e-ISSN: 0975-5160, p-ISSN: 2820-2651

Available online on www.ijtpr.com

International Journal of Toxicological and Pharmacological Research 2024; 14(11); 116-119

Original Research Article

Risk Factors and Microbial Etiology of Surgical Site Infections Following Lower Segment Cesarean Section: A Prospective Cohort Study

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Received: 11-08-2024 / Revised: 12-09-2024 / Accepted: 25-10-2024
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Conflict of interest: Nil

Abstract:

Background: Lower Segment Cesarean Section (LSCS) delivery is a major obstetrical surgical procedure to save the lives of mothers and fetus. Various risk factors in SSI following LSCS has been identified which includes subcutaneous hematoma, subcutaneous hematoma, tobacco use in pregnancy, incision length > 16.6 cm, body mass index >30 or 35 kg/m2, prolonged second stage (compared with first stage), no antibiotic prophylaxis, duration of labor >12 h, premature rupture of membranes, gestational diabetes, previous cesarean delivery and emergency delivery. Diagnosis of surgical site infection requires evidence of clinical signs and symptoms of infection which may be further supported by microbiological evidence.

Material and Methods: A total of 646 patients were included in the study of which 27 were diagnosed as SSI. Risk factor for SSI was divided into three categories: 1) host-related factors, 2) pregnancy and intrapartum-related factors, and 3) procedure-related factors at ANMMCH, Gaya.

Conclusion: To reduce the SSI rates post LSCS, proper assessment of risk factors and their modification is required. Frequent antibiotic susceptibility testing for resistance is required.

Keywords: LSCS, SSI.

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Introduction

Lower Segment Cesarean Section (LSCS) delivery is a major obstetrical surgical procedure to save the lives of mothers and fetus [1]. LSCS may be accompanied by a number of complications, surgical site infection (SSI) is one of them with SSI ranges from 3% to 15% worldwide [2,3]. Now a days there is a decrease in the occurrence of SSI, but is expected to increase given the continuous rise in the incidence of cesarean deliveries. Post LSCS SSI may increase maternal morbidity and mortality [4].

Surgical site infection may present as wound infection with erythema, discharge, and induration of the incision, complicates 2-7% of patients and generally develops 4 to 7 days after LSCS [5]. fasciitis a rare but serious infection causes significant morbidity after CD that is characterized by rapid and progressive necrosis of subcutaneous tissue and fascia [6]. Postpartum endometritis results from a polymicrobial infection of the decidua, which is characterized by fever ≥38.0°C, fundal tenderness, and purulent discharge from the uterus [7]. Various risk factors in SSI following LSCS has been identified which includes subcutaneous hematoma, subcutaneous hematoma, tobacco use in pregnancy, incision length > 16.6 cm, body mass index >30 or 35 kg/m^2, prolonged second stage (compared with first stage), no antibiotic prophylaxis, duration of labor >12 h, premature rupture of membrane gestational diabetes, previous cesarean delivery and emergency delivery [8]. Diagnosis of surgical site infection requires evidence of clinical signs and symptoms of infection which may be further supported by microbiological evidence. Skin is generally colonised by a range of microorganisms that generally cause infection. In clean-contaminated procedures like caesarean section the polymicrobial aerobic–anaerobic flora closely resembling the normal endogenous microflora of the operated organ constitutes the most frequently isolated pathogens. [9]

Material and Methods

Present study was carried out in Department of General surgery in collaboration with Department of Obs & Gynae at Anugrah Narayan Magadh Medical College and Hospital Gaya, Bihar. Written informed consent was taken from all the participants. Study duration is Two years.

The Center for Disease Control and Prevention (CDC) defines SSI as an infection occurring within 30 days from the operative procedure in the part of

the body where the surgery took place [10]. A total of 646 patients were included in the study of which 27 were diagnosed as SSI. Risk factor for SSI was divided into three categories: 1) host-related factors, 2) pregnancy and intrapartum-related factors, and 3) procedure-related factors [11].

Results

Table 1: Incidence of SSI

	SSI	Non-SSI	Total
LSCS	27(4.1%)	619(95.9%)	646

Among 646 cesarean sections, surgical site infection was observed in 27(4.1%) cases while the remaining cases had no surgical site infection.

Table 2: Demographic and other characteristics

Characteristics	SSI	Non-SSI
Mean(sd) Age in years	24.8(3.9)	22.1(3.2)
Mean(sd) no. of hospital days	14.1(3.1)	7.3(1.8)
Mean(sd) no. of Antibiotics days	17.3(2.4)	3.1(1.3)

Mean age of cases with surgical site infection was observed to be 14.8 years with sd of 3.9 years where as it was 22.1 years in cases with no surgical site infections and sd of 3.2 years. Average number of stay in hospital is found to be 14.1 and 7.3 days respectively in cases with and without surgical site infections. Antibiotics were given on 17.3 days on average in cases with SSI whereas patients without surgical site infections were on antibiotics for 3.1 days on average.

