



COMPARISON OF SINGLE DOSE ANTIBIOTIC VS MULTIPLE DOSES ANTIBIOTIC REGIME IN PREVENTION OF POST-PARTUM CESAREAN SECTION COMPLICATIONS.

Obstetrics & Gynaecology

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ABSTRACT

Background: Surgical site wound infections and associated complications after caesarean delivery are important causes of maternal morbidity, increased duration of hospital stays and cost of treatment. Though single dose preoperative antibiotic prophylaxis is advocated, clinicians are hesitant to adopt this regimen due to differences in patient profile and uncertainty about asepsis. **Methods:** It was an open label experimental, comparative study which was conducted to compare the efficacy of a single prophylactic intravenous dose of Ceftriaxone 1 gram before caesarean section with multiple antibiotic regimens at Career Institute of Medical Sciences and Hospital, Lucknow between March 2021 and February 2022. **Results:** There were 200 patients in each group. Baseline characteristics, indications for caesarean delivery, operative duration and difficulties were similar. Post-operative morbidities like fever ($p=0.5$) and wound infection ($p=1$) did not differ significantly. None of the women needed prolongation of hospital stay. **Conclusion:** Preoperative single dose antibiotic regimen was as effective as multiple dose multiple antibiotic regimen in preventing complications for routine caesarean delivery. Judicious use of limited antibiotics should be encouraged to decrease antibiotic resistance, with the added benefit of being economical.

KEYWORDS

Cesarean delivery, Infectious complications, Surgical site infections.

BACKGROUND

Caesarean section is a major risk factor for postpartum infection, with a possible 20-fold increase in infection compared with a vaginal delivery (1–3). Infectious complications that occur after caesarean delivery are an important cause of maternal morbidity and mortality, especially in low-resource settings. Known risk factors for post caesarean infection include emergency delivery, low socio-economic status, long duration of labour and ruptured membranes, obstructed labour, inadequate skills or technique of the surgeon (1,3–8). Although general rules to prevent surgical infection, such as good surgical technique and antisepsis, are important, the use of antibiotic prophylaxis has been a major contributor in reducing the incidence of post caesarean infection, and may reduce the incidence by up to two-thirds (4,5,8–11).

The goal of administering prophylactic antibiotics is to have therapeutic tissue levels of antibiotic at the time of microbial contamination. Rather than sterilizing the tissue, antibiotic administration before the skin incision is aimed at decreasing the intra operative microbial load, so that the entry of a smaller load of micro-organisms which could occur, can subsequently be managed by the host immune response. This is achieved by giving broad spectrum intravenous antibiotics preoperatively such that peak serum and tissue concentration is achieved within 20 minutes (12). Delayed administration reduces or eliminates the benefit of prophylaxis. Administration of antibiotics 20-30 minutes before the surgical incision appears to be optimal to maximize tissue and blood concentrations at the surgical site. The antibiotic of choice should be long acting, focused on the bacteria likely to be contaminating the surgical site, cost effective, and have a low incidence of adverse effects (13,14). However, there is considerable debate regarding the preferred antibiotic (narrow-spectrum versus broad spectrum), number of doses (single dose versus multiple dose) and the timing of administration (pre-incision or post – umbilical cord clamping). Another parameter which should be considered is the risk of emerging bacterial antibiotic resistance, which increases with long use (14,15).

AIM AND OBJECTIVES

This study was undertaken to assess whether single dose pre-incision antibiotic prophylaxis can be proven to be as effective as multiple doses for prevention routine Caesarean sections complication in a tertiary care hospital.

MATERIAL AND METHODS

It was an open label experimental, comparative study which was conducted to compare the efficacy of a single prophylactic intravenous

dose of Ceftriaxone 1 gram before caesarean section with multiple antibiotic regimens at Career Institute of Medical Sciences and Hospital, Lucknow between March 2021 and February 2022.

The antibiotic policy of two units of the Obstetrics and Gynaecology department resembled the two arms of the study, with the first unit practising single dose antibiotic prophylaxis and the second unit using multiple dose multiple drug prophylaxis. Patients who were to undergo caesarean section in these units were assessed for eligibility, informed about the study and consented. Exclusion criteria were hypersensitivity to any of the trial drugs, antibiotic administration within the previous 2 weeks, presence of chorioamnionitis, diabetes mellitus (both gestational and pre-existent), HIV/AIDS, tuberculosis, anaemia (Haemoglobin 24 hours, intrauterine foetal death, urinary tract infection and duration of labour >12 hours. By virtue of admission to a particular unit, women were divided into Group A and Group B.

Baseline demographic, medical and obstetric data, including the indication for caesarean delivery was noted. Women in group A received single dose antibiotic prophylaxis with injection ceftriaxone 1gram (g) given intravenously 30-40 minutes before the surgery. Group B received injection cefotaxime 1g + sulbactam 500milligram (mg) intravenously 30-40minutes before the caesarean section, followed by injection cefotaxime 1g + sulbactam 500mg and ornidazole 500mg intravenously twice a day for the first 3 post-operative days followed by oral cefixime 200mg twice a day for the next 5 days. Surgical and postoperative complications were noted in both the groups.

