



SURGICAL SITE INFECTION FOLLOWING CESAREAN SECTION AT A TERTIARY HOSPITAL IN MAHARASHTRA

Obstetrics & Gynaecology

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ABSTRACT

Background: Surgical site infections (SSI) are among the most common hospital acquired infections. Surgical site infection following caesarean section were associated with various modifiable risk factors. Development and strict implementation of protocol by all the health care professionals could be effective to minimize and prevent the infection rate after caesarean section. A total of 1000 cases were studied for a period of one year to evaluate the incidence, risk factors associated with surgical site infections following caesarean sections.

KEYWORDS

Cesarean, Infection, Surgical Site Infections.

BACKGROUND

The number of caesarean deliveries (CD) conducted has increased dramatically worldwide in the last decades particularly in middle- and high-income countries. As with all surgical procedures, CD can be associated with SSIs, as well as being associated with higher maternal morbidity and mortality with future pregnancies^[1].

The rate of SSI ranges from 3% to 15% worldwide^[2,3,4]. The variation in incidence may reflect differences in population characteristics and risk factors, perioperative practices.

The Centers for Disease Control and Prevention defines SSI as an infection occurring within 30 days from the operative procedure in the part of the body where the surgery took place. It divides SSIs into incisional SSI and organ/space SSI. Incisional SSI is further divided into superficial, involving the skin and subcutaneous tissue, and deep SSI, involving fascial and muscle layers.

Wound hematoma and seroma are collections of blood and serum, respectively. Hematomas are usually due to failure of primary hemostasis or bleeding diathesis. Vigorous coughing or severe hypertension immediately after surgery may contribute to the formation of hematoma. Wound hematoma or seroma, described in 2-5% of women after CD can cause wound dehiscence and act as a nidus for development of wound infection. Wound dehiscence is separation of incision and complicates 2-7% of CD^[5,6].

Necrotizing fasciitis is a rare but serious infection causing significant morbidity after CD that is characterized by rapid and progressive necrosis of subcutaneous tissue and fascia. Necrotizing fasciitis is suspected with severe pain, crepitus, wooden-hard induration of the subcutaneous tissues, bullous lesions, skin necrosis or ecchymosis, and elevated serum creatine kinase level.

Many risk factors for SSI have been described. These include maternal factors (tobacco use; limited prenatal care; obesity; corticosteroid use; nulliparity; twin gestations; and previous CD), intrapartum and operative factors (such as chorioamnionitis; premature rupture of membranes; prolonged rupture of membranes; prolonged labor, particularly prolonged second stage; large incision length; subcutaneous tissue thickness > 3 cm; subcutaneous hematoma; lack of antibiotic prophylaxis; emergency delivery; and excessive blood loss), and obstetrical care on the teaching service of an academic institution. Effective interventions to decrease surgical site infection include prophylactic antibiotic use chlorhexidine skin preparation instead of iodine, hair removal using clippers instead of razors, vaginal cleansing by povidone-iodine, placental removal by traction of the umbilical cord instead of by manual removal, suture closure of subcutaneous tissue if the wound thickness is >2 cm, and skin closure with sutures instead of with staples.

The risk for developing SSI has significantly decreased in the last three decades, mainly owing to improvements in hygiene conditions, antibiotic prophylaxis, sterile procedures, and other practices.^[7,8]

Despite this decrease, the overall occurrence of SSI is expected to increase given the continuous rise in the incidence of caesarean deliveries. Post caesarean surgical site infections may increase maternal morbidity and mortality. In addition, surgical site infections can be frustrating for the mother trying to recover from the procedure and at the same time take care of the newborn. It may prolong maternal hospitalization, increase health care costs, and lead to other socioeconomic implications.^[9]

METHODS

This observational study was conducted at Acharya Vinoba Bhave Rural Hospital, Sawangi Meghe, Wardha (a tertiary care hospital in Maharashtra) to find out the magnitude of post caesarean section surgical site infection and the risk factors associated with it among the women who underwent caesarean section between January 2018 to December 2018.

Methodology

A total of 1000 pregnant women who underwent caesarean section during the study period were monitored for signs and symptoms of surgical site infection on third day, and fifth post-operative day, and on the day of discharge, and in scheduled follow up OPD up to 30 days after surgery.

The collected patient data included the following variables: age, nativity(rural or urban), socio economic status, number of antenatal visits, parity, whether caesarean section was performed as an emergency or elective surgery, indication of caesarean section, existing comorbidities, duration of surgery, amount of blood loss and administration of prophylactic antibiotics before the surgery.

RESULTS

Amongst the 1000 patients who were included in the study, surgical site infection was documented in 94 patients.

Parameters	Number of Cases	Percentage
Maternal Age in Years		
<20	9	9.57
21-25	42	44.68
26-30	32	34.04
>30	11	11.7
Nativity		
Rural	74	78.72
Urban	20	21.27

Table 1. Demographic distribution

Demographic Characteristics of the Participants Were-

- Majority of the women are from rural areas (78%).
- Most of the patients belonged to the age group of 21-25 years, contributing to 44 % of the cases.

	Number of Cases	Percentage
Antenatal visits		
Booked	38	40.42
Unbooked	56	59.57

Primigravida	34	36.17
Gravida 2	33	35.1
Gravida 3	19	20.21
Gravida 4	8	8.51

Table 2. Antenatal Visits and Gravidity of Patients**Obstetric Characteristics Of The Participants Were-**

- 59 % of the cases were unbooked.
- Most of them were primi gravida (33 %).

Medical and obstetric risk factors of patients who developed surgical site infections are as tabulated below.

