
Ceftriaxone+Sulbactam+metronidazole	31	12.4%
Cefotaxime+gentamycin	24	9.6%

GRAPH 2 : COMBINATION OF DRUGS USED IN CESAREAN SECTION

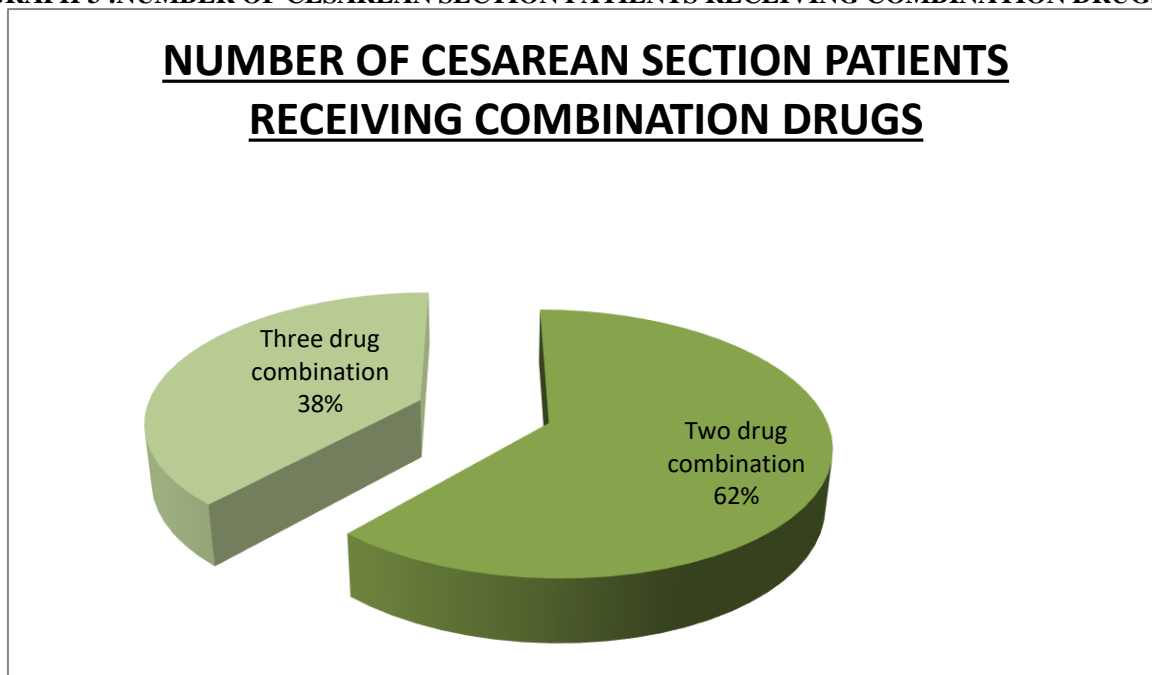


	No of patients	Percentage
Two drug combination	154	61.6%
Three drug combination	96	38.4%

TABLE 6 :NUMBER OF CESAREAN SECTION PATIENTS RECEIVING COMBINATION DRUGS

Two antimicrobials combination was most preferred in our study with 61.6% and three drug combination in 38.4 %. None of the patients received single antimicrobial agent.

GRAPH 3 :NUMBER OF CESAREAN SECTION PATIENTS RECEIVING COMBINATION DRUGS



Adverse drug reactions	No of patients	Percentage
Rash	4	1.6%
Itching	6	2.4%
Nausea and Vomiting	13	5.2%

TABLE 7 : POST OPERATIVE COMPLICATIONS IN CESAREAN SECTION

56 Patients in our study developed post operative morbidity. Fever was most common which was seen in 32 patients, wound infection in 16 patients and UTI in 8 patients.

GRAPH 4: POST OPERATIVE COMPLICATIONS IN CESAREAN SECTION

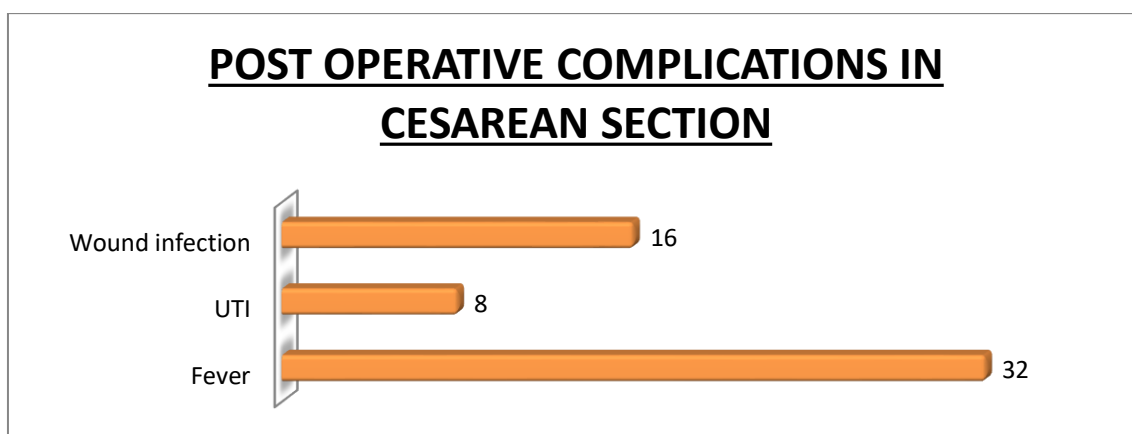


TABLE 8 : NUMBER OF CESAREAN PATIENTS WITH ADVERSE DRUG REACTIONS

Post operative complications	No of patients	Percentage
Fever	32	12.8%
UTI	8	3.2%
Wound infection	16	6.4%
Endometriosis	0	0
Pelvic inflammatory disease	0	0

IV. DISCUSSION

Surgical-site infections account for 20% of all hospital-acquired infections; these hospital-acquired infections continue to represent an important cause of morbidity and mortality.¹⁰ Antimicrobial prophylaxis, long used to prevent infection in several surgical procedures, is being incorporated widely as a performance measure.¹¹ Cesarean delivery is a major risk factor for postpartum infection.

