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PROSPECTIVE ANALYTICAL STUDY OF RISK FACTORS AND MICROBIAL ETIOLOGY OF SURGICAL SITE INFECTIONS FOLLOWING LOWER SEGMENT CESAREAN SECTION

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ABSTRACT

BACKGROUND - Cesarean section (CS) is one of the most frequently performed surgical procedure worldwide. Post Cesarean section surgical site infection (SSI) poses substantial health risk as increase morbidity and financial burden. Hence, study help in prevention of surgical site infection by identifying common risk factors and common infective organism causing SSI.

OBJECTIVE – Identification of risk factors and causative micro-organisms associated with SSI.

METHOD – A prospective analytical 1 year study was conducted in our hospital in which all cases that undergone cesarean section was included irrespective of indication. All patients were followed up from day one of cesarean section to postoperative day 30th.

RESULT – Out of the total 1032 cesarean cases which were followed up to 30 days, 108 were diagnosed as post cesarean SSI. The SSI rate being 10.46%. Preoperative, intraoperative and post operative risk factors were studied. 93.6% (101/108) cases undergone emergency cesarean section were infected. SSI were found commonly in who had rupture of membrane > 12hr(p=<0.0001), multiple vaginal examinations(p=<0.0001) and duration of surgery >1hr(p=<0.001). Staphaureus was the most common organism 36.1% isolated in pus after culture, followed by klebsiella 22.2% and E.coli 20.3%.

CONCLUSION - Thus this study, will help in early assessment of risk factors and causative pathogen that predispose to wound infection following cesarean section so that high risk patients can be identified who require intensive postoperative follow up and timely strategies can be undertaken for decreasing the incidence of surgical site wound infections.

KEYWORDS : Cesarean Section, Surgical Site Infection.

INTRODUCTION

Motherhood is a life-changing event. Successful physiological in addition psychological adaptation is needed during the birth of the child, as it can be accompanying with recovery from serious abdominal operations and manage the pain, irritations and tenderness of an abdominal wound. These difficulties are increased if SSI, develops after cesarean section, especially in current scenario of early hospital discharge, in which women has to cope at home, more often with little practical and emotional support.

Surgical site infections are the universal nosocomial infections causes morbidity and mortality among inpatients of hospitals and shown leading cause of operation related adverse events[1,2]. Surgical site infection is that infection which is linked with the incisions and involving structures nearby to the wounds that would expose during surgery[2].

According to Center for Disease Control and Prevention (CDC), Surgical site infection is described as an infections which occurs under thirty days after surgical procedure involving skin, subcutaneous tissue or another parts of the anatomy[3]. In the developing countries, SSI is the leading infection in the general patient population affecting up to two-third of the operated patients[4].

SSI constitute a weighty health risk in cases of post cesarean section with regards to lengthening hospital stay time , and increases morbidity, mortality, costs, and inappropriate use of broad spectrum antibiotics leading to increased resistance to antibiotics

Thus, the study help in better understanding of SSI predictors helps to minimize the emergence of drug resistance and also help in taking control measures timely.

MATERIAL AND METHOD

This prospective analytical study was conducted in department of obstetrics and gynecology in S.S. Medical College, Rewa from March 2019 to Feb 2020 over a period of 12 months. Aim of this study was to identify the risk factors contributing to surgical site infection following cesarean section and the common organisms causing SSI.

INCLUSION CRITERIA

The cases will be eligible based on the reporting of SSI within 30 days of the lower segment cesarean section (LSCS) and have any of the following:

Discharge from wound site.

At least one of the following signs and symptoms of infection—pain or tenderness, localised swelling, redness (erythma) or heat around wound.

Incision that spontaneously dehisces or deliberately opened by surgeon when the patient have at least one of the following signs or symptoms—fever (>38°), localised pain (tenderness) unless the incision is culture negative; abscess or other evidence symptoms of infection.

