

ORIGINAL RESEARCH

Incidence and Risk factors in Surgical Site Infection following Cesarean Section

¹Jabeena Banoo, ²Nazia Abdur, ³Wajid Rana, ⁴Gokul Sharma¹Senior Resident, ^{2,4}Post graduate student, Department of Obstetrics and Gynaecology, SMGS Hospital, Jammu, J & K, India³Senior Resident, Department of Pediatrics, SMGS Hospital, Jammu, J & K, India**Corresponding author**

Gokul Sharma

Post graduate student, Department of Obstetrics and Gynaecology, SMGS Hospital, Jammu, J & K, India

Received: 14 November, 2023

Accepted: 17 December, 2023

ABSTRACT

Background: Cesarean Section (CS) is one of the most commonly performed surgical procedures in obstetrical and gynecological department. Surgical site infection (SSI) after a cesarean section increases maternal morbidity prolongs hospital stay and medical costs. **Aim:** To determine the incidence and risk factors of surgical site infections in women undergoing caesarean section (emergency and elective). **Materials and methods:** Present retrospective study included 76 patients between 20 -45 years of age who underwent CS in our hospital and were re-admitted within 6 weeks of CS for SSI. For patients who were hospitalized for SSI, cultures were routinely obtained and gentamicin along with Linezolid were administered in the absence of any contraindications and antibiotics were changed according to the sensitivity pattern obtained in culture report. In wound hematomas, we evacuated the clot under sterile conditions, ligated or cauterized the bleeding vessels and reclosed the wound. **Results:** Out of 76 cases of cesarean sections, 10 of them developed SSI with incidence rate of 13.15%. Among them, 80.00% were superficial incisional and 20.00% were deep incisional type of SSI with no organ space type. Patients with high BMI had 1.4-fold increased risk of SSI (OR 1.463; 95% CI 1.273-1.681, $P<0.001$). Likewise, patients with high fasting blood glucose levels had 1.2 increased risk of SSI (OR 1.21; 95% CI 1.06-1.37, $P=0.007$). Patients with high hemoglobin levels and short surgery time had a decreased risk of SSI (OR 0.532; 95% CI 0.408-0.695, $P<0.001$ and OR 0.947; 95%CI 0.909-0.987, $P=0.010$). Pus culture reports showed staph aureus, klebsiella, E.coli **Conclusion:** Multiple risk factors like age, obesity, High BMI, Low Hb, medical complications during pregnancy, prolonged duration of rupture of membrane for more than 18 hours, and more than five vaginal examinations before the procedure increases the risk of surgical site infection (SSI) following cesarean section.

Key words: Caesarean section, maternal infection, surgical site infection

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution- Non Commercial- Share Alike 4.0 License, which allows others to remix, tweak, and build upon the work non- commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

INTRODUCTION

Motherhood is a life-changing event. Successful physiological, as well as psychological, adjustment will be compromised when the arrival of the baby is coupled with recovery from major abdominal surgery and coping with the pain and discomfort of an abdominal wound. Difficulties are compounded when SSI develops, especially in today's climate of early hospital discharge, which leaves women to cope at home, sometimes with little practical and emotional support.¹

Cesarean section (CS) is one of the most performed major surgical procedures in obstetrics. When adequately indicated, it can prevent poor obstetric outcomes and can be a life-saving procedure for both the mother and the fetus. Surgical Site Infection (SSI) is defined as an infection which occurs within 30 days after a surgical procedure.

