Section: Miscellaneous

Original Research Article

EVALUATING THE INCIDENCE OF SURGICAL SITE INFECTION IN SECONDARY CARE HOSPITAL: AN OBSERVATIONAL PROSPECTIVE STUDY

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ABSTRACT

Background: Surgical site infection (SSI) is third most reported Nosocomial infection of all Nosocomial infections. It is a major cause of morbidity. SSI is the leading cause of operation related adverse events and is responsible for the increase in the duration of hospital stay, morbidity rate and cost burden on surgical patients which results in social, physical and economic trauma to patient and their families. The objective is to study the incidence of SSI in patients undergoing different elective surgeries in secondary care hospital in Aligarh. **Materials and Methods:** This prospective observational study was conducted in the Department of surgery Ajmal khan Tibbiya college Aligarh (AKTCH) in collaboration with department of microbiology Jawahar Lal Nehru Medical College AMU for two years on 200 patients who underwent elective surgeries. The patients were enrolled after taken approval by the institutional ethical committee. **Result:** During the study, a total of 200 patients with different elective surgeries were analysed, out of which 40, patients were diagnosed with SSI as per the criteria. **Conclusion:** A plethora risk factors like increasing age, female gender, comorbid conditions like anaemia, diabetes mellitus, hypertension, and personal hygiene contribute to development of SSI. Prevention, extensive diagnosis, and appropriate treatment as well as follow-up are mandatory for surgical site infection, whereas most surgical site infections can be prevented if appropriate strategies are implemented for infection prevention after open surgery.

INTRODUCTION

According to centre for disease control and prevention (CDC) surgical site infection (SSI) occurs at the site of incision or near it and or in deeper underlying tissue spaces and organs within 30 days of a surgical procedure or up to 90 days if prosthetics are implanted.[1] Based on depth and involvement of tissue layer SSIs are classified as superficial, deep and organ space infection.[2-12]

It is one of the most reported Nosocomial infection accountings for 10-40% of all infections and stands third amongst nosocomial infections. SSI leads to cause adverse events and is responsible for the increase in the duration of hospital stay, morbidity rate and cost burden on surgical patients which results in social, physical and economic trauma to patient and their families. It is responsible for additional annual charges of 1.6 billion in the United States alone.[3]

This causes social and economic loss of the family. The aim of present study was to assess the rate of SSI in our hospital to know the magnitude of the problem to decreases the economic burden and hospital stay of the patient and to cut off the maximum use of antibiotics which leads to resistance and side effects to maintain quality management. It is first of its kind study in Ajmal Khan Tibbiya College Aligarh. Hence the present study is important and undertaken to know the rate of infection.

MATERIALS AND METHODS

This prospective observational study was conducted in the Department of Surgery Ajmal khan Tibbiya College Aligarh (AKTCH) in collaboration with department of Microbiology Jawahar Lal Nehru Medical College AMU for two years on 200 patients who underwent elective surgeries. The patients were enrolled after taken approval by the institutional

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ethical committee who fulfilled the inclusion criteria (Patients who underwent different elective surgeries in the Surgery Department, AKTCH) and exclusion criteria (HIV positive patients, HBsAg positive patients, Patients not willing for consent, IV grade wound, ASA class more than II.

Methods for data collection: All surgeries were performed by standard techniques keeping in view the principles of antisepsis including surgical scrub and aseptic preparation of surgical field. A proforma was used to document the findings. The surgical sites were examined on the 3rd, 7th, 14th and 30th post operative days and following parameters such as fever, swelling, discharge and bleeding noted. Any oozing or discharge was sent for culture and sensitivity.

RESULTS

During the study, a total of 200 patients with different elective surgeries were analysed, out of which 40 (20%) patients were diagnosed with SSI as per the criteria. The observations drawn out from the study are depicted in [Table 1].

Table 1: Variables associated with SSI

S. NO	Variables		SSI No. (%)	NO SSI No. (%)
1	Age: (years) 10-25 25-40 40-55 55-70		 11(23.4) 12(15.8) 12(22.2) 5(21.7)	 36(76.6) 64(84.2) 42(77.8) 18(78.3)
2	Gender: Male Female		 10(16.9) 30(21.3)	 49(83.0) 111(78.7)
3	Comorbidities	DM	3(12.5)	21(87.5)
		HTN	5(50.0)	5(50.0)
		Hypothyroidism	2(40.0)	3(60.0)
		Without comorbidity	30(18.6)	131(81.4)
4	ASA Classification	I	30(18.4)	133(81.6)
		II	10(27)	27(73)
5	HB Classification	<10 gm/dl	5(31.3)	11(68.7)
		10 gm/dl	5(33.3)	10(66.7)
		>10gm/dl	30(17.7)	139(82.2)
6	Type of Procedure	Open	39(21.08)	146(78.9)
		Laparoscopic	1(6.7)	14(93.3)
7	Overall SSI		40 (20)	160 (80)

During the study, the maximum no. of patients who developed SSI was 24 in the age group of 25-55years. Among the SSI developed patients, the maximum was female, i.e.,30 (21.3%) as compared to male patients,10 (16.9%).

Surgical site infections were assessed in the patients with comorbidities such as Diabetes mellitus, Hypertension, and Hypothyroidism. Out of 200 patients, 24 (12.0%) patients had Diabetes mellitus, 10 (5.0%) had hypertension, 5 (2.5%) patients had hypothyroidism, and 161 (81%) patients had no comorbidity. Only 12.5% (3/24) of DM, 50% (5/10) of HTN, and 40% (2/5) patients of Hypothyroid patients had SSI, respectively, whereas 18.6% (30/161) of SSI were found in patients without comorbidity.