Seroma (culture positive).

Haematoma (culture positive).

Infective organism isolated in non – purulent drainage

EXCLUSION CRITERIA

- Patient's refusal
- Patients who were lost to follow- up

Surgical wound was inspected at the time of first check dressing on day 3, then on day 5 or on the day of discharge of

the patient and then all patients were followed up in the postnatal clinic (OPD basis) till the 30th day of operation. All patients with wound infection following surgery were included as cases.

Data was collected from all patient regarding age, gestational age, obstetric history, demographic details and details the various risk factors (ex. Indication of LSCS, duration of premature rupture of membrane(PROM), number of vaginal examinations, duration of surgery, etc) by means of a detailed questionnaire.

MICROBIOLOGICAL METHODS

Pus sample was taken from the discharge present at the wound site with sterile cotton swab postoperatively on the day of check dress or whenever discharge appear for the first time. Sample was then immediately sent to microbiological laboratory for culture and sensitivity.

The micro-organism isolated was identified as per standard identification procedures[5]. Antibiotic susceptibility of the isolated microorganism was done by using standard disc diffusion method according to preclinical Laboratory Standards Institute (CLSI) guidelines[6].

RESULT

In the present study, total 1032 cesarean cases were included based on inclusion and exclusion criteria, and out of it 108 were diagnosed as post cesarean SSI. Therefore incidence is about 10.46%. The mean age of cases were 24.04+-4.6 years. Emergency cases were more infected (Chi-square=17.8728,p=0.00002) Incidence of SSI was higher in cases with prolonged duration of rupture of membrane (p=<0.004) also with prolonged duration of labor (p=<0.002)and with greater number of vaginal examinations (p=<0.002)The results were statistically significant(p=<0.001).More the duration of surgery more the chance of infection (p=<0.001).

Staph. Aureus was the most common organism 36.1% isolated in pus after culture, followed by klebsiella 22.2% and E.coli 20.3%.

Table 1. Incidence of surgical site infection

Variables	Number of Cases (%)
Infected cases	108 (10.4%)
Non infected cases	924(89.5%)
Total	1032(100%)

Table 2. Type of cesarean section and frequency of SSI .

Type of surgery	SSI (%) N- 108	No SSI (%) N= 924
Elective cesarean section	07(3)	226(97)
Emergency cesarean section	101(12.6)	698(87.4)

Table 3. Demographic variables associated with SSI

Variables	SSI (%) (N=108)	NO SSI (%) (N= 924)	Total (100%) (N=1032)	p - Value
Age				
<20	7(6.5)	112(12.1)	119	0.0038
21-30	92(85.1)	673(72.8)	765	
>31	9(8.3)	139(15.04)	148	
Nativity				
Rural	81(75)	564(61.0)	645	0.0045
Urban	27(25)	360(39.0)	387	
Socioeconomic Status				
Upper Class	07(6.5)	142(15.4)	149	0.001
Middle class	28(25.9)	324(35.0)	352	
Lower class	73(67.6)	458(49.6)	531	
Antenatal visit				
Booked	21(19.5)	265(28.7)	286	0.00424
Unbooked	87(80.5)	659(11.3)	746	

Table 4. Risk factors associated with SSI

Risk factors	SSI (%) (N = 108)	NO SSI (%) (N= 924)	Total (100%) (N=1032)	P - Value
Duration of ROM				
<12hr	30(4.4)	638(95.6)	668	<0.0004
>12hr	78(21.4)	286(78.6)	364	
Duration of Labor				
<12hr	27(4.1)	630(95.9)	657	<0.0002
>12hr	81(21.6)	294(78.4)	375	
No. of vaginal examinations				
<3	24(3.4)	678(96.6)	702	<0.0002
>3	84(25.4)	246(74.6)	330	
Duration of surgery				
<1hr	39(5.4)	682(94.6)	721	<0.001
>1hr	69(22.1)	242(77.9)	311	
Comorbidities				
Anemia/DM/HTN	94(15.9)	494(84.01)	588	<0.001
Others	14(3.1)	430 (96.8)	444	

