



## Original Article

# Cefazoline or Normal Saline Irrigation Doesn't Reduce Surgical Site Infections After Cesarean

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## ABSTRACT

**Introduction:** Cesarean surgical site infection (SSI) occurs in 3% to 17% of patients who undergo cesarean delivery. SSIs increase postcesarean maternal morbidity and health costs and cause longer hospital stays. Therefore, we designed a study to assess the effects of normal saline and cefazolin irrigation on the incidence of SSIs.

**Methods:** In this study, 200 participants were divided into 3 groups with a 2:1:1 ratio. All pregnant women who underwent cesarean after 6 hours passed their rupture of membrane and were admitted to Shariati Hospital of Bandar Abbas were eligible for our study. Patients with immunodeficiency, coagulopathy, allergy to penicillin or cefazolin, history of immunosuppressive drug use, gestational diabetes mellitus or preeclampsia were excluded from the study. Age, gestational age, hours passed from rupture of membrane, the duration of surgery, anemia (Hb < 11), number of vaginal exams and duration of hospitalization were collected from the patients. The SPSS 13 software was used to analyze the collected data and descriptive statistics, one way ANOVA and chi-square were used. A p-value of < 0.05 was considered as significant (clinicaltrials.gov ID= [NCT01566734](https://clinicaltrials.gov/ct2/show/study/NCT01566734)).

**Results:** The mean age of the participants was 25.8 ± 5.6. The incidence of SSIs was 2.5% among all the participants. In this study, 0 patients (0%) of the cefazolin group, 1 patient (2%) of the normal saline group and 4 (4%) of the control group developed SSIs. No significant relation was seen between age, the number of vaginal exams, mean gestational age, duration of surgery, anemia and the type of irrigation.

**Conclusion:** The results of this study show that normal saline or cefazolin irrigation does not decrease the incidence of SSIs. However, these solutions might have a different impact on high-risk patients.

**Key words:** Cefazolin, Normal saline, Surgical site infections.



### Introduction:

Cesarean surgical site infection (SSI) is an infection that involves the abdominal incision of the uterus and occurs in 3% to 17% of patients who undergo cesarean delivery (1, 2). SSIs increase postcesarean maternal morbidity and health costs and cause longer hospital stays. Also, studies have indicated that many SSIs occur after discharge and this leads to readmission of the patient (3, 4). In the U.S., annual health costs related to maternal SSIs exceed 10 billion dollars (2-7).

As many randomized control trials have suggested, it is recommended to use antibiotic prophylaxis to prevent SSIs (4, 8). Nearly 75% of the postcesarean infections can be avoided using antibiotic prophylaxis (7). Many studies have shown that intra-abdominal irrigation with antibiotic solutions decrease the incidence of SSIs in abdominal surgeries such as cesarean (1) however, some studies did not find any significant relations (9, 10). Normal saline irrigation has also been suggested to prevent or reduce SSIs (10-15).

Due to the increasing rates of SSIs following cesarean surgeries, it is critical to develop new ways to prevent them (5). Therefore, we designed a study to assess the effects of normal saline and cefazolin irrigation on the incidence of SSIs.

### Methods:

This was a single blinded, parallel clinical trial conducted in Bandar Abbas. In this study, 200 participants were divided into 3 groups with a 2:1:1 ratio.

This study was approved by the ethical committee of Hormozgan University of Medical Sciences. Each participant provided an informed written consent.

All pregnant women who underwent cesarean after 6 hours passed their rupture of membrane and were admitted to Shariati Hospital of Bandar Abbas were eligible for our study. The patients with allergy to penicillin or cefazolin, history of immunosuppressive drug use, gestational diabetes mellitus or preeclampsia were excluded from the study.

Simple randomization was used to divide the participants. In all the groups, 30 minutes before surgery, 2 grams of IV cefazolin were administered. In one group, after the surgery and before closing up the patients, 2 grams of cefazolin in 5 cc of distilled water were used to irrigate the patients. In the second group, 150 cc of normal saline was used to irrigate the patients and in the last group, no irrigation was used.

At the time of discharge, the patients of all groups were trained to go to the hospital if they had fever or if they saw any erythema, swelling or discharge at the surgical site. Then, the patients were daily followed by telephone to see if they had signs of symptoms of SSIs. They also returned to the hospital



one week after discharge for the final follow up. The main outcome of this study was developing surgical site infections.

Age, gestational age, level of education, hours passed from rupture of membrane, the duration of surgery, anemia (Hb < 10), number of vaginal exams and duration of hospitalization were collected from the patients.

Blocked randomization was used by an investigator who was not involved in the clinical parts of the trial. A computer-generated random number list was used for this matter. The patients were not aware of the allocation until the end of the study.

