ORIGINAL RESEARCH PAPER
Volume - 14 | Issue - 01 | January - 2025 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

A PROSPECTIVE STUDY ON THE IMPACT OF ASS0CIATED RISK FACTORS ON THE INCIDENCE OF SURGICAL SITE INFECTIONS

Surgery

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ABSTRACT

Background: Following surgeries, surgical site infections (SSIs) still remain a significant problem. **Objectives:** To study the incidence of SSIs in patients undergoing elective surgeries. To study about the risk factors associated with SSIs. To find out common organisms causing SSIs. **Materials And Methods:** A prospective study was carried out in 100 patients who underwent elective surgeries in Terna medical college and hospital. Samples from infected wound are collected under aseptic precautions and sent for microbiological analysis. **Results And Conclusion:** The overall incidence of SSI was found to be 7%. The incidence was high in 15-30 year age group. Obesity and systemic illnesses increase the rate of SSIs. If the duration of surgery is prolonged then it would be associated with increased incidence of SSIs. The use of drain and mesh also increases the rate of wound infection.

KEYWORDS

SSI, risk factors, pathogens.

INTRODUCTION

Surgical site infections (SSIs) are associated with any surgical procedure and represent a significant burden in terms of patient morbidity, inconvenience to surgeon and extended hospital stay. SSIs have been shown to compose up to 20% of all healthcare associated infections and constitute significant burden to healthcare services. At least 5% of patients undergoing surgical procedures develop SSIs. SSIs may range from spontaneous limited wound discharge to life threatening complications.

Despite improvements in surgical techniques, sterilisation of instruments, operation theatre practices, and the best efforts of infection prevention strategies, SSIs remain a major cause of hospital-acquired infections.6

These are further complicated by an increasing prevalence of multidrug-resistant organisms.

Most of the time, it is the patient's endogenous flora that is responsible for many SSIs, and the commonly isolated pathogens include Staphylococcus aureus, coagulase-negative staphylococci, Enterococcus spp., and Escherichia coli.7

However, the identification of factors that cause or predict these SSIs remains

important area of research. The authors aim to investigate the risk factors for SSIs, together with the identification of the aetiological bacterial agents and their antimicrobial susceptibility in a tertiary care teaching hospital.

To track healthcare-associated infections, the National Healthcare Safety Network (NHSN) uses standardised infection ratio, which compares the number of observed infections with the number of predicted infections.2

A Centers for Disease Control and Prevention (CDC) survey from 2015 estimated approximately 110,800 SSIs among inpatient surgeries.4 There was 5% reduction in SSIs in 2020 when compared with 2015 data as baseline among all NHSN operative procedure categories combined.5

Surgical site infections (SSI) are the third most commonly reported nosocomial infection and they account for approximately a quarter of all nosocomial infections. It has an adverse impact on the hospital as well as on the patient. It is responsible for increasing length of stay of patient which results in social and economic loss to the patients and family. Host factors, wound factors and surgery related factors are implicated in the causation of SSI.(1) The present study was aimed at obtaining the incidence of SSI in our set up and to evaluate the risk factors as well as to formulate an antibiotic policy for patients posted for any surgery in our hospital.

Aim: To study the incidence, risk factors and causative organisms causing surgical site infections in patients undergoing elective surgeries in the Department of General Surgery of Tertiary care Hospital and Teaching Institute at Navi Mumbai from May 2021 to May 2022.

METHODOLOGY

A Prospective study of 100 patients admitted in Terna Medical College and Hospital from May 2021 to May 2022 in the Department of General Surgery who underwent elective surgeries.

CDC criteria were used to define the type of surgical wound i.e. Class I-Clean, Class II - Clean contaminated, Class III - Contaminated, Class IV - Dirty.(5) The statistical significance of the relative importance of various parameters affecting SSI has been tested using 'p' test at 95% confidence level ($p < 0.05$).

