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Original Research Article

Incidence and risk factors for post caesarean delivery surgical site infection in a tertiary care hospital

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ABSTRACT

Background: Post-operative surgical site infection (SSI) is the most commonly reported nosocomial infection which constitutes a major public health care problem worldwide. SSI are the one of the most common complication after caesarean section (C-sec) and results in maternal morbidity and mortality, increased length of the hospital stays and economic burden. The aim of the study is to determine the incidence and risk factors of SSI in women undergoing C-sec.

Methods: The prospective observational study carried out in department of Obstetrics and Gynaecology in Goa medical college, Bambolim Goa from 1st November 2017 to 30th May 2019. Collection of data was carried using predesigned and pretested proforma. SSI was examined for association of different risk factors and its distribution.

Results: During this study period, 2106 patients underwent C-sec, out of which 103 patients developed post-operative SSI with the incidence rate being 4.89%. The incidence rate was found higher in emergency cases (6.55%) as compared to that of elective (1.21%) and median time to SSI was the 6th post-operative day. Majority of SSI, i.e., 102 out of 103 (99.08%) were superficial SSI, 1 (0.98%) were deep SSI and no organ/space SSI. The highest rate of SSI was found in 21-34 years of age group (84.47%). The common risk factors associated are anaemia, diabetes, hypertension and obesity.

Conclusions: SSI results from multiple risk factors which include modifiable and non-modifiable factors and thorough analysis of these factors can help prevent SSI. The medical staff should focus on some of the modifiable risk factors can be eliminated by strict antisepsis, timely prophylactic antibiotic and maintaining normothermia as well as optimal glucose level.

Keywords: SSI, C-sec, Deep SSI, Superficial SSI

INTRODUCTION

Surgical site infections (SSI) are most common nosocomial infections and major cause of postoperative morbidity and sometimes mortality.¹

Infections that occur in the wound created by an invasive procedure are generally referred to as SSI. SSIs are one of the most common causes of healthcare associated infections (HCAs). SSIs are characterised by a breach of mechanical/anatomic defence mechanisms and are

associated with greater morbidity, significant mortality, and increased cost of care.²

The SSI is defined by CDC (Centre for disease control and prevention) as an infection occurring within 30 days of surgery, in one of three locations: superficial, deep and/or spaces opened or manipulated during an operation.^{3,4}

In India around 4.17% of the patients in surgical ward are at a risk of acquisition of infection and nosocomial infection.⁵

Of the 4.17% and 40% is postoperative surgical site infection, 42% associated with urinary infection, 14% is the respiratory infection, approximately 4% seen with sepsis and bacteremia.⁶ Following caesarean most common post-operative infection are the surgical site infection, urinary tract infection and the infection of pelvic organs.^{7,8}

Functional infection control committee should employ strict infection control policies which will significantly reduce SSI.

METHODS

The prospective observational study carried out in department of obstetrics and gynaecology in Goa medical college, Bambolim Goa, India from 1st November 2017 to 30th May 2019 after the approval of medical ethical committee. Qualitative data will be tested for significance using chi square test and continuous data will be tested for significance with two tailed T test with p value of <0.05 consider significant.

This is a descriptive study of all the patients who underwent C-sec at our hospital. These patients were observed for the development of wound infections during their stay in the hospital. Those patients who developed surgical site infection that require wound dressing or wound re suturing were included in the study after informed consent. An elaborate study of these cases with regard to the date of admission, history, clinical features of wound infection, type of surgery, emergency or elective, preoperative and postoperative management is done till patient is discharged from hospital.

In history presenting complaints, duration, associated comorbid conditions, associated remote infections are noted.

If SSI was present, the type of SSI, according to the CDC criteria, date of onset, and the microorganism(s) cultured were reported. The treatment given was documented.

Wounds that were confined to the skin and subcutaneous tissues were classified as superficial. Presence of swelling, tenderness, obvious oozing of pus were the main determinants for inclusion in this category.

Abscesses were opened in the ward to give way for the pus under pressure, while pus swabs were taken for microbial sampling. All the patients with these wounds were not re-operated, but secondary repair was undertaken after control of sepsis. No report of mortality was observed from these groups of patients.

Deep surgical site infection was determined either through the ultrasonography, clinical signs of intra-abdominal sepsis.

