The MedS Alliance
Journal of Medicine and Medical Sciences

Original Investigation

Surgical Site Infection and Its Associated Factors Following Obstetric Surgeries: A Retrospective Study

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ARTICLE INFO

Article history:
Received: 17 March 2021
Revised: 11 May 2021
Accepted: 23 June 2021

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Citation:
Sharma G RP, Rajbanshi L, Thapa B, Singh JP, Tamrakar R. Surgical Site Infection and Its Associated Factors Following Obstetric Surgeries: A Retrospective Study. MedS. J. Med. Sci. 2021; 1(1):32-36

ABSTARCT

INTRODUCTION: Surgical site infection (SSI) is most common type of Hospital Acquired Infection (HAI) in low and middle-income countries. The objective of the study was to find out the incidence and associated factors of SSI following obstetric surgeries especially Lower Segment Cesarean Section (LSCS). **MATERIALS AND METHODS:** A retrospective cross sectional study was conducted at Chitwan Medical College Teaching Hospital. A total of 1739 patients files who had undergone Lower Segment Cesarean Section from 14th April 2019 to 12 April 2020 was reviewed. Data was analysed using IBM SPSS Version 20.0 and interpreted in descriptive and inferential statistics. **RESULTS:** Among 1739 obstetric surgeries performed, 50 patient showed signs and symptoms of SSI yielding to an infection rate of 2.9%. Majority (80%) of patients developed SSI after they were discharged. There was significant association between SSI and type of surgery (p=0.007) and, SSI was not associated with haemoglobin level, blood transfusion, residence and age of the patients. **CONCLUSIONS:** Though overall infection rate was low, most of the women developed infection after being discharged, thus it is recommended that discharge counselling about wound care should be emphasized.

Keywords: Associated factors, lower Segment, caesarean section, surgical site infection.

INTRODUCTION

Surgical Site Infection (SSI) is defined as infection related to an operative procedure that occurs at or near the surgical site incision within 30 days of the procedure or within 90 days if prosthetic material is implanted at the surgical site. It is among the most common preventable complication after surgery [1]. Surgical site infection (SSI) is most common type of hospital acquired infection (HAI) in low and middle-income countries and affects one third of the patients who have undergone surgical procedures [2]. It occurs in 2-4% of all patients undergoing inpatient surgical procedures [1]. Even though most infections are treatable, SSI still remains a leading cause of prolonged hospital stay, morbidity and mortality after surgery [3]. It is also common in patients undergoing cesarean section, having history of previous cesarean section, age group above 35 years and having co-morbidities such as diabetes, obesity, anaemia etc [4].

According to World Health Organization (WHO) in low-middle income countries, the pooled incidence of SSI was 11.8 per 100 surgical procedures. According to European Centre for Disease Prevention and Control (ECDC)-SSI surveillance (2010-2011) reported cumulative incidence of 2.9% for cesarean section, where as in Africa, up to 20% of cesarean section procedure lead to SSI. Incidence of SSI per 100 procedures in USA (2014) was 1.9%, in Europe (2013-14) 0.6-9.5% and in South East Asia it was 7.7% [1, 5]. SSI leads to 38% of hospital acquired infection. Prevalence of SSI following obstetric surgeries varies from 3-15% and it is higher in cases with emergency procedure compared to elective procedures [6].

SSI is a preventable complication, if it is neglected it has significant burden in progress of patient condition following admission in intensive care unit, readmission and increased the cost of post discharge care. SSI is the fourth most common nosocomial infections among obstetric surgeries [7]. Since Nepal is a developing country and resources are limited, surveillance activities are important aspect in understanding its own incidence and prevalence. Thus, studies are required to identify common problems and persuade others to commit to improvement. The results of this study will help to identify incidence of SSI related to obstetric surgeries and its associated factors, in order to evaluate the outcome and undertake preventive measures in near future. It also provides baseline information for hospital and guide to make improvement against this study. The aim of this study is to find out incidence and associated risk factors of SSI following obstetric surgeries.

MATERIALS AND METHODS

Study design and setting

A retrospective cross-sectional study was conducted from 15 June 2020 to 15 September 2020 at Chitwan Medical College Teaching Hospital (CMCTH). A total of 1739 patient files who underwent Lower Segment Cesarean Section at CMCTH, from 14th April 2019 to 12th April 2020 were reviewed.

