Original Article

Factors Responsible for Surgical Site Infection among Patients Undergoing General Surgeries

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ABSTRACT

Objective: To determine the responsible factors for surgical site infection among patients underwent general surgeries.

Study Design: Cross sectional study

Place and Duration of Study: This study was conducted at the Departments of General surgery of Peoples medical University Hospital Nawabshah from September 2016 to February 2017.

Materials and Methods: All the patients who had developed surgical site infections after general surgeries were included. All the patients were noted regarding Hospital stay, surgical duration, obesity, diabetes mellitus, hypertension, history of smoking and numbers of blood transfusions. All the data was recorded in the self-made proforma.

Results: In this study total 70 infected cases were studies. Majority of patients were above 45 years of age, particularly as;42.9% were in age group of 45-60 years and 17.1% were above 60 years. Males were in majority 65.5% and females were 34.5%. Most of the cases 67.10%, underwent emergency surgeries. After old age and emergency surgery; other responsible factors for surgical site infection as; smoking, multiple blood transfusions, obesity and prolonged Hospital stay were found frequent among patients who had surgical site infection as 21.4%, 17.1%, 17.1% and 21.4% respectively. Diabetes was among 12.9% and hypertension was among 11.4% patients, while 20.0% patients were with unknown causes.

Conclusion: It was concluded that emergency surgery, obesity, smoking, prolonged Hospital stay and multiple blood transfusions were frequent factors among patients who had developed surgical site infection**.**

Key Words: General Surgery, SSI, Factors

Citation of articles: Abbasi MA, Riffat, Memon FA, Wilson NR. Factors Responsible for Surgical Site Infection among Patients Undergoing General Surgeries. Med Forum 2019;30(4):99-102.

INTRODUCTION

An infection of surgical site is one which takes place following surgical procedure in the surgically operated part of the body. A surgical site infection (SSI) is an accidental and often preventable effect of surgical procedure.[1] SSIs are correlated with patient's morbidity as well as raisedcosts of healthcare.[1] The SSI rate differs greatly from hospital to hospital globally. Various studies reported the rate of SSI ranging between 2.50% and 41.90%.[1,2]

Presently there are over 40,000,000 inpatient and 31,000,000 outpatient surgeries beingcarried out yearly in the United States, and a minimum 2% of these cases, or around 1,400,000; develop a SSI with varying severity.[3] Surgical site infections (SSIs) are not only the commonest complications after surgeries, however are as well the commonest type of nosocomial infections. They represent 20.0% of overall healthcare-related infections and 38.0% of NIs in surgical cases.[4,5] A pilot study conducted in Pakistan exhibits that 13.0% of subjects who went through elective surgical procedure had SSIs.[4,6] A large number of studies globally revolve around this issue from various scientific perspectives, improving the definitions of SSI parameters and risk factors in addition to increasing our information of factors that are significant contributors to SSIs and the ways to control these factors at clinical level.[7,8] Majority of authors admit that SSI is a worst complication that a subject can undergo following an intervention.[7] Different studies showed different risk factors as some reported that transfusion was a statistically significant risk factor for wound separation or superficial SSI development.[9,10] Others stated that extended preoperative hospital stay, diabetes mellitus, increasing age, emergency surgery, ASA score >3, extended duration of surgical procedure and contaminated surgical sites were correlated with greater rate of SSI.[1] On other hand a recent systemic review reported that in Pakistan there is inadequate data on the

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Received: October, 2018
Accepted: January, 2019
Printed: April, 2019

post-operative wound Infections.[11] Surgical Site Infection (SSI) has raised over the last few years.[11] World Health Organization (WHO) reported that 66.0% of underdeveloped countries have no documented data in terms of the SSI burden and also the data grounded on the surgical prophylaxis is inadequate.[11]Tolower the prevalence of SSIs, underlying risk factors are needed to be identified to implement preventative measures.[10] Therefore this study has been conducted to know the responsible factors for surgical site infection among patients who underwent general surgeries.

MATERIALS AND METHODS

This cross sectional study was done at the Departments of General surgery of Peoples Medical University Hospital Nawabshah. Study duration was 6 months from September 2016 to February 2017. All the patients who had developed surgical site infections after general surgeries, age more than 15 years and both gender were included in the study. All the patients with tuberculosis and malignant diagnosis and patients presented with open dirty wound due to trauma and did not want to participate in the study were excluded. Wound infection was classified according to surgical site classification. All the patients were noted regarding hospital stay, prolonged surgical duration, obesity diabetes mellitus, hypertension, history of smoking and numbers of blood transfusions. All the data was recorded in the self-made proforma. Data was analyzed by spss version 16.

RESULTS

In this study total 70 infected cases were studied to know the factors responsible for surgical site infection. Majority of patients were above 45 years of age, particularly as 42.9% were in age group of 45-60 years and 17.1% were above 60 years. While remaining 28 cases presented with age group of 15-30 years and 31-45 years respectively.

Table No.1: Patient's distribution according to age and gender n=70

	Frequency	Percent
Age groups		
15-30 years	08	11.4
31-45 years	20	28.6
45-60 years	30	42.9
>60 years	12	17.1
Total	70	100.0
Gender		
Male	41	65.5%
Female	29	34.5%
Total	70	100.0%

Age (Mean+SD) =49.22±5.16 years

Males were in majority 65.5% and females were 34.5%. Table 1. Most of the cases 67.10%, underwent emergency surgeries and 32.90% underwent elective surgeries. Fig. 1.

