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Original Research Article

Effectiveness and use of prophylactic antibiotics in elective and emergency caesarean section at tertiary care hospital

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ABSTRACT

Background: Post-operative infections in obstetrics and gynecological settings have been higher compared to other specialties. Women undergoing caesarean section have 5 to 20-fold greater risk for infection compared with vaginal delivery. Many studies reported antimicrobial prophylaxis prevent post-operative infections. Hence this study concentrates the evaluation of the prescribing antimicrobial use and to assess the frequency of post-operative morbidity related to infection in subjects undergoing caesarean section. The aim of the study was to analysis the effectiveness, prophylactic antibiotics (amoxicillin versus ceftriaxone) and to evaluate the post-operative (caesarean) infections in patients undergoing lower segment caesarean section (elective and emergency).

Methods: This is a prospective observational study which assessed the effectiveness and use of prophylactic antibiotics in patients undergoing cesarean section at department of obstetrics and gynecology. The study was conducted over a period of one year.

Results: The corresponding mean age of all the study population in amoxicillin group (n=113) was 56.5±28.5 and in ceftriaxone group (n=97) was 48.5±26.5 respectively. The participant who underwent previous cesarean section in amoxicillin group is 65.48% similarly in ceftriaxone group is 47.42%. The patients with fetal distress in ceftriaxone group are 14.77% and in amoxicillin group is 8.92%. Failed induction in amoxicillin group is 9.82% and in ceftriaxone group is 6.81%. The number of days in hospital stay in amoxicillin group is 42.42% and in ceftriaxone group is 45.94%. The post-operative complications in amoxicillin group reported, with Febrile Illness are 40% and wound Infection is 60%.

Conclusions: Administration of pre-operative antibiotics significantly reduce post-operative infections. Use of ceftriaxone as a prophylactic antibiotic in patients undergoing lower segment caesarean section (elective and emergency) is more effective than Amoxicillin in preventing post-operative infections.

Keywords: Amoxicillin, Ceftriaxone, Post-operative infections, Prophylactic antibiotics

INTRODUCTION

Women undergoing caesarean section are under higher chance for infection compared with a vaginal delivery. Many studies reported antimicrobial prophylaxis prevent post-operative infections. Postoperative endometritis is an

infection caused by bacteria normally present in the host's lower genital tract.¹ Prophylactic antibiotics in women undergoing caesarean delivery substantially reduced the incidence of pyrexia. Prophylactic antibiotics are administered prior to surgical incision to reduce infections at the surgical site. Antibiotics are frequently

prescribed in obstetrics and gynaecological practice prophylactic during pre-operative and post-operative procedures (C-section) or to treat ongoing infections (vaginitis, endometriosis, urinary tract infection etc.). The solely use of prophylactic use of antibiotics is not to sterilize the tissue but it acts as an adjunct to decrease the intra-operative microbial load to a level which can be managed by the host innate and adaptive immune responses.² The use of antibiotics in women for child-bearing age group is important because it effects this population and there next generations.

Surgical site infections are common complication of obstetrics and gynaecological procedures. Several studies proved the use of antimicrobial prophylaxis for C-section been effective in reducing post-operative morbidity, cost and duration of hospitalization.³ Usage of antibiotics although becoming inevitable but it should be under low level.⁴ Incidence of post-partum infections for both mother and neonates is prevented by prophylactic use of antibiotics.⁵ Hence present study was carried out to evaluate the usage of antimicrobial prophylaxis in women undergoing C-section.

METHODS

This is prospective observational study was conducted in department of obstetrician and gynecology at NRI General Hospital, Guntur. Approximately 30-60 patients will undergo cesarean section (elective and emergency) in the department per month. The study was conducted over a period of one year from July 2018 to June 2019. The patients included in the study were patients undergoing elective and emergency lower segment cesarean section and excluded patients with patients on long term steroids, or immune suppressants, patients who are allergic to any of the drugs under study, patients who have established infections before surgery, e.g. chorioamnionitis, patients with febrile conditions of unknown etiology, patients whose data is insufficient.