Patients and study procedure

All the patients who gave birth via lower segment caesarean section at Chitwan Medical College Teaching Hospital from 14th April 2019 to 12th April 2020 were considered as the study participants. Inpatient number of all the patients underwent LSCS from 14th April 2019 to 12th April 2020 were traced from Delivery Register of Gynaecology and Obstetrics department at CMCTH. Then, the patient files (medical records) were retrieved from hospital information system. Complete data regarding, demographic profile, medical and surgical history and investigations were filled in a pre-determined proforma. All files of patients who underwent Lower Segment Cesarean Section at Chitwan Medical College Teaching Hospital form 14 April 2019 to 12 April 2020 were included in the study. All files of the patients who had LSCS at other hospitals were excluded from the study.

Study variables and its measurements

Study variables includes: Dependent/ outcome Variable as: surgical site infection following lower segment cesarean Section. Independent variable includes: age, residence, parity, haemoglobin, blood transfusion and type of surgery. This study was conducted only after getting approval from Institutional Review Committee of Chitwan Medical College Teaching Hospital with reference (Ref: CMC-lRCl0761077-tI). Verbal consent for access of patient files from Hospital Information System was taken from hospital authority. All activities of this research were conducted in accordance to ethical guidelines by maintaining the confidentiality of patient data.

Statistical considerations

Data was analysed using IBM SPSS version 20 and interpreted in terms of descriptive statistics such as frequency, percentage, and median for socio demographic and clinical characteristics and information on surgical site infection. The Chi-square test (inferential statistics) was used to observe association between surgical site infection and selected variables. P-value less than 5% was considered statistically significant for this study.

RESULTS

Most of the patients (90.9%) were from the age group of 20-35 years with IQR of 29 to 22, and 79.6% resided in urban area (Table 1). More than half 57% were primiparous, 77.9% had hemoglobin level of ≥11 gm/dl, blood transfusion was received among 2.2%, and emergency caesarean section was done on 76% of the patients (Table 2). Out of 1739 LSCS performed, 50 patients showed signs and symptoms of SSI, yielding to an infection rate of 2.9%. SSI was seen in 80% of the patients after discharge, and in 40% of patients SSI had developed in ≤7 of post operation day. Among swab culture of 50 SSI cases, bacteria was isolated in 6 cases only and 2 cases was evidenced with Acinetobacter and Staphylococcus aureus. (Table 3).

Table 1| Sociodemographic characteristics (n=1739).

Characteristics	Number (n)	Percentage (%)
Age in years		
<20	113	6.5
20-35	1581	90.9
>35	45	2.6
Median (IQR = Q3-Q1),	25 (29-22)	Min. = 16, Max = 43
Place of Residence		
Rural	355	20.4
Urban	1384	79.6

Table 2| Clinical Characteristics (n=1739)

Variables	Number (n)	Percentage (%)
Parity		
Primiparous	992	57
Multiparous	747	43
Haemoglobin level		
≥ 11 gm/dl	1355	77.9
< 11gm/dl	384	22.1
Blood Transfusion		
Yes	38	2.2
No	1701	97.8
Types of surgery		
Emergency	1322	76.0
Elective	417	23.0

Table 3| Information on Surgical site infection

Variables	Number (n)	Percentage (%)
Presence of Surgical site infection (n=1739)		
Yes	50	2.9
No	1739	97.2
Timing of surgical site infection (n=50)		
Before Discharge	10	20.0
After Discharge	40	80.0
Post-op day SSI Detected (n=50)		
≤7 days	20	40.0
8-14 days	19	38.0
≥ 15 days	11	22.0
Swab Culture Report (n=50)		
Positive	6	12.0
Negative	44	88.0
Bacteria isolated (n= 6)		
Acinetobacter	2	33.3
Staphylococcus aureus	2	33.3
Pseudomonas	1	16.7
Klebsiella	1	16.7

Association between surgical site infection (SSI) and selected variables are shown in Table 4. There was statistically significant association between SSI and types of caesarean section (p=0.007). However, SSI was found insignificant for other socio demographic and clinical characteristics (p>0.05).