Types of it are: superficial incisional primary and secondary SSIs, deep incisional primary and secondary SSIs, organ/space SSIs: involving structures deeper than muscle and fascia space. The risk factors include

duration of rupture of membranes, emergency CS, lack or improper use of preoperative prophylactic antibiotics and onset of labor.²

The rates of SSI after cesarean section reported in the literature range from 3% to 15%, depending on the surveillance methods used to identify infections, the patient population, and the use of antibiotic prophylaxis. Maternal infectious morbidity has been shown to be eight-fold higher after cesarean delivery than after vaginal delivery. Due to the worldwide continuous rise in the incidence of cesarean deliveries, the number of women with postpartum infection is expected to increase. The SSI after cesarean section causes physical, psychological and economical burden to woman, her family and to the community.^{3,4}

Present study aimed to determine the incidence and risk factors of surgical site infections in women undergoing caesarean section(emergency and elective)

MATERIALS AND METHODS

This is a retrospective study involving women who underwent labor and scheduled C-sections from

February, 2022 to August, 2022 at the SMGS, Obstetrics and Gynaecology. Present study included 76 patients between 20 -45 years of age who underwent CS in our hospital and were re-admitted within 6 weeks of CS for SSI.

Data was collected from patient using special Pro forma and direct observation of wound. Wound observation was done for the development of SSI on third, fifth post operative day and on the day of discharge. All the suspected surgical sites were evaluated irrespective of the day of operation until complete recovery. However, patient who developed infection after discharge were not included in the study due to incompleteness of follow up.

For patients who were hospitalized for SSI, cultures were routinely obtained and gentamicin along with Linezolid were administered in the absence of any contraindications and antibiotics were changed according to the sensitivity pattern obtained in culture report.

In wound hematomas, we evacuated the clot under sterile conditions, ligated or cauterized the bleeding vessels and reclosed the wound. All statistical analyses were carried out with SPSS 21.0 (Statistical Package for Social Sciences). An α value ≤ 0.05 was considered statistically significant.

RESULTS

Out of 76 cases of cesarean sections, 10 of them developed SSI with incidence rate of 13.15%. Among them, 80.00% were superficial incisional and 20.00% were deep incisional type of SSI with no organ space type.

Patients with high BMI had 1.4-fold increased risk of SSI (OR 1.463; 95% CI 1.273-1.681, $P < 0.001$). Likewise, patients with high fasting blood glucose levels had 1.2 increased risk of SSI (OR 1.21; 95% CI 1.06-1.37, $P = 0.007$). Patients with high hemoglobin levels and short surgery time had a decreased risk of SSI (OR 0.532; 95% CI 0.408-0.695, $P < 0.001$ and OR 0.947; 95% CI 0.909-0.987, $P = 0.010$).

Pus culture reports showed staph aureus, klebsiella, E.coli

Hemoglobin levels were lower in the SSI group and higher hemoglobin levels were protective against SSI.

Table 1:

	N=76	P VALUE
Age		0.67
Parity		0.522
Body mass index		<0.001
Gdm		0.967
Hypertension		0.906
Haemoglobin		<0.001
Emergency caesarian section		0.281
Operation time		<0.005
Fasting blood sugar		0.022

DISCUSSION

The CS rates have been increasing continuously in our country and all over the world. In India the Ceserian rates have crossed the WHO threshold of 15% , a severe public health concern. Consequently, the incidence of SSI following CS is gradually increasing. Similarly, Haidar et al. reported the incidence of SSI following CS as 6.5%.⁴

Surgical site infection following caesarean section found high rates in this study, which comprises 12.6%.⁵ Comparing to other studies conducted in different parts of the world, the SSI following CS was found to be lower in other studies: Oman study 2.66%,² US 5%,³ Norway 8.3 %,⁶. Similar rates were found in other studies conducted in UK 11.2% and Ethiopia 11.4%.^{7,8} However, higher rate (16%) was found in studies conducted in US and India (24.2%) before intervention. In a retrospective study done in Patan hospital in Nepal, the SSI rate was found to be only 2.7% which is lower compared to this study. However, a randomized trial comparing skin closure in cesarean section conducted in Chitwan showed that, overall wound complications rate for the entire cohort was found 15.2%.

