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Original Research Article

Frequency of Wound Infection in Emergency Caesarean Section

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Abstract: ***Background:*** One of the most prevalent complications of a cesarean section, especially during emergency cases is surgical site infection (SSI), which leads to maternal morbidity, prolonged hospital stay, and healthcare expenses. ***Objective:*** To determine the frequency of wound infections in patients' undergoing emergency caesarean section. ***Methods:*** The study was a cross-sectional study that was carried out at the Department of Obstetrics and Gynecology, Dr. Ruth K.M. Pfau Civil Hospital within a period of six months. The non-probability consecutive sampling was adopted to enroll 188 women of 18 -45 years old with gestational age of 32 weeks and above who were undergoing emergency cesarean delivery. The evaluation of wound infection on the tenth postoperative day was done using the clinical manifestations and laboratory data, as well as the outcome of wound culture. The SPSS version 26.0 was used to analyze the data; evidently, the data were stratified and multivariate logistic regression was used to determine independent predictors of infection. ***Results:*** The overall wound infection rate was 34 (18.1). Multivariate analysis found three independent risk factors which include maternal age over 30 years (adjusted OR: 2.12; 95% CI: 1.01-4.43; p=0.047) and obesity (BMI ≥30 kg/m 2) (adjusted OR: 2.85; 95% CI: 1.2960.56; p=0.009). Parity and gestational age were other factors that were not significantly linked with wound infection.
Conclusion: Wound infection is another serious complication when emergency cesarean section is performed especially on old and obese women. To minimize postoperative morbidity, it is important to follow infection prevention guidelines and optimize the perioperative care.

Keywords: Emergency cesarean section; Maternal morbidity; Risk factors; Surgical site infection; Wound infection.

INTRODUCTION

Surgical site infection (SSI) has remained among the most prevalent complications in after cesarean section and has remained a major cause of maternal morbidity, extended hospital stay and high healthcare expenses in most parts of the world [1]. The latest epidemiological reports have shown inconsistent rates of post-cesarean SSIs in various regions, which is evidence of inconsistency in infection control measures, patient demographics, and healthcare facilities [1, 2]. This issue is especially worrying when it comes to the low- and middle-income nations, where the lack of resources and delayed access to medical care can also increase the risk of infection [2].

The incidence of the SSI post cesarean delivery is reported to be very diverse with institutional and population based studies tracing various factors in relation to SSI [3]. A meta-analysis and systematic review in Saudi Arabia showed that the prevalence of post-cesarean SSI pooled was significant, and that despite the current progress in the management of the perioperative condition, the burden of infection remained high [4]. Equally, meta-analyses carried out in the regions and globally have demonstrated that there is a large degree of variation in the incidence of SSI and that the determinants of SSI, like rather obesity, long labor, and premature rupture of the membranes and lack of proper antibiotic prophylaxis, among others, are modifiable [5].

There are some maternal comorbidities that also predispose to postoperative wound infection. Indicatively, gestational diabetes has been found out to be an independent predictor of post-partum cesarean section SSI, probably because of poor immune response and delayed wound healing [6]. Infection analyses indicate that in infected wounds, gram-positive cocci and gram-negative bacilli are predominant and it is necessary to adopt the right antimicrobial stewardship and infection prevention measures [7].

World Health Organization has published detailed recommendations on prevention of surgical site infections and has suggested evidence-based interventions such as the administration of timely antibiotic prophylaxis, adequate surgical hand-preparation and standard wound care practices [8]. Regardless of these recommendations, other local studies still report substantial post-cesarean section wound infection rates especially in emergency departments where optimizing the preoperative period might not be possible [9,10].

Emergency cesarean section may be carried out in emergency situations and is usually carried out after a long labor, when the fetus is in distress or the mother has complications. The conditions can put patients at risk of experiencing postoperative wound infection than in elective surgeries. Thus, the identification of the frequency of wound infection in emergency cesarean section will help to identify the lapses in perioperative care and establish specific preventative measures. The purpose of the study is to evaluate the prevalence of wound infection among patients who receive emergency cesarean section, as well as to add to the existing literature on the topic of postoperative maternal outcomes.

METHODS

This was a cross-sectional study carried out in the Department of Obstetrics and Gynecology, Dr. Ruth K.M. Pfau Civil Hospital. The study was started after receiving the ethical approval [IRB-4168/DUHS/Approval/2025/457] of the Institutional Review Board (IRB) of Dow University of Health Sciences.