Table 5. Isolation of various pathogens associated with SSI

Organisms	Frequency of SSI	%
Staph. Aureus	39	36.1
Pseudomonas	05	4.6
Klebsiella pneumonia	24	22.2
Ecoli	22	20.3
No growth	18	16.6

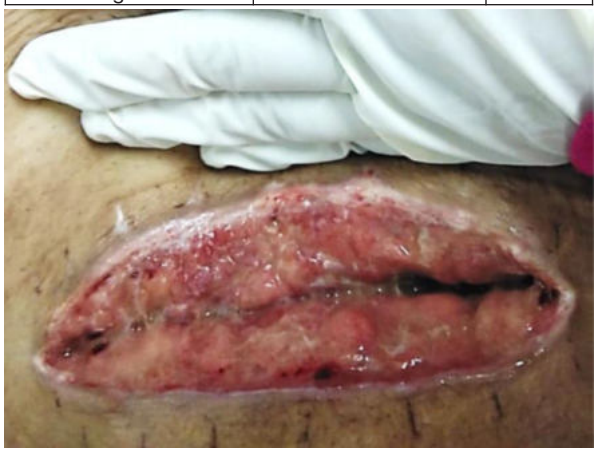

Figure 1 - WOUND DEHISCENCE WITH IMAGE SHOWS ERYTHEMA, INDURATION AND DISCHARGE

DISCUSSION

The development of SSI is multifactorial and various number of risk factors have been discovered to predict post cesarean SSI[7,8]. It is a surgical complication with a high morbidity rate but it is associated with predictable and preventable risk factors.

The incidence of SSI following cesarean section in present study was slightly higher i.e. 10.4% than other studies but nearly similar to study by Devi LS et al[9] (8.4%) and study conducted in Tanzania(10.9%)[10].This may be because our hospital mostly serves the rural population of nearby areas.

Women from rural area were more infected i.e. 75% (81/108) than women from urban (p- value = 0.0045). most of the cases 80.55% (87/108) with infection were unbooked, had no antenatal visits (Chi- square test =4.1168, p-value =0.0424) which correlates with study conducted by Amenu D et al[11] where 71% cases were unbooked.

Premature rupture of membrane, prolonged labor, multiple vaginal examination and duration of surgery were associated with significant risk of SSI. Killian CA et al[12] and B.R Moir Bussy et al[13] also conducted study with similar results.

Pre-operative anemia is an important predictor of infection and has been proved by other studies also, like study conducted by Devjani et al[14] found that in cases with hemoglobin < 10gm% risk of SSI was significant (p value = <0.05).

The most common pathogenic organism causing SSI in present study was Staph. aureus (36.1%) isolated in pus after culture, followed by klebsiella (22.2%) and E.coli (20.3%). Lilani et al[15] and Mahesh et al[16] also found pre-ponderance of Staphylococcus aureus and Pseudomonas in SSIs in their studies.

CONCLUSION

In postoperative patients surgical site wound infection is common complication. SSI increases the morbidity of the patient, psychosocial and psychological problems and also creates financial burden over a family, as duration of hospital stay also increases. Therefore, timely identification of common risk factors which leads to wound infection as some of them are modifiable risk factors like anemia which can be corrected with regular antenatal visits and Prompt measures should be taken in cases with premature rupture of membrane as prolonged leaking increases risk of wound infection. By maintaining partograph adequate labor progress can be monitored so that in cases with prolonged labor early decision for proper augmentation or cesarean section can be taken, as prolonged duration of labor also increases risk of SSI. Also, frequent vaginal examination should be avoided as it leads to contamination of amniotic fluid.

Therefore, timely identification of common risk factors which leads to wound infection help in decrease incidence of SSI.

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