In a systematic review of the maternal intrinsic risk factors associated with SSI following cesarean section, obesity and were concluded to be common risk factors for the overall SSI . Obesity was shown to increase the risk of surgical site complications such as seroma, hematoma, and dehiscence by at least 2-3 times. According to our Study, high fasting blood glucose level is risk factor for SSI. Hyperglycemia, known to be associated with disturbed angiogenesis, leads to impairment in wound healing. In a study of Guzman et al., every 100 ml blood loss was found to increase the risk of SSI by 1.3 times.¹⁰

In another study, in patients who had blood loss requiring postpartum transfusion, the incidence of SSI was significantly higher.¹¹

In present study, we found that hemoglobin levels were lower in the SSI group and higher hemoglobin levels were protective against SSI

Optimum weight gain should be offered according to BMI and if required, patients should be referred to dietitians for professional support. If high fasting blood glucose levels are determined in the first antenatal visit, close monitoring and adequate control of blood glucose should be the target and endocrinologic consultation should be sort if required. Anemia should be diagnosed and treated promptly with appropriate iron supplementation either by oral or parenteral route. Surgical procedure should be performed under maximum sterile conditions and operation time should be optimum.

CONCLUSION

Surgical site infection following caesarean section is common. Various modifiable risk factors were observed in this study. Multiple risk factors like age, obesity, High BMI, Low Hb, medical complications

during pregnancy, prolonged duration of rupture of membrane for more than 18 hours, and more than five vaginal examinations before the procedure increases the risk of surgical site infection (SSI) following cesarean section.

REFERENCES

1. Gould D. Cesarean section, surgical site infection and wound management. *Nursing Standard* 2006 Nov;21(32):57-66.
2. Hamilton BE, Martin JA, Osterman MJK, Curtin SC, Matthews TJ. Births: Final Data for 2014. *National Vital Statistics Reports*, vol. 64, no. 12. National Center for Health Statistics: Hyattsville, MD, USA, 2015.
3. Olsen MA, Butler AM, Willers DM, Devkota P, Gross GA and Fraser VJ. Risk factors for surgical site infection after low transverse cesarean section. *Infect Control Hosp Epidemiol* 2008;9:477-84
4. Haidar ZA, Nasab SH, Moussa HN, Sibai BM, Blackwell SC. Cesarean Delivery Surgical Site Infection: What are Expected Rates and Potentially Modifiable Risk Factors? *J Obstet Gynaecol Can.* 2018;40(6):684-9. doi: 10.1016/j.jogc.2017.09.020.
5. Dhar H, Busaidi AI, Rathi B, Nimre A E, Sachdeva V and Hamdi I. A Study of Post-Cesarean Section Wound Infections in a Regional Referral Hospital, Oman. *Sultan Qaboos University Med J* 2014 May; (14)2:e211-21.
6. Eriksen HM, Sæther AR, Løwer HL, Vangen S, Hjetland R, Lundmark H, Aavitsland P. Infections after caesarean sections. *Journal of Norwegian Medical Association. Tidsskr Nor Legeforen* 2009;129:618–22.
7. A Johnson, D young, J Reilly. Cesarean section surgical site infection Surveillance. *Journal of hospital infection* 2006;64:30-35.
8. Amenu D, Belachew T and Araya F. Surgical site infection rate and risk factors among obstetric cases of Jimma University specialized hospital, Southwest Ethiopia. *Ethiop Journal of Health Science* 2011 July;21(2).
9. Castillo E, McIsaac C, MacDougall B, Wilson D, Kohr R. Post-Cesarean Section Surgical Site Infection Surveillance Using an Online Database and Mobile Phone Technology. *J Obstet Gynaecol Can.* 2017;39(8):645-51.
10. Guzman MA, Prien SD, Blann DW. Post-cesarean related infection and vaginal preparation with povidone-iodine revisited. *Primary Care Update OB/GYNS* 2002;9(6):206–9.
11. Horan TC, Andrus M, Dudeck MA. CDC/NHSN surveillance definition of healthcare-associated infection and criteria for specific types of infections in the acute care setting. *Am J Infect Control.* 2008;36:309–32.