Certain risk factors like – type of surgical wound, elective or emergency surgery, antibiotic prophylaxis, duration of surgery, presence or absence of drain / mesh and any underlying or predisposing conditions were noted. Swabs were obtained from the post operative infected wounds and processed by the conventional microbiological meth

Inclusion Criteria

Adult male and female patients
Patients undergoing elective surgical procedure
Patients with comorbid conditions like diabetes, hypertension.

Exclusion Criteria

Immunocompromised individuals
Class IV - wounds

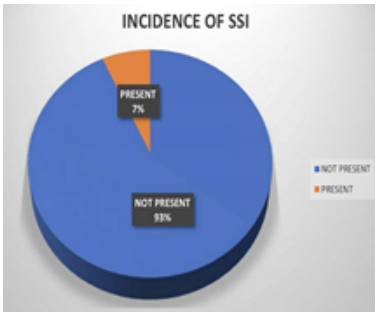
Third generation cephalosporin cefoperazone was given to all patients in this study 30 minutes before surgery and wound covered using adhesive dressings.

Injection cefoperazone was continued in the postoperative period. The wound was inspected for the signs of inflammation after 48hrs till the day of discharge.

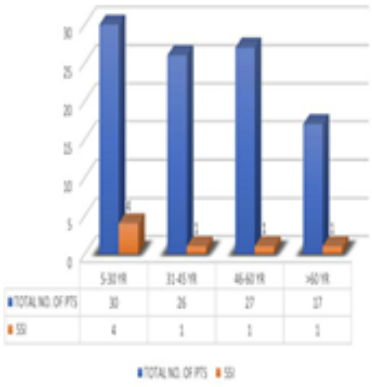
The criteria for SSI was based on CDC guideline. Daily dressing done under strict aseptic precautions. Wound swab from infected wounds were taken and sent to microbiological laboratory for culture. The incidence rate were calculated separately for each wound class.

RESULTS:

Out of 100 patients who underwent elective surgeries 7 developed SSI.

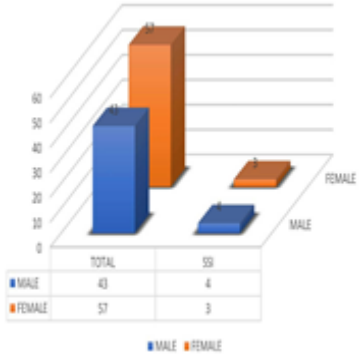


Incidence In Relation To Age Group

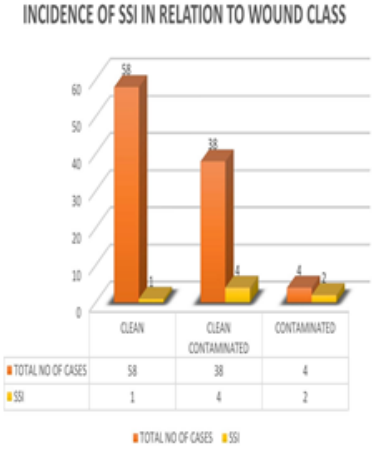


In this study, in the age group of 15-30 years out of 30 patients 4 patients developed SSI, in the age group of 31-45 years out of 26 patients 1 developed SSI, in the age group of 46-60 years out of 27 patients 1 developed SSI , in the age group of > 60 years out of 17 patients 1 developed SSI .

