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ORIGINAL ARTICLE

Surgical site wound infection rates and its risk factors following emergency caesarean sections.

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ABSTRACT… Objective: To determine the frequency of surgical site wound infection and factors responsible for it following emergency Caesarean section performed in, PNS Shifa Hospital Karachi. **Study Design:** Cross Sectional study. **Setting:** Department of Obstetrics and Gynecology, PNS Shifa Hospital Karachi. **Period:** 4th July 2021 to 4th January 2022. **Methods:** Three hundred eleven women with term pregnancy undergoing emergency Caesarean section for maternal or foetal indications were included in this study. Wound inspection for signs of infection was done every day. Factors responsible of causing wound infection were noted from the discharge card. All the information was recorded on a preformed questionnaire. **Results:** 62(19.94%) of 311 women experienced surgical site wound infections in which prolonged duration of rupture of membranes was the commonest factors i.e. 51.6% (32/62), prolong duration of labor before operation 29%(18/62) and excessive volume of intra operative blood loss 29% (18/62). **Conclusion:** It is concluded there is a need to adopt specific preventative measures to decrease the frequency of identified factors so that the frequency of wound infection after the emergency caesarean section can be controlled with decreasing maternal morbidity and reduce hospital stays and thus, reducing the cost of treatment.

Key words: Emergency Caesarean Section, Prolong Duration of Labor, Surgical Site Wound Infection.

INTRODUCTION

In obstetrics, the second most common cause of maternal mortality is infection.[1] Caesarean section is commonly performed in obstetrics and infection at the surgical site is a common nosocomial infection, leading to maternal morbidity and increased medical costs.[2] Wound infection develops in 3-15% of caesarean deliveries although the incidence has been reported much lower if prophylactic antibiotics are administered.[3,4]

Frequency of surgical site infection (SSI) is more common when emergency Caesarean sections are performed as compared to the elective Caesarean sections.[5] A study was conducted at the Lahore General Hospital, in the department of Obstetrics & Gynecology where the total number of Caesarean sections were 597 (29.48%). Out of the total numbers, the emergency Caesarean section were 518(86.7%) and 7.9% of the women experienced surgical site wound infections.[6]

Superficial infections involving skin and subcutaneous tissues of incision occurred in 90% of surgical site wound infections.[7] In some cases wound infection invades deep tissues and leads to severe complications such as partial or complete dehiscence of the wound which requires surgical revision and correction by debridement.[8] Moreover, the rates of SSI are elevated in the presence of certain factors such as prolonged rupture of membranes i.e. >12 hrs. (59%)[1], duration of labour before operation (15.1%)[9], excessive intra operative blood loss > 1000ml (23%)[1] and peri-operative blood loss (76%).[10] Other related causative factors are poor surgeon skills and surgical techniques, poor hemostasis and presence of dead space, predisposing to enhanced risk of wound infection.[11] Along with

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the factors mentioned, medical illness during or at the time of pregnancy and malnutrition also contributes towards the problem.[12,13,14]

There are very few studies that have outlined or discussed the frequency of SSI and its risk factors in Pakistan. The rationale of the present study is to determine the frequency and incidence of SSI so that a strategy for the preventative measures can be adopted to decrease the maternal morbidity, reducing hospital stays and costs.

METHODS

This Cross Sectional study was conducted in the department of Obstetrics and Gynecology in PNS SHIFA hospital Karachi for 6 months from 4th July 2021 to 4th Jan 2022. This was approved by ethical committee (ERC/2021/Gynae/77, Dated:16 June 2021).

Sample size calculated is 311 in patients undergoing emergency caesarean section, keeping anticipated population proportion of SSI as 7.9%, 95% confidence level and absolute precision required is 3%. The sampling was done with non probability consecutive.

Sample Technique

Non-probability consecutive.

Inclusion Criteria

1. Both Primi and multigravida with term pregnancy i.e. 37 completed weeks of gestation undergoing emergency Caesarean section for maternal or fetal indications.
2. Age of patient between 17 to 45 years.

Exclusion Criteria

1. Women undergoing Elective Caesarean section.
2. Co-morbidities in pregnancy that may delay wound healing such as diabetes, eclampsia, bleeding disorders and others.
3. Immune compromised patients like patients with active liver disease or renal transplant etc.
4. Haemoglobin<7g/dl.

The above mentioned cases may act as effect modifiers and if included in the study, introduced bias in the study results.

