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Original Research Article

Wound grading and surgical site infection following caesarean section

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ABSTRACT

Background: Surgical site infection (SSI) following caesarean section can adversely influence the postpartum period for the women. The objective of the study was to study the extent of infection and the microbiological flora in cases of surgical site infection following caesarean section.

Methods: Women undergoing caesarean section amongst women admitted in labour ward were followed till discharge for any surgical site infection Detailed assessment of the wound was done. Any discharge if present was taken for culture.

Results: 88.88% had normal wound healing, implying no infection. Of those with abnormal wound, 22% had serosanguinous or purulent discharge. Most had superficial incisional SSI. *Enterococcus faecalis* and *Staphylococcus* were the commonest organisms grown on culture.

Conclusions: All surgical site infections should be looked into as early as possible and managed appropriately.

Keywords: Deep spaces, Infection, Surgical site, Superficial, Wound

INTRODUCTION

Caesarean section (CS) is the most commonly performed major surgery worldwide. World Health Organization recommends that caesarean section rate should be in the range of 10-15% for attaining the best maternal and foetal outcome.¹ In India, the rate has increased to 32.6%.² In the teaching hospitals in India it varies between 41-54%, as these are also the tertiary care referral units.³

Surgical site infection (SSI) is defined as an infection that occurs after surgery in the part of the body where the surgery took place. It is classified as superficial, deep incisional and organ/space related. It is classified according to Center for Disease Control and Prevention (CDC) guidelines.⁴ SSI are associated with increased costs, higher rates of patient dissatisfaction, increased length of hospital stay and high mortality and morbidity rates.⁵

Although caesarean sections are performed in a sterile environment, the risk of surgical site infection (SSI) always

exist. Surgical site infection (SSI) following caesarean section can adversely influence the postpartum period for the women. These impact not only the physical health but also her emotional wellbeing. It influences a woman's ability to care for her infant, as well as her perception of her childbirth experience. Compared to women delivered vaginally, those delivered by caesarean have a 5 to 20-fold increase in risk.⁶ Surgical site infection (SSI) complicates up to 8.9% caesarean sections.⁷ Rates of SSIs differ world over and are higher in less developed compared to developed countries where advanced hospital infection control protocols exist and correct implementation of evidence-based guidelines for SSI prevention are present.⁸

Although most caesarean section wound infection are superficial, however, a proportion of infections are more severe involving deeper tissue or reproductive organs necessitating extended hospital stays or readmission to hospital, adding further to morbidity and cost of treatment. Correct evaluation of the extent of the infection and the organisms involved would help in timely control.

Since SSI following caesarean section is a very common entity and poses a considerable burden to our health care system, the objective of the study was to assess the rate and extent of surgical site infection following caesarean section during the hospital stay and the microbiological flora in these cases.

METHODS

This was a prospective descriptive type of observational study. The duration of study was from July 2020 to December 2020 for a period of six months. The study was done in the Department of Obstetrics and Gynaecology, SMS Medical College, Jaipur. Institutional review board and ethical committee approval was taken prior to the study.

Sample size of 442 caesarean deliveries was required for present study at 80% study power and alpha error of 0.05 assuming 6.8% incidence of surgical site infection following caesarean deliveries.⁹ It was further enhanced and rounded off to 450 caesarean deliveries as final sample size for the study.

Inclusion criteria

Women undergoing caesarean section, who understood and were willing to give consent to participate in the study were selected from amongst women admitted in labour ward.

Exclusion criteria

Women with local skin disease were excluded.

Informed consent of the women was taken prior to inclusion in the study.

After a detailed history and clinical examination, caesarean section was performed of all selected women by Misgav-Ladach method using Joel-Cohen incision for opening the abdomen using same suture material for all women. Antimicrobial prophylaxis was used as per hospital protocol.

Women were followed till discharge for any SSI detailed assessment of the wound was done by Southampton wound grading.¹⁰ Wound depth was graded according to CDC guidelines.⁴ Discharge if any was sent for culture and sensitivity test.

Data was compiled. All nominal/categorical variables were expressed as percentages. Appropriate tool was used for all statistical calculations and conclusions were drawn.

RESULTS

The mean age of the women included in the study was 25.29 years, 47.55% were educated more than secondary level. All women belonged to lower and middle

socioeconomic class. In our study, most women were from the urban area (59.55%) since the hospital is situated in the centre of the city and is easily approachable for the population. (93.11%) had no history of smoking, tobacco chewing or alcohol intake and only 8.88% women were anaemic.

Four hundred women out of 450 had normal wound healing, grade 0, implying no infection, 88.88%. Majority of surgical site infections become apparent within 30 days of an operative procedure and most often between the 5th and 10th postoperative days. Diagnosis of surgical site infection requires evidence of clinical signs and symptoms of infection which may be further supported by microbiological evidence.

Table 1: Southampton wound scoring.

