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OBSERVATIONAL STUDY EVALUATING SURGICAL SITE INFECTION IN ABDOMINAL SURGERIES IN TERTIARY CARE HOSPITAL

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ABSTRACT

Background: Although surgeons are beginning to view surgical site infections (SSIs) as an indicator of the caliber of patient care, the prevalence of SSIs in our setting is still higher than in the industrialized world.

Aim: The purpose of this study was to assess the type, incidence, and risk factors of surgical site infections (SSI) following abdominal procedures.

Methods: Patients' immediate postoperative periods were monitored. After the second day, the wound was inspected every day until the day of release. Proforma had all of the information. Up to thirty days, the patients were monitored once a week.

Results: Smoking (p=0.001), a preoperative stay of more than three days (p=0.000), an ASA score (p=0.001), a contaminated and dirty wound (p=0.000), the length of surgery (p=0.010), and the length of SSI symptoms were sought after. Should the patient experience SSI during this time, the kind of SSI was determined and a swab culture was carried out to determine the bacterium and pattern of antibiotic sensitivity. The SSI rate was 14%.and swab culture was used to determine the pattern of antibiotic sensitivity and bacteria. Risk factors and diagnosis were made using the CDC (Center for Disease Prevention and Control) criteria. In our study, smoking (p=0.001), a preoperative stay of more than three days (p=0.000), an ASA score of more than 0.001, a polluted and dirty wound (p=0.000), the length of the surgery (p=0.010), and the length of the drain insertion (p=0.000) were all linked to SSI.

Conclusion: our research forces us to examine the weaknesses in our surgical and infection control practices, allowing us to develop policies that would lower the rate of wound infections. Reducing the length of preoperative hospital stays and using the right antibiotics can help lower SSI administration guidelines, sufficient patient preparation prior to surgery, cutting down on the length of the procedure, careful use of drains, maintaining a septic during the procedure, and appropriate observance of operating room discipline.

Keywords: Introduction to Surgical Site Infection (SSI), Glycemic Control, ASA Score, Abdominal Surgeries

INTRODUCTION

Surgical site infections (SSIs) are post-operative infections of the incision, organ, or space. In 1992, the phrase "surgical wound infection" was replaced by "surgical site infection" (SSI). Surgical site infections (SSIs) have been known for 4000–5000 years and have always been a serious side effect of trauma and surgery. In LMICs, SSI is the most commonly reported HAI across all hospitals and the most frequently researched Global Health.

According to the World Health Organization's (WHO) Clean Care is Safer Care program, up to one-third of patients who have had surgery in low- and middle-income countries (LMICs) suffer from surgical site infections (SSIs). For every 100 surgical patients undergoing the operation, the pooled incidence of SSI was 11.8 (range 1.2 to 23.6).1, 2

SSI is still a common form of HAI in Europe and the USA, although having a significantly reduced prevalence in high-income nations. In several European nations, it even stands for the most common kind of HAI. Even though SSIs are among the most preventable HAIs, they nevertheless cause significant morbidity and mortality in patients as well as extra expenses for health systems and service payers across the globe.3. Patients with an SSI had a 2–11 times higher chance of dying during surgery than operative patients without one, and each SSI is linked to about extra postoperative hospital days.4 The cost and difficulty of treating surgical site infections (SSIs) are increased by the rise of antibiotic-resistant organisms and surgical patients who are initially encountered with more severe comorbidities.5.

For these reasons, surgeons, infection control specialists, medical authorities, the media, and the general public have all given the prevention of SSI a great deal of attention. The purpose of this study was to assess the kinds, risk factors, and incidence of surgical site infections (SSI) following abdominal procedures.

MATERIAL AND METHODS

This prospective study was carried out over the course of 18 months, from April 2018 to September 2019, at PGIMSR and ESIC Medical College in Chennai. One hundred adult patients scheduled for both emergency and elective abdominal surgery were chosen. The study was conducted in accordance with the ethical guidelines for human experimentation, and the institutional ethical committee's approval was obtained.

Exclusions from the trial included patients with hepatic, cardiac, or renal failure, patients receiving chemotherapy or radiation therapy, patients receiving oral steroids or other immunosuppressive medications, patients with HIV, HBV, or HCV infection, and patients with an ASA (American Society of Anaesthesiologists) score of IV or V.

Method of study: Written informed consent was acquired. A thorough history was obtained, followed by a clinical examination and pertinent investigations. Antibiotics were administered intravenously 30–60 minutes before to the surgery. Strict aseptic precautions were taken while performing the appropriate surgical care. The patients' immediate postoperative period was monitored. After the second day, the wound was inspected every day until the day of release. SSI symptoms were sought after. Should the patient experience SSI during this time, the kind of SSI was determined and a swab culture was carried out to determine the bacterium and pattern of antibiotic sensitivity. The diagnosis and classification of SSI was done using the criteria set out by the CDC (Center for Disease Prevention and Control). After treatment, the patient was released. The proforma had all of the information. Up to thirty days, the patients were monitored once a week. In the event that the patient showed any signs of SSI during the follow-up period following discharge, they received the above-described treatment. Every detail was included into the proforma.

