

# Comparison of Post-Operative Infectious Morbidity in Patients Undergoing Elective Caesarean Section with Administration of Antibiotic Before Skin Incision and After Cord Clamping

Misbah Malik<sup>1</sup>, Iram Munawwar<sup>2</sup>, Nadia Zahid<sup>2</sup>

1. Department of Gynaecology and Obstetrics, Continental Medical College, Lahore
2. Department of Gynaecology and Obstetrics, Avicenna Medical College, Lahore

## Abstract

**Introduction:** To compare post-operative infectious morbidity in patients undergoing elective cesarean section with administration of antibiotic before skin incision and after cord clamping

**Methods:** In this prospective, double-blind, randomized controlled trial all the women of age 18-40 years, being scheduled for cesarean section on elective list due to any reason, were included. They were divided into two groups: Group A included pre-incision group and Group B included cord-clamp group. Patients in group A were given 1G Ceftriaxone intravenously (IV), about 15-30 minutes before skin incision while in group B patients; antibiotic was administered after cord clamping. Post-operatively, patients were assessed for wound infection, endometritis, pyelonephritis, UTI and overall infectious morbidity.

**Results:** A total of 174 patients were enrolled in the study. The mean age of the patients was  $27.17 \pm 4.68$  years. The demographic characteristics were generally evenly distributed in both groups. Maternal outcomes in both groups including wound infection, urinary tract infections, endometriosis, pyelonephritis and overall infectious morbidity did not reach a statistically significant level.

**Conclusion:** Administration of prophylactic antibiotic at 30-60 min before skin incision resulted in better maternal outcome than after cord clamp. However it is not significant and we recommend more clinical trials.

**Key Words:** Cesarean; Cord clamp; Wound infection

## Introduction

Cesarean section (SC) is one of the most commonly performed surgical procedures in women worldwide.<sup>1</sup> In 2013, the World Health Organization (WHO)

conducted a Multicountry Survey on Maternal and Newborn Health in 29 countries. They showed that overall rate of cesarean delivery was 28.6%, and the coverage of prophylactic antibiotics for cesarean birth was 87.3%, globally.<sup>2</sup> However it carries a lot of morbidity along with it. Women giving birth by CS present a 5- to 20-fold greater risk of infection than women giving birth by vaginal delivery.<sup>3</sup> Rates of severe wound infection can be as high as 25%.<sup>4</sup> Therefore, role of administration of prophylactic antibiotic is well established in patients undergoing CS. Traditionally in all surgical procedures, antibiotic is usually administered before skin incision. However in CS, there is a risk of damage to fetus due to administration of antibiotic. Therefore Centers for Disease Control (CDC) and Prevention mentioned in its guidelines to administer antibiotic after cord clamping.<sup>5</sup>

In a study conducted by Bhattacharjee, post-operative infectious morbidity was seen in 19/476 (3.99%) patients receiving antibiotics before skin incision while in 47/477 (10.1%) patients receiving antibiotic after cord clamping.<sup>6</sup> In same study, wound infection was seen in 10 of 476 (2.10%) women receiving antibiotic before skin incision compared to 25 of 477 (5.24%) patients receiving antibiotic after cord clamping ( $p=0.010$ ), while Endometritis was observed in 7/476 (1.47%) patients and 17/477 (3.56%) patients in both groups respectively.<sup>6</sup> In another study conducted by Dlamini LD and colleagues, overall infection rate was found in 65.9% (139/211) of patients in pre-incision group and in 85.1% (188/221) of patients in after cord clamp group.<sup>7</sup> Kandil and colleagues found UTI in 7/50 patients (14%) of pre-incision group and in 9/50 (18%) of patients in after cord clamp group.<sup>8</sup>

## Patients and Methods

This prospective, double-blind, randomized controlled trial was conducted at department of Gynaecology and Obstetrics, Continental Medical College, Lahore. The

duration of the study was one year from January, 2015 to December, 2015. All the women of age 18-40 years, being scheduled for cesarean section on elective list due to any reason, were included in the study. Our exclusion criteria included: Patients having anemia (according to WHO criteria, Hb <10.9 g/dl), diabetes Mellitus, Immunosuppression; patients allergic to Ceftriaxone; and patients who received antibiotics 2 weeks before due to any other reason. Patients were randomly divided in two groups by lottery method. Group A: Pre-incision group, Group B: Cord-clamp group. Patients in group A were given 1G Ceftriaxone intravenously (IV), about 15-30 minutes before skin incision and surgical procedure was started. In group B patients, surgical procedure was started and after delivery of the baby and cord clamping, same dosage of antibiotic was administered intravenous. The surgical procedure was done in both groups as standard procedure. Post-operatively, patients were assessed for wound infection, endometritis, pyelonephritis, UTI and overall infectious morbidity at 1<sup>st</sup> and 2<sup>nd</sup> post-operative day by on duty doctor, unaware of group of the patient. In this study Wound infection was defined according to Center for Disease Control (CDC) and prevention. Wound infection was labelled if patient develops any of following within 30 days of surgery: Purulent discharge from wound; Pain, localized swelling, redness and hotness over the surgical site; Organism is isolated after tissue culture from wound site. UTI was labelled if patient had all of the following uptill 10<sup>th</sup> post-operative day: temperature >38C; flank pain; and urine culture showing gram negative pathogens. Endometritis was labelled if patient had all of the following uptill 10<sup>th</sup> post-operative day: Maternal fever greater than 38°C on two separate occasions; uterine fundal tenderness and tachycardia on clinical examination; and leukocytosis (WBC Count >11,000/mm<sup>3</sup>). Overall infectious morbidity was labelled if patient had any of the above mentioned variables including wound infection, fever, endometriosis and pyelonephritis. If any morbidity was noted, it was dealt according to the ward policy of antibiotics. If no morbidity was detected, patients were discharged at 3<sup>rd</sup> post-operative day and were seen in follow up clinic at 7<sup>th</sup>, 14<sup>th</sup> and 28<sup>th</sup> day for outcomes by on duty resident, blind about group of the patient. Also expected loss in follow up was taken as 10%, so 16 cases were added. A total of 174 patients were enrolled in the study. The collected data were entered and analyzed accordingly using Statistical Package for Social Sciences (SPSS) version 21 through its statistical program. p-value ≤ 0.05 was considered as significant.

