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Original Research Article

An Investigation of Surgical Site Infection in Obstetrics and Gynaecological Surgeries at a Tertiary Care Hospital

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Abstract

Aim: To Study of surgical site infection in obstetrics and Gynaecological surgeries in a tertiary care hospital in Bihar region. **Methods:** The prospective analytical study was conducted in the Department of Obstetrics and Gynaecology, Darbhanga Medical College and Hospital, Laheriasarai, Darbhanga, Bihar, India, from December 2019 to July 2020. A total of 100 females undergoing abdominal surgeries at our hospital were selected for study after informed consent. Patients with SSI occurring within 30 days after operation involving only skin and subcutaneous tissue were included. Patients who are not operated in our hospital or coming with surgical site infection after getting discharge from the hospital were excluded. **Results:** Mean age of the study subjects was 37.8 years with over half of them (58%) were between 20-40 years of age. Out of total 100 cases, 43% were gynaecological procedures while rests 57 were obstetric cases. Most common obstetric surgery was LSCS (52%) while most common gynaecological surgery performed was total abdominal hysterectomy (26%) cases while TAH BSO was performed in 14% cases. Exploratory laparotomy and tubal ligation were done in 4% cases each. Prevalence of Surgical site infections in present study was 9%. Most common organism isolated from SSI site was Staph. Aureus (5 cases) followed by *E. coli* (2 cases) and Klebsilla (2 cases). Prevalence of SSI was 11.63% in gynaecological procedures while it was 7.02% in obstetric procedures (p-0.67). No difference was observed between subjects with and without SSIs with respect to mean age, haemoglobin and leucocyte count (p>0.05). However, mean hospital stay was significantly higher in cases with SSIs (7.8 vs 4.52 days). **Conclusion:** The incidence of SSI was same for Obstetric as well as Gynaecological surgeries. The multiple risk factors identified in the present study can be helpful for SSI risk stratification and prioritizing interventions in low-middle income countries.

Keywords: SSI, Gynaecological procedures, Nosocomial infection

Introduction

Nosocomial infection constitutes a major public health problem worldwide. The most common types of nosocomial infections that could occur in a hospital set up are surgical wound and other soft tissue infections, urinary tract, respiratory and blood stream infections.[1] The Centers for Disease Control define an SSI as "an infection related to an operative procedure that occurs at or near the surgical incision within 30 days."[2] Postoperative infection is one of the most important and leading causes of increased morbidity, such as greater antibiotic usage, more reoperations, and prolonged hospital and intensive care unit (ICU) stays, thus also augmenting treatment costs and increasing resource utilization.[3] One of the most common infections at gynaecology department is surgical site infection. The obstetric and gynecological procedures at high risk of post-operative infection include vaginal and abdominal hysterectomy and Caesarean section.[4] Compared with women delivered vaginally, those delivered by caesarean section at increase risk of infection (2-fold - 20- fold)[5] The overall incidence of wound sepsis in India is from 10%-33%. However, the incidence of wound complications in the obstetric population varies with rates ranging from 2.8% to 26.6%.[6] Infections can be divided into groups on the basis of mechanism and the etiological factor. Microorganism responsible for causing post-operative wound infection can be endogenous (a patient's internal flora causes the infection) or exogenous (the infection is caused by microorganisms acquired from the hospital environment).[6] Microbes most commonly involved in causing post-operative wound infections are E. coli, Pseudomonas aeruginosa, Staphylococcus aureus, Enterobacter, Klebsiella, Bacteroides fragilis, and Enterococcus. In choosing antibiotic determination of causative organism is important. Susceptibility pattern of bacteria responsible for causing infections vary greatly. Knowledge of the most likely organism and the prevailing antibiotic sensitivity/resistance pattern will be useful to initiate empirical treatment. Other than microbes, there are many factors within the patient and his environment, both local and general, which ultimately determine the outcome. These local factors such as hematomas, seromas, suture material, poor surgical technique, degree of contamination and also age, nutrition, hygiene, and other associated disease play an important role in the etiology of postoperative wound infection.[7]

Materials and Method

The prospective analytical study was conducted in the Department of Obstetrics and Gynaecology, Darbhanga Medical College and Hospital, Laheriasarai, Darbhanga, Bihar, India, from December 2019 to July 2020 after taking the approval of the protocol review committee and institutional ethics committee. A total of 100 females undergoing abdominal surgeries at our hospital were selected for study after informed consent. Patients with SSI occurring within 30 days after operation involving only skin and subcutaneous tissue were included. Patients who are not operated in our hospital or coming with surgical site infection after getting discharge from the hospital were excluded.