All the processes were performed in line with the institutional ethics. All participants signed written informed consent after receiving the explanation of the purpose and methodology of the study. Calculation of the sample assigned was done using the World Health Organization sample size calculator using an expected frequency of wound infection of 39.4% among women undergoing emergency cesarean section as discovered in a past study [11], a 95% confidence level and a margin of error of 7%. The sample size calculated was 188. The sampling method used was non-probability consecutive sampling.

The population of the study included women of 18-45 years of age having a gestational age of at least 32 weeks and an emergency cesarean section due to a singleton pregnancy. There were any parity and gravida women who made an informed consent. The patients who had undergone elective cesarean section, known to have antibiotic allergy, had a known underlying immunosuppressive condition (e.g., HIV infection, organ transplantation, active chemotherapy), had a pre-existing chronic wound or infection before surgery were excluded to confound the results.

The process of data collection commenced with the approval of IRB. Patients who came to the labor room were evaluated based on the set inclusion and exclusion criteria. Sudden demographic and clinical data were collected on an ordered proforma as baselines. BMI was calculated as the weight in kilograms/height in meters squared (kg/m ^{2}). The consultants and the surgical team that were on duty carried out emergency cesarean based on the hospital procedures. Patients were treated in postoperative procedures as per the routine institutional policies and were discharged. All the subjects were contacted after 10 days of the operation to evaluate wound infection relying on the objective operational parameters, such as pain (VAS above 3), tenderness, local swelling, fever (80 or above), purulent discharge, leukocytosis (WBC above 12,000/mm^3), or positive wound culture.

The entry and analysis were carried out with the help of IBM SPSS Statistics for Windows, Version 26.0 (IBM Corp., Armonk, NY, USA). The ShapiroWilk test was used to determine normalcy of continuous variables. Continuous variables were age, gestational age, height, weight, and BMI, which were reported in the mean + standard deviation or median with interquartile range as the case implies. Nominal variables such as residential status, parity, gravida, surgical information and wound infection (yes/no)

were displayed as frequencies and percentages. Such effect modifiers as age, gestational age, BMI, parity, and gravida were controlled with the help of stratification. Comparisons that were to be done post-stratification were done by the Chi-square test or by Fisher exact test where necessary with a significant level of p 0.05. The multivariate logistic regression analysis was performed to correct the possible confounders and the independent impact of the relevant variables on the prevalence of wound infection at the 5% level of significance was determined.

RESULTS

A total of 188 women who underwent emergency cesarean section were included in the analysis. The mean age of participants was 28.6 ± 4.9 years, and the mean gestational age at delivery was 37.8 ± 2.1 weeks. The overall frequency of wound infection was 34 (18.1%).

Sociodemographic and obstetric characteristics of the study population are presented in **Table 1**.

Table 1: Baseline Characteristics of Study Participants (n = 188)

Variable	Mean ± SD / n (%)
Age (years)	28.6 ± 4.9
18–25 years	62 (33.0%)
26–35 years	98 (52.1%)
>35 years	28 (14.9%)
Gestational age (weeks)	37.8 ± 2.1
≥37 weeks	149 (79.3%)
<37 weeks	39 (20.7%)
BMI (kg/m²)	27.4 ± 3.8
Normal (18.5–24.9)	54 (28.7%)
Overweight (25–29.9)	89 (47.3%)
Obese (≥30)	45 (23.9%)
Primigravida	71 (37.8%)
Multigravida	117 (62.2%)
Primipara	64 (34.0%)
Multipara	124 (66.0%)
Urban residence	121 (64.4%)
Rural residence	67 (35.6%)

The frequency of wound infection and its distribution across selected clinical variables are shown in **Table 2**.

Table 2: Frequency of Wound Infection According to Clinical Variables (n = 188)

Variable	Wound Infection n (%)	p-value
Overall frequency	34 (18.1%)	—
Age ≤30 years (n=118)	16 (13.6%)	0.041
Age >30 years (n=70)	18 (25.7%)	
BMI <30 kg/m² (n=143)	19 (13.3%)	0.018
BMI ≥30 kg/m² (n=45)	15 (33.3%)	
Primigravida (n=71)	9 (12.7%)	0.162
Multigravida (n=117)	25 (21.4%)	
Gestational age <37 weeks (n=39)	10 (25.6%)	0.214
Gestational age ≥37 weeks (n=149)	24 (16.1%)	

On adjusted analysis, maternal age greater than 30 years and obesity (BMI ≥30 kg/m²) were independently associated with wound infection following emergency cesarean section, whereas gravida status and gestational age did not show statistically significant association.

Multivariate logistic regression analysis was performed to determine independent predictors of wound infection, as shown in **Table 3**.

