

Surgical Site Infection : A Challenge In Obstetrics And Gynaecological Surgeries

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Abstract: Background: Surgical site infection (SSI) is among the most common sufferings following caesarean section. It contributes to increased morbidity and negative impact on the mental, social aspect of patient's life. **Aim:** To determine the incidence, risk factors and therefore the bacteriological SSI following obstetrics and gynecological surgeries at Umaid Hospital Jodhpur. **Methods:** This was a prospective study of 50 patients who developed SSI after caesarean section over 3 months. Wound swab was collected from these patients and culture and antibiotic sensitivity were done for aerobic organisms. **Results:** Out of the 1500 participants who had a caesarean section, 50 patients had SSI, giving an incidence of 3.33%. The common isolates were CONS (57%) , Staphylococcus aureus (14%), followed by E.coli (17 %), Acinatobactor (7%) and Klebsiella (3%).Risk factors significantly associated with post caesarean section wound infection were emergency caesarean section, underlying medical illness, lack of intra operative antibiotic coverage, previous caesarean section.Most isolates were highly resistant to ofloxacin and highly sensitive to vancomycin, linezolid and amikacin. **Conclusion:** The post-caesarean wound infection rate in our centre was 3.33% of all caesarean . Linezolid , cefazoline antibiotics were very sensitive for SSIs and may be used prophylactically till the report of wound swab microscopy, culture and sensitivity is obtained.This may reduce the complications associated with SSI.

Keywords: Caesarean section, Surgical site infection, Wound infections, Antibiotic sensitivity

Introduction:

SSI is defined as an infection occurring within 30 days after a surgery and affecting superficial/deep tissues at the operation site¹. Surgical site infections (SSI) is one of the most common causes of nosocomial infections, with a reported incidence rate of 2-20%².Postoperative SSI following caesarean section is related with increased morbidity, mortality, prolonged hospital stay and socio-economic loss to the patient ³.

Among risk factors patient related factors are old age, nutritional status, pre existing infection, co-morbid illness and procedure related factors like poor surgical technique,

prolonged duration of surgery, pre operative part preparation, improper aseptic precautions. These factors can influence SSIs significantly⁴.

In addition to these risk factors, the virulence and the invasive power of the organism involved, physiological state of the wound tissue and the immunological integrity of the host are also the important factors. Surgical site infections delay recovery of patient thus prolong hospital stay or outpatient treatment, may necessitate readmission as well as other morbidities and mortality⁵. Thus are responsible for significant psychological and economical loss to the society. The rate of surgical site infection after caesarean section range from 3% to 15%.⁶⁻⁸

Causes of SSI: The causes of surgical site infection following caesarean include following.⁹⁻¹² Intrinsic factors are age, obesity, underlying medical conditions like diabetes mellitus, hypertension, immunocompromised states like HIV infection, anemia. Extrinsic factors include preoperative parts preparation, type of procedure carried out (emergency/elective), type of anaesthesia (regional/general), type of skin incision given (horizontal/vertical), prophylactic antibiotic coverage, chorioamnionitis, number of vaginal examinations carried out before surgery, duration of operation and environment of the operating room.¹³⁻¹⁴ Knowledge of risk factors may help to reduce the incidence and severity of surgical site infections.

The CDC definition¹⁵ describes three levels of surgical site infection; Superficial incisional SSI Infection occurs within 30 days after the operation and infection involves only skin or subcutaneous tissue of the incision and at least one of the following: 1. Purulent drainage, with or without laboratory confirmation, from the superficial incision. 2. Organisms isolated from an aseptically obtained culture of fluid or tissue from the superficial incision. 3. At least one of the following signs or symptoms of infection: pain or tenderness, localized swelling, redness, or heat and superficial incision is deliberately opened by surgeon, unless incision is culture-negative. 4. Diagnosis of superficial incisional SSI by the surgeon or attending physician. Deep incisional SSI Operation related infection involving deep soft tissues which occurs within 30 days after the operation and at least one of the following: 1. Purulent drainage from the deep incision but not from the organ/space component of the surgical site. 2. A deep incision spontaneously dehisces or is deliberately opened by a surgeon when the patient has at least one of the following signs or symptoms: fever (>38°C), localized pain, or tenderness, unless site is culture-negative. 3. An abscess or other evidence of infection involving the deep incision is found on direct examination, during reoperation, or by histo-pathologic or radiologic examination. 4. Diagnosis of a deep incisional SSI by a surgeon or attending physician..

