

LOWER SEGMENT CESARIAN SECTION SURGICAL SITE INFECTION: RISK FACTOR AND MICROBIAL ETIOLOGY

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Abstract

INTRODUCTION: Lower Segment Cesarean Section (LSCS) delivery is a major obstetrical surgical procedure to save the lives of mothers and foetus. Surgical site infections (SSI) are the most common reason about 20% to be unplanned admitted after discharging of the patient to their home. 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 labour >12 h, premature rupture of membranes, gestational diabetes, previous cesarean delivery and emergency delivery.

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. Purulent discharge was obtained from the surgical incision site 48 hours postoperatively with sterile disposable swabs. Blood sample for blood culture was collected when the possibility of septicemia or bacteremia as suggested by the presence of fever, shock, or other signs and symptoms of sepsis associated with the surgical wound. The bacterial isolates obtained were identified as per standard identification procedures in time microbiology laboratory. Antibiotic susceptibility of the organisms done as per protocol.

RESULTS: A total of 646 patients were included in the study of which 94 (14.55%) were diagnosed as SSI. mean age of patients who underwent LSCS was 24± 4.57 years. Of the 646 patients in 18 - 20 years 125 (19.3%), 21-25 years 304 (47.1%), 26-30 years 189 (29.3%) and in > 30 years age group 28 (4.3%) cases were observed, of the total 94 SSI cases 11 (8.8%) were in the age group if 18 - 20 years, 39 (12.8%) were in the age group of 21-25 years, 32 (16.9%) were in 26-30 years age group and 12 (42.9%) were in the > 30 years age group. *Acinetobacter spies* was the commonest isolate 29(30.9%) followed by *staphylococcus aureus* 22 (23.4%), *Escherichia coli* 21 (22.3%) and *Klebsiellapneumoniae*. premature rupture of membrane (PROM), antibiotics given earlier than 2 hours and increased duration of stay in the hospital were found to be statistically significant. It was interpreted that PROM > 24 hrs is likely to increase the chances of infection. As the duration of hospital stay increases by 1 day, the chances of infection increase.

CONCLUSION: Identification, management and proper assessment of risk factors are necessary to in reduction of SSI rates. Premature rupture of membrane (PROM), antibiotics given earlier than 2 hours, BMI >25 and increased duration of stay in the hospital were associated with increased SSI rate.

Introduction:

Lower Segment Cesarean Section (LSCS) delivery is a major obstetrical surgical procedure to save the lives of mothers and foetusⁱ. 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^{ii,iii}. 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^{iv}.

Surgical site infections (SSI) are the most common postoperative complications which accounts for 3.2 billion dollars in contributable cost per year in hospitals. Surgical site infections (SSI) are the most common reason about 20% to be unplanned admitted after discharging of the patient to their home^{v,vi}.

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^{vii}. Necrotizing fasciitis a rare but serious infection causes significant morbidity after CD that is characterized by rapid and progressive necrosis of subcutaneous tissue and fascia^{viii}. Postpartum endometritis results from a polymicrobial infection of the decidua, which is characterized by fever $\geq 38.0^{\circ}\text{C}$, fundal tenderness, and purulent discharge from the uterus^{ix}.

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 labour >12 h, premature rupture of membranes, gestational

diabetes, previous cesarean delivery and emergency delivery^x.

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^{xi}.

MATERIAL AND METHODS

Present study was carried out in Department of Gynaecology in collaboration with Dept. of Surgery at K.M. Medical College and Hospital, Mathura (UP). Written informed consent was taken from all the participants.

The Centres 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^{xii}.

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^{xiii}.

Purulent discharge was obtained from the surgical incision site 48 hours postoperatively with sterile disposable swabs. Blood sample for blood culture was collected when the possibility of septicemia or bacteremia as suggested by the presence of fever, shock, or other signs and symptoms of sepsis associated with the surgical wound. The bacterial isolates obtained were identified as per standard identification procedures in time microbiology laboratory.

Antibiotic susceptibility of the organisms done as per protocol.

Socio-demographic factors, obstetrics related factors, operation and anesthesia related factors information was collected. Data were coded, entered using EPI data and analysed via SPSS version 22. A frequency was presented in

different forms of descriptive statistics by using tables, graphs and figures.

