



SURGICAL SITE INFECTIONS (SSI); POST-CAESAREAN RATE AND FACTORS

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ABSTRACT... Objectives: The objective of this study is to determine the frequency of post-caesarean SSI and determine the frequency of factors leading to post-caesarean SSI. **Study design:** Descriptive case series. **Setting and duration:** Department of Obstetrics & Gynaecology, District Headquarters Teaching hospital, Rawalpindi from June 2015 to Nov 2015. **Materials and methods:** Through non-probability consecutive sampling, 180 patients who have undergone caesarean section who fulfilled the inclusion criteria were enrolled in the study. The data was collected manually on a formatted proforma. All patients suspected of having SSI within 30 days of CS were identified for any pre-operative factors leading to their SSI. Suspected SSI was confirmed by Culture testing of wound swabs, prior to commencement of an antibiotic treatment or as soon as the diagnosis was suspected. Data was analyzed using SPSS version 20. **Results:** Of the 180 patients, 8 suffered from SSI (4.4%). The average age for the patients was 25.42 ± 3.68 years. The operations were elective in 38.9% of the cases and 61.1% were urgent. On data analysis, Diabetes, Anaemia and emergency CS were significantly associated with SSI with a p-value less than 0.05. **Conclusion:** SSI continues to be a significant post-operative complication. A thorough assessment of risk factors that predispose to SSI and their prevention may help in reduction of SSI rates. We recommend that above mentioned factors to be taken into consideration before planning obstetrical surgeries. Prevention of these infections should be a clinical and public health priority.

Key words: Surgical site infection, risk factors, Cesarean section.

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INTRODUCTION

The Caesarean Section (CS) nowadays is a commonly performed surgical procedure. It is a clean category surgery according to classification.¹ Post-caesarean section SSI is a frequent occurring. It poses a substantial health risk, with regards to prolonged hospital stay, morbidity, mortality, costs, and inappropriate use of broad-spectrum antibiotics leading to antimicrobial resistance.²

According to various published studies, post-caesarean section SSI rates range from 6-27%.² This may be due to the differences in the criteria used for the diagnosis of infections, different post-operative surveillance periods and the use of various antibiotics.¹ Royal College of Obstetrics and Gynaecology's green top guidelines quote benchmark SSI rate of 6.4%¹ whereas; others report it as high as 9.6%.³

According to CDC, SSI is as an infection which occurs after surgery either at or in proximity to operative field during first thirty days of operation.⁴ This infection occurs when the bacteria colonize and infect the incision site. The surgical site infection rate depends on multitude of factors. Out of those factors some need special attention as there are preventable strategies for them taking into account these measures, can substantially reduce incidence of SSI and associated morbidity. E.g. administration of antimicrobial drugs prior to surgery, nature of operation whether elective or emergency, pre – existing co – morbid diseases of mother and various obstetric situations.²

Identification and surveillance of SSI is an integral component of infection control programme.⁵ SSI leads to prolonged hospital stay with direct health and financial implications.⁶

As the independent factors for SSI after caesarean-section have not been well documented, despite the large number of caesarean sections performed and relatively common occurrence of associated SSI. In our study we will endeavor to determine the rate of SSI in our setups in comparison against reported rates elsewhere and also identify the factors which affected post-caesarean SSI rates after lower segment transverse CS and to incorporate them into approaches for prevention and surveillance of SSI after surgery.

METHODS

Our study was descriptive case series, which took place in Gynecology and Obstetrics Department, DHQ Hospital Rawalpindi with effect from June 2015 to Dec 2015. These patients were followed up for any evidence of SSI up to 30 days post-operatively. The data of the patients collected from hospital registry was recorded on pre – designed proforma. The pre disposing factors for SSI to be studied included age, body mass index, presence or absence of diabetes and Anaemia, duration of PROM prior to CS and type of CS whether elective or emergency.