Table 4| Association between surgical site infection and selected variables

Variables	Presence of SSI		p-value
	Yes, n (%)	No, n (%)	
Age in years			
<20	2 (1.8)	111 (98.2)	
20-35	48 (3.0)	1533 (97.0)	0.657
>35	0	45 (100.0)	
Place of residence			
Rural	15(4.2)	340 (95.8)	0.088
Urban	35(2.5)	1349 (97.5)	
Parity			
Primiparous	33(3.3)	959 (96.7)	0.194
Multiparous	17 (2.3)	730 (97.7)	
Hemoglobin level			
≥ 11 gm/dl	39 (2.9)	1316 (97.1)	0.989
<11gm/dl	11(2.9)	373 (97.1)	
Blood transfusion			
Yes	2 (5.3)	36 (94.7)	0.299
No	48 (2.8)	1653 (97.2)	
Types of surgery			
Emergency	46 (3.5)	1276 (96.5)	0.007*
Elective	4 (1.0)	413 (99.0)	

DISCUSSION

In the present study, the incidence of SSI was 2.9% among women where caesarean section was performed. According to study conducted in Dulikhel Hospital, Nepal 12.6% SSI was evidenced [8], and in tertiary care hospital of North India, 10.3 % of SSI was evidenced among patients undergoing cesarean section [9]. However, 8.1% SSI was found Debretor General Hospital, Northwest Ethiopia [10]. Thus the infection rate was far less compared to studies conducted in India, Africa and other hospitals of Nepal, might be due to inadequate tracing of cesarean section patients after discharge to identify SSI. In this study, out of 50 infected cases, 92% were observed in emergency caesarean section cases, which was consistent with the study findings of Shrestha et.al, at Dhulikhel hospital, Nepal, i.e. 90.2% [8]. However, a study conducted in India revealed that 80.16% of SSI was evidenced in emergency caesarean section [11]. In the present study, 40% of the patients were detected with SSI within 7 days of surgical procedure, whereas 52.7% was seen in Assela teaching referral hospital, Ethiopia [6]. In regards to timing of SSI, Bizimana et al. found that 62.5% developed SSI after discharge [12], whereas, in this study 80% of patients developed SSI post-discharge. The reason behind these results might be lack of compliance or lack of healthcare professionals communicating about wound care, nutrition, and hygiene practices before discharging of patient. Out of 50 SSI patients swab collected, only 6 patients yielded positive growth. In a study done in Rwanda, out of 16 SSI patients, 14 patients showed positive microbiological culture [2]. The microbial growth was not evidenced much in this study, probably due to intake of prophylactic antibiotic before surgery and continuing till post-operative period. Chada et al. found that staphylococcus aureus was the most common bacterial isolated from patient who had undergone LSCS, followed by E Coli [13]. As per a teaching hospital in Goa, 79.33% of the isolates were gram negative bacteria, pseudomonas being the most common isolate, followed by E. coli [14]. In study conducted in china, 20 strains of bacteria including E. coli, S. aureus and P. aeruginosa were isolated from SSI cases [15]. In the present study staphylococcus 2 (33.3%), Acinetobacter 2 (33.3%), Klebsiella1 (16.7%) and Pseudomonas 1(16.7%) was observed among SSI patients. In this study there is significant association between SSI and type of surgery (p=0.007) and same observation was evidenced in most of the study [8, 11]. SSI was not statistically associated with age of patients, residence, parity, hemoglobin level and blood transfusion status. The study has some limitations: Since it is retrospective study, there is no adequate evidence to trace various causes and risk factors associated with SSI, but this study helps to provide baseline data of SSI at a teaching hospital.

CONCLUSIONS

Based on the findings of this study, it is concluded that SSI was evidenced among obstetric surgeries which is far less compared to other hospitals. However, overall infection rate is low. The infection rate was high among patients undergoing emergency LSCS cases and mostly developed at home after discharge from the hospital. Thus, it is recommended that patient should be provided awareness on self-care before discharge to prevent further infection of incision site. Further studies can be done to find out the factors associated with SSI at home.

ADDITIONAL INFORMATION AND DECLARATIONS

Acknowledgment: We are thankful to Chitwan Medical College for providing study site and to staffs of Gynaecology and Obstetrics department and medical records department for helping in data collection for the study.

Funding: The authors received no funding for this work.

Competing Interests: The authors declare no competing interests.

Author Contributions: Concepts, design, literature review and data acquisition: RPSG; Data Analysis: JPS; Manuscript preparation and Editing: RPSG and RT; Intellectual content: LR; Manuscript Finalization: RPSG, LR, BT, JPS, RT

Data Availability: Data will be available up on request to corresponding authors after valid region.

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