The SPSS 13 software was used to analyze the collected data and descriptive statistics, one way ANOVA and chi-square were used. A p-value of < 0.05 was considered as significant.

### Results:

In this study, 200 patients were divided into three groups and 50 patients (25%) were assigned to the cefazolin group, 50 patients (25%) were assigned to the normal saline group and 100 patients (50%) were assigned to the control group.

The mean age of the participants was  $25.8 \pm 5.6$  years and the mean gestational age of the participants was  $36.8 \pm 4.2$  weeks. Also, 108 patients (54%) had anemia (hemoglobin below 11 g/dL) and 92 patients (46%) did not have anemia.

In this study, the mean time interval between rupture of membrane (ROM) and undergoing surgery was  $22.1 \pm 35.8$  hours. The mean number of the vaginal examinations was  $9.8 \pm 8.9$ . Also, the mean duration of the surgery was  $39.6 \pm 12.1$  minutes. Among the participants, 86 patients (43%) had a subcutaneous thickness more than 2 while the subcutaneous thickness of 114 patients (57%) was below 2. Table -1 shows the baseline characteristics of the patients of each group.

**Table -1: Baseline characteristics of the patients of each group:**

|   | Control group | Normal saline | Cefazolin   | P-value |
|---|---------------|---------------|-------------|---------|
| <b>Age (years ± SD)</b>                                 | 26.1 ± 5.8    | 26.6 ± 5.5    | 24.5 ± 5.5  | 0.107   |
| <b>Gestational Age (weeks ± SD)</b>                     | 36.5 ± 4.8    | 37.5 ± 3.6    | 36.4 ± 3.3  | 0.362   |
| <b>Anemia (number - percent)</b>                        | 52 (52%)      | 27 (54%)      | 29 (58%)    | 0.785   |
| <b>Interval Between ROM and Surgery (minutes ± SD)</b>  | 17.4 ± 19.6   | 16.7 ± 11.7   | 31.3 ± 57.3 | 0.74    |
| <b>Vaginal Examinations (number ± SD)</b>               | 8.9 ± 8.6     | 10.7 ± 9.1    | 10.9 ± 9.2  | 0.345   |
| <b>Duration of Surgery (minutes ± SD)</b>               | 39.5 ± 11.7   | 40.3 ± 13.6   | 38.5 ± 11.3 | 0.659   |
| <b>Subcutaneous Thickness &gt; 2 (number – percent)</b> | 47 (47%)      | 17 (34%)      | 22 (44%)    | 0.313   |

Among all the participants of this study, 5 patients (2.5%) developed surgical site infections. Among the control group, 4 patients (4%) developed SSIs while 1 patient (2%) of the normal saline group and none (0%) of the cefazolin group developed SSIs. There was no significant difference between the incidence of SSI in the groups (P-value > 0.05).

**Conclusion:**

This study was conducted in Shariati Hospital of Bandar Abbas to compare the effects of cefazolin and normal saline irrigation on the incidence of SSIs with no irrigation.

In this study, 200 patients were enrolled. The mean age of the participants was 25.8 years. Five (2.5%) patients developed SSIs. None of the patients of the Cefazolin group developed SSI while 2% of patients of the normal saline group and 4% of patients of the group with no irrigation were diagnosed with SSIs. However, no significant differences were seen among the 3 groups.

Gungorduk et al. also compared the effects of normal saline irrigation with no irrigation on 260 patients who underwent cesarean delivery. About 7.3% of patients of the control group and 6.5% of the patients in normal saline group developed SSIs. However, this difference was not significant (16).

Hrrigill et al. also studied maternal complications in 196 cesarean deliveries. They found that 13.1% of patients of the control group and 14.4% of patients of the normal saline group developed maternal complications. They also did not find this difference significant (17).

Parcells et al. studied the effects of normal saline irrigation, antiseptic solution and antibiotic solution irrigation in patients who underwent abdominal surgery. About 9.8% of patients with saline irrigation,



20.7% of the patients with antiseptic solution and 0.5% of patients with antibiotic irrigation developed SSIs. They found this difference to be significant (18).

The overall incidence of SSIs of the patients of our study was 2.5%. This rate was similar to studies conducted in Hungary, Negev and Saudi Arabia (3.6%, 3.7% and 4.5% respectively) (19-21).

One of the limitations of this study was that preparation for operating room and shaving the patients was performed by different personnel. Also, cesarean was performed by different surgeons, thus the effect of surgeon's skill was not controlled.

The results of this study show that normal saline or cefazolin irrigation does not decrease the incidence of SSIs. However, these solutions might have a different impact on high-risk patients.

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