Table 3: Multivariate Logistic Regression Analysis for Factors Associated with Wound Infection

Variable	Adjusted OR	95% CI	p-value
Age >30 years	2.12	1.01–4.43	0.047
BMI ≥30 kg/m²	2.85	1.29–6.29	0.009
Multigravida	1.54	0.69–3.44	0.285
Gestational age <37 weeks	1.72	0.73–4.06	0.218

DISCUSSION

The current research showed a prevalence rate of 18.1% in post-emergency cesarean section wound infection. SSI in cesarean sections has been a significant cause of postpartum morbidity, extended hospital stay, and higher health expenditure. Modern literature also focuses on the fact that cesarean wound infections still pose a serious clinical issue even in the face of aseptic procedures and antibiotic prophylaxis [11].

Our study has observed an approximate frequency which has been reported in recent cohort studies but the world estimates differ widely due to the nature of the population and the method of conducting the surveillance. The significance of the optimal approach to antimicrobial use in high-risk groups was demonstrated through the evidence of a landmark randomized control trial that showed that adjunctive azithromycin prophylaxis can help to significantly decrease the incidence of post-cesarean infections [12]. On the same note, a Cochrane review established that prophylactic antibiotics significantly decrease postoperative infectious morbidity relative to no prophylaxis which supports the need to have a universal method of administering perioperative antibiotics [13].

In our analysis, advanced maternal age and obesity were independent variables with wound infection. The results align with previous studies that have observed maternal obesity, long duration of operation, and comorbidities to be significant factors of post-cesarean SSI [14]. There was also population-based surveillance data of Kuwait showing a rising tendency of SSI and that obesity and emergency surgeries are the major predictors [15]. Emergency cesarean sections by definition involve greater risk of infectiousness because of insufficient preparation before surgery, long labor, and ruptured membranes. The importance of the preventive strategies is further justified by the fact that the evidence-based practices that have been implemented to minimize the rates of cesarean SSI, such as a standardized skin preparation, glycemic control, and timely antibiotic intake, proved to be effective in decreasing the rates of the phenomenon [16]. The independent predictors of infection have also been identified in prospective cohort data as elevated BMI, anemia, and long rupture of membranes, and prolonged rupture of membranes, and emergency surgery, which correspond to the risk profile in the present study [17]. A comparable predictors have been described in an Ethiopian cohort, with emergency Cesarean delivery and maternal comorbidities being significant predictors of the risk of SSI [18].

The global meta-analytic data provide pooled SSI rates in the post-cesarean section and suggests rates of 3 to 15 per cent with significantly high rates in resource-constrained environments [19]. The relatively high rate in the case of our research could be attributed to the burden of emergency cases, patient-related risk factors, and institutional dissimilarities in the perioperative practice.

The time of antibiotic prophylaxis has also been reported to have an effect on the risk of SSI. A large systematic review showed that pharmacokinetic administration up to 60 minutes before incision is a significant factor in reducing postoperative infection compared to a late administration [20]. Promoting compliance with evidence-based prophylactic timing measures could, thus, help to minimize the further decrease proportion of patients with wound infection in emergency cesarean sections.

In general, the results of this paper are in line with the available literature that proves that the occurrence of wound infection in the post-emergency cesarean section is a clinically-important complication, especially in older and obese women. The mechanisms to decrease the postoperative infectious morbidity among this high-risk population should focus on strengthening infection prevention bundles, optimizing antibiotic prophylaxis and enhancing the perioperative risk stratification.

Limitations of study: This research was limited in various ways. First, it took place in one tertiary care hospital, which might not be representative of the extrapolation of the findings to the other settings, especially in the rural or private healthcare setting. Second, the research utilized a non-probability consecutive method of sampling, which could present the selection bias. Third, only ten days were allowed after surgery, which might be insufficient to determine late onset surgical site infections especially in patients with slow wound healing or who are discharged prematurely. Also, some of the possible confounders like intraoperative blood loss, operation time and differences in surgery procedures were not fully captured which might have affected the rates of infection observed. Lastly, observational design does not allow making causal assumptions when it comes to risk factors, and residual confounding cannot be completely eliminated.

CONCLUSION

Post-emergency cesarean section wound infection is a major postoperative complication and the frequency in this study population is 18.1%. The independent predictors of infection were found to be advanced maternal age and obesity. These data outline the necessity to follow the principles of infection prevention, optimize perioperative antibiotic prophylaxis, and focus on mitigating the risks, especially in women at high risk. Prompt

prevention and treatment of the risk factors that can be modified may decrease the postoperative surgical site infection burden and improve maternal outcomes in emergency cesarean delivery.

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