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Original Research Article

Surgical site infections post cesarean section

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ABSTRACT

Background: Surgical site infections are among the most common hospital acquired infections. They make upto 14-16% of inpatient infections. Objective of present study was to evaluate the risk factors associated with surgical site infections and the bacteria causing wound infections in obstetric operations and the antibiotic sensitivity and resistance pattern of the pathogens isolated.
Methods: 100 women with wound infection during hospital stay or within 30 days following surgery. Pus samples were collected from the wound site with help of sterile swabs under aseptic precautions and immediately transported to microbiology laboratory for culture and sensitivity.
Results: Most of the patients belonged to the age group of 21-25 years, contributing to 55% of the cases. Majority of the women are from rural areas (71%). 57% of the cases were unbooked. 90% of the SSI were seen in emergency surgeries. Anaemia (48%) was the most common medical risk factor followed by hypertensive disorders 25%. The risk of post operative infection has been shown to be proportional to volume of blood loss during cesarean section and duration of surgery. Staphylococcus aureus to be predominant organism of wound infection of which 21% were MRSA followed by Klebsiella and *E.coli*. The gram negative isolates were 100% resistant to ampicillin followed by 22.5% to third generation cephalosporins and aminoglycosides.
Conclusions: Proper assessment of risk factors that predispose to SSI is critical for the development of strategies for reducing the incidence of SSI and for identifying high risk patients requiring intensive postoperative surveillance.

Keywords: Antibiotics, Cesarean, Infection, Surgical site infections

INTRODUCTION

Surgical site infections are among the most common hospital acquired infections. They make upto 14-16% of inpatient infections.[1]

The increasing incidence of cesarean deliveries worldwide has contributed to greater wound morbidity.[2]

The incidence of cesarean section in india was 7.1% in 1998 and there is 16.7% rise in the rates annually in India.[3] The rates of SSI are considered as an indicator of the quality of surgical and postoperative care provided by the hospitals.[4]

Knowledge of the organisms causing SSI and their antibiotic sensitivity and resistance patterns provide an insight into the current antibiotic prescription practices and the factors affecting these practices. The present study helps to know the risk factors and the organisms causing SSI in our hospital and their sensitivity to different antibiotics which help in formulating infection control practices.

METHODS

This was a cross sectional descriptive study conducted at Niloufer hospital between 2013 to 2015 with a sample size of 100.

Inclusion criteria

- Women with wound infection during hospital stay or within 30 days following surgery, using the criteria for CDC5 (The center for disease control and prevention)
- The operations included are Caesarean section, lapratomy for uterine rupture including rent repair and peripartum hysterectomy.

Exclusion criteria

- Women with wound infection after 30 days following surgery, Surgeries in 1st trimester i.e lapratomy for ectopic pregnancies and molar pregnancies
- Women who fulfill the inclusion criteria are enrolled in the study. Diagnostic criteria were maternal fevers accompanied by spontaneous parting of wound or purulent discharge from the wound with or without positive bacterial culture/local swelling.[6]
- Demographic information, potential risk factors, operative findings, the amount of blood loss are recorded. Pus sample collected from the wound sent for culture and sensitivity.

RESULTS

Most of the patients belonged to the age group of 21-25 years, contributing to 55% of the cases.

Majority of the women are from rural areas (71%). 57% of the cases were unbooked.

Most of them belong to primi gravida (59%).

Table 1: Demographic distribution in study.

Parameters	Number of cases	Percentage
Maternal age		
<20	5	5
21-25	55	55
26-30	33	33
>30	7	7
Nativity		
Rural	71	71
Urban	29	29
Antenatal visits		
Booked	43	43
Unbooked	57	57
Gravidity		
Primi	59	59
Gravida 2	29	29
Gravida 3	10	10
Gravida 4	2	2

90% of the SSI were seen in emergency surgeries (Figure 1).

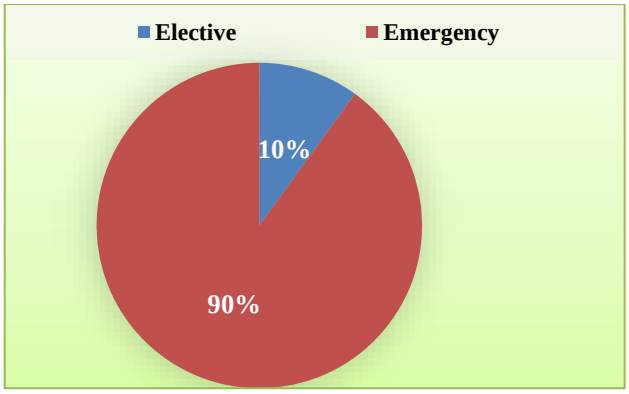

Figure 1: Circumstances of surgery.

Almost all cases are of cesarean section (Table 2).

Table 2: Types of surgery.

Type of surgery	No. of cases	Percentage
Cesarean section	90	90
Uterine repair	5	5
Peripartum hysterectomy	5	5

Table 3: Risk Factors.

Medical risk factor	No. of cases
Anemia	51
Hypertensive disorders	25
Diabetes	09
Jaundice	03
Hypothyroidism	02
HIV+ve	04
Ascitis	05
Obstetric risk factors	
Prev. LSCS	30
Rupture Uterus	05
Failed Induction	15
Placenta Previa	05
Placenta Acreta	02
Abrution	04
DIC	04
PROM	27
Chorioamnitis	08

Table 4: Duration of surgery, ruptured membranes and Intra operative blood loss.

