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**ORIGINAL ARTICLE**

# Comparison of Frequency of Post Caesarean Wound Infection with Amoxicillin Versus Ceftriaxone

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## ABSTRACT

**Background:** Cesarean delivery is a crucial factor in association with postpartum infection, there is a 5 to 20-timesmuch higher risk of getting an infection in contrast with a vaginal delivery. By not having prophylactic antibiotics, the rates of postpartum endometritis can reach 35 to 40%. This study was conducted to contrast the frequency of postoperative wound infection in patients receiving prophylactic amoxicillin vs. ceftriaxone.

**Methods:** This Randomized Controlled Trial was conducted at the Department of Obstetrics & Gynecology, Ayub Teaching Hospital, Abbottabad, from 1st February 2016 to 31st January 2017. 210 patients undergoing cesarean section were included in this study. All the patients who participated in this study were categorized and further divided into two equal groups. Each group comprised 105 patients each through the process of block randomization. Patients in Group A were administered Amoxicillin 1000 mg and patients in group B were administered ceftriaxone 1000 mg for 48 hours following cesarean section patients were followed up on the 8thpost-op day for removal of stitches and wound examination.

**Results** Wound infection was noted in 17 (8.1%) patients. 13 of which belonged to the Amoxicillin category. There was a statistically huge difference between the two groups regarding postoperative wound infection (p=0.023). Upon stratification of outcome variable with age and parity, the results were found to be statistically insignificant (p > 0.05).

**Conclusion** The incidence of post-operative wound infection is minimal with the administration of ceftriaxone following a cesarean section.

**Keywords:** Amoxicillin, Ceftriaxone, Nosocomial infection, Wound infection, cesarean section.

## INTRODUCTION

There is a rise in the incidence of cesarean delivery. It is the most common surgical procedure.[1-3] Cesarean delivery is reported to be one of the major factors in association with postpartum infections, and the risk of infection in contrast with vaginal delivery is significant. It is 5 to 20 times higher than a normal vaginal delivery. Postpartum endometritis rates might be as high as 35 % to 40 % if preventive antibiotics are not used. In terms of the clinical situation, this level varies greatly; the use of common prophylactic antibiotics significantly reduces the rate of infection.[2]

Emergency caesarean section, labor and the time spent during the procedure, rupturing of the membranes and the time duration of those ruptures, the use of prophylactic antibiotics or not, the woman's socioeconomic status, the total number of prenatal visits, the extensive examinations of the vagina during the labor process, anaemia, colossal blood loss, and use of general anaesthetic are all factors linked to a higher risk of infection in caesarean delivery.[1-3]

Staphylococcus aureus is regarded as the most commonly 'isolated bacteria in wound infections after cesarean sections (CS). This organism gives rise to serious infections and displays traits of resistance to commonly available, low-quality antibiotics like penicillin. Other workers isolated additional gram-negative organisms like Proteus mirabilis, E. coli, Pseudomonas, and Klebsiella in cesarean section wound infections. The disparity in the scope of these causative organisms means that although prophylactic antibiotics can be effective at times, they may fail due to the wrong use of an agent or that agent being used inappropriately.[4]

Amoxicillin used as a prophylaxis antibiotic does not eliminate bacteria, but it terminates bacteria from multiplying; it stops the bacteria from establishing protective walls that surround them, without which they cannot survive. Cephalosporinis the most routinely prescribed class of antibiotics and they use the same mode of action as penicillin does. Cephalosporin impedes the synthesis of the peptidoglycan layer of the bacterial cell walls, eventually, it causes the walls to break down and the bacteria die.[3]

There is no consensus in many nations about which sort of antibiotic regimen to employ, especially in low-resource settings where surgery is frequently conducted under poor aseptic circumstances.[5] Because of the wide range of pathogenic organisms, prophylactic antibiotics can be ineffective when the wrong medication is administered or when it is used incorrectly. The use of prophylactic antibiotics during cesarean section surgery has been extensively researched, and it has been discovered to be one of the most effective medications for infection prevention. Despite the fact that numerous studies and publications revealed that suggestions for its usage were applied inconsistently and differently.[4,5]

The main purpose of this study was to compare the effects of Amoxicillin in contrast with Cephalosporin to prevent post-cesarean section (CS) infections. The main function of prophylactic antibiotics is to prevent post-cesarean wound infections; it will not only reduce post-partum morbidity and mortality but also sub side health-related issues in hospitals as well.

Material and Methods: This study was carried out in the Department of Obstetrics and Gynecology at Ayub Teaching Hospital from 1st February 2016 to 31st January 2017. The nature of this study was a Randomized Controlled Trial. The size of the samples was calculated using WHO software. There were 210 patients (105 in each group). The sampling technique used for this study was based upon the non-probability consecutive sampling technique. The patients that were included in this study were booked patients with ages ranging from 18-35 years of age, they had a parity assessment up to 5, the BMI number ranging from 18.5-24.9, and their hemoglobin level (pre-operative) was not less than 10 g/dl. Patients with diabetes mellitus, hypertension, allergic to antibiotics, or with already established infection were excluded from the study. For the purpose of this study, the following criteria were used for infection (all the below):

There should be at least one verified sign of inflammation (e.g., it can be from normal pain to tenderness, the conditions of induration, it can also be a skin rash such as erythema, or the local warmth of the wound).