After approval from the Institutional Human Ethical Committee and taking informed consent from the study

subjects the relevant and necessary data were obtained using a data collection form with the following details, treatment charts and laboratory data reports and in-patient progress. All the patients were monitored from the day of admission to the day of discharge for any post-operative events that may occur after cesarean section. All the data was subjected to analysis in order to assess the effectiveness of antibiotics during cesarean section.⁵

Statistical analysis

The data was analyzed and the percentage value was calculated for the use of different class of antibiotics with respect to various parameters such as indication, dose, frequency and duration and time of administration of antibiotics was assessed by analyzing the collected data against standard texts, relevant literature and available antibiotic guidelines. Averages/means, standard deviations and percentages were obtained by using student t-test and Microsoft excel.

RESULTS

During the study 210 patients who underwent caesarean section were enrolled and were divided into two groups amoxicillin and ceftriaxone groups. Various parameters were evaluated for the effectiveness of the prescribed antibiotics. The study subjects in amoxicillin group with age groups 15-25 and 25-35 were found to be 75.22, 24.77% respectively and in ceftriaxone group was found to be 77.31 and 22.68% respectively and there mean age of this study subjects in amoxicillin group is 56.5 ± 28.5 and 48.5 ± 26.5 in ceftriaxone group. The socio-economic status in amoxicillin group categorized as employed and unemployed are 36.28 and 63.71% respectively, similarly in ceftriaxone group it is 41.23 and 58.76 %.

The mean socio-economic status of this study in amoxicillin group is 56.5 ± 15.5 and in ceftriaxone group is 48.5 ± 8.5 . The education level in groups standard <10th and above 10th standard group in amoxicillin is 53.09 and 46.90 respectively, similarly in ceftriaxone group is 61.85 and 38.14 (Table 1).

Table 1: Socio-demographic characteristic of the participants.

Characteristics	Amoxicillin group		Ceftriaxone group	
	No. of patients (n=113)	Percentage	No. of patients (n=97)	Percentage
Age in years				
15-25	85	75.22%	75	77.31%
25-35	28	24.77%	22	22.68%
Socio-economic status				
Employed	41	36.28%	40	41.23%
Unemployed	72	63.71%	57	58.76%
Education level				
<Standard 10 th	60	53.09%	60	61.85%
>Standard 10 th	53	46.90%	37	38.14%

Table 2: Obstetric characteristics in the study subjects.

Characteristics	Amoxicillin group		Ceftriaxone group	
	No. of patients (n=113)	Percentage	No. of patients (n=97)	Percentage
Parity				
1	28	24.77%	35	36.08%
2	46	40.70%	35	36.08%
3	27	23.89%	21	21.64%
4	8	7.07%	5	5.15%
5 and > 5	4	3.53%	1	1.03%
Gestational age				
25-29	1	0.88%	-	-
30-34	29	25.66%	24	24.74%
35-39	83	73.45%	73	75.25%
Antenatal care	Yes 113	100%	97	100%
	No -	-	-	-
Previous c-sections	Yes 74	65.48%	46	47.42%
	No 43	38.05%	45	46.39%

Obstetric characteristics in the study subjects whose parity is categorized into 1-5. Majority of patients are in parity 2 followed by 1, 3, 4 and finally 5 in amoxicillin group. Majority of patients are in parity 1, 2 followed by 3, 4 and 5 in ceftriaxone group. The gestational age of amoxicillin group 25-29, 30-34 and 35-39 weeks is observed as 0.88, 25.66 and 73.45%, respectively and in ceftriaxone group 30-34, 35-39 is 24.74 and 75.25% (Table 2).

