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To determine the Risk factors and Preventive Measures of Surgical site Infections

Amit kumar Bharti[1], Dr.Harshada Shah[2],Dr.Kailash Jatav[3],komal singh[4], Navdeep

1. Amit kumar Bharti, Ph.D Scholar, Dept. of Microbiology, Malwanchal university, Indore, Madhya Pradesh
2. Dr.Harshada Shah, Professor, Dept. of Microbiology, Malwanchal university, Indore, Madhya Pradesh
3. Dr.Kailash Jatav, Assistant Professor, Dept. of Microbiology, LNCT Medical college, Indore, MP
4. Komal Singh, Ph.D Scholar, Dept. of Microbiology, Malwanchal university, Indore, Madhya Pradesh

Corresponding Author:

Amit kumar Bharti, Ph.D Scholar, Dept. of Microbiology, Malwanchal university, Indore, Madhya Pradesh, akbh06@gmail.com

Abstract

Background: Surgical site infections (SSI) are a serious problem globally. Surgical site infections cause a significant increase in the cost of hospitalization. This is the main reason why the whole scientific world is looking for prevention of these complications. **Aim:** The aim of the present study is to determine the incidence of SSI, analyze the risk factors and further planning for measures to be taken for prevention of SSI if any, in a tertiary care hospital. **Methods:** In terms of methodology, the research can be classified as an experiment with a descriptive component. The investigation includes both of these components. It was conducted out in Indore after gaining ethical approval from the Institutional Ethics Committee of the Index Medical College Hospital & Research Centre (IMCH&RC), which can be found in the phrase before this one. The patients who had undergone procedures in the departments of Surgery, Obstetrics and Gynecology, and Orthopedics and who had acquired signs and symptoms of postoperative wound infections were the ones who provided the materials for this study. The investigation included a total of 248 patients who had undergone surgeries were considered. **Results:** Of those cases, 68 showed signs of surgical site infection (SSI), while 180 showed no signs of SSI. These examples comprised both elective and emergency procedures that required surgical intervention. There was an SSI present in 27% of the cases that were examined. In the following observations, we made an attempt to determine the determinants of risk that led to the SSI. Patients with diabetes are more likely to experience SSIs than those without diabetes, according to statistical analysis. There is not a statistically significant difference between the SSI of patients who are obese and patients who are not obese when comparing both groups of patients. **Conclusion:** According to the findings of our research, diabetes mellitus and a longer duration of surgery are both factors that are associated with an increased risk of developing a surgical site infection. It is important that efforts be made to shorten the duration of surgical procedures while keeping the same level of care.

Introduction:

Surgical site infections (SSI) are a serious problem globally. The global estimate of SSI varies from 0.5% to 15% however; studies in India have consistently shown a higher incidence rate ranging from 23% to 38% [1-2]. Development of medicine has reduced their percentage, but still, they are a huge problem to face with [3]. Surgical site infections cause a significant increase in the cost of hospitalization. This is the main reason why the whole scientific world is looking for prevention of these complications [4]. Surgical site infections are defined as infections that occur 30 days after surgery with no implant, or within 1 year if an implant is placed and infection appears to be related to surgeries [3,4]. These are the most frequent type of healthcare-associated infection (HAI) observed on admission in low- and middle-income countries (LMICs). The incidence of SSIs ranges between 2.5-41.9%, with a significantly higher percentage in developing countries as compared to developed countries [5-8]. The patients of SSIs have 2-11 times greater risk of death in comparison to the patients having no SSI [9]. The number of incidences reported for SSI may be different across several countries due to the various systems applied for the epidemiological control of hospital related infection [10]. Surgical site infections can sometimes be superficial infections involving the skin only. Other surgical site infections are more serious and can involve tissues under the skin, organs, or implanted material [11,12]. Approximately one in 10 people who have surgery in LMICs acquire an SSI, SSI is reported as the second most common HAI in Europe and the United States of America [13-15].