Purulent drainage "culture documentation not required".

Organisms that are isolated from the fluid/tissue of superficial incision. 1gram amoxicillin IV TDS and 1 gm ceftriaxone IV OD for 1st 48 hours postoperatively was given to the respective groups after the test dose.

**Data Collection and Analysis**: For the execution of this study an official approval was granted by the hospital ethical committee. All

those patients who qualified for the criteria for this study were enrolled. The purpose and the significant role of this study were explained to the participating patients. It was made mandatory that their identity be kept confidential, subject to proper consent. all of them agreed and the study was hence conducted.

For this study, necessary demographic characteristics were needed. Among the data collected from the participating patients were their names, age, gender, addresses, and type of surgery they were undergoing was also recorded. Their prior history was taken, and a complete physical and systemic examination was performed. For the purpose of balance, patients were divided randomly into two groups (Group A and Group B) by blocked randomization. Group A comprised of all the patients receiving Amoxicillin while group B included patients that received ceftriaxone. Follow-up was done on the 8th post-operative day. Stitches were removed and the wound was examined. Outcome along with other information was recorded throughout the study period on a Proforma by the trainee.

All of the data collected was further analyzed in Statistical Package for the Social Sciences software (SPSS Statistics version 20). The standard deviation (Mean ±SD) was calculated for quantitative variables like patients' age, height, weight, and parity. Different frequencies and percentages of the study were calculated for categorical variables like outcome variable i.e. frequency post-cesarean wound infection. The outcome variable was stratified by age and parity. The chi-square test was used at a 5% level to see significant differences in the two groups with respect to outcome variables. Post—stratification (by age and parity) chi-square test was also applied to see differences in outcome in the two groups.

## RESULTS

This randomized controlled trial enrolled 210 patients in two groups of 105 patients each to study the outcome of antibiotic prophylaxis using two different antibiotics i.e., Amoxicillin and Ceftriaxone. There was a huge difference between Group A and Group B when it came to posting cesarean wound infection ($p = 0.023$), with significantly fewer patients developing post-cesarean wound infection in the ceftriaxone group. The (Mean ± SD) age of the study participants was 27.26±3.49 years. Likewise, the Mean ± SD weight of study participants was 64.47±7.25 Kg. Group-wise statistics of these variables as well as of height and parity is given in Table-1.

Table 1: "Descriptive statistics of study population"

| All participants | | Minimum | Maximum | Mean | Standard Deviation |
|---|---|---|---|---|---|
| Age | | 22 | 33 | 27.26 | 3.49 |
| Weight(Kg) | | 45 | 105 | 64.47 | 7.25 |
| Height (m) | | 1 | 2 | 1.55 | 0.06 |
| Parity | | 1 | 4 | 2.48 | 1.07 |
| Treatment Group | | Minimum | Maximum | Mean | Standard Deviation |
| Amoxicillin | Age | 22 | 33 | 27.78 | 3.52 |
| | Weight(Kg) | 45 | 79 | 64.34 | 7.14 |
| | Height(m) | 1 | 2 | 1.55 | 0.05 |
| | Parity | 1 | 4 | 2.51 | 1.05 |
| Ceftriaxone | Age | 22 | 33 | 26.73 | 3.40 |
| | Weight(Kg) | 50 | 105 | 64.61 | 7.39 |
| | Height(m) | 1 | 2 | 1.55 | 0.06 |
| | Parity | 1 | 4 | 2.44 | 1.08 |

Table 2: Cross-tabulation of post-cesarean wound infection with the treatment Groups

| | | Treatment Group | Total | | p value |
|---|---|---|---|---|---|
| | | Amoxicillin | Ceftriaxone | | |
| Post cesarean wound infection | Present | 13 | 4 | 17 | 0.023 |
| | Absent | 92 | 101 | 193 | |
| Total | 105 | 105 | 210 | | |

The overall frequency of post-cesarean wound infection was 17 (8.1%) out of which 13 cases were identified in the amoxicillin group and 4 patients from the ceftriaxone group were found to have post-cesarean section wound infection as shown in table 2. When the outcome variable was stratified with age and parity, no statistically significant association was observed as shown in tables 2-3 ($p > 0.05$).

