ORIGINAL RESEARCH PAPER

General Surgery

A PROSPECTIVE STUDY ON SURGICAL SITE INFECTIONS IN CLEAN ELECTIVE SURGERIES AT TERTIARY CARE CENTER.

KEY WORDS: Surgical site infections (SSIs), elective surgery, clean wound, class I & II wounds.

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ABSTRACT

Background: Surgical site infection is one of the commonest nosocomial infections. CDC has classified it into superficial incisional, deep incisional and organ/space based on the depth of tissues involved. We have undertaken this study with the aim to assess the surgical site infections in patients undergoing clean elective surgeries. **Methods:** Present study was prospective in nature conducted on 50 electively operated patients. All patients fulfilling inclusion criteria and exclusion criteria were taken up for the study. **Results:** Majority of the patients was in the age group of 40-60 years and most of them were male. We found that incidence of surgical site infection (SSIs) was 9 (18%) cases. Of these 9 cases, 4 needed post-operative re-exploration due to gaping of wound; in another 4 cases there was pus draining from the wound with antimicrobial resistance (8%) which later on responded to antibiotic changeover & 1 (2%) case was died due to generalized septicemia. **Conclusion:** Incidence of surgical site infection was 18% among clean wounds in elective surgery but fortunately there was a good outcome in 98% of the cases.

INTRODUCTION

Surgical site infection is one of the commonest nosocomial infections.[1] Center for disease control and prevention (CDC) defined Surgical Site Infections (SSIs) as "infections that occur after surgery at the site of incision, organ, or space."[2] Discharge of pus or appearance of signs of inflammation at surgical site within 30 days that was primarily closed constitutes Surgical Site Infections (SSIs). It not only put the patient life in danger by increasing morbidity & mortality but also increases the cost of healthcare.[3] Developed countries reporting lower rates of surgical site infection rate i.e. around 1-3% while developing countries still reported the rates of 3 %-15% in clean surgeries and around 23% in clean-contaminated surgeries.[4-8]

It's spectrum may varies from simple superficial infection to severe life threatening sepsis. CDC has classified it into superficial incisional, deep incisional and organ/space based on the depth of tissues involved. Frequency, pattern, causative organisms and antimicrobial resistance of SSIs are well studied in western literature but there is paucity of such studies in our setting hence we have undertaken this study with the aim to assess the surgical site infections in patients undergoing clean elective surgeries.

OBJECTIVES

1. To assess the incidence of surgical site infections in patients undergoing clean elective surgeries.
2. To determine the incidence of outcomes (death, re-intervention & antimicrobial resistance) associated with SSI.

MATERIALS AND METHODS

This was a prospective study conducted over a period of 3 months, protocol of which was approved by the Institutional Ethical committee of the medical college. Written informed consent was taken from all study subjects.

All patients fulfilling inclusion criteria and exclusion criteria admitted in general surgical ward of our tertiary care hospital were taken up for the study until fulfilling the required sample size. Inclusion criteria were patients >18 years admitted for surgery and underwent operation as per elective surgery list, all elective surgeries conducted over a period of 2 months i.e. February–March & each patient was followed post-operatively daily for any signs of SSI before discharge and patient was also asked to follow up till day 30 for assessment of any signs of SSI & assessment of outcomes at day 30. The type of surgery by wound class (CDC, 1999) was classified as clean surgery (Class I-operative wound) / clean-contaminated surgery (Class II-operative wound). Also type and duration of operation, antimicrobial prophylaxis, drain used, and duration of pre-operative stay was noted. We have excluded the cases with implants.

Sample size was calculated with $n = [DEFF*Np(1-p)]/ [(d^2/Z^2_{1-/2}*(N-1)+p*(1-p)]$ using OPENEPI software version 3.

Daniel Curcio et al [9] in their study of Surgical site infection in elective clean and clean-contaminated surgeries in developing countries, found prevalence of surgical site infection among clean and clean-contaminated surgeries was 15%. Considering this, with 95% confidence interval and absolute precision of 10%, sample size came out to be 49 but we have rounded figure to 50. Method of sampling was consecutive sampling method of non-probability sampling.

Method Of Assessment

Pre-validated, pretested, semi structured questionnaire was used as data collection tool. Thorough systemic and general examination including local surgical site examination was done for clinical evaluation.

Primary outcome measure was 30 day incidence of SSI (surgical site infection). US Centers for Disease Control have given criteria for superficial and deep incisional SSI. SSI criteria require that patient should have at least one of the following: (1) purulent drainage from the superficial or deep (fascia or muscle) incision but not from within the organ or space component of the surgical site; (2) pain or tenderness, localized swelling, redness, heat, or fever, or several of these symptoms, and the incision is opened deliberately or spontaneously dehisces; or (3) abscess within the wound (clinically or radiologically detected). Secondary outcome measures were death, post-operative re-intervention incidence, post-operative antibiotic resistance. Data was entered in Microsoft Excel and analyzed using SPSS Software.