Material and methods: This prospective study was carried out in Department of Obstetrics and Gynecology, Umaid Hospital, Dr S.N. Medical Colleg, Jodhpur, Rajasthan

India. The study population comprised of patients that had a cesarean section and then developed post-caesarean section surgical site infections during hospital stay or readmitted after released from hospital. The exclusion criteria were women with wound infections occurring after 30 days of surgery, caesarean sections done outside our hospital admitted following wound infection and refusal to give consent. Post-operative surgical site infection was as defined according to CDC criteria¹⁵. The study was conducted over a period of 3 months and 50 samples were taken in study time. Structured questionnaires were used to extract data from the patients undergoing caesarean sections. The information includes demographic data, existing chronic disease (such as diabetes mellitus, hypertension), past medical history. For those patients that developed SSI, physical examination was done to determine the diagnosis and type of the surgical site infection. Wound swabs for microbiologic culture were taken from the infection site using sterile swabs sticks before the wound is cleaned with an antiseptic solution without contaminating with skin commensals and sent to the hospital laboratory immediately for microscopic, culture and sensitivity.

Results:

The study was performed over a period of 3 months with 50 women developing SSI. Result are depicted in tables below.

Fig1: Shows that 50 patients out of 1500 participants (3.33%) had surgical site infection following caesarean section.

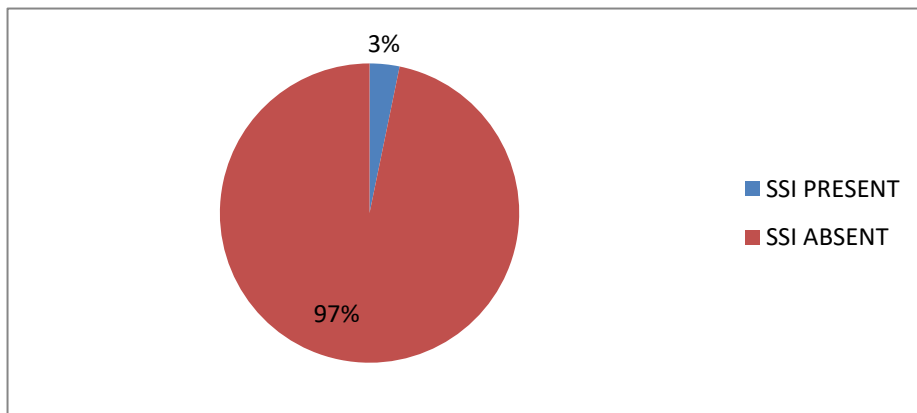


Figure 1 Percentages of patients with a wound infection after caesarean section

Table 1 :Depicts the demographic data of patient developing SSI. Majority of patient were between 21-25 years of age (44%), married (100%) and had primary education (60%).

Age	Total patients
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	<20 years 21-25 years 26-30 years 31-35 years 36-40 years >40 years	09 22 10 03 03 03
Marital status	Married Single Separated/widowed	50 00 00
Education level	None Primary College level	08 30 12
Religion	Hindu Muslim Other	41 09 00

Fig 2: Depicts incidence of SSI in our study. Out of total surgeries done in a period of 3 month, about 50 developed SSI with a incidence of 3.33%. Out of these 50 surgeries, 40 were caesarean sections (80%) and 10 were other gynecological surgeries (20%) .