Out of 210 subjects, 59 reported with co-morbidities in amoxicillin group and 56 reported with co-morbidities in ceftriaxone group. Oligohydramnios condition in amoxicillin group is 10.61 and in ceftriaxone group is 11.34% gestational diabetes mellitus in ceftriaxone group is 4.42% followed by anaemia in amoxicillin group is 8.84 %, gestational hypertension in ceftriaxone group 9.27% and pre-eclampsia and hyperthyroidism in amoxicillin group is 5.08% and 2.65% (Table 3).

Table 3: Co-morbidities of pregnant women.

Co- morbidities	Amoxicillin group		Ceftriaxone group	
	No. of patients (n=113)	Percentage	No. of patients (n=97)	Percentage
Gestational DM	5	4.42%	11	11.34%
Gestational HTN	8	7.079%	9	9.27%
Oligohydramnios	12	10.61%	11	34%
Anemia	10	8.84%	3	3.09%
Scar rupture of uterus	7	6.19%	1	1.03%
Pre-eclampsia	3	2.65%	7	7.21%
Hypothyroidism	8	7.079%	6	6.18%
Hyperthyroidism	3	2.65%	-	-
Others	3	2.65%	4	4.12%

Indication for current caesarean section in study population of previous c-section of amoxicillin group is 30.35 and 26.13% in ceftriaxone group. The patients with foetal distress in ceftriaxone group are 14.77% and in amoxicillin group is 8.92%. Failed induction in Amoxicillin group is 9.82% and in ceftriaxone group is 6.81%. Breech presentation in amoxicillin groups is 3.57% and in ceftriaxone group is 4.56%. Twin pregnancy in amoxicillin group 2.67% and 1.13% in ceftriaxone group (Table 4). The participants who reported with pyrexia in amoxicillin group is 4.42% in amoxicillin group and in ceftriaxone group is 4.12% (Table 5).

In Amoxicillin group 22.12, 27.43 % and 50.44% study subjects had c-section procedure duration 30-45 min, 45-60 min and 60-90 min respectively. In ceftriaxone group 50.44, 31.95% and 52.57% study subjects had c-section procedure duration of 30-45 min, 45-60 min and 60-90 min respectively (Table 6).

The length of hospital stays of amoxicillin group 3-5 days, 6-7 days, 8-9 days, 10-15 days is 7.07, 18.18, 42.42 and 32.32% respectively, and similarly in ceftriaxone group is 11.71, 21.62, 45.94 and 20.72% respectively (Table 7).

The post-operative event in amoxicillin group reported with febrile illness is 40% and wound infection is 60% (Table 8) whereas none of the study subjects in

ceftriaxone group reported febrile illness and wound infection.

Table 4: Indication for current caesarean section.

Indication	Amoxicillin group		Ceftriaxone group	
	No. of patients (n=113)	Percentage	No. of patients (n=97)	Percentage
Breech presentation	4	3.57%	4	4.56%
Fetal distress	10	8.92%	13	14.77%
Placenta Praevia	4	3.57%	1	1.13%
Cephalo-pelvic disproportion	6	5.35%	6	6.81%
Pregnancy induced hypertension	5	4.46%	4	4.54%
Failed Induction	11	9.82%	6	6.81%
Premature ruptured membranes with failed induction	2	1.78%	3	3.4%
Twin Pregnancy	3	2.67%	1	1.13%
Previous C/S	34	30.35%	23	26.13%
Two previous c/s	8	7.14%	6	6.81%
Others	25	22.32%	21	23.86%

Table 5: Post-operative fever of study subjects.

Pyrexia	Amoxicillin group		Ceftriaxone group	
	No. of patients (n=113)	Percentage	No. of patients (n=97)	Percentage
Yes	5	4.42%	4	4.12%
No	108	95.57%	93	95.87%

Table 6: Intra-operative events.