Data Collection Procedure

Patients undergoing emergency caesarean section for maternal or fetal indications were included in the study. The last menstrual period (LMP) and the ultra-sound findings were the basis on which the duration of the pregnancy was determined. They were explained the surgical procedure and informed consent was taken. Experienced resident such as a R3 or R4 performed the caesarean section. All the effect modifiers were controlled by following the exclusion criteria i.e. elective caesarean section, co morbidities, anemia, diabetes, and hypertension were excluded from study.

After the surgical procedure, informed consent for being included in the study was taken. Inspection of the wound was performed every day to check for any signs of infection. A follow-up program was explained to the patients upon discharge and they were advised that they visit the outpatient department (OPD) at least once a week, so that any signs of infection could be identified. In case there were no signs of infection after 30 days of the surgical procedures, patient was regarded as having no SSI. Those patients who were not able to visit the clinician, were contacted via telephone so that the status of their wound could be identified.

If patient presents with any signs of infection within 30 days of operation, she was readmitted in the ward. Factors responsible for it like prolong duration of rupture of membranes, prolong duration of labour before operation and excessive volume of intra op blood loss, causing wound infection were noted from the discharge card. All the information was recorded on a preformed questionnaire.

Data Analysis Procedure

Data was entered and analyzed in SPSS (Statistical software for social sciences) version 17. Data comprised on quantitative and qualitative variables. Mean± SD was computed for quantitative variables i.e. age.

Categorical variables i.e. surgical site wound infection, parity, patients having prolonged labour pains and prolong rupture membranes for more than 12 hours before operation and excessive intra operative blood loss were presented in term of frequency and percentages. The results were presented in the form of tables and charts.

With respect to age and parity, stratification was done, post-stratification chi-square test was applied and p ≤0.05 was taken as significant.

RESULTS

There were 311 women with primi and multigravida with term pregnancy i.e. 37 completed weeks of gestation undergoing emergency Caesarean section for maternal or fetal indications were included in our study. Mostly women were of 21 to 30 years of age and, above 30 years of age as

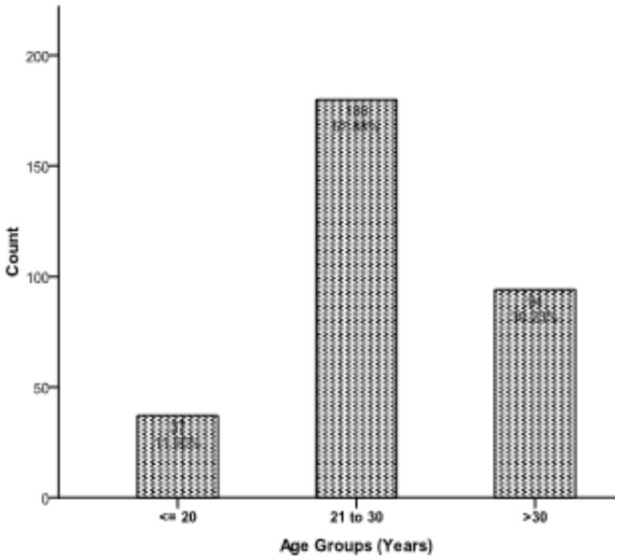

Figure-1. Distribution of age of the patients (N=311)

presented in Figure-1.

The average age of the women was 27.38±5.23 years (95%CI: 26.79 to 27.96) as shown in [Table-I].

There were 67 of 311 women (21.54) primigravida and 244 of 311 women (78.46%) were multigravida [Figure-2].

Out of 311cases, 62(19.94%) of the women experienced surgical site wound infections as presented in [Figure-3].

			Statistic
Age (Years)	Mean		27.38
	95% Confidence Interval for Mean	Lower Bound	26.79
		Upper Bound	27.96
	Median		28.00
	Variance		27.384
	Std. Deviation		5.23
	Minimum		17
	Maximum		38
	Range		21
	Inter quartile Range		7

Table-I. Descriptive statistics of study patients n=311

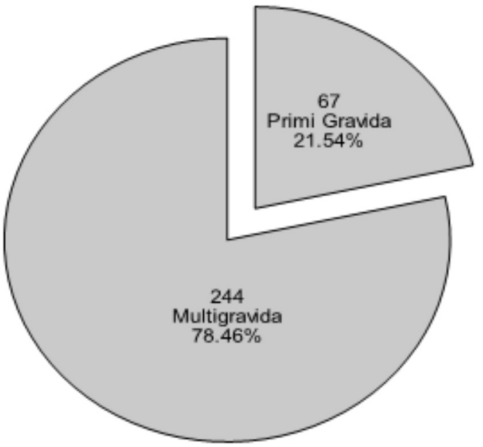

Figure-2. Parity distribution of the patients (N=311)