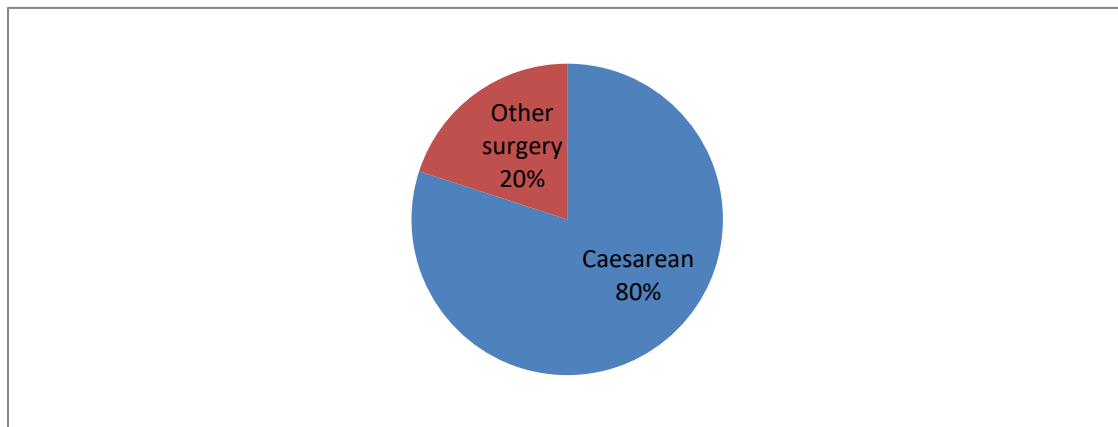


Figure 2 Incidence of SSI in different surgeries

Table 2:

Depicts Obstetrics data: Primigravida (54%) were at higher risk of developing SSI.

Antenatal visits	Yes
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	No	23 17
Previous deliveries	0 1 2	27 08 05
Previous caesarian	0 1 2	31 06 03
Gestational age	Term Preterm	35 05

Table 3: Shows the risk factors for post-caesarean wound infection. SSI was significantly higher among emergency caesarean section (84%) than the elective caesarean section (26%) The most common indication of caesarean section developing SSI was Fetal distress followed by previous LSCS.

Type of surgery	Elective Emergency	08 42
Indication of C-Sec		
	FD PREVIOUS LSCS DTA CPD 1BREECH FI APE PLACENTA PREVIA CORD PROLAPSE BOH	15 09 03 03 03 03 01 01 01 01
Past illness	Diabetesmellitus Hypertension	03 06

Hypothyroidism	01
Epilepsy	01

Fig3: Shows indications of caesarean section developing SSI. Most common indication was Fetal distress (43%) followed by previous LSCS (26%)