Characteristics	Amoxicillin group		Ceftriaxone group		
	No. of patients (n=113)	Percentage	No. of patients (n=97)	Percentage	
Type of anaesthesia	Spinal	113	100%	97	100%
	GA	-	-	-	-
	Epidural	-	-	-	-
Duration of surgery	30-45 min	25	22.12%	15	15.46%
	45-60 min	31	27.43%	31	31.95%
	60-90 min	57	50.44%	51	52.57%
Type of surgery	Elective	53	46.9%	57	58.76%
	Emergency	60	53.09%	40	41.23%

Table 7: Length of hospital stay.

Hospital stay (days)	Amoxicillin group		Ceftriaxone group	
	No. of patients (n=99)	Percentage	No. of patients (n=111)	Percentage
3-5	7	7.07%	13	11.71%
6-7	18	18.18%	24	21.62%
8-9	42	42.42%	51	45.94%
10-15	32	32.32%	23	20.72%

DISCUSSION

Postoperative infections at obstetrics and gynecology are higher when compared to other specialties. As there is higher occurrence of caesarean delivery and it is the

most commonly performed major surgical procedures in the department of obstetrics and gynecology. This causes a significant burden in terms of patient morbidity and cost to health services around the world.⁶ The mean age of this study subjects in amoxicillin group is

56.5±28.5 and 48.5±26.5 in ceftriaxone group. Study data is comparable to that of Ibrahim WH et al, with the mean age 33.33±14.38.⁷

The mean gestational age of this study in amoxicillin group is 37.66±34.03 and in ceftriaxone group is 48.5±24.5. This is agreed nearly to Prathima S et al that showed the mean gestational age was 38.26±0.79.⁸ The participant who underwent previous c-section in amoxicillin group is 58.5±15.5 and in ceftriaxone group

is 45.5±0.5. This finding is in agreement with Shah Z et al, who showed that the previous caesarean section in the study subjects was 45.15±14.46.⁹

Concerning the indication for current caesarean section previous c-section of amoxicillin group is 30.35 and 26.13% in ceftriaxone group. This is agreed nearly with Prathima S et al, which showed that the percent of repeated caesarean section as primary indication was 29.2%.⁸

Table 8: Post-operative events.

Post-operative event	Amoxicillin group		Ceftriaxone group	
	No. of patients (n=5)	Percentage	No. of patients (n=0)	Percentage
Wound Infection	2	40%	-	-
Endometritis	-	-	-	-
UTI	-	-	-	-
Pneumonia	-	-	-	-
Febrile illness	3	60%	-	-
Others	-	-	-	-

Regarding the duration of surgery in amoxicillin group is 37.66±13.88 and in ceftriaxone group is 32.33±14.72. The findings were similar to Farouk H et al, who reported the duration of surgery was 38.7±13.6.¹⁰

The incidence of post-operative febrile illness 2% and wound infection 3% and no post-operative febrile illness and wound infection were found in cephalosporin group this results are not in agreement with Ibrahim WH et al, who reported post-operative fever was significantly higher in amoxicillin group (12%) versus (3%) in cephalosporin group.⁷ There was reduction of wound infections in cephalosporin group which is in agreement with Dlamini LD.¹¹ Use of ceftriaxone as a prophylactic antibiotic in patients undergoing lower segment caesarean section (elective and emergency) is more effective than amoxicillin in preventing post-operative infections reduce the rates of post-operative complications like surgical site wound infection, febrile morbidity, and urinary tract infections irrespective of time of administration which can reduce the length of hospital stay that in turn increases the quality of patient care.¹²

CONCLUSION

Administration of preoperative antibiotics before surgery significantly reduced to post-operative infections. Use of ceftriaxone as a prophylactic antibiotic in patients undergoing lower segment caesarean section (elective and emergency) is more effective than amoxicillin in preventing post-operative infections. Based on the findings of the present study it concluded that: use of ceftriaxone as a prophylactic antibiotic in patients undergoing lower segment caesarean section (elective

and emergency) is more effective than Amoxicillin in preventing post-operative infections.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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