RESULTS

In the current prospective study there was no lost to follow up and we have analyzed 50 patients at the end, so the response rate was 100%. Majority i.e. 23 (46%) of the patients were in the middle age group of 40-60 years followed by 14 (28%) from the age group of <40 years and least 13 (26%) from the age group >60 years. 70% of the patients were male. In 26 (52%) patients some form of comorbidity was present. 22

(44%) gave history current smoking, 8 (16%) were past smokers & 20 (40%) were not addicted to smoking. (Table 1)

Table 1. Distribution Of Patients According To Baseline Characteristics.

Baseline characteristic		Frequency(no.)	Percentage (%)
Age groups	<40	14	28
	40-60	23	46
	>60	13	26
Mean Age	Mean + SD	57.46 + 11.33 years.	
Gender	Male	35	70
	Female	15	30
Comor-bidities	Yes	26	52
	No	24	48
Smoking status	Current smoker	22	44
	Past smoker	08	16
	Non-smoker	20	40

Table 2 is showing surgical details of the patients. 28 (56%) patients had class II type of surgical wound i.e. clean contaminated wound while 22 (44%) patients had class I type of wound i.e. clean wound. In majority i.e. 29 (58%) cases surgery was open & in 21 (42) laparoscopic. In most of the cases (72%) in our study, duration of surgery was prolonged for ≥2 hours & among 28% cases it was 1-2 hours. Among only 20% of the cases pre-operative antibiotic prophylaxis was used & in 80% cases, pre-operative antibiotic prophylaxis was not used. Drain was used in 32% of the cases. Duration of pre-operative stay was more than 1 day in majority i.e. 41 (82%) cases & in 9 (18%) cases it was upto 1 day. (Table 2)

Table 2. Surgical Details Among The Study Subjects.

Surgical detail	Subcategory	Frequency	(%)
Type of wound	Class I	22	44
	Class II	28	56
Type of surgery	Open	29	58
	Laparoscopic	21	42
Duration of surgery	Between 1-2 hours	14	28
	>2 hours	36	72
Antimicrobial prophylaxis use	Yes	10	20
	No	40	80
Drain use	Yes	16	32
	No	34	68
Duration of pre-operative stay	1 day	09	18
	>1 day	41	82

We found that incidence of surgical site infection (SSIs) was 9 (18%) cases. Of these 9 cases 4 needed post-operative re-exploration due to gaping of wound; in another 4 cases there was pus draining from the wound with antimicrobial resistance (8%) which later on responded to antibiotic changeover & 1 (2%) case was died due to generalized septicemia. (Table 3)

Table 3. Distribution Of Patients According To Outcomes.

Outcome	Frequency (no.)	Percentage (%)
SSI	09	18
Post-operative re-intervention	04	08
Anti-microbial resistance	04	08
Death	01	02

DISCUSSION

In the current prospective study on surgical site infection patients with mean age of 57.46 ± 11.33 years, majority were males (70%). High proportions (around 60%) of patients were addicted to smoking & around 52% had some form of comorbidity as a risk factor. Consistently Thota Venkata Ravi Kumar et al[10] in their study found that as age increases SSI was also increases, 31% were smokers in their study & most had comorbidities like obesity, diabetes, anaemia & cancer.

Among majority (56%) patients had class II type of surgical wound while 22 (44%) patients had class I type. In 58% cases surgery was open & 42% laparoscopic. In 72% cases duration of surgery was prolonged (≥2 hours) and 80% of the cases there was lack of pre-operative antibiotic prophylaxis. Drain was used in 32% of the cases. Duration of pre-operative stay was more than 1 day in majority (82%) of the cases. These findings are consistent with Dégbey et al[11];Thota Venkata Ravi Kumar et[10] al who reported prolonged (≥2 hours) duration of surgery in 50% of the cases and Shiferaw et al[12] who in their study reported that duration of surgery >1 hour, diabetes mellitus, clean contaminated wound & pre-operative hospital stay >7 days were significantly associated with SSI.

Incidence of surgical site infection (SSIs) in our study was 18%. Of these 4 cases required post-operative re-exploration due to gaping of wound; in another 4 cases there was pus draining from the wound with antimicrobial resistance (8%) which later on responded to antibiotic changeover & 1 (2%) case was died due to generalized septicemia. Similarly Thota Venkata Ravi Kumar et al[10] in their study from south India reported incidence of SSI of 19.2% overall & 14.6% for clean, 29.2% for clean contaminated & Shiferaw et al[12] reported incidence of 12.3%. Dégbey et al[11] in their study reported quite low incidence of surgical site infection (SSIs) which was 7.81%.

CONCLUSION

Incidence of surgical site infection was 18% among clean wounds in elective surgery which could be associated with advancing age, male gender, addiction, comorbidity, open surgery, prolonged duration of surgery, use of drain, lack of pre-operative antibiotic prophylaxis & longer duration of pre-operative stay in the hospital. But fortunately there was a good outcome in 98% of the cases.

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