Incidence In Relation To Sex

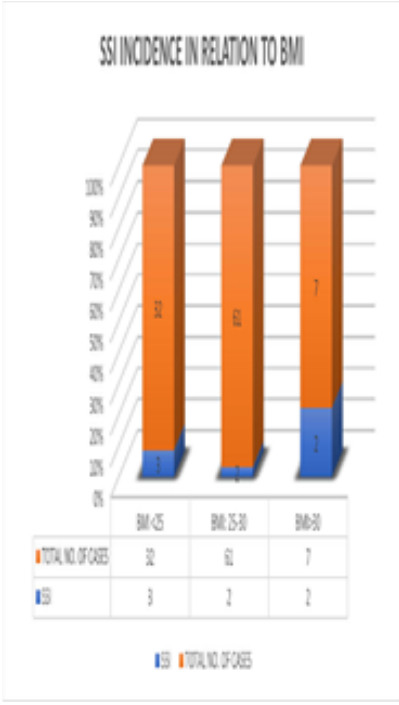


In this study it was found that there is male preponderance for post operative wound infections which is statistically significant.

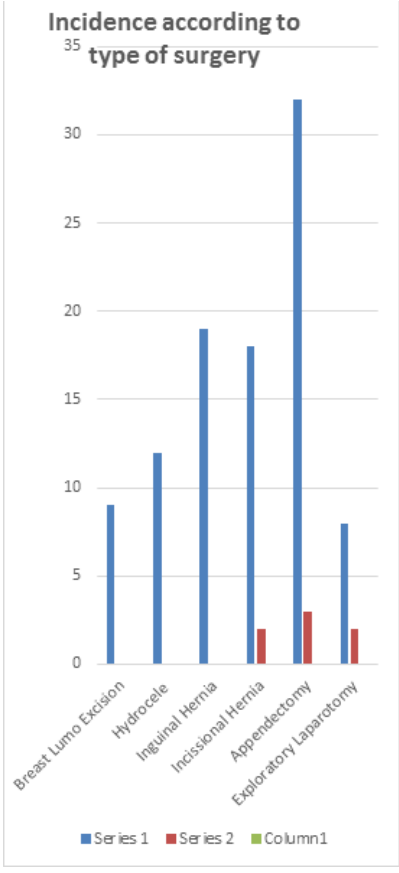


In this study we had 58 patients in class I, 38 patients in class II and 4 patients in class III. Class IV patients were not included in the study.

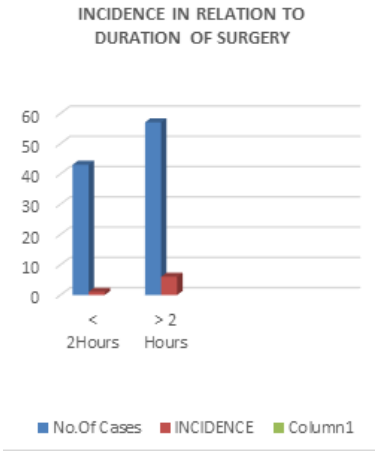
About 1.72% of class I, 10.52% of class II & 50% of class III are found to develop post operative wound infection.



According to the data obtained in this study most people belong to the category with BMI of 25-30. SSI is more common among people having BMI more than 30.



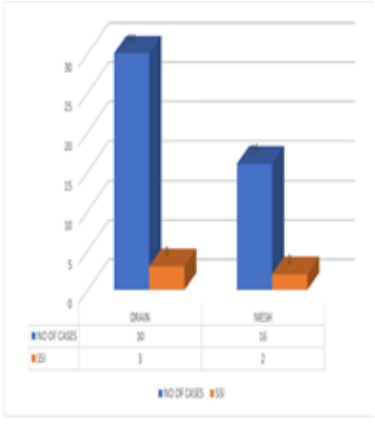
In this study, SSI is found in 2 out of 18 cases of Incisional hernia repair ; 3 out of 32 cases of Appendicectomy and 2 out of 8 cases of Exploratory Laparotomy with RA patients.



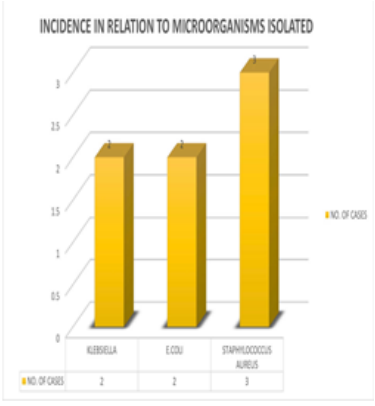
The incidence of SSI was 2.32% when duration of surgery was less than 2 hours.

