

ORIGINAL ARTICLE

FACTOR RESPONSIBLE FOR SURGICAL SITE INFECTION FOLLOWING EMERGENCY NON-TRAUMATIC ABDOMINAL SURGERY

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Citation:

Yadav AP, Rauniyar CS, Joshi M, Singh A, Shrestha B. Factor Responsible for Surgical Site Infection Following Emergency Non-Traumatic Abdominal Surgery. Medphoenix. 2023;8(1):7-10

DOI: <https://doi.org/10.3126/medphoenix.v8i1.56841>**Conflict of interest:** None, **Funding:** None**Publisher:** National Medical College Pvt. Ltd. **MedPhoenix - Journal of National Medical College (JNMC); 2023,8(1), available at www.jnmc.com.np**

ISSN:2631-1992 (Online); ISSN:2392-425X (Print)



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**ABSTRACT****Introduction:** Surgical Site Infection (SSI) have always been a major complication of surgery. It results from microbial infection during or after the surgical procedure. According to CDC, SSI can be classified as superficial, deep and organ/space. It increases morbidity and also increases cost to the patient and healthcare system. The aim of this study is to determine the factors responsible for surgical site infection following emergency non-traumatic abdominal surgery.**Materials and Methods:** This prospective study was carried out in Department of Surgery of National Medical College and Teaching Hospital. A total of 90 patients were included in this study. Data analysis was done using SPSS (Statistical Package for social sciences), version 26.**Results:** Mean age of the study population was 42.74 years. The majority of the subjects were in the age group of 31-40 years. Most of the patients were males (68.8%). The commonest pathology for undertaking operation was Perforated Duodenal ulcer (42.2%). Preoperative serum albumin level, Smoking, comorbidity like COPD, Hypertension, DM, BMI showed statistical relation to surgical site infection.**Conclusion:** Numerous host factors like malnutrition, obesity, co-morbidity, type of wounds, time of presentation, personal habit contribute to increased incidence of SSI.**Keywords:** Exploratory Laparotomy, Risk Factor, Surgical Site Infection**INTRODUCTION**

The infection of a wound can be defined as the invasion of organisms through tissues following a breakdown of local and systemic host defenses, leading to cellulitis, lymphangitis, abscess and bacteremia.¹ Wound infection may be responsible for the failure of an operation to achieve its purpose. Surgical site infection (SSI) has always been a major complication of surgery and trauma and has been documented for 4000-5000 years.

The main determinants of infection are the microorganisms, environment and host defense mechanisms. There is a continuous interaction between these three factors. Other factors involved include the presence of COPD, obesity, diabetes mellitus, malnutrition or steroids use, duration of surgery and age and sex.² Wound infections usually appear between 5th and 10th day after

surgery but they may appear early.³ The first sign of wound infection is usually fever and pain. Postoperative fever requires inspection of the wound and if it is infected, appropriate management needs to be done.

Surgical site infections are the most common hospital associated infection, accounting for 14-16 per cent of all infections in hospitalized patients. Surgical site infection concerns 2 million cases annually worldwide.⁴ Aim of this study is done to determine the factors responsible for surgical site infections following emergency non-traumatic abdominal operations.

MATERIALS AND METHODS

The prospective study was carried out in Department of

Surgery, National Medical College and Teaching Hospital, Birgunj over period of 6month from November 2022- April 2023. Approval was taken by Institutional review committee [F-NMC/615/079-080].

A total of 90 patients requiring Emergency non traumatic exploratory laparotomy were included in the study.

Selection criteria

Inclusion criteria:

- The patients requiring emergency non traumatic abdominal operations.
- Age more than 12 year
- Patient willing to participate in the study

Exclusion Criteria:

- Patients with trauma were excluded from the study.
- Age less than or equal to 12 years
- Patient not willing to participate in the study

Patients requiring emergency abdominal surgery and fulfilling the inclusion criteria were offered to participate in the study. Informed written consent was taken. Data were maintained through proforma. Detailed history and thorough examination were performed. Essential investigations were done. Preoperative factors related to SSI in the patient were noted and under aseptic conditions operation was done. Postoperatively, all the wounds were monitored. Postoperative events were recorded in the data sheet during 30 days of follow up.

