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Original Article

Obstetrics and Gynaecology Section

Postcaesarean Surgical Site Infection at a Tertiary Care Centre in Southern Rajasthan, India

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ABSTRACT

Introduction: Surgical Site Infection (SSI) is one of the most common complications of postcaesarean section, which is mainly associated with increase morbidity and mortality. This is also an important cause of prolonged hospital stay, patient dissatisfaction and higher treatment cost. There is very limited data available on the incidence, outcome and clinical spectrum of postcaesarean SSI from Southern Rajasthan.

Aim: The aim was to find out the frequency of SSI and variables contributing to it in women who had a caesarean section in a tertiary care centre in Rajasthan, India.

Materials and Methods: This was a prospective observational study conducted over a duration of six months from June 2019 to November 2019 at SHKBM, Jhalawar Hospital and Medical College, Jhalawar, Rajasthan, India. All the women who developed postcaesarean SSI during hospital stay or within 30 days following surgery were included in the study. Demographic data and all the potential risk factors were noted. Pus samples from the infected wound were sent for culture and sensitivity. Data was presented as frequencies and percentages. Statistical Package for Social Sciences software (SPSS) version 26.0 and Epi Info Software were used for the statistical analysis.

Results: A total of 1157 cases underwent caesarean section during study period, among them 53 cases had postcaesarean SSI, which gave a incidence rate of 4.5%. In present study, majority of women belonged to 21-25 years of age group 33 (62.26%), 31 (58.49%) cases were unbooked, 47 (88.67%) of SSI was seen in emergency caesarean section, and 48 (90.56%) of SSI cases had pfannenstiel incision. Anaemia (81.13%), hypertensive disorder (13.2%) and urinary tract infection (3.77%) were associated medical risk factors for SSI. There were other obstetrics and intraoperative risk factors found to be associated with postcaesarean SSI, out of them previous caesarean section was most common (56.6%). *Klebsiella* was the most common organism isolated.

Conclusion: Infrequent antenatal visits, emergency caesarean sections, anaemia and history of previous caesarean section were the most common risk factors for SSI.

Keywords: Gynaecology, Obstetrics, Pfannenstiel incision, Prophylaxis, Sepsis

INTRODUCTION

The incidence of caesarean section is increasing worldwide. In India, it was 7.1% in 1998 which has increased currently to 17.2% in 2015-2016 [1]. This increase in caesarean section rate has contributed to greater wound morbidity. World Health Organisation (WHO) recommends caesarean section rate between 10-15% [2]. The Centers for Disease Control and Prevention (CDC), defines only SSI as an infection occurring within 30 days of surgery, in one of the three locations: superficial, deep and or in organs or spaces opened or manipulated during an operation [3,4].

Surgical site infection are among the most common hospital acquired infection and most common complication after postcaesarean section, which is mainly responsible for increase morbidity and mortality, longer hospital stay, patient dissatisfaction and higher treatment cost [4]. The rate of SSI after low transverse caesarean during a two year study section was 5%. Furthermore, the pathophysiology of SSI is a complex process, conducted by the primed and pretriggered host immune-inflammatory response to pathogen predisposed by genetic factors and tailored by the location, the load and the virulence of the invading microbes in surgical patients [5].

Hence, the aim of this study was to know the incidence of SSI in postcaesarean section patients and to recognise risk factors for it to help, reduce maternal morbidity and mortality associated with SSI.

MATERIALS AND METHODS

This was a prospective observational study conducted over a period of six months duration from June 2019 to November 2019 in the Department of Obstetrics and Gynecology at SHKBM, Jhalawar in Southern Rajasthan, India, after getting approval from local Institutional Ethical Committee (IEC no. 04/05).

Inclusion and Exclusion criteria: Women who developed postcaesarean SSI (according to CDC guidelines) [6], during hospital stay or within 30 days following surgery were included in the study. Women who had Lower Segment Caesarean Section (LSCS) somewhere else and later referred to our hospital and women who developed SSI after 30 days were excluded from the study.

Demographic information including age, parity, socio-economic status, Body Mass Index (BMI), related medical and Obstetrics history, intraoperative risk factors, duration of surgery and blood loss during surgery was noted. Pus samples from the infected wound were sent for culture and sensitivity.

STATISTICAL ANALYSIS

Using Epi Info Software, SPSS version 26.0, the data collected was analysed. For categorical variables, frequency and percentage analysis were done.

RESULTS

In the present study, a total of 1157 cases underwent caesarean section over six months duration from June 2019 to November 2019.

Out of them, 53 cases had postoperative SSI, which gives an incidence rate of 4.5%. In this study, majority of patients 33 (62.26%) belonged to 21-25 years of age group.