Burke demonstrated the importance of establishing tissue levels of antibiotics before bacterial contamination.¹² Data from human studies reinforce the influence of antibiotic timing on infection rates. Lowest rates of wound infections were observed when antibiotics were administered within 2 hours before skin incision, with infection rates increasing when antibiotics were delayed until after skin incision.¹³

The mean age of the women who underwent cesarean section was to be 24.9 years. Majority of the women were of age group 22-24 and 19-21 years who constituted 38% and 26.8% respectively. This is similar to the study conducted by JahanAraKhanem et al where the age group was between 21 to 35 years.¹⁴

CS is further classified as elective and emergency type. In our study emergency CS (63.6%) was more prevalent than elective CS(36.4%).Emergency CS was common between the age group 19-23. Our study correlates with the study conducted by Heethal et al¹⁵ where most of the cases were of emergency.

In the present study the most commonly used antibiotic for prophylaxis was Metronidazole which was prescribed in 100% of women. Ceftriaxone was used in 57.6% of the study population. Cefotaxime and Gentamycin was used

in 42.8% and 35.6% respectively. Salbactam was least commonly used. All antibiotics used were broad spectrum and bactericidal. An article published by Th-akibet al. regarding utilization of antibiotics in CS found that most of the women underwent emergency CS and this was the reason why rate of the antibiotic prophylaxis was very high 16. Our present study we found that almost two third of the women underwent an emergency CS but also the rate of antibiotic prophylaxis was very high. This may be due to the prescribing habit of the physician. On the other hand, high rate of antibiotic prophylaxis can lead to cases of resistance. The summary of a Swedish- Norwegian Consensus Conference for antibiotic prophylaxis in surgery recommended that second-generation cephalosporins as an intravenous single dose, be used for all emergency and some elective CSs 17. A systemic review also recently concluded that a single dose of ampicillin or first-generation cephalosporins has been established to be efficacious as the other extended broad-spectrum antibiotics 18. But from our study we found that metronidazole, ceftriaxone and gentamycin were more commonly used. In addition, the degree of colonization and drug resistance of organisms causing antibiotic failure need to be considered in each area. Fortunately, healthy pregnant women undergoing CS are unlikely to be colonized with drug-resistant organisms from the community prior to surgery 19. Thus, high spectrum antibiotics should not be required and the cost can be reduced, especially in developing countries. The most commonly used antibiotics were metronidazole, ceftriaxone, and gentamycin which were in contrast to a study done by Th-akibet al. where ampicillin was the commonly used one in Nepal 16. In addition to the drugs mentioned above, a fixed combination like ampicillin+cloxacillin was still used. Although there was no data on the most likely infecting pathogen in high risk CSs, it seems that the choice of the antibiotic was based on empiric and availability considerations.

The number of antibiotics prescribed in this study ranged from 2 to 3. 61.6% of the women got 2 antibiotics for prophylaxis and 38.4% got 3 antibiotics for prophylaxis. Whereas none of the women undergoing caesarean delivery got single antibiotic for prophylaxis. The research of Th-akibet al. found that for prophylactic purpose most of the women were given single antibiotic 16.

In our study all the patients received Antimicrobial agents preoperatively, none of them received intra operatively or while cord clamping.

A randomized controlled trial conducted evaluated the administration of cefazolin (2 g, intravenously) at the time of skin incision (at-incision group) compared with administration after umbilical cord clamping in women in labor undergoing cesarean delivery (cordclamping group). The investigators observed a significant decrease in endometritis (7.8% versus 14.8% in the at-incision group and the cord-clamping group, respectively), but not wound infection (3.9% versus 5.4% in at-incision group and cord-clamping group, respectively) 20.

In our study, the total number of post operative complications in the patients was about 22.4% (56 patients). Post-operative febrile morbidities were found in 32(12.8%) patients, 16 (6.4%) patients had wound infection and 8(3.2%) patients developed UTI. Endometriosis and pelvic inflammatory disease was not found in our study. In the study conducted Hasan Karahasan et al 20 the most common inflammatory complication was wound infection in 21 cases (84%) endometritis in 2 cases (0.66%) and peritonitis in 2 cases (0.66%). Fever may occur after any surgical procedure and cesarean section may not necessarily be a marker of infection. In a large prospective study of Nielsen and Hokegard 21, they demonstrated an overall infection rate of 13.3%. In the study of Hagglund and et al. 22, the total number of infections after elective caesarean section was 9%.

In our study, adverse drug reactions was seen in 9.2% of the patients. Nausea and vomiting was common in patients taking Ceftriaxone. Rash and itching was seen in patients taking antimicrobial agents containing Gentamicin.

V. CONCLUSION

- Overall, this study proved that, use of prophylactic antibiotics in women undergoing cesarean section substantially reduced the incidence of episodes of fever, endometritis, wound infection, urinary tract infection and serious infection after cesarean section.
- Majority of the women received more than 1 antibiotic which is not in accordance with the antibiotic guidelines.
- Cases where even narrow spectrum antibiotics can work efficiently, our study revealed that all the antibiotics used were broad spectrum and bactericidal. Hence, a proper guideline is required for optimum antibiotic prophylaxis in CS.

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