**Original article:**

**Risk factors for wound complications following caesarean delivery**

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**Abstract:**

Aim: The study aimed to investigate the incidence rate and risk factors associated with surgical site wound infection in women who had undergone cesarean section.

Methodology: The study was a prospective observational study conducted at a tertiary medical college hospital from January 2021 to July 2022. A total of 172 women who had developed surgical site wound infection after cesarean section were included in the study, and their data was collected.

Results : The study found that the incidence rate of wound infection was 2.12%, and the most common postoperative wound complications were wound gape (83.72%), followed by wound hematoma (8.14%) and stitch abscess (6.40%). The study also found that most patients who developed wound infection had undergone an emergency cesarean section (94.19%).

Conclusion: The findings of the study suggest that increased attention to wound care practices is necessary to prevent surgical site wound infections, particularly in emergency cases. Further research could focus on the impact of different suture materials and techniques on wound infection rates and wound healing.

Keywords: Caesarean section, surgical site infection, risk factors, wound complications, suture material

**Introduction:**

Several risk factors have been found to be associated with post cesarean wound infections. Known risk factors for post cesarean SSIs include prolonged rupture of membranes, prolonged labour, multiple vaginal examinations and emergency CS. 1  Along with this, medical conditions such as diabetes mellitus, obesity and anaemia also predispose mothers to SSIs following CS. **(2)** These infections may be a superficial or deep incisional infection or may extend to involve organ or body space. Accordingly, SSIs are classified based on structures involved and depth of tissue involvement. **(3)** Surgical site infection is one of the common complications of caesarean section. For the majority of patients, it rarely represents a threat to life. But it may produce far reaching morbidity and socio-economic consequences for the patient and the healthcare services. Maternal morbidity related to infections after caesarean delivery was observed to be eight-fold higher than after vaginal delivery. **(4)** The diagnosis of wound infection is requires detailed history taking, physical examination and laboratory work. Wound infection usually starts after two days post-surgery with discharge of serosanguinous or purulent discharge from the surgical site.(5) Diagnosis is obvious if the patient is febrile and the wound is unusually tender, inflamed and indurated or if drainage of purulent material is observed on palpation.

**Material and methods:**

The study was a prospective observational study that was conducted at a tertiary Medical College Hospital from January 2021 to July 2022. The Institutional ethical committee had approved the study before it began, and data collection took place during this period.

A total of 172 women who had undergone a caesarean section and developed surgical site wound infection were included in the study if they were willing to participate and met the inclusion criteria.

Women who delivered vaginally, had wound infection after 30 days following surgery, were operated outside this hospital, or required obstetric hysterectomy/any other surgical complication were excluded from the study. After enrollment, the purpose of the study was explained to the participants, and informed consent was obtained.

The confidentiality of the data was ensured, and the participants were allowed to withdraw from the study at any point.

**Results:**

The mean age of the patients was 24.02 + 4.27. we observed that maximum number of patients belonged to 18-22yr age group (44.76%) followed by 23-27 yr group (33.13%). Whereas very few patients were present in 33 and above age group.

We found that 93.6% patients were from rural background.

**Table 1) Incidence Rate of wound infection**

|  |  |  |
| --- | --- | --- |
| **Incidence Rate of wound infection** | **Number** | **Percentage** |
| Wound infection | 172 | 2.12 % |
| No h/o wound infection | 7938 | 98 % |
| Total cases | 8100 | 100 % |

# Table 2) Postoperative wound complications

|  |  |  |
| --- | --- | --- |
| **Wound complications** | **Number** | **Percentage** |
| Wound gape | 144 | 83.72 % |
| Wound hematoma | 14 | 8.14 % |
| Stich abscess | 11 | 6.40 % |
| Burst abdomen | 3 | 1.74 % |
| Total | 172 | 100.00 % |

We found that 83.72 patients who developed infection presented with wound gape. While 8 % of patients had wound hematoma and 6% patients had skin abscess.