Out of total 53 patients, 29 (54.17%) were primigravida. Majority of patients 31 (58.49%) were unbooked and 27 (50.94%) of the patients belonged to lower socio-economic status. Maximum number of patients i.e. 27 (50.94%) were overweight followed by normal BMI, 22 (41.5%) as depicted below in [Table/Fig-1].

Parameters	Number of cases (n)	Percentage (%)
Maternal age		
≤20	2	3.77
21-25	33	62.26
26-30	15	28.30
>30	3	5.66
Antenatal visit		
Booked	22	41.50
Unbooked	31	58.49
Gravidity		
Primigravida	29	54.71
Gravida 2	16	30.18
Gravida 3	5	9.43
Gravida 4	2	3.77
Gravida ≥5	1	1.88
Socio-economic status (Modified Kuppuswamy classification [7])		
Upper	0	0
Upper middle	7	13.20
Lower middle	19	35.84
Lower	27	50.94
BMI (kg/m^2) (WHO classification [8])		
Under weight (<18.5)	1	1.88
Normal (18.5-24.9)	22	41.5
Over weight (25-29.9)	27	50.94
Obese (≥30)	3	5.66

[Table/Fig-1]: Demographic profile in study N=53 [7,8].

Out of 53 cases, 47 (88.67%) underwent emergency caesarean section, whereas only 6 cases (11.32%) had elective caesarean section as shown is [Table/Fig-2]. 79.24% patients with SSI had superficial SSI [Table/Fig-3].

Type of surgery	Cases n (%)
Emergency caesarean section	47 (88.67)
Elective caesarean section	6 (11.32)

[Table/Fig-2]: Indication for the type of surgery.

Type of wound	Number of cases (n)	Percentage (%)
Superficial	42	79.24
Deep	11	20.75
Organ/space	0	0

[Table/Fig-3]: Type of wound N=53.

In present study, 48 cases (90.56%) had caesarean section using pfannenstiel incision, whereas only 5 cases (9.43%) had infra-umblical midline incision approach. Incision given to caesarean section was pfannenstiel incision in 90% cases (48/53) while in 10% cases (05/53) it was midline.

Most common medical risk factor associated with SSI was anaemia, 43 cases (81.13%). Previous LSCS, 30 cases (56.6%) followed by leaking per vagina, 23 cases (43.39%) were other associated obstetric risk factors. Cases 45 (84.90%) had duration of surgery less than one hour. In 48 cases (90.56%), skin closure was done by mattress sutures whereas only in 5 cases (9.43%) subcuticular suturing was done [Table/Fig-4].

Risk factors	Number of cases (n)	Percentage (%)
Medical		
Anaemia	43	81.13
Hypertensive disorder	7	13.2
Diabetes	0	0
Urinary tract infection	2	3.77
HbsAg positive	1	1.88
Obstetrics		
Previous LSCS	30	56.6
History of LPV		
Duration of surgery <8 hour	9	16.98
Duration of surgery >8 hour	14	26.41
Failed induction of labour	11	20.75
Premature rupture of membrane	18	33.96
Operative		
Amniotic fluid		
• Clear	44	83.01
• Meconium stained	9	16.98
Duration of surgery <1 hour	45	84.90
Duration of surgery ≥1 hours	8	15.09
Blood loss <1000 mL	42	79.24
Blood loss ≥1000 mL	11	20.75
Skin closure		
Mattress suture	48	90.56
Subcuticular suture	5	9.43

[Table/Fig-4]: Various risk factors associated with SSI in caesarean sections N=53. LSCS: Lower segment caesarean section; LPV: Localised provoked vulvodynia

Out of 53 cases, 23 cases (43.39%) had no organism growth in pus culture and sensitivity test but among those who tested positive, *Klebsiella* was the most common organism isolated i.e. in 14 cases (26.41%) [Table/Fig-5].

Organisms	Number of cases (n)	Percentage (%)
Klebsiella	14	26.41
E. Coli	6	11.32
Staphylococcus aureus	4	7.54
Pseudomonas	3	5.66
Acetobacter	3	5.66
No growth	23	43.39

[Table/Fig-5]: Organisms isolated from wound swab culture.

DISCUSSION

Following urinary tract infections, SSI is the second most frequent complication after caesarean section. SSI has high morbidity but associated with predictable and preventable risk factors [9]. The incidence of postcaesarean SSI varies in different parts of world. In present study, postcaesarean section infection rate was 4.5% which was comparable to study by Olsen MA et al., i.e. 5% [10].