Grade	LSCS	Percentage
0 Normal healing		400 (88.88)
1-5 Abnormal wound		50 (11.11)
I Normal healing with mild bruising or erythema	19	38
Ia Some bruising,	9	
Ib Considerable bruising	7	
Ic Mild erythema	3	
II Erythema plus other signs of inflammation	16	32
IIa At one point	4	
IIb Around sutures	4	
IIc Along wound	6	
IId Around wound	2	
III Clear or haemoserous discharge	6	12
IIIa At one point only (≤ 2 cm)	2	
IIIb Along wound (> 2 cm)	2	
IIIc Large volume	1	
IIId Prolonged (> 3 days)	1	
IV Pus	5	10
IVa At one point only (≤ 2 cm)	3	
IVb Along wound (> 2 cm)	2	
V Deep or severe wound infection with or without tissue breakdown; hematoma requiring aspiration	4	8

On examining and grading the wound by Southampton wound grading, on postoperative day five, 70% had grade 1 or 2 wound- those having mild erythema or with other signs of inflammation along and around the sutures and wound. 22% had serosanguinous or purulent discharge, grade 3 or 4 wound (Table 1).

According to CDC guidelines, superficial incisional SSI occurs within 30 days and involves only skin and subcutaneous tissue of the incision.⁴ Deep incisional SSI

occurs within 30 or 90 days and involves deep soft tissues of the incision (e.g. fascial and muscle layers). Organ/space SSI occurs within 30 or 90 days and infection involves any part of the body, excluding the skin incision, fascia, or muscle layers, which was opened or manipulated during the operative procedure. In our study, 92% of the women with SSI developed only superficial surgical site infection. Only 8% of the women developed deep SSI (severe wound infection with tissue breakdown or hematoma requiring aspiration) (Table 2).

Table 2: CDC site of surgical infections.

Type of SSI	SSI cases (n=50)	Percentage
Superficial	46	92
Deep	4	8
Organ space	0	0

Of the 50 women with abnormal wound healing, there was discharge from 15. In most of them, *Enterococcus faecalis* and *Staphylococcus* growth was found on culture. Mixed pathogens were also found in few (Table 3).

Table 3: Pathogens associated with post caesarean surgical site infection.

Pathogens	Number of SSI cases	Percentage
<i>Enterococcus faecalis</i>	4	8
<i>Staphylococcus saprophyticus</i>	3	6
<i>Staphylococcus aureus</i> (MRSA)	2	4
<i>Acinetobacter</i> + <i>Staphylococcus l epidermidis</i>	1	2
<i>Enterococcus faecalis</i> + <i>Candida tropicalis</i>	1	2

DISCUSSION

The American College of Obstetricians and Gynaecologists recommends antibiotic prophylaxis during caesarean section by receiving antibiotics within 1 hour before the start of surgery. In the case of emergency caesarean section, prophylaxis should be started as soon as possible.¹¹ The recommended prophylactic antibiotic for caesarean section is cefazolin 1-2 gm i.v. For patients allergic to penicillins and cephalosporins, clindamycin with gentamicin is a reasonable alternative.⁶

Since all the women in our study were given postoperative antibiotic, this is often the reason that no organisms are found on culture even in the presence of surgical site infection.

Vallejo et al found that during caesarean section the surgical site is exposed to vaginal polymicrobial aerobic and anaerobic flora accounting for the higher incidence of

infection compared to other types of surgical procedure that only break the skin surface.¹² Hence, these operations are classified as clean contaminated cases.

Skin is normally colonised by a range of microorganisms that could cause infection. In clean-contaminated procedures like caesarean section, the polymicrobial aerobic-anaerobic flora closely resembling the normal endogenous microflora of the operated organ constitutes the most frequently isolated pathogens. Amongst the aerobic bacterial agents causing surgical site infection in caesarean section patients, enteric gram negative bacilli is the most common followed by enterococci and group B streptococci. *Clostridia* and *Bacteroides* are commonly isolated anaerobic organisms. These endogenous vaginal flora are usually introduced following repeated vaginal examinations or instrumentation. Considering that the postoperative caesarean section infections could be polymicrobial, the samples should be appropriately processed for aerobic, anaerobic, fastidious bacteria, slow growing organisms and fungi.

Sullivan et al found a lower incidence of endometritis and wound infection with preoperative antibiotic administration compared to the previous practice of later administration after the umbilical cord had been clamped to prevent antibiotics from crossing over to the newborn.¹³

Similar to our study, Wloch et al found that the majority of infections reported from caesarean sections were superficial incisional infections.¹⁴ There were too few deep incisional or organ/space (uterine and reproductive tract infections).

Zejnnullahu et al also found that the majority of the infections in their study sample were superficial infections (93.75%) whereas 6.25% were deep primary incisional surgical site infections.¹⁵ Organ/space surgical site infection or endometritis based on patient-reported criteria (uterine tenderness, abdominal pain and purulent discharge from the uterus) as defined, were not identified in their study too.

There are some limitations of the study. The study was performed in a single centre which is a tertiary referral government hospital, hence, selection bias may have been there. All patients were given prophylactic antibiotics, so the incidence of SSI may be less than in other places.

CONCLUSION

Although superficial incisional infections are relatively minor, they are still likely to result in pain and discomfort, require antimicrobial therapy and might progress to affect deeper tissues. Avoiding more severe infections by monitoring superficial ones is essential, to detect early any potential problems. Furthermore, all infections would result in costs to the health service through extended hospital stay and visits to the doctors.

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