The patients were divided in two groups on the basis of age, first group was of patients aged < 35 years and second group included patients aged 35 years or more. Regarding BMI, groups were; equal to or less than 25 and more than 25. We recorded the data of all patients undergoing cesarean section between the ages of 15 to 49 years regardless of gestational age and parity in Gynecology and Obstetrics Department, DHQ Hospital Rawalpindi. Patients excluded from the study were cases where any non-sterile techniques or measures were used e.g. Dai handled cases or those with trial of labor at some clinic, patients having history of other surgeries except caesarean, immunocompromised patients, patients lost to follow-up, those with deep SSI and organ space infections, SSI reported after 30 days of caesarean and cases of unintentional perioperative hypothermia. Those patients with SSI who reported to our hospital setting, but were operated elsewhere were also not included in our study. Patients having slight redness, inflammation and tenderness, but

without gape wound or without discharge, were categorized as being probably infected. These patients were called for follow up in OPD, until inflammation resolved or they became definitely infected and so grouped subsequently.

All patients in study population were given antibiotic prophylaxis 30 minutes or immediately before incision or at rupture of membranes (CEFTRIAXONE 1g).

Statistical Package for the Social Sciences (SPSS) v. 20 was used to analyze the data. Descriptive variables were used to describe the data.

RESULTS

A total number of 180 patients' details were collected and among those 8 patients developed post caesarean Surgical Site Infection. The overall incidence of the surgical site infections in the present study was 4.4%.

Incidence of SSI was more in younger age group 3.9 % (n=6).

Incidence of SSI among patients who were overweight (i.e. BMI \geq 25 kg/m²) was 9.2% and 1.7% among patients with BMI < than 25 kg/m²

Among various risk factors studied obesity, anemia, diabetes and urgency of surgery were found to have significant association (p value < 0.05) with SSI. Out of 8 patients who developed SSI, 7 were anemic (8.8%) making this a major risk factor for SSI.

3 out of 8 patients (12%) with SSI, on retrospective analysis were found to have poor glycemic control.

All patients with post caesarean SSI were found to be operated for emergency indication. No elective patients developed SSI.

The incidence of SSI was equal among patients with intact membranes and those with PROM.

| Variable | Classification | Total | | SSI + | | SSI - | | P value |
|--------------------------|----------------|-------|------|-------|-----|-------|------|---------|
| | | N | % | N | % | N | % | |
| Age Group (yrs) | < 35 | 155 | 86.1 | 6 | 3.9 | 149 | 96.1 | 0.353 |
| | ≥ 35 | 25 | 13.9 | 2 | 8 | 23 | 92 | |
| BMI (kg/m ²) | < 25 | 115 | 63.9 | 2 | 1.7 | 113 | 98.3 | 0.019 |
| | ≥ 25 | 65 | 36.1 | 6 | 9.2 | 59 | 90.8 | |
| Anemia | Yes | 80 | 44.4 | 7 | 8.8 | 73 | 91.3 | 0.012 |
| | No | 100 | 55.6 | 1 | 1 | 99 | 99 | |
| Diabetes | Yes | 25 | 13.9 | 3 | 12 | 22 | 88 | 0.048 |
| | No | 155 | 86.1 | 5 | 3.2 | 150 | 96.8 | |
| Type of Surgery | Emergency | 110 | 61.1 | 8 | 7.3 | 0 | 0 | 0.021 |
| | Elective | 70 | 38.9 | 0 | 0 | 70 | 100 | |
| PROM | No | 110 | 61.1 | 4 | 3.6 | 106 | 96.4 | 0.482 |
| | < 24 hrs. | 49 | 27.2 | 2 | 4.1 | 47 | 95.9 | |
| | > 24 hrs. | 21 | 11.7 | 2 | 9.5 | 19 | 90.5 | |

Table-I.

DISCUSSION

The independent factors for SSI after caesarean section have not been well documented, despite the large number of caesarean sections performed and relatively common occurrence of associated SSI.

The development of wound infection involves multiple factors. Skin serves a protective function to guard the human body against microorganisms. If continuity of skin breaches e.g. after surgical incision, this function of skin will be lost hence rendering the body prone to infection.

Compared to women giving birth vaginally women undergoing CS have a five to twenty fold greater chance of getting infected.⁷

In this study, we reviewed 180 caesarean sections to determine the frequency of SSI and other factors leading to its development. These remain a substantial problem for patients undergoing procedures in spite of advances in surgical techniques and medical care.

Different factors which may have an influence on the development of SSI include, preexisting comorbidities of the mother, obstetric situations and nature of caesarean sections whether emergency or elective.²

In our study the rate of SSI came out to be 4.4%. Ward et al. in a collaborative multi-center study of post caesarean SSI in Britain, showed SSI prevalence of 8.9%.⁶

In another study done by Ghuman M, et al showed a post-caesarean SSI rate of 5%.¹

This rate is lower than that reported by other studies due to smaller sample size, better hygiene of our study population and better sterilization in our hospital setting.