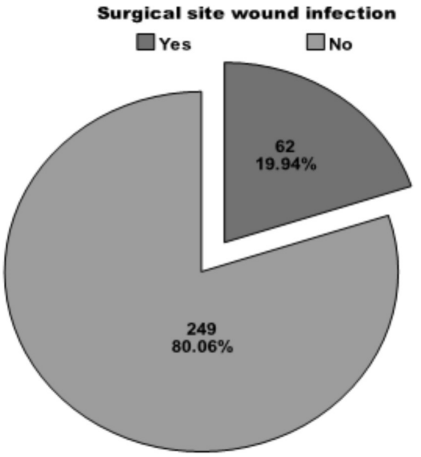

Figure-3. Frequency of surgical site wound infection (N=311)

Factors responsible for surgical site wound infection are presented in table 2 & 3 with respect to age and gravidity.

Prolonged duration of rupture of membranes was the commonest factors that was observed in 51.6% (32/62), prolong duration of labour before operation 29 %(18/62) and excessive volume of intra operative blood loss 29% (18/620).

Rate of SSI was also observed with respect to age groups. Rate of SSI was significant among the different age groups (p=0.007) as shown in [Figure-4].

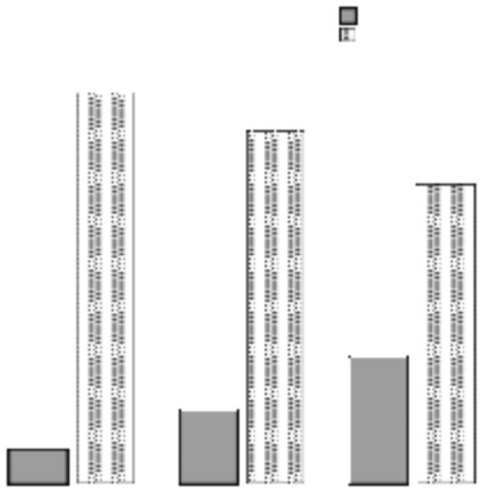

Figure-4. Frequency of surgical site wound infection with respect to age group (N=311)

While with respect to gravidity rate of SSI was insignificant between primi and multigravida as presented in [Figure-5].

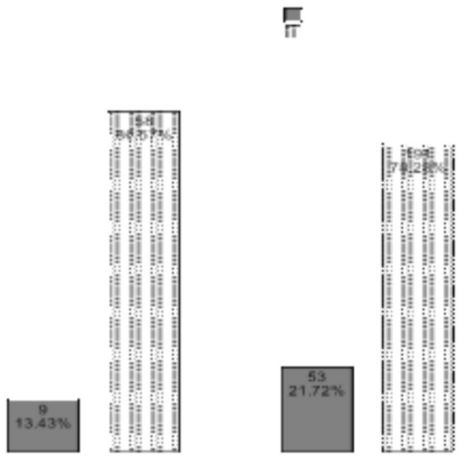

Figure-5. Frequency of surgical site wound infection with respect to gravida (N=311)

Similar factors responsible of SSI were also observed with respect to age groups and gravida as shown in [Table-II, Table-III].

Factors	Age Groups (Years)		P-Value
	≤30 Years n=34	>30 Years n=28	
Prolong duration of rupture of membranes	16 (47.06%)	10 (35.7%)	0.023*
Prolong duration of labour before operation	6 (17.6%)	12 (42.9%)	0.03*
Excessive Volume of intra op blood loss	12 (35.3%)	6 (21.4%)	0.23

Table-II. Factors responsible for surgical site wound infection with respect to age groups n=62 Chi-square test applied for each factor separately. *significant

Factors	Gravida		P-Value
	Primi-gravida n=9	Multi-gravida n=53	
Prolong duration of rupture of membranes	3(33.3%)	29(54.7%)	0.23
Prolong duration of labour before operation	3(33.3%)	15(28.3%)	0.75
Excessive Volume of intra op blood loss	3(33.3%)	15(28.3%)	0.75

Table-III. Factors responsible for surgical site wound infection with respect to gravida n=62 Chi-square test applied for each factor separately.