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The significant factors influencing the risk of SSI are either patient related, or procedure related [14]. Among patient related factors: old age, nutritional status, preexisting infection and co-morbid illness are common. The procedure related factors include poor surgical technique, prolonged duration of surgery, preoperative part preparation and inadequate sterilization of surgical instruments [15]. In addition to these risk factors, the virulence and the invasiveness of the organism involved, physiological state of the wound tissue and the immunological integrity of the host are also the important factors that determine whether infection occurs or not [15]. Therefore, the aim of the present study is to determine the incidence of SSI, analyze the risk factors and further planning for measures to be taken for prevention of SSI if any, in a tertiary care hospital.

Materials & Methods:

In terms of methodology, the research can be classified as an experiment with a descriptive component. The investigation includes both of these components. It was conducted out in Indore after gaining ethical approval from the Institutional Ethics Committee of the Index Medical College Hospital & Research Centre (IMCH&RC), which can be found in the phrase before this one. The patients who had undergone procedures in the departments of Surgery, Obstetrics and Gynecology, and Orthopedics and who had acquired signs and symptoms of postoperative wound infections were the ones who provided the materials for this study. The investigation included a total of 248 patients who had undergone surgeries were considered.

Inclusion criteria: Patients over the age of 18 who were scheduled for emergency and elective laparotomies (clean-contaminated and contaminated operations) and willing to participate in the study after providing written informed permission were eligible. Exclusion criteria: Individuals who are morbidly obese, have a known allergy to providone iodine, or are unwilling to participate in the trial are excluded.

Statistical Analysis:

All the obtained data will be entered into SPSS (version 22.0) and was analyzed. Mean and standard deviation were calculated. T test was used to compare the means between the two variables. $P < 0.05$ was considered as statistically significant.

Results & Discussion:

Table 1: Risk factors for surgical site infections (SSI)

Variables	**SSI Positive**	**SSI negative**	**P value**
	Mean ± SD	Mean ± SD	
Age (years)	52. 3 ± 11.9	48.1 ± 13.1	0.312
BMI (kg/m^2)	23.8 ± 4.8	24.1 ± 2.9	0.634
Hb (g/dL)	9.2 ± 3.1	10.8 ± 3.4	0.072
TC (x10^3)	13.6 ± 1.6	8.9 ± 2.8	**0.0001**
Hospital stays (Days)	11.1 ± 0.8	7.3 ± 0.7	**0.0001**
RBS (mg/dL)	169.6 ± 58.2	148.6 ± 62	0.349

Table 2 showing duration of surgery & surgical site infections (SSI) in study population.

Duration of surgery	Number of cases with > 3 hours	Number of cases with < 3 hours
SSI	20	48
Non-SSI	40	140

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Table 3 showing diabetics & surgical site infections (SSI) in study population.

Status of Diabetes mellitus	Number of cases with SSI	Number of cases without SSI
Diabetic	48	68
Non-diabetic	20	112

The aim of the present study is to determine the incidence of SSI, analyze the risk factors and further planning for measures to be taken for prevention of SSI if any, in a tertiary care hospital. Throughout the time period of the current investigation, a total of 268 surgical cases were admitted to the hospital. Of those cases, 68 showed signs of surgical site infection (SSI), while 180 showed no signs of SSI. These examples comprised both elective and emergency procedures that required surgical intervention. There was an SSI present in 27% of the cases that were examined. In the following observations, we tried to determine the determinants of risk that led to the SSI. Most of the cases come from people who are between the ages of 41 and 60, with 92 male individuals and 36 female subjects falling into this age range. These findings are in synonym with the findings of other study [12]. The age range of 21 to 40 years old accounts for the second biggest proportion of cases. Within this age range, there are 32 male cases and 48 female cases. When male and female cases are compared, the age range 41-60 has a much larger proportion of males, whereas the other age groups have a much higher proportion of female among the cases that have been reported. Similar findings have been in the studies belonging to other demographic regions [3-6]. Over the time covered by the current study, a total of 268 surgical cases were admitted to the hospital. Of those 268 cases, 116 showed signs of diabetes, while 132 showed no signs of diabetes; these two groups make up 42% and 58% of the total, respectively.