In this study, majority (62.26%) of patients belonged to 21-25 years of age group which is consistent with Devi S and Durga VK as being a rural area, this is the most common age group for girls to get married and bear children [11]. In current study, majority 29 (54.17%) cases were primigravida and 31 (58.49%) cases were

unbooked, which is similar to Devi S and Durga VK study [11]. Lack of care due to insufficient antenatal visits could be a reason for associated morbidities postdelivery and SSI postcaesarean could be one among them. Majority (50.94%) of patients were overweight followed by normal weight as also seen in the study by Bharatnur S and Agrawal V which leads to the inference that abnormal BMI interferes in one or the other way with wound healing [3]. Also, many (50.94%) patients belonged to lower socio-economic status which may again interfere with nutritive status and hygiene status of the patient adding to the morbidities.

In present study, 88.67% of the patients had emergency caesarean section whereas 11.32% patients had elective caesarean section which is comparable to the Ghuman M et al., and Sangavi R and Rajkumari KS where 97% patients had emergency caesarean sections [12,13]. Thus, every hospital should have proper protocols regarding preoperative antibiotics and sterilisation techniques [13,14].

Patients who were anaemic seem to be more prone to SSI as anaemia diminishes resistance to infection. In present study, 81.13% patients were anaemic whereas in study conducted by Devi SL et al., 48% patients were having anaemia [11]. The difference between these two studies in terms of anaemia could be due to higher prevalence of unbooked pregnancy.

In a study by Zejnullahu VA et al., it was reported that there is increased risk for SSI with co-morbidities [4]. Thus, poor control of blood sugar in perioperative period increases the risk of infection. Although in present study, no patient had diabetes but Devi S and Durga VK found 9% of the patients with diabetes [11].

Hypertensive disorders in pregnancy were seen among 13.2% of patients with SSI whereas a study conducted by Devi S and Durga VK [11] reported 25% of patients as hypertensive. In current study, 3.77% of the patients had urinary tract infection and 1.88% were found HBsAg positive.

In the present study, 56.6% of patients had repeat caesarean sections whereas it was 30% in the study conducted by Devi S and Durga VK [11]. Premature rupture of membrane is a well-established risk factor for SSI as it is associated with largest bacterial inoculums and liquor infection. In this study, 33.96% had Premature Rupture of Membranes (PROM) whereas it was 27% in Devi S and Durga VK [11].

In the present study, 20.75% patients had caesarean delivery because of failed induction of labor, whereas it was 15% in study conducted by Devi S and Durga VK [11]. Possible pathogenesis could be due to multiple vaginal examinations in these cases.

Zejnullahu VA et al., concluded that duration of operative procedure (>1 hr) increases the risk of SSI, which may be because of anesthesia related stress, extensive tissue trauma and inadequate serum or tissue concentration of antibiotics in prolonged surgical procedures [4]. In our study, duration of surgery was more than one hour in 15.09% cases which is similar to Devi S and Durga VK [11]. In this study, 16.98% cases with postcaesarean SSI had meconium stained amniotic fluid.

Risk of SSI increases by 30% for every 100 mL blood loss [11]. In our study, 20.75% cases of SSI had a blood loss of more than 1000 mL and these results were comparable to Devi S and Durga VK [11] and Amenu D et al., [15] study. Bharatnur S and Agrawal V reported that SSI was 3.5 times higher in skin closure by mattress sutures which was also seen in present study [3].

In our study, 43.39% patients had sterile culture, thus, discouraging the routine use of antibiotic in patients with SSI. Most common organism isolated was *Klebsiella* (26.41%) cases followed by *E. coli* and *Staphylococcus aureus.* A study conducted by Sangavi R and Rajkumari KS showed *E. coli* as most common organism followed by *Actinobacter* species [13]. Devi S and Durga VK isolated *Staphylococcus aureus* as most common organism followed by *Klebsiella* [11]. Thus, the organisms vary from hospital to hospital as a result of which every case of SSI should undergo pus culture and sensitivity and should be treated accordingly [16].

Limitation(s)

Due to small sample size in the present study, actual incidence may vary. Also, being a tertiary care centre most of the cases were complicated cases. Thus, the incidence of postcaesarean SSI may be high as compared to other centres. Follow-up was not possible in some of the patients who took Leave Against Medical Advice (LAMA). So that may have interfered with the incidence of SSI.

CONCLUSION(S)

In the present study, the incidence of postcaesarean section SSI was found to be 4.5%. The various risk factors associated were emergency caesarean section, anaemia, history of previous caesarean section, history of leaking per vaginum, abnormal BMI, which are modifiable as well as preventable with good and regular antenatal visits. The organisms isolated vary from hospital to hospital, thus, prescribing antibiotics should strictly follow pus culture and sensitivity report.

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