Inclusion criteria

Inclusion criteria included all C-sec done in tertiary care centre which undergo SSI, SSI occurring within 2 weeks of surgery.

Exclusion criteria

Exclusion criteria excluded patients not operated in GMC, patients coming with SSI after getting discharge from hospital, and patients already having pre-existing infection at the surgical site.

RESULTS

The current study was undertaken in Goa medical college in department of obstetrics and gynaecology from 1st November 2017 to 30th May 2019 after the approval of medical ethical committee.

The study population consisted of underwent caesarean surgeries and were eligible considering the inclusion criteria. 103 patients out of 2,106 developed post-operative SSI and the overall rate being 4.89%. The distribution of total number of post caesarean surgical site infection among the elective and emergency cases was 6.55% in the emergency group and 1.21% in the elective surgery group.

Superficial SSI accounted for 99.02% of the total cases and 0.98% were deep surgical site infection <20 years age group accounted for 3.88% of total cases of SSI, 84.47% of the patients were between 20-34 years and 11.65% were in >35 years.

In our study, out of 103 cases of SSI, comorbidities were seen in 53 patients. Out of all patients with surgical site infection diabetes mellitus was seen in 18.44% of cases, anaemia in 20.39%, and hypertension in 9.70% and obesity in 2.91%.

As observed among 103 LSCS cases that had SSI, the risk of wound infection was 27.19% in patients who had rupture of membranes for more than 12 hours. Of all the patients with SSI, 35 patients with surgical site infection had undergone previous abdominal surgeries and contributed to 21.35%.

Of all patients who had SSI, 87.38% patients had received spinal anaesthesia, followed by 12.62% of cases with general anaesthesia. 89 out of 103 cases received antibiotics 30 minutes before surgery with the incidence of 86.41% and 13.59% received during or after procedure. 92 (89.32%) of the SSI diagnosed on 5-7th post-operative day, 5 (4.85%) SSI were diagnosed <5 days and 6 (5.82%) cases diagnosed after 7 days.

Out of all patients with surgical site infection, 71 patients (68.93%) underwent wound re-suturing and remaining 32 (31.07%) cases healed by wound dressing.

Table 1: Distribution of different type of C-sec.

Type of C-sec	Surgical site infection		Total	Percentage (%)
	Yes	No		
Elective	8	648	656	1.21
Emergency	95	1355	1450	6.55
Total	103	2003	2106	

Table 2: Distribution of SSI based on risk factors involved.

Variables	Groups	SSI	Percentage (%)
Type of LSCS	Superficial SSI	102	99.02
	Deep SSI	1	0.98
Age group (Year)	<20	4	3.88
	21-34	87	84.47
	>35	12	11.65
Comorbidities	Anaemia	21	20.39
	Diabetes	19	18.44
	Hypertension	10	9.70
	Obesity	3	2.91
Prolonged rupture of membranes (hourly)	<12	75	72.81
	>12	23	27.1
Previous 1 or more LSCS	Yes	22	21.35
	No	81	78.64
Type of anaesthesia	Regional	13	12.62
	General	90	87.38
Time of prophylactic antibiotic	30 minutes prior to surgery	14	13.59
	With/after the surgery	89	86.41
Day of diagnosis of SSI (Days)	<5	5	4.85
	5-7	92	89.32
	>7	6	5.82
Management of SSI	Conservative	32	31.07
	Wound re suturing	71	68.93

DISCUSSION

The study conducted in the only referral tertiary care hospital in Goa over the period of 18 months based on the inclusion criteria; total 2,106 patients who underwent C-sec were eligible for analysis in Goa medical college in obstetrics and gynaecology department. The present study showed the postoperative SSI was found in 103 patients out of 2,106 amounting for incidence of 4.89% which is comparable to Bizimana et al 4.9% and Damecha et al being 4.25%.^{9,10}

Incidence of postoperative SSI was more in emergency C-sec than elective surgeries (6.55% vs 1.21%). The similar results were observed in Bizimana et al study, which reported 3.4% in emergency surgeries and 1.5% in elective surgeries.⁹ In our study we found that incidence of infection is higher in emergency cases as compared to routine elective cases. The probable reason being the elective cases are better prepared. Most of the emergency cases are done at the trainee level. Hence longer period of time taken for surgery and with the possibility of higher blood loss in emergency cases compared to elective cases which are handled by the consultant. Ours being the only

tertiary level postgraduate teaching institute in Goa these is an unavoidable parameter.