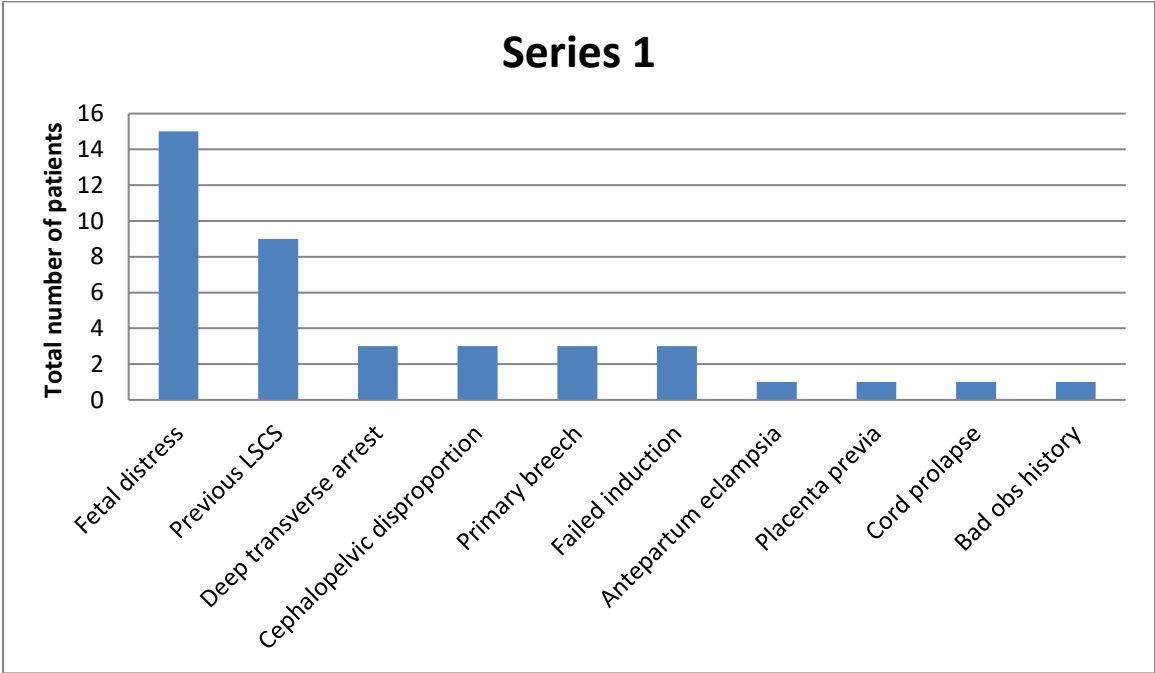


Figure 3 Indications of caesarean sections developing SSI

Fig 4: Shows type of wound infection: About 76% were superficial and 24% were deep wound infections

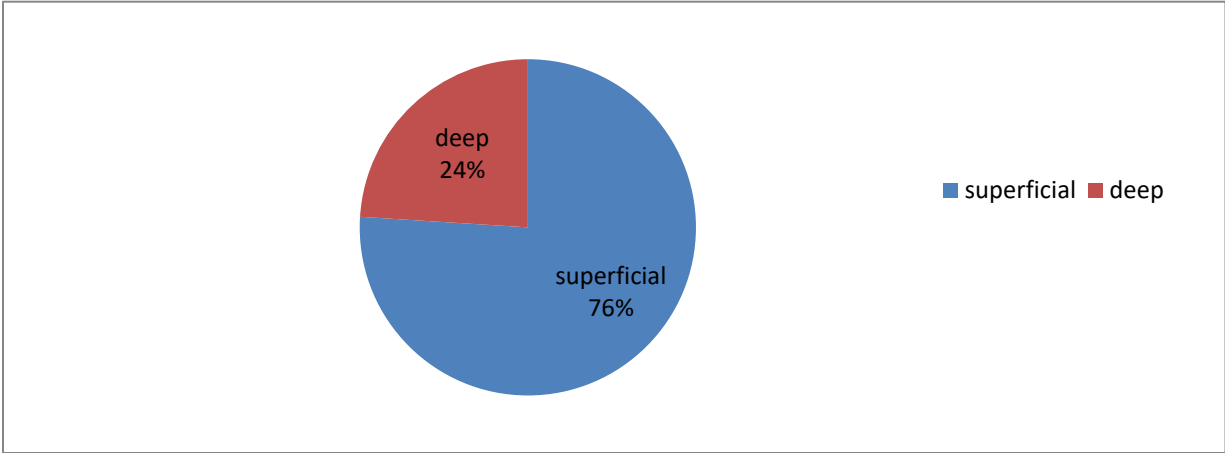


Figure 4 Type of wound infection developing SSI

Fig5: Shows number of bacterial isolates from culture. A total of 50 wound swabs were collected from patients developing post caesarean SSI. Among these 28 (56%) had bacterial growth while 22 (44%) showed no growth.

