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Original Research Article

Incidence And Clinical Presentations of Surgical Site Infection Following Cesarean Section

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Abstract

Objective: To Study Incidence and Clinical Presentations of Surgical Site Infection Following Cesarean Section.

Methods: A prospective hospital-based clinical study was conducted among all pregnant woman admitted to the labor room with either elective or emergency caesarean section in OBG department at SSIMS & RC Davangere, during period of March 2021 to March 2023.

Result: Overall prevalence of surgical site infection was 13.5%. Prevalence of surgical site infection among conventional and study groups were 18.4% and 8.6% respectively which is statistically significant (p=0.001)

Conclusion: After implementing the care bundle in our study, the prevalence of study group was 8.6% when compared to the convention group, which reported 18.4%. Majority of the study participants had superficial surgical site infection (n=30, 73.2%).

Keywords: Incidence, Clinical Presentations, Surgical Site Infection, Cesarean Section.

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Introduction

Surgical site infection symptoms usually appear three to seven days after surgery. But by definition, depending on the exact kind of surgery done, these symptoms have to appear 90 days after the procedure. The specific duration varies according to the type of surgical procedure. Surgical site infections can occur more frequently in complicated, time-consuming, contaminated, or urgent surgical procedures. Patients often appear with slow onset of discomfort around the surgical site, as well as overall malaise or weariness, when they have deep or superficial incisional surgical site infections. Patients who have infections in their organs or spaces may report fever, chills, night sweats, exhaustion, or malaise as well as localized or widespread pain. Physical examination findings could include wound dehiscence, delayed healing, purulent or non- purulent discharge, and incisional erythema. Palpable tenderness can be more broad or localized.

Microbial contamination of the wound is usually the first trigger for the development of a surgical site infection. Both endogenous and foreign pathogens may be the etiologic agents of surgical site infections. Endogenous microorganisms can be introduced through hematogenous dissemination or arise from the patient's skin, mucous membranes, or adjacent hollow viscera. The most frequent endogenous bacteria responsible for surgical site infections differ according on the anatomical location of the procedure (1). The common microorganism in causing SSIs includes Staphylococcus aureus, Klebsiella pneumonia, and Escherichia coli (2).

Exogenous bacteria may have originated in the operating room or from its occupants; they may have dispersed through the air, on instruments or materials, or through hospital staff. SSIs are often linked to the detection of foreign pathogens such staphylococci and streptococci. Conversely, among the most prevalent extremely pathogenic hospital-acquired pathogens are methicillin-resistant S aureus (MRSA) and extended-spectrum β-lactamase bacteria isolated from surgical site infections (3).

One of the most frequent complication after a caesarean section is surgical site infection. It is responsible for raise in maternal mortality and

morbidity. Longer hospital stays, reduced satisfaction among patients, and financial burden occurs due to SSIs.

The importance of the study lies in its potential to significantly reduce the incidence of SSIs, thereby improving the maternal and neonatal health outcomes. By identifying and validating the most effective preventive measures, this research contributes to the optimization of cesarean section (c-section) procedures, reducing healthcare costs associated with surgical site infections, and improving overall patient satisfaction. Furthermore, the insights gained from this comparative study can be applied to other surgical settings, promoting broader improvements in surgical care and infection control practices.

Material And Methods

A prospective hospital-based clinical study was conducted among all pregnant woman admitted to the labor room with either elective or emergency caesarean section in OBG department at SSIMS & RC Davangere, during period of March 2021 to March 2023.

This study was conducted on obstetric cases in elective and emergency caesarean section attending the department of OBG at S.S. Hospital, Davangere. Ethical committee approval was obtained to conduct the study

Inclusion criteria

a. Women of all age group undergoing caesarean section
b. Primigravida and multigravida

Exclusion criteria

a) Patients not willing to give consent for the study.
b) Patients who are known allergic to chlorhexidine (4%) solution.

Sample size

Sample size was calculated using the formula:

$N = [(Z\alpha + Z\beta)2 \times (p1q1+p2q2)] / d2$

n = 303 rounded up to 304 (152 in each group).

Method of Data collection: All admitted women are randomized into group A & group B by odds & even randomization method. Detailed questionnaire-based history was taken after taking consent and confirming the inclusion and exclusion criteria. Detailed general physical and obstetric examination was done. Provisional diagnosis and possible etiology of the disorder and associated conditions are noted down. Following this, patients were subjected to the investigations which helps in confirming the suspected etiology. The collected data was analyzed and sub classified based on different variables considered in the proforma. Suitable tests of significance were applied during statistical analysis to establish the correlation and effects of the variables considered in the study.