Superficial SSI was accounted for 99.2% cases of total cases and 0.8%. However, in other studies the rate of deep SSI and organ space SSI was more i.e., in Mpogoro et al study 12.5% was deep/organ space SSI and in Bizimana et al study 4.9% was deep SSI and 2.5% was organ space SSI.^{9,11} Most probable reason for this difference could be early diagnosis and timely antibiotic received according to sensitivity pattern on culture report.

Considering the age group, 26-30 years accounted for 37.8% of total cases of surgical site infection, 23.6% of patients were between 21-25 years and 17.3% belonged to 31-35 years. Mamo et al reported 13.9% of SSI in <19 years age group patients, 63.9% in 20-34 years and 22.2% in ≥35 years.¹²

In our study the majority of patients i.e., 63% had SSI had comorbid conditions. Among this, it was seen that diabetes mellitus was present in 30% cases followed by anaemia in 21% cases. The most common risk factors in postoperative SSI reported in Bhaduria et al study was anemia (21.15%)

and diabetes 8.45%.¹³ The most probable reason being presence of multiple comorbidities like anaemia and diabetes in India. In addition to this diabetes also results in hyperglycaemia which further results in abnormal cell mediated immunity and phagocytosis and reduction in blood supply to tissues.

As observed among 103 LSCS cases that had SSI, the risk of wound infection was 27.19% in patients who had rupture of bag of membranes for more than 12 hours, however in Bhaduria et al study incidence of SSI with prolonged rupture of membranes 23.05%. In pregnancy cervical mucus and amniotic fluid act as a barrier to infection. However, in case of prolonged rupture of membranes, the protective effect wanes off as amniotic fluid no longer remains sterile. Once amniotic fluid gets infected, it might act as a transport medium through which microorganisms comes in contact with uterus and skin incision site.

Of all the patients with SSI, 35 patients had previous abdominal surgeries and contributed to 27.6% and which was comparable to Naphade et al study which accounted to 26% of surgical site infection in previous abdominal surgeries.¹⁴

In our study, SSI was seen majority in Pfannenstiel incision accounting for 88.2% as compared to 11.8% with vertical incision, most probably because most of the cases with SSI were LSCS cases same seen in comparison with Mamo et al study wherein SSI were observed in 83.3% with Pfannenstiel incision and 16.7% with vertical incision.¹²

121 out of 127 cases received pre op antibiotics before 1 hour of surgery with the incidence of 95.3%. In Pathak et al study inappropriate timing of antibiotic prophylaxis was a significant risk factor for SSI and during the study period no standard policy for prophylaxis was followed.

Most of the wound infections diagnosed on 5-7th post-operative day with peak on 6th day with 48 cases (37.8%) which indicates source of infection is not due to surgical procedure but due to external environment or patient's attendant. Naphade et al reported most of the wound infections diagnosed on 5-7th post-operative day with peak on 6th day with 48 cases (37.8%).¹⁴

In our study, 71 patients (68.93%) underwent wound re-suturing (surgical management) and remaining 32 (31.07%) cases healed by wound dressing (conservative management). Wound re-suturing was achieved after obtaining wound swab culture report, starting sensitive antibiotic and then carrying out secondary suturing by excising fibrosed granulation tissue and refreshing the edges. Naphade et al study reported 29% had their wound healed by wound dressing (secondary intention) whereas 71% needed secondary suturing.¹⁴

CONCLUSION

In the current scenario, the increasing trend of SSI is seen mostly due to increase in the number of surgeries which are performed. In the preoperative period SSI can be prevented by identifying SSI at early stages, proper preoperative workup of patient, correction of anemia, blood sugar level. These little efforts can significantly reduce the burden on the patient and the surgeons and further reduce morbidity and mortality. This will also ensure reduction in hospital stay and economical load on patient. The surgeon should consider proper surgical technique during the surgery and preoperative prophylactic antibiotics should be started to patients. Knowledge of the independent risk factors for SSI is very important to develop strategies to reduce incidence of SSI and to identify high risk patients require intensive post-operative surveillance.

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