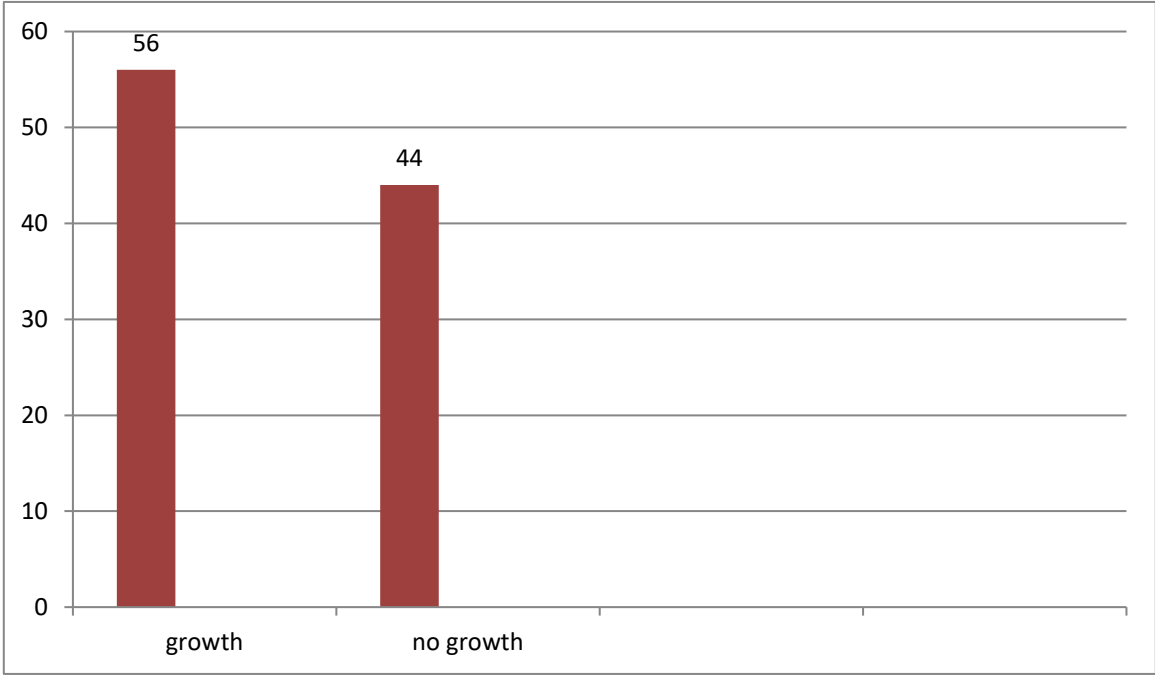


Figure 5 Percentage of culture with growth

Table 4: Shows the frequency of pathogenic bacteria isolates from post-operative wound infection.

Type of organism	Pus culture
CONS	16
E.coli	05
Staph aureus	04
Klebsiella	01
Acinatobactor	02

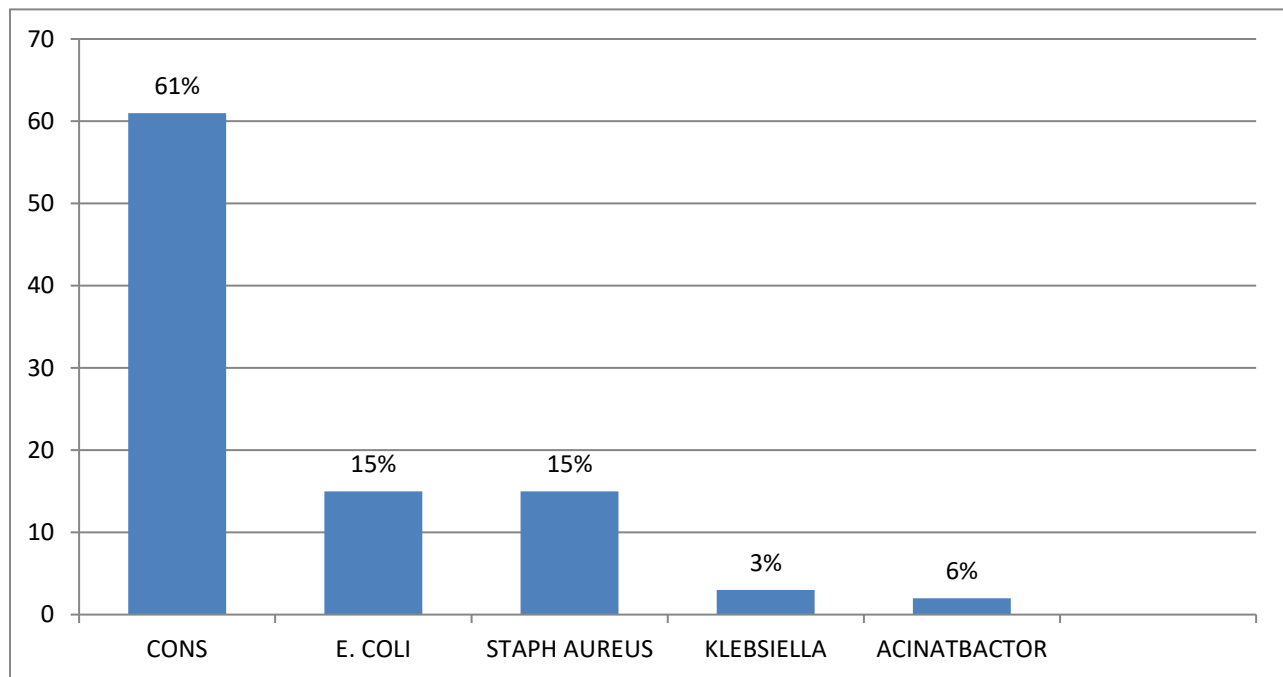


Figure 6 Frequency of bacterial isolates from post operative wound culture.