Medical Risk Factors	Number of Cases	Percentage
Cardiac case	4	4.25
Anemia	21	22.34
Hypertension	12	12.76
Diabetes	4	4.25
Jaundice	3	3.19
HIV positive	2	2.12
Hypothyroidism	8	8.51
Ascites	5	5.31

Table 3. Medical Risk Factors among Participants

Mother has been in labor before surgery	No of cases
Yes	58
No	36
Duration of labor	
< 24 hrs	33
> 24 hrs	25
State of membranes	
Intact	32
Ruptured	26
Color of liquor	
Clear	9
Meconium-stained liquor	15
Blood-stained liquor	2

Table 4. Obstetric Characteristics of Patients

Indications for CD in the patients who developed SSI are tabulated below in table 5.

Note- Some of the patients had more than one factors as an indication.

Indication	No. of Cases	Percentage
Previous LSCS	23	24.46
Failure of induction	11	11.7
Fetal distress	21	22.34
Malpresentation	9	9.57
Multiple gestation	6	6.38
Pregnancy induced hypertension	12	12.76
Obstructed labor	6	6.38
PROM	15	15.95
Placenta previa	2	2.12
Abruptio placenta	1	1.06
Other	4	4.25

Table 5. Indications of Caesarean Sections

Intra operative and anesthetic factors pertaining to the patients are tabulated below (table 6)

Characteristics	Number of Cases	Percentage
Duration of surgery		
< 1 hr	61	64.89
> 1 hr	33	35.1
Intra operative blood loss		
< 1000 ml	65	69.14
> 1000 ml	29	30.85
Prophylactic antibiotics		
Given	88	93.61
Not given	6	6.38
Type of anesthesia given		
Spinal	86	91.48
General	8	8.51

Table 6. Duration of Surgery, Intra Operative Blood Loss, Type of Anesthesia given, Antibiotic Prophylaxis Status**DISCUSSION**

The purpose of this review is to provide information on reported

infection rates following caesarean section at Acharya Vinoba Bhave Rural Hospital, wardha. We found rate of surgical site infection of 9.4%, many times greater than those in high-income countries, such as the United States.

Surgical site infection is the second most common infectious complication after urinary tract infection following cesarean delivery.^[10] It is often associated with predictable and preventable risk factors.

The majority of patients in our study group belong to the age group of 21 to 25 years, this could be because most pregnant women fall within this age distribution.

79% of the patients with SSI were from rural areas and 31 % from urban areas. This implies that obstetric care services should be strengthened in rural areas. Majority of the cases were unbooked. Antenatal care provides opportunities for health education, prior detection and correction of maternal risk factors. These findings are consistent with similar studies conducted by Devi SL in secundrabad, Amenu D et al in ethiopia.^[11,12]

Patients with anemia were seen to be more prone to surgical site infections, because of the lower resistance to infection. In the present study 48% of the patients had anemia which is consistent with Devjani et al study.^[13] Anemia can cause impaired oxygen transportation to the uterus and causes delay in wound healing. Moreover, lack of oxygen causes tissue death, dysfunction of oxidative activities in the tissues and this creates conducive environment for wound infection. Poor control of glucose during surgery and in the perioperative period increases the risk of infection and worsens the outcomes of sepsis. The results of present study are consistent with Olsen MA et al study.^[14] Hypertensive disorders were seen in 13% of the women in our study which correlates with the incidence seen in Schneid - Kofman et al study.^[15] The role of hypertension in inducing infection is due to higher rate of intra-operative bleeding. Aggressive treatment of hypertension during or after the operation may also lead to a reduction of perfusion in the skin and soft tissues and postpone wound healing, increasing the rate of SSI.

24% of the cases in our study had a repeat CS which correlates with Olsen MA et al study.^[14] PROM is seen in 16 % of cases. PROM is associated with the largest bacterial inoculum and liquor gets infected and infection supervenes.^[16] An obstetrics related risk factor is length of time that the membranes are ruptured prior to cesarean section. Following membrane rupture, the amniotic fluid is no longer sterile and may act as a transport medium through which bacteria comes into contact with the uterine and skin incisions.^[17] The increased incidence of SSI in cases with intact membranes may be due to multiple vaginal examinations in cases with failed induction and other coexisting risk factors. The duration of surgery is more than one hour in 35% cases. Shapiro et al reported that with each hour of surgery the infection rate almost doubles.^[18] Blood loss of more than 1000ml was reported in 30% of the cases. The risk of postoperative infection has been shown to be proportional to volume of blood loss during cesarean section.^[19,20] A high volume of blood loss is usually associated with poor control of bleeding increased tissue damage from prolonged retraction and manipulation and more sutures.^[5]

Majority of the SSI in this study, (59%) required secondary suturing while in 41% of the cases, the wound healed with daily aseptic dressings and secondary intention.

CONCLUSIONS

To begin with, decreasing or at least controlling the continuous rise in cesarean section rate worldwide is essential in reducing the occurrence of SSI related to the procedure. Women opting for a caesarean section for non-medical reasons should be discouraged and informed of the risks of SSI as a complication.

SSI is more prevalent among emergency procedures and women who were unbooked. It is important for antenatal women to have regular antenatal visits so that modifiable risk factors like anemia, hypertension, diabetes are corrected before term. Proper assessment of risk factors that predispose to SSI is critical for identifying high risk patients requiring intensive preoperative and postoperative surveillance. In the pre-operative phase, measures such as the patient's personal hygiene, antibiotic prophylaxis, proper antiseptic preparation

of the surgical site and the use of sterilized instruments all contribute to suppressing post-operative infection. Identifying and properly managing patients with comorbidities and reducing surgery time, intra operative blood loss can further decrease SSI rates.

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