Table 3: Cross-tabulation of age and post-cesarean wound infection according to treatment groups

| Treatment Group | | | Age of patients: 27 years | Age of patients: > 27 years | Total | p value |
|---|---|---|---|---|---|---|
| Amoxicillin | Post cesarean wound infection | Present | 5 | 8 | 13 | 0.32 |
| | | Absent | 49 | 43 | 92 | |
| | Total | | 54 | 51 | 105 | |
| Ceftriaxone | Post cesarean wound infection | Present | 2 | 2 | 4 | 0.74 |
| | | Absent | 59 | 42 | 101 | |
| | Total | | 61 | 44 | 105 | |

Table 4: Cross-tabulation of parity and post-cesarean wound infection according to treatment groups

| Treatment Group | | | Parity: Upto 2 | Parity: > 2 | Total | p value |
|---|---|---|---|---|---|---|
| Amoxicillin | Post cesarean wound infection | Present | 9 | 4 | 13 | 0.13 |
| | | Absent | 43 | 49 | 92 | |
| | Total | | 52 | 53 | 105 | |
| Ceftriaxone | Post cesarean wound infection | Present | 2 | 1 | 3 | 0.56 |
| | | Absent | 50 | 51 | 101 | |
| | Total | | 52 | 52 | 104 | |

## DISCUSSION

Cesarean section is the most common obstetrical procedure and it involves an incision in the lower abdomen to take out the baby [6, 7]. Infection after Cesarean section increasesthe hospital stay of the patient and delays patient return to routine daily life[8]. The infection may be mild from severe and rarely may even lead to maternal death. The infection may involve kidneys or pelvic organs. There are multiple studies in favor of using antibiotics for reducing infection after Cesarean section[9,10]. Multiple risk factors have been mentioned in the literature responsible for post-Cesarean section infection like obesity, duration of operation, no. of vaginal examination, and duration of premature rupture of membranes[11].

There are many studies in the literature which have sought to compare the efficacy of antibiotics in the prevention of postoperative wound infection in surgical incisions as well as following a cesarean section. Recently, Osman and colleagues reported that there was no difference in efficacy of prophylactic administration of antibiotics to patients before or immediately after cesarean section.[12] In this randomized controlled trial, from 180 women (90 in each study arm) got intravenous injections of ceftizoxime at a dose of one gram. This was done either prior to the incision or after the umbilical cord was clamped. There was no endometritis in any of the women in any of the groups. In the pre-incision group, one lady was diagnosed with a chest infection. There were no significant differences in the incidence of wound infections between the two groups, 8 (6.7%) vs. 3 (3.3%); P-value = 0.2.

A study from Nepal compared different modes of delivering the antibioticsprophylactic to patients undergoing cesarean section.[13] The researchers divided the study population into two groups. Initially, there were Group A and Group B; There were 100 patients in Group A; they were randomly allocated (based on no fundamental model) and were injected with ceftriaxone 1gm. When itwasthe time of the induction of anesthesia (30 mins. before incision) I/V stat was given. There were also 100 patients in Group B and they were given antibiotics for five days straight. After this study, the postoperative evaluation was performed. All the data was analyzed and the infection rates for both the groups were compared. Group A had a wound infection of 2% and Group B consisted of 3% wound infection. The results for Endometritis were such that Group A had 1% and Group B had 2%, The results for UTI were such as Group A had 3% and Group B recorded 4% of infections, Fever for Group A stood at 6% whilst Group B recorded

it at around4%. The authors concluded the study with the statement that a single dose of prophylactic antibiotic is corresponding to multi doses of antibiotic.[14]

There was a significant difference between post-operative wound infection in both the cephalosporin and amoxicillin groups in this study (p=0.023). On the other hand, a study by Ibrahim and colleagues has reported that the use of amoxicillin is as potent as cephalosporin in the prevention of postoperative wound infection in patients undergoing cesarean section.[3] The authors recruited women undergoing emergency as well as elective lower segment cesarean section. The sample study consisted of 200 pregnant women. For better understanding, they were divided into two groups. As a preventive antibiotic, the first 100 pregnant women got Amoxicillin while the second 100 pregnant women received Cephalosporin. 50 women from each group got conventional wound treatment at the hospital, while the other 50 women received comprehensive wound care instruction. The results of the study showed that the frequency of post-operative wound infection was considerably greater in women who received Amoxicillin (12%) compared to women who received Cephalosporin (3%) with significant difference (P=0.016). It was shown that women with infected wounds (3%) did not get health education on wound care and were not substantially higher than those who did (2%), (P=0.361).[3]

Some of the limitations of our study were that this was a small hospital-based study therefore the results cannot be generalized to the general population, no attempt was made to identify organisms causing infection in the study population and similarly, antibiotic sensitivity of possible etiologic organisms was not also determined.

## CONCLUSION

There is a significantly less incidence of post-operative infection of wounds in women undergoing cesarean section when compared with amoxicillin. Although the decision to choose antibiotics should be guided by the prevailing patterns of microbiology and antibiotic sensitivity, third-generation cephalosporin appears to be a good choice as empirical therapy in prophylaxis of post-operative wound infections.

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