Methodology

A detailed history was taken from all patients followed by through general and systemic examination along with necessary investigation. The patients were prepared for operative procedures through abdominal approach, either elective or emergency as per standard hospital protocol. Patients undergoing surgeries were graded according to ASA score.[8]. Operated patients were followed up regularly, during the post-operative period. The wound was classified as per CDC criteria and were checked on 3rd post operatively day routinely and later according to the complaints of the patients.

Presence of erythema, pain and discharge were taken as signs of surgical site infection. Wound swabs were taken from where the discharge was present and sent for culture and sensitivity.

Statistical Analysis

The quantitative data was represented as their mean ± SD. Categorical and nominal data was expressed in percentage. The t-test was used for analysing quantitative data, or else non parametric data was analyzed by Mann Whitney test. Categorical data was analyzed by using chi-square test. The significance level of p value was set at <0.05. All analysis was carried out by using SPSS software version 25.0

Results

Mean age of the study subjects was 37.8 years with over half of them (58%) were between 20-40 years of age. Out of total 100 cases, 43% were gynaecological procedures while rests 57 were obstetric cases. Most common obstetric surgery was LSCS (52%) while most common gynaecological surgery performed was total abdominal hysterectomy (26%) cases while TAH BSO was performed in 14% cases. Exploratory laparotomy and tubal ligation were done in 4% cases each (**Table 1**).

Table 1: Distribution of patients according to type of surgery

Type of Surgery	N	%
LSCS	52	52
TAH	26	26
TAH with BSO	14	14
Exploratory Laparotomy	4	4
Tubal Ligation	4	4
Total	100	100

Prevalence of Surgical site infections in present study was 9%. Most common organism isolated from SSI site was Staph. Aureus (5 cases) followed by *E.coli* (2 cases) and Klebsilla (2 cases). Prevalence of SSI was 11.63% in gynaecological procedures while it was 7.02% in obstetric procedures (p-0.67) (**Table 2**).

Table 2: Association of type of procedure with development of SSIs

Procedure	SSI		Total
	No	Yes	
Gynaecology	38	5	43
	88.37%	11.63%	100
Obstetric	53	4	57
	92.98%	7.02%	100.00%
Total	91	9	100
	91%	9%	100.00%
p- value - 0.67			

Prevalence of SSI was significantly higher in cases with emergency procedures as compared to elective procedures (24% vs 6%; p<0.05). A significant association was also observed between prevalence of SSI and higher ASA grade (p<0.05), high BMI (> 30 Kg/m^2) (40% vs 8%; p<0.05) and diabetics (32% vs 6%; p<0.05). No association was observed between prevalence of SSIs with hypertension (p- 0.15) and anemia (p-0.32). (**Table 3**).

Table 3: Association of various factors with development of SSIs

Type of Procedure	SSI		Total	p-value
	No (n-91)	Yes (n-9)		
Emergency	23	7	30	**<0.05**
	76.67%	23.33%	100%	
ASA Grade II/ III	25	8	33	**<0.05**
	75.76%	24.24%	100 %	
Obesity	6	4	10	**<0.05**
	60%	40%	100%	
Diabetes	15	5	20	**<0.05**
	75%	25%	100 %	
Hypertension	12	4	16	**0.15**
	75%	25%	100%	
Anemia	43	7	50	**0.32**
	86%	14%	100%	
Contaminated Wound	8	4	12	**<0.05**
	66.67%	33.33%	100%	
*Overall Prevalence - 9%				

No difference was observed between subjects with and without SSIs with respect to mean age, haemoglobin and leucocyte count (p>0.05). However, mean hospital stay was significantly higher in cases with SSIs (7.8 vs 4.52 days) (**Table 4**).

Table 4: Mean comparison of variables with development of SSIs

Variables	SSI	N	Mean	SD	p- value
Age (years)	**No**	91	38.81	13.96	**0.37**
	Yes	9	42.5	13.5	
Hemoglobin (gm%)	**No**	91	9.53	1.54	**0.065**
	Yes	9	8.75	0.99	
TLC (/cu mm)	**No**	91	12197.78	3231.54	**0.52**
	Yes	9	10690.04	3888.97	
Hospital Stay (days)	**No**	91	4.52	1.62	**< 0.01**
	Yes	9	7.8	2.89	

Discussion

Very few studies in India, have reported the incidence and risk factors associated with Obstetric and Gynaecological surgeries simultaneously. In present study, the prevalence of surgical site infections among obstetric and gynaecological surgeries was 9%. In a study by Pathak et al.[9] the cumulative incidence rate of SSI was 7.84% (95% CI 6.30–9.38) while Shahane V et al.[10] and Nisa MN et al.[11] observed the cumulative incidence as 6% and 6.5% respectively.