Surgical site infection (SSI) classification per Centre for Disease Control was used in this study. (16)

Superficial incisional SSI - only skin or subcutaneous tissue is involved, treated by antibiotics and dressing.

Deep incisional SSI - deep soft tissue (fascial and muscle layers) involved or occurrence of wound dehiscence managed by secondary suturing.

Organ/space SSI - involves any part of the anatomy (e.g. organs or spaces), other than the incision, that was manipulated or opened during surgery. Managed by exploration and closing.

Evidence of any other infection manifesting in the postoperative period was looked for, investigated and recorded. Use of additional

antibiotics other than the antibiotics administered in the study regimen was also noted. Data in the two groups were compared. Statistical analysis was done using SPSS Version 23. Descriptive statistics were represented with percentages, mean and standard deviation. Independent t-test, Mann-Whitney U test, Chi-square and Fisher Exact tests were applied to find the significance. p

RESULTS

A total of 400 cases of caesarean delivery were recruited in this study. There were no differences in patients baseline demographic status. Mean age was 24.79 ± 3.14 years in group A and 24.79 ± 3.41 years in group B ($p=0.06$). Mean BMI in group A was 23.02 ± 3.27 kg/m² and in group B it was 22.63 ± 2.74 kg/m² ($p=0.25$). Mean gestational age was 38.08 ± 1.38 weeks in group A and 37.76 ± 1.21 weeks in group B. 34.4% ($n=55$) in group A and 39.4% ($n=63$) in group B were primigravidae. The indications for caesarean deliveries in the two groups were comparable. Most common indication in both the groups was previous caesarean section.

Table 1: Notable intraoperative finding

Parameters	Group A (n=200)		Group B (n=200)		P value
	Frequency	%	Frequency	%	
Difficult extractions	08	4.0%	06	3.0%	0.55
Ascites	06	3.0%	04	2.0%	0.48
Extension of uterine incision	15	7.5%	17	8.5%	0.52
Scar dehiscence	08	4.0%	07	3.5%	1
Uterine rupture	02	1.0%	01	0.5%	1
Low laying placenta previa	02	1.0%	02	1.0%	1
Significant adhesions	7	3.5%	8	4.0%	1
Distended bladder	5	2.5%	4	2.0%	1
Intra and post operative haemorrhage >2000ml	4	2.0%	3	1.5%	1

Notable intra-operative findings listed in table 1, were comparable in the two groups. Uterine exteriorisation for repair of uterine incision was done in 15 patients in group A and 17 patients in group B. Vicryl number 1 (Polyglycolic acid) was used in all cases for closing the uterus.

Table 2: Post operative Morbidity

Parameters	Group A (n=200)		Group B (n=200)		P value
	Frequency	%	Frequency	%	
Febrile morbidity	04	2.0%	08	4.0%	0.15
Endometritis	02	1.0%	00	0.0%	0.45
Urinary tract infection	02	1.0%	04	2.0%	0.20
Respiratory tract infection	08	4.0%	06	3.0%	0.72
Paralytic ileus	02	1.0%	01	0.5%	0.50

Post-operative morbidities noted are listed in table 2. None of the patients had deep incisional or organ /space SSI. Superficial incisional SSI was seen in 2% ($n=4$) in group A and 4% ($n=8$) in group B ($p=0.15$). All these eight patients who developed wound infection had had use of nonabsorbable mattress sutures. Overall, there was no statistically significant difference in postoperative morbidities in both groups. None of the patients suffered adverse drug effects in our study. Additional antibiotics were given in 2 patients in group A and 5 patients in group B ($p=0.28$). None of the participants required prolongation of hospital stay.

DISCUSSION

This study proves that single dose pre-incision antibiotic prophylaxis is as effective as multiple drug, multiple dose antibiotic regimen in selected cases of caesarean section at low risk for infection, even in the low socioeconomic population served at our hospital. Prophylactic antibiotics have been recommended by many research workers. (12) Shaheen et al compared one day of antibiotic prophylaxis with seven days of antibiotic prophylaxis in elective caesarean sections in Pakistan and found no statistically significant differences in wound infections (17). In a study by Bhattachan et al in Nepal which included both elective and emergency caesarean sections, wound infection rate

was 1% and 0% in single dose and multiple doses respectively. Other studies have also found antibiotic prophylaxis to be effective in both elective and emergency caesarean sections (18).

Febrile morbidity in the study by Bhattachan et al was 2% and 6% in single versus multiple doses respectively (19), comparable to our study which had rates of 4% and 8% respectively. Higher rate of febrile morbidity in multi-dose antibiotic group could be related to a longer duration of retention of the intravenous cannula which would be required for longer administration of intravenous antibiotics. The resultant higher rates of phlebitis could be responsible for more febrile morbidity (20).

CONCLUSION

In our study, preoperative single dose antibiotic regimen was found to be as effective as multiple doses multiple antibiotic regimens for prevention of routine caesarean delivery complications. Single dose antibiotic use reduces the cost of treatment and has the potential to decrease the emergence of antibiotic resistant micro-organisms.

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