## Results

A total of 174 patients were enrolled in the study. The mean age of the patients was found to be 27.17 ± 4.68 years. The demographic characteristics were generally evenly distributed in both groups (Table 1). Maternal outcomes in both groups including wound infection, UTI, endometriosis, pyelonephritis and overall infectious morbidity did not reach a statistically significant level (Table 2).

**Table 1: Demographic details of patients in both groups**

|                                 | Group A<br>(n= 87) | Group B<br>(n= 87) |
|---------------------------------|--------------------|--------------------|
| Age (Mean) (In Years)           | 28.68± 5.767       | 25.65±1.236        |
| Age at menarche(Mean)(In Years) | 12.06± 1.23        | 12.22±1.273        |
| Gravidity (Mean)                | 2.44 ± 1.37        | 2.62± 1.488        |
| Parity (Mean)                   | 1.42 ± 1.36        | 1.03± 1.243        |
| Hemoglobin Level (Mean) (g/dl)  | 8.14± 1.418        | 8.11± 1.422        |

**Table 2: Comparison of study variables in both groups**

|                   | Group A<br>(n= 87) | Group B<br>(n= 87) | Risk Ratio (RR) | 95% CI        | p-Value |
|-------------------|--------------------|--------------------|-----------------|---------------|---------|
| Wound Infection   | 8 (9.1%)           | 13(14.9%)          | 0.615           | 0.268 - 1.41  | 0.2569  |
| Endometritis      | 2 (2.2%)           | 3 (3.4%)           | 0.651           | 0.111 - 3.805 | 0.6661  |
| UTI               | 3 (3.4%)           | 5 (5.7%)           | 0.6             | 0.147 - 2.433 | 0.4988  |
| Pyelonephritis    | 1 (1.1%)           | 2 (2.2%)           | 0.5             | 0.046 - 5.412 | 0.6228  |
| Overall Morbidity | 14(16.0%)          | 23 (26.4%)         | 0.608           | 0.336 - 1.103 | 0.1003  |

## Discussion

As CS rate is increasing worldwide, at the same time, infectious morbidity associated with it is also increasing.<sup>9</sup> Many authors have worked over the measures to decrease infectious morbidity after CS including prophylactic antibiotics, surgical techniques, skin preparing solutions, hand washing techniques, drain placement in subcutaneous area and subcutaneous fat closure.<sup>10</sup> Many controversies exist in the literature regarding antibiotics treatment for CS. Rouzi et al had suggested that antibiotics for CS are needed only in case of emergency CS.<sup>11</sup> While some other authors had suggested usage of antibiotic both for emergency and elective CS.<sup>12</sup> Similarly some authors have proposed the use of cefazolin for CS, while cephalotin, cefazolin plus metronidazole and ampicillin have also been proposed.<sup>12-15</sup>

In this study, we evaluated the infectious morbidity in terms of wound infection, endometritis, pyelonephritis and UTI. It was found that wound infection was low in group A than group B, but this difference was not significant. Similarly other variables were also found in less frequency in group A than group B. OR calculated in all of these as not significant. Francis et al also compared antibiotic administration preoperatively and after cord clamping.<sup>16</sup> They also found that infectious morbidity variables were low in patients receiving antibiotic preoperatively than those getting after cord clamping.

Baaqeel et al conducted a systematic review and compared the timing of antibiotic administration for CS.<sup>17</sup> They had found that Endometritis incidence significantly decreased after pre-operative administration of antibiotic. Similarly post-operative fever, UTI, wound infection and neonatal sepsis were also less in preoperative group, but difference was not significant. Similarly in a Cochrane meta-analysis by Mackeen et al, patients receiving antibiotic preoperatively had less maternal morbidity than those getting it after cord clamp.<sup>18</sup>

In present study, the overall wound infection rate was 12.06%. It was quite higher than other western studies being conducted on wound infection rate after CS.<sup>19,20</sup> In this study, we have evaluated only timing of antibiotic administration. But in order to evaluate the proper causes of higher infection rate after CS in our settings, more focused trials are needed aiming particularly on other causes like septic measures, condition of patients and quality of disinfectants.

## Conclusion

Administration of antibiotic for cesarean section is essential. However timing of its administration is debatable as in this study, no significant difference in these two protocols was found.

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