Development of post caesarean SSI depends on a multitude of factors and in any given case, SSI could be due to an isolated factor or a result of interplay of different factors.

We studied Age, BMI, Diabetes, Anaemia, Duration of PROM prior to CS and type of CS as risk factors of SSI.

In our study, patients more than 35 years of age had more incidence of SSI as compared to patients of age less than 35 years. This is in comparison with other studies which have also shown increased SSI rates among older patients.^{9,10,11} This difference is probably due to reduced immune defense mechanisms in older

population making them more susceptible to SSI.

In the present study, obesity ($BMI \geq 25.0$) has been found to significantly influence the presence of SSI. Similar results were found by Ashby et al¹², Xue et al¹³, and Giles et al¹⁴

Obesity is a well-studied risk factor for SSI development. The pathophysiology involves increased amount of avascular subcutaneous adipose tissue, requirement for larger skin incisions, defective defense mechanism and poor penetrative power of antibiotics in avascular subcutaneous tissue.¹

Among anaemic patients, 8.8% had SSI. Anemia and wound infection are strongly linked in literature as documented by Zaman F.¹⁵ and Dunne JR et al.¹⁶

In our study rate of SSI among diabetics was 12%. Hence diabetes mellitus was found to be a significant pre disposing factor for SSI with a p value of 0.048. This is consistent with National Academy of Science report of higher rate of infection in patients with Diabetes mellitus.¹⁷ Comparable results were found in various studies involving different surgical procedures.^{13,14}

Other workers including Yang K et al¹⁸ Ibtisam K Afifi et al¹⁹ Aikaterini Masgala et al²⁰ and Guo-qing et al²¹ concluded that the rate of SSI has an independent association with hyperglycemia.

Among diabetics deranged blood sugar levels result in neutrophil dysfunction and subsequent delayed wound healing resulting in increased SSI rate.²¹

Wound healing is impaired due to uncontrolled hyperglycemia and low hemoglobin level leading to increased rate of SSI.

In our study, it was seen that the patients having PROM for a longer duration had increased SSI rate in comparison to those with intact membranes. Some studies are in agreement with these findings. Pre-labour rupture of membranes (PROM) > 24 hours was associated with 25.6% of SSI as reported by De D et al.⁵

SSI rate was increased in emergency surgical procedure probably owing to insufficient time for patient's preoperative preparation and severity of indication leading to that emergency procedure.²²

Our study showed increased incidence of SSI among emergency caesarean section of 7.3%.

This study showed that emergency cesarean sections were a major risk factor for development of SSI, which is in agreement with other studies conducted elsewhere.²³ This causation is likely due to lack of time for necessary infection preventive measures and PROM before surgery.²⁴

This study has certain limitations e.g. being conducted in a single hospital setting, smaller sample size and case finding methodology. Moreover, patients were followed for only up to 30 days postoperatively.

In this study, important contributory factors leading to post cesarean SSI were identified. Hence reminding the hospital staff that there is a need to take necessary solid measures in order to reduce infection rate and to implement preventive strategies for high risk individuals.

Such measures include good glycemic control in patients with diabetes, maintenance of hemoglobin levels to prevent anemia, preoperative skin antisepsis, use of sterile dressings and routine use of prophylactic antibiotics.²⁵

CONCLUSION

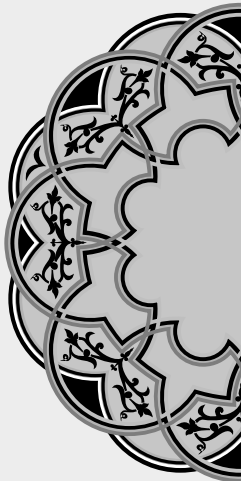
SSI continues to be a significant post-operative complication. A thorough assessment of risk factors that predispose to SSI and their prevention may help in reduction of SSI rates. Hence it is recommended that all the aforementioned factors must be taken into account before conducting any surgical procedure. Prevention of these infections should be a clinical and public health responsibility.

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*“Even fools seem smart
when they are quiet.”*

Proverbs

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