Fig 7: Shows post of management of patient. About 39 patients (78%) were managed by dressing alone while 11(22%) required resuturing.

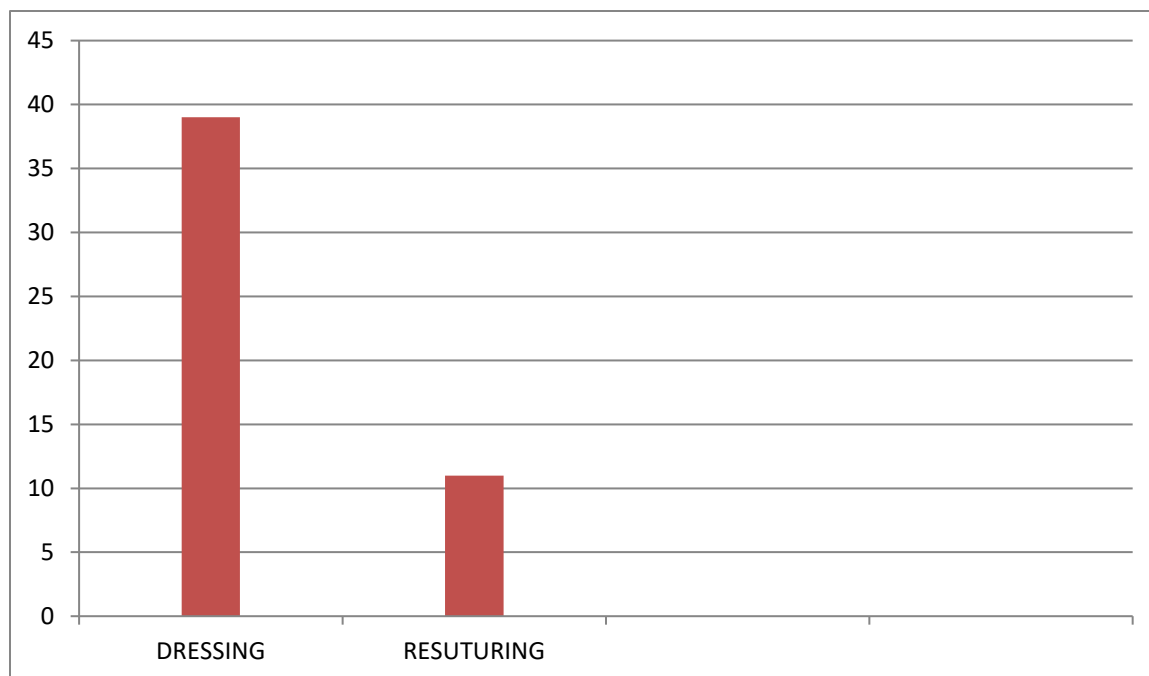


Figure 7 Post operative management of SSI

Table 5: Shows hospital stay of patient after developing SSI.

<5 days	04
5-10 days	21
>10 days	25

Table 6: Shows degree of sensitivity of antibiotics. Most of the CONS were highly sensitive to linezolid (100%) and amikacin (100%), while highly resistant to ofloxacin. E coli was highly sensitive to Meropenam (100%), Cefepime (100%), Tobramycin (100%)

The degree of sensitivity and resistance varied significantly.