Group 1: Conventional Group:

- Shaving with razors.
- Painting by povidone-iodine
- Preop antibiotic 3rd gen. Cephalosporins.
- Operation time as per surgeon
- Suturing of fat > 2 cm thickness.
- Follow up as per surgeon.

Group 2: Study group:

- Trimming with clippers (BD clipper -3M)
- Vaginal cleansing by povidone iodine.
- Painting by chlorhexidine (4%) solution for skin antisepsis with three minutes of drying time prior to skin incision.
- Prophylactic antibiotics (3rd gen. Cephalosporins) within 60 minutes & prior to skin incision.
- Duration of surgery >2hrs - antibiotic extra dosage; Blood loss >1000 ml- Antibiotics extra dose.
- Removal of placenta by - Continuous cord traction.
- Suturing of fat > 2cm.
- Removal of dressing by post-op 3
- Follow up after 15 days, for removal of sutures & examination of caesarean wound.
- And nothing the condition of the wound according to CDC guidelines.

Chlorhexidine 4% solution is an effective antimicrobial agent commonly used for skin decontamination. Antiseptic surgical hand scrub is used to reduce the surgical site infections.

Statistical analysis

Continuous data was expressed as mean ± SD. Categorical data was expressed as numbers and percentages. Chi-square test was done. P-values of <0.05 was considered statistically significant.

Results

A total of 304 study participants were included in the study. Both the conventional group and the study group consists of 152 study participants. Mean age of the study participants was 27.61 ± 4.56 years. Majority of the study participants were in the category of 25-30 years (50.30%). The mean age of study participants in the conventional group and study group were 27.84 ± 4.68 and 27.38 ± 4.43 respectively.

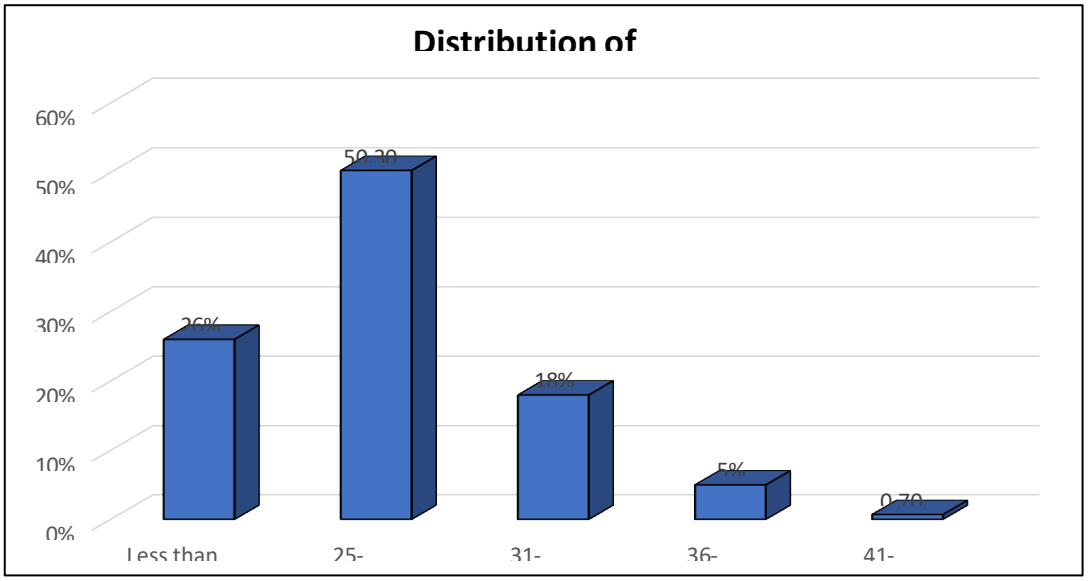

Figure 1: Age distribution among study participants

Mean BMI of the study participants was 24.53 ± 3.78. The mean BMI in conventional group and the study group were 25.01 ± 3.38 and 24.05 ± 4.10 respectively. Majority of the study participants were normal (54.3%). It was statistically significant between the groups.