RESULTS

A total of 646 patients were included in the study of which 94 (14.55%) were diagnosed as SSI. mean age of patients who underwent LSCS was 24± 4.57 years.

Table 1: Age group and SSI

Age group	Number	%	SSI	%
18 - 20 years	125	19.3%	11	8.8%
21-25 years	304	47.1%	39	12.8%
26-30 years	189	29.3%	32	16.9%
>30 years	28	4.3%	12	42.9%
Total	646		94	14.6%

Of the 646 patients in 18 - 20 years 125 (19.3%), 21-25 years 304 (47.1%), 26-30 years 189 (29.3%) and in > 30 years age group 28 (4.3%) cases were observed, of the total 94 SSI cases 11 (8.8%) were in the age group if 18 - 20 years, 39 (12.8%) were in the age group of 21-25 years, 32 (16.9%) were in 26-30 years age group and 12 (42.9%) were in the > 30 years age group.

Table 2: organisms isolated

Organisms isolated	Number	%
Acinetobacter spp.	29	30.9%
Staphylococcus aureus	22	23.4%
Escherichia coli	21	22.3%
Klebsiella pneumoniae.	14	14.9%
Pseudomonas aeruginosa	4	4.3%
Coagulase negative Staphylococcus	2	2.1%
Enterococcus spp.	1	1.1%
Citrobacterfreundii	1	1.1%
Total	94	

Acinetobacter spies was the commonest isolate 29(30.9%) followed by staphylococcus aureus 22 (23.4%), Escherichia coli 21 (22.3%) and Klebsiellapneumoniae.

Table 3: Risk factors associated with LSCS

Risk factors	No SSI cases (n=552)	%	SSI cases (n=94)	%	P value
Body Mass lindex> 25	24	4.3%	21	22.3%	<0.05
Premature ruptue of membrane > 24 hrs (22.94 ± 2.4 hrs)	51	9.2%	26	27.7%	<0.05
No antibiotic prophylaxis	49	8.9%	59	62.8%	<0.05
per vaginal examination > 3 times	121	21.9%	39	41.5%	<0.05
prolonged stay after surgery>12 days	24	4.3%	26	27.7%	<0.05

By multivariate logistic regression premature rupture of membrane (PROM), antibiotics given earlier than 2 hours and increased duration of stay in the hospital were found to be statistically significant. It was interpreted that PROM > 24 hrs is likely to increase the chances of infection. As the duration of hospital stay increases by 1 day, the chances of infection increase.

DISCUSSION:

Diagnosis of surgical site infection requires evidence of clinical signs and symptoms of infection which and supported by microbiological culture. 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^{xiv}. Surgical site infection is an important outcome indicator after caesarean surgery. The situation is worsened by the polymicrobial resistant strains of nosocomial pathogens^{xv}.

The prevalence of surgical site infection after cesarean section in our study was 14.6%. Other studies reported rates ranging from 2.5 to 41.9%^{xvi, xvii, xviii}.

Body mass index of more than 25 has been shown to increase the SSI. Increase in adipose tissue, decreased circulation to fat tissue, an increase in local tissue trauma and a need for larger incision, can contribute to an increased incidence of SSI in these patients^{xix}.

Lilani et al. in their study found that mean postoperative stay of patients who developed infection was almost 4 times (24.82 days) as compared to patients who did not develop SSI. Patients with multiple per vaginal examinations were having more SSI similar findings were shown in other study^{xx}. In our study patients who received antibiotics 2 hours before surgery were found to be less prone for developing SSI as compared to those who did not receive antibiotic prophylaxis. Similar findings was shown by M. Weinberg in their study^{xxi}. Premature rupture of membranes is associated with SSI in our study as liquor gets infected and infection supervenes. It was found to be a significant risk factor in the study as was reported by other authors^{xxii, xxiii}.

CONCLUSION

Identification, management and proper assessment of risk factors are necessary to in reduction of SSI rates. Premature rupture of membrane (PROM), antibiotics given earlier than

2 hours, BMI >25 and increased duration of stay in the hospital were associated with increased SSI rate.

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