According to the American Society of Anaesthesiologists (ASA), the maximum number of SSI was found in category II patients i.e., 27% (10/37), while 18.4% (30/163) patients developed SSI in Category I.

Based on haemoglobin percentage, patients were divided into three categories: haemoglobin> 10gm/dl, haemoglobin = 10gm/dl, and haemoglobin < 10gm/dl. Out of 200 patients, 169 (84.5%) had more than 10gm/dl of haemoglobin, 15 (7.5%) had 10gm/dl of haemoglobin, and the rest of the patients i.e. 16 (8.0%) had less than 10gm/dl. The maximum cases of SSI were detected in 10gm/dl of the haemoglobin category, i.e., 33.3% (5/15), followed by 31.3% (5/16) in <10gm/dl Category, while the minimum number of SSI was found in patients with haemoglobin more than 10gm/dl, i.e., 17.7% (30/169). Results were found to be insignificant after applying the chi-square test ($p>0.05$).

During the study, two types of procedures were performed: open and laparoscopic, which were 185(92.5%) and 15 (7.5%), respectively. The maximum number of surgical site infections was detected in open procedures, i.e.,21.08% (39/185), whereas 6.7% (1/15) patients developed SSI in laparoscopic procedures.

In this study, the overall SSI was found to be 40 (20%) who underwent different elective surgeries, where the total number of patients was 200.

DISCUSSION

Laloto TL.et al.,2017 found that most of the patient between age of 30.85± 17.72 developing SSI while in our study the mean age of the patient developing SSI was 36.6±15.1 years which is quite similar with above mentioned study. Many authors revealed that as age increases, the immunity decreases and chances of occurrence of chronic disease would increase; hence immunity of the individual will decrease thus

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both the parameters synergistically predispose the patient to develop SSI.[5] Noorit P.et al.,2018 reported that the maximum number of SSI are found in the upper age group i.e. the mean age to develop SSI was 44.4 years of age.[13] Saravanakumar R.et al.2019 stated that the maximum number of patients with SSI was in the age group of 20-60 years.[14]

As per the gender the female individuals are more prone to develop SSI with 21.3% as compared to male individual with 16.9% occurrence which is similar with the study done by Setty N K et al.,2014 which showed that in Aligarh female individuals showed predominance to develop SSI as compared to male.[15] However, according to Laloto TL.et al., 2017, Uludag O. et al 2000 and Noorit P.et al., 2018, sex is not a predeterminant of the risk of SSI. Although the number of male individuals is less in our observations but the difference is not much significant and most of the surgeries performed in our hospital are of cholelithiasis and it may be the fact that cholelithiasis is more common in females and it may be possible that females were found more in this study and in the small sample size it was inconclusive.[5,13,16]

Co-morbid conditions like anaemia, diabetes mellitus and hypertension were the significant risk factor for the development of SSI. but in our study patients with co morbidities has have statistically insignificant (p >0.05) SSI. Nwankwo E O. et.al.2012 found that SSI was 6 times increased risk to develop in patients who had co morbid conditions like diabetes mellitus as compared to non-diabetic patients while anaemic patients have three and a half time the risk of post operative infection when compared with those without anaemia. In our study diabetic patients had more risk to develop SSI that is 12.5%.[17] This observation was equivalent with the studies conducted by different authors.[18] This may be because hyperglycaemia can increase infection rate and impaired wound healing. Poorly controlled diabetes adversely affects the functions of leucocytes to destroy the invading bacteria and to prevent the harmful proliferation of usually present bacteria in the healthy individuals. According to haemoglobin, patient who had Hb 10gm/dl and less than 10gm/dl developed SSI with incidence rate of 33.3% and 31.3% respectively. This observation resembles with the study conducted by Setty NK.et.al.,2014.[15] Another researcher reported that pre surgery low haematocrit value are risk factor to develop SSI.[17]

ASA Score is not only an index for assessing the preoperative physical status of the patients but also an important component of SSI risk prediction. Usually, ASA score more than or equal to III was associated with increased risk of SSI, but in our study, there is a limitation of enrolment of the patient with ASA score of more than II. The maximum number of SSI was found in class-II of ASA (American Society of Anaesthesiologist Classification) i.e. 27% followed by 18.4% cases in Class-I ASA classification. This finding is statistically insignificant (p>0.05). Our study is concomitant with the previously done studies.[19-24]

The observation made based on depth and tissue layer involved, the maximum number of patients was found with superficial surgical site infection i.e. 82.5% followed by deep surgical site infection i.e. 17.5% and no organ space SSI was found. This observation is alike with the various studies conducted previously.[14,17,24]

The surgical site infection is the most frequently reported complication in surgical patients in both developed and developing countries, despite introduction of scrupulous antiseptic regime in surgical practice it can occur from either an endogenous or an exogenous sources are the third most reported nosocomial infection, and they account for approximately a quarter of all nosocomial infection. The rate of SSI varies greatly worldwide and from hospital to hospital i.e. 2.5% to 41.9% as per different studies.[5,15]

CONCLUSION

From the observation, results and discussion it was concluded that, the incidence rate of SSI in our study was 20%. A plethora risk factors like increasing age, female gender, comorbid conditions like anaemia, diabetes mellitus, hypertension, and personal hygiene contribute to development of SSI. Prevention, extensive diagnosis, and appropriate treatment as well as follow-up are mandatory for surgical site infection, whereas most surgical site infections can be prevented by taking appropriate techniques for infection prevention after open surgery.

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