Rate of prolong duration of rupture of membranes and prolong duration of labour before operation were significant between groups while excessive volume of intra operative blood loss was not significant between groups [Table-II]. Rate of prolong duration of rupture of membranes, prolong duration of labour before operation and excessive volume of intra operative blood loss were observed insignificant between primi and multigravida [Table-III].

DISCUSSION

One of the commonest post-operative complication is surgical site infection (SSI). It constitutes a major public health issue in terms of morbidity and mortality. SSI also causes increased anti-microbial resistance due to excessive use of broad spectrum antibiotics and also one of the reasons for prolonged hospital stays.[15,16,17] It remains as an important complication of

surgery and requires high financial costs for its treatment.[18,19] It is the second commonest type of infection seen after a C-section, among those patients who are generally considered to be fit and young females.[20,21] SSI rates range from 6 to 27% after caesarean deliveries.[22,23] These ranges depend upon the methods of surveillance used for infection identification and the use of anti-microbial drugs. The morbidity caused due to infections has been shown to be eight-times higher after the cesarean section as compared to vaginal delivery.[24] Maternal morbidity may be reduced by identifying the risk factors and by reducing the number of deliveries done by the cesarean section method.

The SSI incidence following C-section shows variation, ranging from 0.3% to 17%, in turkey and Australia respectively.[25,26] Among the hospitals which have reported to the National Nosocomial Infections Surveillance (NNIS) System, SSI after the c-section ranged from 2.8% to 6.7%, as per the risk index category.[27] In current study, 62(19.94%) out of 311cases, the women experienced surgical site wound infection. This can be compared with the rates between 6.3%[28] and 10.1%[29] described in other studies of Caesarean section SSI. It should be however noted that the comparison of rates is limited by the variety of SSI definitions and the methods used in the studies. In the current investigation, the incidence of the SSIs detected were after the patients were discharged from the hospital, and is on a higher side when compared to what has been reported in the literature and could be, in part, a reflection of the shorter length of stay in hospital associated with this procedure.[30,31]

Rates of SSI was significant among the different age groups (p=0.007). 8.11 % in less than 20 years, 17.22% in 21-30 years, 29.79% in greater than 30 years of age. This data shows that increasing age increases the risk of SSI after the C-section. However, the literature suggests that age is not a specific risk factor to the category of c-section surgery although, age has been shown to be a risk for many other classes of surgery.[32]

The obstetric-related risks of both extrinsic and intrinsic origin are high during a c-section. Once the membrane is ruptured, the amniotic fluid is no longer sterile and could act as a medium of transport by which the microbes may come in contact with the skin and uterine incisions.[33] In the current study, the prolonged duration of membrane rupture was the common factor that was observed in 51.6% (32/62), prolong duration of labour before operation 29% (18/62) and excessive volume of intra operative blood loss 29% (18/620). The literature has identified a strong association between the risk of SSI and prolonged rupture of the membranes.[34]

The current study was carried out in a teaching hospital of a developing country and it should be noted that the incidence of maternal mortality is very high and healthcare services are far from ideal. Therefore, addition of useful data from this part of the world helps us in improving our understanding of variables that influence the overall rate of SSI. The data will surely help in better implementation of surveillance and infection control protocols.

CONCLUSION

This study identified key risk factors being prolonged rupture of membranes, labor duration, and intraoperative blood loss. To curb infections, healthcare providers should adopt timely intervention, optimized labor management, and standardized protocols, emphasizing patient education for effective postoperative care.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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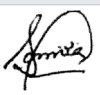
AUTHORSHIP AND CONTRIBUTION DECLARATION

No.	Author(s) Full Name	Contribution to the paper	Author(s) Signature
1	Samia Ghulam Mohammad	Idea the original study, collected the data and produced the first draft, rea, revised and approved the submitted version of the manuscirpt.	
2	Tasneem Ashraf	Idea the original study, collected the data and produced the first draft, rea, revised and approved the submitted version of the manuscirpt.	
3	Khadija Farrukh	Carried out the design of the study, analyzed/interpreted the data, statistical analysis, read, revised and approved the submitted version of the manuscript.	
4	Samina Rehan Khan	Collected the data analyzed/interpreted the data rea, revised and approved the submitted version of the manuscript.	
5	Amera Tariq	Collected the data, proof read the first draft, read, revised and approved the submitted version of the manuscript.	
6	Ayesha Arif	Collected the data analyzed/interpreted the data rea, revised and approved the submitted version of the manuscript.