After old age and emergency surgeries other responsible factors for surgical site infection such as; smoking, multiple blood transfusions, obesity and prolonged Hospital stay were found frequent among patients who had surgical site infection as 21.4%, 17.1%, 17.1% and 21.4% respectively. Diabetes was among 12.9% and hypertension was among 11.4% patients, while 20.0% patients were with unknown causes. Table, no, 2

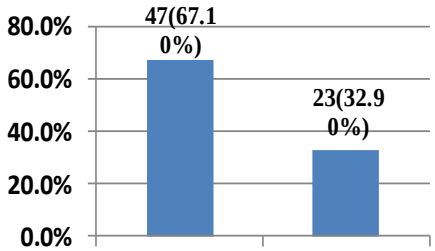

Figure No.1. Type of the surgeryn=70

Table No.2: Otherresponsible factors for SSIn=70

Factors	Frequency	Percent
Obesity	12	17.1%
Diabetes	9	12.9%
Hypertension	8	11.4%
Smoking	15	21.4%
Multiple blood transfusions	12	17.1%
Prolonged Hospital stay	15	21.4%
Unknown	14	20.0%

DISCUSSION

In this study majority of patients were above 45 years of age, particularly as 42.9% had age group of 45-60 years and 17.1% were above 60 years. Study conducted by Neumayer L et al[12] reported that age was an autonomous risk factor for SSI. Qualified nurses collected data on operative and inherent risk factors for SSI in cases experiencing vascular and general surgery, subjects aged >40 had a statistically substantially raised risk of SSI development. Other studies also documented advanced age as a risk factor for SSI development.[13,14] Most of the cases 67.10%, underwent emergency developed SSI in our study. Alike results were found in the study conducted by Sanabria A et al.[15]

In the present study, 17.1% obese patients developed SSI. RasulA et al[16] also found obesity as a comorbid and risk factor among surgical patients. Adipose tissue vascularizes poorly and the resulting effect on tissues'

oxygenation and immune response function is believed to raise the risk for SSI. Additionally, surgeries on obese patients can be further prolonged and complex.[17] Theprocess of wound healing can possibly be influenced by vasoconstrictive effects and decreased oxygen-carrying ability of blood correlated with smoking cigarettes.

In our study 21.4% smokers developed SSI. Similarly in a prospective observational study conducted by Graante G et al[18] who investigated SSI in patients undergoing surgery. Partakers were asked to discontinue smoking at least four weeks before surgical procedure. 24subjects developed SSI that took place 8 days post operative averagely. Statistically considerably more smokers acquired SSI in comparison to non-smokers $P < 0.05$. 16 out of 43 smokers acquired SSI. The smokers who smoked more cigarettes were further likely to acquire SSI and those who continued smoking cigarettes for an extended period of time also underwent statistically substantially more infections. A number of observational studies in patients of general surgery who were admitted to noncritical care regions have as well exhibited that hyperglycemia is correlated with raised risks of perioperative complications, mortality and length of stay [19]. In this series 12.9% diabetic patients developed SSI. In comparison to our results, study conducted by Ata A et al[20] reported that Postoperative hyperglycemia can possibly be the highlysignificant risk factor for SSI.BibiS et al[21] reported that diabetic cases are 3.6-foldsfurther susceptible to the infection rate in contrast non diabetics.In this study, 17.1% patients developed SSI, in whom blood was transfused. In comparison to our results, study conducted by Michael Met al[22] reported that transfusion of RBC has no evident correlation with raised risk for incisional SSIs, however can possibly be correlated with raised risk for septic shock and organ space SSI following colon resection surgical procedure. Transfusion of RBCs among surgical subjects with major bleeding could be a lifesaving intervention, however transfusion of RBC is as well correlated with several complications, together with infection.[23] Transfusion of RBC has the potential to raise the risk of infection for numerous reasons, and the term transfusion-associated immunomodulation has in recent times been applied to define the immunologic variations that take place with allogeneic blood transfusions. These variations included injury of normal monocyte functions and reducedproduction of tumor necrosis α in response to endotoxin (lipopolysaccharide). The pathophysiology of transfusion-associated immunomodulation is incompletely known, however it is believed to be associated to both the RBC storage solutions and RBC storage lesion .

In this study, 21.4% patients who had prolonged hospital stay developed SSI. In comparison to our results, study conducted by Malik AZ et al[4] reported that subjects with SSIs exhibited a substantial variance in the mean duration of hospital stay than those who did not develop SSIs $p<0.001$). The increased duration of hospital stay is a major contributor to the mounting costs of SSIs.[24] Another study conducted by Florio M et al[25] also reported that Pre-operative hospital stay ≥ 48 h, obesity, diabetes, and HIV/AIDS infection were statistically significantly correlated with raised risk of SSI.

CONCLUSION

It was concluded that emergency surgery, obesity, smoking, prolonged Hospital stay and multiple blood transfusions were frequent factors among patients had developed surgical site infection**.** Surgeons should be conscious regarding infection development among patients presented with these factors.

Author's Contribution:

Concept & Design of Study:	Mushtaque Ahmed Abbasi
Drafting:	Riffat, Fayaz Ahmed Memon
Data Analysis:	Nasreen Rebeca Wilson
Revisiting Critically:	Mushtaque Ahmed Abbasi, Riffat
Final Approval of version:	Mushtaque Ahmed Abbasi

Conflict of Interest: The study has no conflict of interest to declare by any author.

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