# Table 3) Suture material

|  |  |  |
| --- | --- | --- |
| **Suture material** | **Number** | **Percentage** |
| Vicryl | 141 | 81.98 % |
| Silk | 31 | 18.02 % |
| Total | 172 | 100.00 % |

# Table 4) Skin suturing technique

|  |  |  |
| --- | --- | --- |
| **Skin suturing technique** | **Number** | **Percentage** |
| Subcutaneous | 141 | 81.98 % |
| vertical mattress | 31 | 18.02 % |
| Total | 172 | 100.00 % |

We observed that subcutaneous sutures taken with vicryl had more chances of infection as compared to vertical mattress suture with silk.

|  |  |  |
| --- | --- | --- |
| **Type of cesarean** | **Number** | **Percentage** |
| Elective | 10 | 5.81 % |
| Emergency | 162 | 94.19 % |
| Total | 172 | 100.00 % |

**Table 5: Type of cesarean (n=172)**

We observed that 94.19 % patients who developed wound infection had undergone emergency cesarean section.

**Discussion:**

The study found that the mean age of patients who developed surgical site wound infection after caesarean section was 24.02 + 4.27 years, with the majority of patients belonging to the 18-22 years age group. The high incidence rate of wound infection was found to be 2.12%, with most patients having a rural background. The most common postoperative wound complications were wound gape (83.72%), followed by wound hematoma (8.14%) and stitch abscess (6.40%).

Regarding the type of suture material, Vicryl was used in the majority of cases (81.98%) and was found to have more chances of infection compared to silk when used in subcutaneous sutures. The majority of patients who developed wound infection had undergone an emergency cesarean section (94.19%), indicating that emergency cesarean sections may be associated with a higher risk of wound infection.

These findings suggest the need for increased attention to wound care practices in caesarean section surgeries, particularly in emergency cases. Further research could focus on the potential impact of different suture materials and techniques on wound infection rates and wound healing. Overall, the study highlights the importance of addressing and preventing surgical site wound infections to ensure better postoperative outcomes for patients.

We have observed that only 10.46% were taken bath before the cesarean section. We observed that prmipara and multipara comprised of 43 and 48 % patients respectively while only 7 % .of the patients were grandpara.

Most of the deliveries (69.76 %) occurred at the term period i.e. full gestation.15% of newborns were born as preterm and post term each . We observed that 94.19 % patients who developed wound infection had undergone emergency cesarean section. We found that subcutaneous sutures taken with vicryl had more chances of infection as compared to vertical mattress suture with silk. We observed that almost half of the patients were having history of previous LSCS.

We found that 83.72 patients who developed infection presented with wound gape. While 8 % of patients had wound hematoma and 6% patients had skin abscess. We observed that 68 % cases of postcesarean infection were caused by gram positive organisms like MRSA. It was also observed that in 25% cases cause of wound infection is gram negative organisms like acinetobactor, E coli, enterobacteraceae, klebsiella, and pseudomona. Approx. 7 % cases did not grow any organism on culture. Linezolid was the most preferred antibiotic. Linezolid was the preferred antibiotic for the treatment for MRSA. Gram negative bacteria were treated with antibiotic according to culture and sensitivity report. The average duration of hospital stay was 21.05 + SD 3.74 days. this period was calculated from the day of admission of patient for cesarean section.Top of Form

Devi et al **(6)** 2018 reported Patients with anemia were seen to be more prone to SSI. Anemia diminishes resistance to infection and is frequently associated with puerperal sepsis. In study by Devi et al **(6)** 2018, 48% of the patients had anemia which is consistent with other study.

Poor control of glucose during surgery and in the perioperative period increases the risk of infection and worsens outcome of sepsis. Hypertensive disorders were seen in 25% of the women in study by devi et al **(6)** 2018 which correlates with incidence seen in Schneid - Kofman et al **(8)** 2000 study.

PROM is seen in 27% of cases in study by devi et al **(6)** 2018. PROM associated with the largest bacterial inoculum and liquor gets infected and infection supervenes. Anaemia and Previous caesarean section were the most common high risk factors found in our study. Premature Rupture of Membranes and Post Caesarian Pregnancy in labour with Scar tenderness were the risk factors detected in study by K. Bhavani and et al.(7) 2017. *Deepika Panwar et al* **(9)***2021* reported the proportion of SSI was the highest among teenagers (8.1%), among those with ≥ 4 children (4%), and those who had secondary education (3.3%). SSI was significantly higher among emergency.

**Conclusion:**

Risk factors like high BMI, severe anemia, emergency caesarian delivery, no bath before caesarean section, prolonged labour, multiple per vaginal examination, low socioeconomic status, low educational status and previous CS were associated with the development of SSI.

**Study limitations:**

The limitation of this study was the lack of follow-up of patients who developed SSI after discharge from the hospital within 30 days of surgery and went to other institutes for management.

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