Descriptive statistics such as mean, SD andpercentage were used to present the data. To assess,the association factors with SSI, chi-square test wasused. A p-value less than 0.05 was considered assignificant. Data analysis was performed using software SPSS.

RESULTS

The present study was conducted among 90 patients who underwent emergency non traumatic exploratory laparotomy over a period of 6 month at Department of Surgery, National Medical College and Teaching Hospital (NMCTH), Birgunj, Nepal. The mean (SD) age of the subjects were in the age group of 31-40 years. Most of the patients were males 68.8% and 31.1% were females. The commonest pathology for undertaking operation was perforated duodenal ulcer (42.2%), and the second most common condition was acute intestinal obstruction

(32.2%). Preoperative serum albumin level, smoking, comorbidity, BMI showed statistical relation to surgical site infection. Most of our patient presented 24 hours after the symptoms developed.

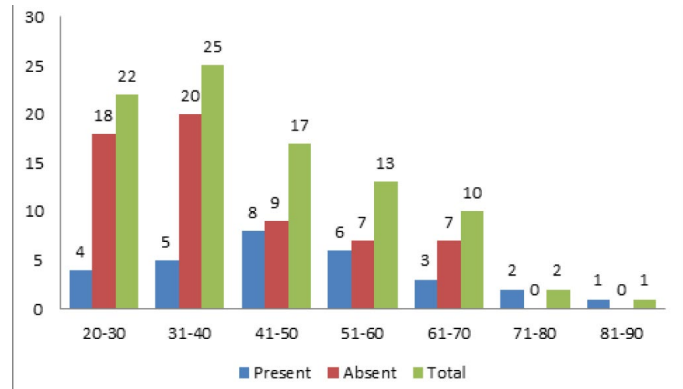


Figure 1: Age distribution of study population in relation to SSI

Table 1: Baseline Characteristics of study population

Variables	Surgical Site Infection		p value
	Present	Absent	
Gender			
Male	22 (35.4%)	40 (64.5%)	0.3244
Female	7 (25%)	21 (75%)	
Smoker			
Yes	18 (42.8%)	24 (57.1%)	0.0434
No	11 (22.9%)	37 (77.0%)	
Alcoholic			
Yes	11 (28.2%)	28 (71.7%)	0.4757
No	18 (35.29%)	33 (64.7%)	
Co morbidity			
Yes	12 (41.3%)	47 (77.0%)	0.00087
No	17(58.6%)	14(22.9%)	
Serum Albumin			
<3.5 gm/dl	20(68.9%)	18 (29.5%)	0.00039
>3.5 gm/dl	9 (31.0%)	43(70.4%)	
Time of presentation			
< 6hr	3 (10.3%)	35 (57.3%)	0.2797
6-24 hr	9 (31.0%)	16 (26.2%)	
> 24 hr	17 (58.6%)	10 (16.3%)	
BMI			
Underweight	5 (17.2%)	4 (6.5%)	0.0366
Normal	7 (24.1%)	31 (50.8%)	
Obese	17 (58.6%)	26 (42.6%)	
Type of wound			
Clean Contaminated	4(13.7%)	28(45.9%)	0.017
Contaminated	9(31.0%)	20 (32.7%)	
Dirty	16 (55.1%)	13(21.3%)	

Table 2: Distribution of patient based on diagnosis

Final Diagnosis	Frequency	Percent
Perforated Duodenal ulcer	38	42.2
Acute Intestinal Obstruction	29	32.2
Appendicular Perforation	19	21.1
Ileal Perforation	4	4.4

DISCUSSION

It was observed that factors like type of disease, comorbidity delayed presentation, duration of surgery, nutritional status, body mass index were associated with increased rate of surgical site infection. The rate of surgical site infections in my study group was 32.22 % which is higher. The incidence of SSI is more in developing countries like in India (20%),⁵ Bangladesh (20.31%)⁶ as compared to western countries like in America (5%),⁷ England (4.65%)⁸ this probably due to lack of trained manpower, adequate facilities, delayed presentation, poor operation theater set up, lack of infection control, poor patient.