Antibiotic name	CONS	E COLI	Staphylococcus aureus
Linezolid	100%	-	100%
Amikacin	100%	50%	100%
Cefazoline	96.66%	-	100%
Vancomycin	91.66%	-	100%
Ampicillin+sulbactam	85.71%	-	
Tobramycin	60%	100%	100%
Ampicillin	50%	-	-

Piperacillin	0%	-	-
Ofloxacin	0%	0%	0%
Meropenam	-	100%	-
Cefepime	-	100%	-
Aztronem	-	80%	-
Ciprofloxacin	-	-	100%
Piperacillin +Tazobactam	-	-	100%

DISCUSSION:

The study gives information about pathogens associated with post-operative wound infections in this hospital and their sensitivity profiles. The incidence of post-caesarean wound infection in this study was 3.33%. Similarly in another study done by Charles Obinna Njoku and Amarachi Nnaemezie Njoku² in 2019 incidence of SSI was found to be 8.5% (16). Another study done by Vikrant negi, Shekhar Pal, Deepak Juyal, Munesh Kumar Sharma, neelam Shara incidence came out to be 1 7.8% (17). The possible reason for variation in these studies could be due to differences in the population under study, diversity of indications for caesarean sections performed in different centers.

According to Eritrean EMOH in 2011, female reproductive age group is from 15-45 yr. Similar results were found in our study. Cunningham (18) mentioned that many obstetrical complications such as prolonged labour, PIH, and post partum sepsis were commonly observed among teenagers and in reproductive age group. In this study reproductive age group (21-25yr) showed higher percentage of SSI (44%)

Educated women are expected to have healthy health practices and thus less risk of SSI as shown in a study done by Charles Obinna Njoku and Amarachi Nnaemezie Njoku (16) however in this study SSI was more in educated women 84% as compared to illiterate one 20%.

Generally patients undergoing emergency Caesarean section are at higher risk of infections. In this study elective surgeries developing SSI were 16% while 84% were emergencies. This is probably due to antibiotic prophylaxis given in elective surgeries reducing the risk of post operative SSI. Similar results were found in Study done by Charles Obinna Njoku and Amarachi Nnaemezie Njoku with more no. of emergency caesarean sections as compared to elective developing SSI (16)

Most common indication of caesarean section developing SSI in our study was fetal distress (37%) followed by prev LSCS (22%). Study done by Tsehaynesh Aslake Wendmagegn et al 2018 also showed Fetal distress to be the most common indication (19) In our study 76 % wound infection were superficial while 24% were deep

wounds . While a study done by Ghirmay et al in 2015 showed superficial incidence as 25% and deep 75% [20]

In this study out of 50 patients developing SSI, 28 patients (56%) had microbial culture growth where Staphylococcus aureus was (72%) most common organism, followed by E.coli (17%), Acinetobacter (7%) and Klebsiella (3%). Similar results were found in other studies done by Charles Obinna Njoku and Amarachi Nnaemezie Njoku where staphylococcus aureus was most common organism associated with SSI (16).

In this study, CONS isolates were highly sensitive to amikacin, linezolid, cefazoline and vancomycin (table 9). Another study done by Njoku et.al reported CONS to be sensitive to amikacin and imipenem, and highly resistant to cephalosporins, amoxicillin/clavulanate, gentamicin and meropenem, and moderately resistant to fluoroquinolones.(16) In spite of availability of antibiotics SSI are still responsible for much morbidity and socio economic loss for both patient as well as health care systems. Reduction in SSI while minimizing antibiotic resistance still remains a challenge for many health care institutions.Out of total SSI, in 22% underwent resuturing while 78% of cases were managed on conservative basis i.e. dressing alone .Which shows that proper aseptic precautions were taken while managing these patients and secondary resuturing rate was less at our centre.

CONCLUSION :

- The incidence of SSI in this study was 3.33% which is within WHO recommendation(2-20%)
- Presence of wound sepsis was associated with longer duration of hospital stay which further lead to economic loss to the patient.

PREVENTION OF SSI:

- For controlling SSI, strict infection control policies should be formulated.A committee should be established which should be able to monitor SSI through surveillance studies . This would bring the level of SSI to an acceptable level.
- Surveillance of SSI with feedback data to surgeons has been shown to be an important component of strategies to reduce SSI risk.

RECOMMENDATIONS:

- Evaluate and improve pre and post operative care through further training and supervision.

- Pre operative antibiotics should be given to all patient scheduled for caesarean section whether emergency / elective.
- Infection prevention procedure in order to reduce the risk of wound sepsis should be followed appropriately.

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