	No. of cases	Percentage
Duration of surgery		
<1 hour	82	82
>1 hour	18	18
Duration of ruptured membranes		
<8 hrs	10	10
>8 hrs	17	17
Intra operative blood loss		
<1000ml	78	78
>1000ml	22	22

Anemia is most common medical risk factor in the patients. Previous LSCS is most effected patients with obstetric risk factor (Table 3).

In 82% cases duration of surgery is more than 1 hour and duration of ruptured membrane is >8 hrs. Blood loss during surgery is less than 1000 ml in 78% of patients (Table 4).

Table 5: Organisms isolated from the pus.

Organisms isolated	No. of cases
Staphylococcus aureus	36
Klebsiella	23
Escherichia coli	18
Pseudomonas	6
No growth	17

Staphylococcus aureus is most common organism isolated in pus after culture (Table 5).

Table 6: Antibiotic sensitivity pattern of the *Staphylococcus aureus*.

Antibiotic	MRSA	MSSA
Penicillin	0 (0%)	21 (70%)
Oxacillin	0 (0%)	30 (100%)
Tetracycline	2 (25%)	15 (50%)
Linezolid	8 (100%)	30 (100%)
Levofloxacin	8 (100%)	30 (100%)
Clindamycin	4 (50%)	23 (76%)
Ciprofloxacin	2 (25%)	15 (30%)
Vancomycin	8 (100%)	30 (100%)
Erythromycin	2 (25%)	23 (76%)
Gentamycin	4 (50%)	24 (80%)

Staphylococcus aureus to be predominant organism of wound infection of which 21% were MRSA. The gram negative isolates were 100% resistant to ampicillin followed by 22.5% to third generation cephalosporins and aminoglycosides (Table 6).

DISCUSSION

SSI is the second most common infectious complication after urinary tract infection following cesarean delivery7. It is a surgical complication with a high morbidity rate, but it is associated with predictable and preventable risk factors. The majority of patients in our study group belong to the age group of 21 to 25 years could be because most pregnant women fall within this age distribution and 71% from rural areas and 29% from urban areas (Table 1).

This is consistent with the Amenu D et al study.[8] Obstetric care services should be strengthened in rural areas. 59% of the patients were nulliparous which is similar to that of study in Mitt et al.[9] Tran et al reported that the risk factor of surgical site infection was shown to be reduced by 39% and 60% when women had one or more children respectively.[10] Majority of the cases were unbooked which correlates with Amenu D et al study.[8] Antenatal care provides opportunities for health education, prior detection and correction of maternal problems.

Patients with anemia were seen to be more prone to SSI. Anemia diminishes resistance to infection and is frequently associated with puerperal sepsis. In present study 48% of the patients had anemia which is consistent with Devjani et al study.[11] Poor control of glucose during surgery and in the perioperative period increases the risk of infection and worsens outcome of sepsis. The results of present study are consistent with Olsen MA et al study.[12] Hypertensive disorders were seen in 25% of the women in our study which correlates with incidence seen in Schneid - Kofman et al study.[6]

30% of the cases in our study had a repeat CS which correlates with Olsen MA et al study.[12] PROM is seen in 27% of cases. PROM associated with the largest bacterial inoculum and liquor gets infected and infection supervenes.[13] The incidence of chorioamnionitis was 8% consistent with Al Jama FE study of Qatar.

An obstetric related risk factor of both intrinsic and extrinsic origin is length of time that the membranes are ruptured prior to cesarean section (Figure 1 and Table 2). Following membrane rupture, the amniotic fluid is no longer sterile and may act as a transport medium by which bacteria come into contact with the uterine and skin incisions.[14] The increased incidence of SSI in cases with intact membranes may be due to multiple vaginal examinations in cases with failed induction and other coexisting risk factors. The duration of surgery is more than one hour in 18 cases, (Table 3) Shapiro et al reported that with each hour of surgery the infection rate almost doubles.[15] The risk of postoperative infection has been shown to be proportional to volume of blood loss during cesarean section (Table 4).[16,17] Risk of surgical site infection increased by 30% for every 100 ml blood loss. A high volume of blood loss is usually associated with poor control of bleeding increased tissue damage from prolonged retraction and manipulation and more sutures18. Blood loss of more than 1000ml was in 22 cases similar to that in the Amenu D et al study.[8]

Majority of the SSI, 63% required secondary suturing while in 37% of the cases, the wound healed with daily aseptic dressings and secondary intention. The most common pathogenic organisms causing SSI in present study (Table 5 and 6) were found to be S. aureus 35% followed by gram negative rods of which Klebsiella species 24%, *E. coli*. 18%. 44% *S. aureus* strains were found to be resistant to penicillin. Ineffectiveness of penicillin in *S. aureus* has been also reported in other studies.[15,19]. *E. coli*, Klebsiella, Pseudomonas were 100% sensitive to piperacillin and ticarcillin.

CONCLUSION

SSI is more prevalent among emergency procedures and women who were unbooked. It is important for antenatal women to have regular antenatal visits so that modifiable risk factors like anaemia are corrected before term. Staphylococcus aureus was predominant organism of wound infection of which 21.05% were MRSA followed by Klebsiella and *E. coli*. Antibiotic use should be vigilant as MRSA was 100% resistant to penicillin, oxacellin and 75% to erythromycin, ciprofloxacin and tetracyclin. Proper assessment of risk factors that predispose to SSI is critical for the development of strategies for reducing the incidence of SSI and for identifying high risk patients requiring intensive postoperative surveillance.

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