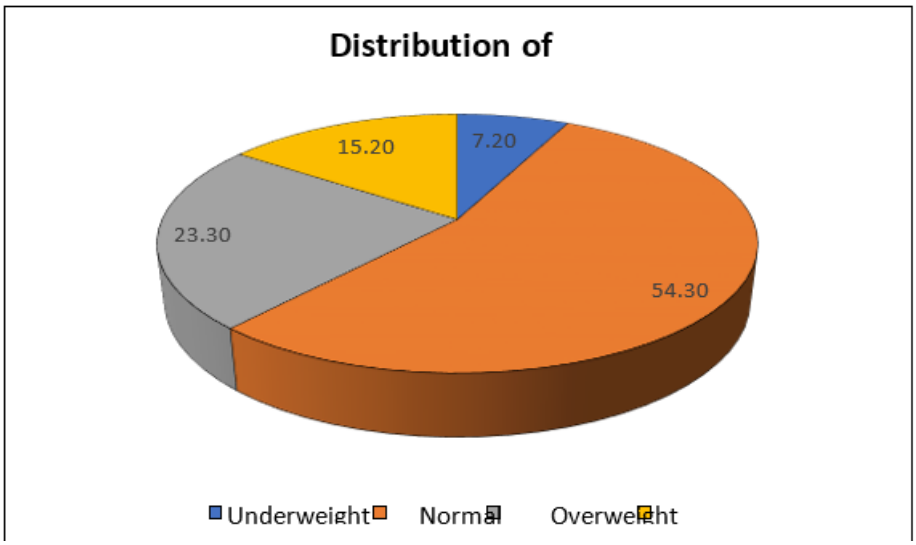

Figure 2: Distribution of BMI

Gestational status: Half of the study participants were preterm and the remaining half of the study participants were full-term during labour.

Table 1: Gestational status

Study Variable	Total	Group 1 Conventional Group (N=152)	Group 2 Study Group (N=152)	P Value
Preterm	152 (50%)	64 (42.1%)	66 (43.4%)	0.454
Full-term	152 (50%)	88 (57.9%)	86 (56.6%)	

Surgical site infection: Overall prevalence of surgical site infection was 13.5%. Prevalence of surgical site infection among conventional and study groups were 18.4% and 8.6% respectively which is statistically significant (p=0.001)

Table 2: Surgical site infections

Study Variable	Total	Group 1 Conventional Group (N=152)	Group 2 Study Group (N=152)	P Value
Surgical site infection	41 (13.5%)	28 (18.4%)	13 (8.6%)	**0.001**

Majority of the study participants had superficial surgical site infection (n=30, 73.2%). Prevalence of superficial and deep surgical site infections in the conventional group were 71.4% and 26.8% respectively. Prevalence of superficial and deep surgical site infections in the study group were 76.9% and 23.1% respectively.

Table 3: Type of SSIs

Type of Surgical Site Infection	Total	Group 1 Conventional Group (N=28)	Group 2 Study Group (N=13)	P Value
Superficial	30 (73.2%)	20 (71.4%)	10 (76.9%)	0.791
Deep	11 (26.8%)	8 (28.6%)	3 (23.1%)	

Discussion

In our study, majority of the study participants were between 25-30 years of age (50.3%) with mean age of 27.61 ± 4.56 years. The mean age of the study participants in a prospective study conducted in Pondicherry was 26.20 ± 4.385 years (4).

The mean BMI of the study participants was 24.53 ± 3.78. The mean BMI of the study participants in the two study centres (PGIMER and Civil hospital) was 25.2 ± 4 & 25.7 ± 5.7 respectively during the baseline and 26.3 ± 5.1 & 25.9 ± 4.3 respectively during the intervention period among elective CS (5).

Prevalence of surgical site infection in our study was 13.5%. In the conventional group and the study group, the prevalence of surgical site infection was 18.4% and 8.6% respectively. This value was statistically significant with p value of 0.001. This improvement in our study can be due to better compliance of bundle of care in the intervention group.

In an interventional study conducted for 14 months by implementing multidisciplinary team approach designed based on evidence-based interventions, had a prevalence of SSI as 6.7% and it reduced to 3.45% at the end of the study with p value of 0.006. This study implemented interventions including preoperative showering, avoidance of hair removal, preoperative antibiotics, and correct skin preparation technique and drying time (6).

Incidence of surgical site infections in PGIMER and Civil hospital were 11.1% and 8.5% respectively among elective CS. During baseline period, all the SSIs in the PGIMER were superficial. Among civil hospital centre, 91% of the infection were superficial and remaining 9% were deep infections. During intervention period, incidence of SSI in PGIMER and civil hospital centres were 3.7% and 8.2% respectively. All the infections in the PGIMER centre were superficial, whereas in the civil hospital, 96.2% of the infections were superficial and 3.8% of the infection was organ/ space infection (5).

In a retrospective study conducted in UAE, the prevalence of surgical site infection post c-section was 1.4%. Gestational age was found to be an independent factor for predictor of surgical site infection in this study (7). Overall incidence of surgical site infection in the intervention study was 1.89% (8).

Conclusion

After implementing the care bundle in our study, the prevalence of study group was 8.6% when compared to the convention group, which reported 18.4%. Majority of the study participants had superficial surgical site infection (n=30, 73.2%). A significant reduction in the number of surgical site infections in the intervention group was reported in our study.

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