Whereas the incidence of SSI was increased to 10.52 % when surgery took more than 2 hour

Incidence In Relation To Use Of Drain And Mesh



In patients in whom drain is used, the incidence of SSI found to be 10 %; if mesh is used incidence is 12.5%. This incidence accounts to increased tissue handling by the trainees.



In this study, common microorganisms isolated from wound culture were Staphylococcus aureus followed by E.coli and Klebsiella.

DISCUSSION

In developing countries, no proper study, surveillance or feedback available regarding the incidence of SSIs. Most of the studies are conducted in isolation and the rate of SSIs vary from institution to institution, which warrants a united approach to develop and adopt certain strategies to overcome this ever-menacing problem.

Several studies from India have reported SSI rates ranging from 0.04–22.00%.12,13 Our study reported 7% of SSIs, which is higher than global averages. SSI are a major cause of morbidity and mortality worldwide, affecting 5.6% of surgical procedures, mostly in developing countries. (10)

In this study out of 100 patients, SSI occurred in 7 patients. This incidence is found to be higher than that in western countries such as United Kingdom (3.1%), Holland (4.3%), etc.

The incidence of SSI in our set up was 7%. This is in agreement with the SSI incidences in other studies. (12,14) However, infection rates varying from 20% to as high as76.9% have also been reported. (8-12)

In the present study, SSIs were recorded in the age group 15–65 years, which was also seen in the similar study by Keith et al. (18) However, gender was not a significant factor for prediction of SSI risk in our study, which is similar to study by Berard et al. (20)

In sex wise incidence, there is higher incidence seen in males. This is because of the presence of additive risk factors like smoking, systemic illness more among males.

The rate of SSI incidence differed by wound classification in our study. The maximum number of incidences of SSI noted in class III followed by class II wounds. We had no class IV wound included in this study as this study involves only elective surgeries. Because of the need of more tissue handling in class I wound, there is relative increased incidence of wound infection seen in these cases.

In this study, obese individuals with BMI > 30 have increased incidence compared to those with less BMI. Similar results were obtained in Hoer Jet al study. This is mainly due to the decrease in blood circulation in fat tissues.

Antibiotic prophylaxis reduces the rate of SSIs significantly in this study.

It reduces the microbial burden of the intra operative contamination to a level that can be handled by host defense mechanisms. In this study we found that prophylactic administration of antibiotics half an hour before the surgery wound brings best results in reducing the incidence of SSIs.

However, there is significant correlation observed from this study between duration of surgery and the incidence of SSIs. The risk of SSI increases when the duration of surgery is more than 60 minutes. This is attributable to the explanation that prolonged exposure of tissues and prolonged tissue handling make the tissues more vulnerable to the incidence of wound infection.

The presentation of SSI at the earliest time according to this study is on 3rd post operative day. Most cases of wound infection presented on day 4.

In this study the bacteriological) profile showed that the commonest organisms isolated from the culture are staphylococcus aureus followed by Klebsiella and E.coli. It also showed that commonly there is single organism involved in causing SSIs.

CONCLUSION:

To reduce our SSI rate, we need to follow a standard infection control protocol:

Without compromising the surgical outcome and patient's safety try to reduce the duration of surgery.

With the thorough examination and investigations of all the surgical patients, we can provide appropriate care to the poor risk patients to enable them to withstand the stress of surgery. Also, utmost post operative care and efforts to boost their immunity would help further in reducing the occurrence of SSI.

If the drain is kept it should be cared properly.

As SSI being an important indicator of health care in a given system, the Infection Control Committee to undertake regular periodic surveillance of SSI which will help in laying down strict guidelines to further reduce the SSI incidence.

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