In this study the mean age of patient was 42.74 year with SD 15.047. The maximum age was 85 years and minimum age was 20 years. Most of the Surgical site infection was seen in 41-50 year of age group (27.58%), which was similar to study conducted by Wagh A et al. (28.30),⁹ Vimal. AS et al. (26.47),¹⁰ Shrestha S et al. (20%)¹¹. In this study 28 were female (31.1%) and remaining 62 (68.8%) were male. Among 62 male patients, 22 (35.4%) patient developed SSI which was similar to studies done by Wagh A et al. (22.2%)¹⁰, Bhatta PN et al. (38.9%),⁵ Rahaman A et al. (22.2%).⁷ There is no well explainable cause for it but may be due to increase prevalence of smoking in male resulting in peptic ulcer perforation.²⁴

In this study 42.8% of patient were smoker who develop SSI which is similar to the studies conducted by Khan FU et al. (44.2%),¹² Rahaman A et al. (17.2%),⁷ Lubega A et al.,¹³ as smoking delays the healing by causing local and systemic vasoconstriction. which results in tissue hypoxia result in surgical site infection¹⁴ whereas alcohol is not significantly associated with surgical site infection in our study .

Diabetic mellitus was the most common comorbidity seen in our patient. In our study 41.3% of patient with comorbidity developed SSI which is similar to study conducted by Rahaman A et al. 54.5%,⁷ Wagh A et al. 43.7%,¹⁰ Mannarakkal R et al. 12.9%,¹⁵ Huda F et al. 12.5%¹⁵. Similarly in our study incidence of SSI was higher among patients with low serum albumin (68.9%) as compared to those with normal levels. This present study was comparable with other studies done by Bhuyan K et al.,¹⁶ Sindgikar et al.,¹⁷ Warrie V M et al.,¹⁸ Hennessey et al.¹⁹ and Lalhruaizela et al.²⁰ showed that

the incidence of SSI rate was 36%, 72.7%, 31.9%, 46.4% and 24.09% respectively and those studies revealed that hypoalbuminemia was one of significant risk factors associated with surgical site infection.

With respect to time of presentation of patient it was observed that SSI was only 10.3% when the patient present of developing symptoms. The rate increases with delayed presentation. SSI rate was 31.0% and 58.6% when patient presented with 6-24 hour and more than 24 hours which is similar to study done by Wagh A et al.¹⁰ (11.1%, 26.2%, 35.6%), Ramadoss P et al.²¹ (9.09%, 26.16%, 18.42%, 52.68%), Vimal AS et al.¹¹ (0%, 33.3%, 71.1%) respectively. Regarding BMI 58.6% obese patient developed SSI which is similar to conducted by Rahaman A et al.,⁷ Masoomi H et al.,²² Alkaaki A et al.²³ In relation to different type of wound above study shows that 13.7%, 31%, 55.1% of patient have SSI with clean contaminated, contaminated and dirty wound respectively, which is similar to the studies done by Vimal AS et al. (7.3%, 31.1%, 18%)¹¹, Ramadoss P et al. (8.33 %, 27.27 % 32.61 %)²², Wagh A et al. (7.7%, 52%, 45.2%)¹⁰.

CONCLUSION

Numerous host factors like malnutrition, obesity, comorbidity, type of wounds, time of presentation, personal habit contribute to incidences of SSI. So, quality of surgical care, advanced surgical facilities, preoperative resuscitative units, modern operation theatre and good sterilization unit are required to minimize the risk of surgical site infection.

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