Various other authors have separately reported incidence of SSIs among obstetric and gynaecological procedures. In present study prevalence of SSIs was 11.63% in gynaecological procedures while it was 7.02% in obstetric procedures. Amenu D et al.[12] observed an overall surgical site infection rate of 11.4% among women having surgery for Obstetric reasons. Devjani et al.[13] observed the incidence as 24.2% following lower segment caesarean section while in similar studies Ansar A et al.[14] Ghuman et al.[15] , Vijayan et al.[16] observed the prevalence as 5.8%, 5% and 4.1% respectively.

Prevalence of SSI was significantly higher in cases with emergency procedures as compared to elective procedures (24% vs 5.4%; p<0.05). Various studies have shown that emergency cases land up in SSI more than the elective ones.[17-23] Amenu D et al.[12]in their study observed Surgical Site Infections rate to be two times higher in emergency procedures as compared to that of elective cases. Kishwar N et al.[18] also observed emergency caesarean sections as risk factor for development of SSI.

We observed a higher prevalence of SSI in contaminated wounds (36%) as compared to clean & contaminated (6%) and clean wounds (10%). This is an expected observation as it is well known that patients with contaminated wounds have nearly three-fold increased risk of SSI compared to non-contaminated wounds.[24,25] Shahne V et al.[10] in their study observed that rate of infection was highest in contaminated type of wounds (12.3%), followed by clean contaminated wounds (8.0%) and least in clean wounds (4.6%). In a study by Anvikar et al.[26], similar rates were noted i.e. percentage of infection rate was 10.6 % and 4% in clean contaminated and clean cases respectively while in Mumbai, Lilani et al.[27] , prevalence was 22.4% and 3.0% respectively.

The ASA score is a subjective assessment of a patient's overall health that is based on five classes (I to V) with class I being completely healthy fit patient and V was moribund patient. In present study, a significant association was observed between higher ASA grade and prevalence of SSI (p<0.05). Various studies have shown that ASA score greater than 2 is a risk factor for development of SSIs.[28-31] Morgan et al.[28] in their study observed that ASA score of more than two was associated with increase in risk of SSI by 1.52 times. A study on SSI following cesarean section from Tanzania showed that ASA score more than 3 had about 2.7 times higher risk for SSI.[29] Other studies showed the risk as 1.79 times[30] and 1.61 times[31] respectively.

Certain underlying conditions like diabetes, obesity, anemia and smoking may alter or decrease the immune status thus significantly increasing the risk of SSI. Patients of diabetes especially with poor glycemic control share much comorbidity, like obesity, poor nutritional status, poor peripheral oxygen supply, and metabolic derangements.[32] In present study, Prevalence of SSI was significantly higher in cases with associated co-morbidities like obesity (40% vs 8%; p<0.05) and diabetes (32% vs 6%; p<0.05). In a study by Ghuman M et al.[15], key risk factors for surgical site infection post-caesarean section were elevated BMI and diabetes. Vijayan et al.[16] in their study also observed high body mass index (BMI) (above 25) and blood sugar levels as risk factor for SSIs in multivariate analysis. Noveli S et al.[17] observed poor nutrition and diabetes as the common risk factors in obese women at risk of development of SSIs after CS.

Most common organism isolated from SSI site was Staph.Aureus (5 cases) followed by E.coli (2 cases) and Klebsilla (2 cases). In a study by Nisa MN et al.[11], the commonest organism isolated was Staphylococcus aureus followed by E.coli. In various other studies as well, Staphylococcus aureus has dominated the scene in cases with SSIs.[33-35] However, Shahane V et al.[10] in their study observed that out of 18 SSI cases, E.coli was the most common organism followed by Staph. Aureus. In the study by Devjani et al.[13], commonest isolate was Acinetobacter species (32.03%) followed by Staphylococcus aureus and coagulase negative Staphylococcus (21.09%).

Conclusion

The incidence of SSI was same for Obstetric as well as Gynaecological surgeries. The key risk factors for surgical site infection identified in present study were: elevated BMI, poor pre-op health status, diabetes, emergency procedure and contamination of wounds. The multiple risk factors identified in the present study can be helpful for SSI risk stratification and prioritizing interventions in low-middle income countries.

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