In the present study, 68 patients were diabetic but did not have SSI, hence 48 of the patients had SSI in addition to their diabetes. Twenty of the patients did not have diabetes but did have SSI, while the rest 112 did not have diabetes and did not have SSI. Patients with diabetes are more likely to experience SSIs than those without diabetes, according to statistical analysis. This difference is statistically significant. $X2 = 4.68$; Relative risk = 69.14 Attributable Risk = 0.62; & $p < 0.05$. According to the findings of our research, diabetes is a risk factor for SSI. These findings are in corroboration with the findings of the studies [9-12].

The present study showed, 16 patients had SSI in addition to their obesity; 12 of the patients were obese but did not have SSI. The remaining 168 patients did not have obesity and did not have SSI, while 52 of the patients did not have obesity but did have SSI. There is not a statistically significant difference between the SSI of patients who are obese and patients who are not obese when comparing both groups of patients. There is no connection between being overweight and having an increased likelihood of acquiring SSI. $X2= 1.12$; $p > 0.05$. Coming to anemia presence in the present study, 44 of the patients had anemia but did not have SSI, while the remaining 32 patients all had SSI in addition to their anemia. The remaining 136 patients did not have anemia and did not have SSI, while 36 of the patients did not have anemia but did have SSI. All of the patients had a normal white blood cell count. The SSI values of the two groups do not differ from one another in any way that can be considered statistically significant. There is no connection between having anemia and having a higher likelihood of developing SSI.

During the time period that was being researched for this particular research topic, the hospital had a total of 268 surgical patients that required medical attention. Hence, 20 of the patients had SSI who were under more than 3 hours of surgery, since the remaining 40 patients were not having SSI but did undergo > 3 hours of surgery. On the other hand, forty-four patients did have SSI who underwent < 3 hours of surgical procedure and the remaining 140 patients did not have SSI who underwent < 3 hours of surgery. Between the two groups that had procedures lasting more than three hours, there was a statistically significant difference in the incidence of SSI.$X2 = 3.678$; $p < 0.05$.

The incidence of infection at the surgical site was significantly higher for emergent procedures compared to elective treatments. According to the findings of our research, diabetes mellitus and a longer duration of surgery are both factors that are associated with an increased risk of developing a surgical site infection. It is important that efforts be made to shorten the duration of surgical procedures while keeping the same level of care [11]. The information gleaned from this study will assist the infection control team in developing effective guidelines for antibiotic therapies in various surgical procedures, with the goal of reducing the risk of developing SSIs and ensuring the correct and efficient use of the anti-infectious arsenal. Periodic observation of SSI will aid in the development of stringent standards, lowering the occurrence of Surgical Site Infections [3]. The information gleaned from this study will assist the infection control team in developing effective guidelines for antibiotic therapies [4]. The data that were

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gathered from this study can assist the infection control team in establishing effective guidelines for antibiotic therapies in various surgical procedures [6]. This will help to minimize the risk of developing surgical site infections (SSIs) and to ensure that the anti-infectious armamentarium is used in a manner that is both correct and efficient [15].

Conclusion:

According to the findings of our research, diabetes mellitus and a longer duration of surgery are both factors that are associated with an increased risk of developing a surgical site infection. It is important that efforts be made to shorten the duration of surgical procedures while keeping the same level of care. The information gleaned from this study will assist the infection control team in developing effective guidelines for antibiotic therapies in various surgical procedures, with the goal of reducing the risk of developing SSIs and ensuring the correct and efficient use of the anti-infectious arsenal.

Conflict of interest:

None declared.

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