Table 3: SSI according to gravida

Gravida type	Count
Primi gravida	5
Secondary gravida	8
Multigravida	14
Total	27

Among all LSCS about 52% were multigravida followed by about 30% secondary gravida and least being primi gravida nearly 18%.

Table 4: Organisms isolated

Organisms isolated	Count
Escherechiacoli	11(40.8%)
Klebsiella pneumoniae	3(11.1%)
Pseudomonas aeruginosa	3(11.1%)
Acinetobacter species	1(3.7%)
Staphylococcus aureus	7(25.9%)
Not identified	2(7.4%)
Total	27

Table 5: Risk factors

Risk factors	SSI	Non- SSI	P - value
BMI: mean(sd)	28.7(4.6)	24.2(3.1)	<0.0001
Gestational Diabetes	15(55.6%)	11(1.7%)	<0.0001
Tobacco uses	3(11.1%)	4(0.64%)	<0.0001
No antibiotic prophylaxis	5(18.51%)	102(16.4%)	0.7726
No ANC checkup	8(29.6%)	94(15.1%)	0.0428

Risk factors identified - BMI in SSI 28.7(4.6) and in Non - SSI 24.2(3.1). This was highly statistically significant. Gestational diabetes was observed to be in 55.5% cases with SSI while in Non-SSI it was observed in just 1.7% cases. The difference between proportion was found to be highly significant. In cases with SSI it has been observed that 11.1% cases used tobacco whereas in cases with non-SSI 0.64% cases used tobacco, the difference was highly significant. No antibiotic prophylaxis was given to 18.51% and 16.4% cases of SSI and Non-SSI respectively. No significant difference was observed in no antibiotic prophylaxis. 29.6% cases in SSI had not undergone ANC check-up while in Non-SSI 15.1% cases did not undergo ANC check-up, the difference was statistically significant.

Discussion

Even if small hematomas increase the incidence of surgical site infections, they may resorb with our

surgical interventions. Wound hematoma can be managed by evacuating the clot under sterile conditions, ligation or cauterization of bleeding vessels, and reclosure of wound. Wound healing is delayed by seromas which increases the risk of SSI. Evacuation of seromas under skin is possible by needle aspiration. Wound exploration maybe required in the oprating room if seromas persist [12]. In present study among 646 cases of LSCS, SSI was identified in 27(4.1%) cases. Mean age of patients with SSI was 24.8 years with sd of 3.9 years whereas it was 22.1 years in cases with no surgical site infections and sd of 3.2 years. It was found that mean age was more in cases with SSI, so age may be one of the risk factors for SSI in LSCS cases. The prevalence of SSI following CS was 9.1% in a study by Jido et al., in Kano Nigeria. In a various study the infection rate was 2.5 to 41.9% [13,14,15].

In our study BMI in SSI 28.7(4.6) and in Non - SSI 24.2(3.1), which was highly significant. In other studies, it was found that BMI of more than 25 has more incidence of SSI and adverse outcome of surgery [16,17].

Gestational diabetes was observed to be in 55.5% cases with SSI while in Non-SSI it was observed in just 1.7% cases. The difference between proportion was found to be highly significant. In cases with SSI it has been observed that 11.1% cases used tobacco whereas in cases with non-SSI 0.64% cases used tobacco, the difference was highly significant. In other studies it has been observed that hypertension, gestational diabetes and other co-morbid conditions results in high rate of SSI following LSCS [18,19]. No antibiotic prophylaxis was given to 18.51% and 16.4% cases of SSI and Non-SSI respectively No significant difference was observed in no antibiotic prophylaxis. Patients who received antibiotics 2 hours before surgery were found to be less prone to SSI as compared to those who did not receive it in a timely fashion. But in our study this association was not found to be statistically significant like other studies [20,21]. 29.6% cases in SSI had not undergone ANC check-up while in Non-SSI 15.1% cases did not undergo ANC check-up, the difference was statistically significant. Out of total 27 surgical site infection E-coli was isolated in 11(40.8%) cases followed by 7(25.9%) isolations of staphylococcus aureus. Klebsiella pneumonia and pseudomonas aeruginosa were isolated in 3(11.1%) cases each. Acitenobacter was found in only 1(3.7%) case. 2(7.4%) isolates were not identified in our study. In our study most common isolate was E.coli (40.8%) in contrast to NNIS service survey (1997–2001) which reported Staphylococcus aureus (47%) including MRSA and Staphylococcus epidermidis(CONS) as the most common organism causing SSI. Other studies have reported similar findings of predominance of Staphylococcus aureus in wound infections.

Conclusion

To reduce the SSI rates post LSCS, proper assessment of risk factors and their modification is required. Frequent antibiotic susceptibility testing for resistance is required.

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