With the use of SPSS, data was gathered, computed, and organized systematically before being shown in a variety of tables and figures. Statistical analysis was then performed to assess the study's goals. The Chi square analysis was completed.

RESULTS

The majority of the patients in our study were male and ranged in age from 35 to 65. Of the patients, 14 were smokers and 12 had a known diabetes diagnosis. Ninety-five participants in our study stayed less than three days before surgery. 3 participants in our study had blood sugar levels that were higher than 200 mg/dl. Compared to elective procedures, there were 64 emergency surgeries performed. 26 of the 58 male patients had anaemia. No blood transfusion was necessary for any of the patients. The majority of patients were between the ages of 13 and 35. Every male patient older than 65 had low Hb levels, 64 participants in our study had an ASA score of I or lower.

Surgical wounds were clean and infected in most cases. For 71 procedures, the surgery lasted longer than two hours. Thirty-one operations had drainage tubes installed. 74 participants underwent a 3–7 day postoperative stay. 23 patients spent a lot of time in the hospital. Glycemic control was maintained for every patient during the recovery phase. Oral feedings were initiated for 71 patients within a 24-48-hour period. Thirteen of the fourteen patients who experienced SSI had superficial SSI. One organ was Space SSI. Deep incisional SSI was absent in all individuals.

9 of the 14 patients were between the ages of 35 and 65. There was an 18.4% infection rate (9/49). In this age category, the percentage of people over 65 is 25% (1/4). Ten of the fourteen cases were men. It was discovered that SSI was unrelated to age or gender. Three individuals with diabetes mellitus experienced SSI. 25% of the sample had an infection (3/12). In our investigation, diabetes mellitus did not appear to be a risk factor for SSI.

Six of the patients smoked. There is a 42.9% infection rate among smokers. It is discovered that smoking and SSI are related (P=0.001). Twelve of the patients had normal BMIs. In our investigation, we did not find any correlation between SSI and patients who were undernourished or obese.

Every patient who experienced SSI had their blood sugar under control both before and after surgery. Therefore, our study was unable to find any correlation between perioperative hyperglycemia and SSI. Three of the four female patients who got SSI had anaemia, and the infection rate was 10.3% (3/26). There were seven SSI patients with low serum albumin levels. In patients with hypoalbuminemia, the infection rate is 20% (7/35) but not statistically significant. 4 patients required more than 3 days to recover before surgery.

Eighty percent (4/5) of the cases were infectious, and this was substantially correlated with SSI (P=0.000). Patients in ASA classes II and III had infection rates of 28.1% (9/32) and 50% (2/4), respectively. In our study, there is a strong correlation (p=0.001) between a higher ASA score and SSI. Ten of the fourteen patients have had emergency surgery. Patients who had emergency surgery had an infection rate of 12% (10/83) while those who had an elective treatment had a rate of 23.5% (4/17). Clean and contaminated wounds had a strong correlation (p=0.000) with SSI.

It was discovered that 11 of the 14 cases had infected wounds. A drain was inserted for more than four days in all SSI cases. This has a substantial correlation (p=0.0) with SSI. Five patients' swab cultures yielded the isolation of several organisms. Escherichia coli were the organism that was isolated the most.

In our analysis, the rate of surgical site infections (SSI) was 14%. Smoking (p=0.001), a preoperative stay longer than three days (p=0.000), an ASA score of at least 0.001, a contaminated and dirty wound (p=0.000), the length of the surgery (p=0.010), and the length of the drain installation (p=0.000) were risk factors linked to SSI. The table has all of the information, and the atlas includes the photographs.

DISCUSSION

Between 3.4% and 36.1% of surgical site infections following abdominal surgeries were documented in a large number of studies 96. Of the 100 patients in our study who had abdominal surgery, 14 of them experienced SSI. In our analysis, the SSI I rate is 14%. This is greater than in Western nations and lower than in a small number of Indian studies, and it is equivalent to other studies conducted in India. This is because, unlike our nation, which primarily relies on sporadic surveys, developed countries have surveillance bodies and a systematic feedback system for SSI rates, such as the National Nosocomial Infection Surveillance System (NNIS) in the United States of America and Hospitals in Europe Link for Infection Control through Surveillance (HELICS) in Europe.6 The majority of the patients in our study were middle-aged (35–65), with a preponderance of men. In our study, smoking (p=0.001), a preoperative stay of more than three days (p=0.000), an ASA score of more than 0.001, a polluted and dirty wound (p=0.000), the length of the surgery (p=0.010), and the length of time the drain is placed (p=0.000) are risk factors linked to SSI. A connection between SSI and BMI grading, anaemia, or hypoalbuminemia was not seen in our study. As in earlier research, smoking was found to be related to SSI in our study.7.

Smokers have an infection rate of 42.9% (6/14) compared to 9.3% (8/86) for non-smokers. A preoperative stay longer than three days is strongly linked to SSI. Patients who stay more than three days prior to surgery had an infection rate of 80%, while patients who stay less than three days have a rate of 10.5%. Numerous research have reported similar findings.8, 9, 10, SSI is linked to patients with ASA classes of 2 and 3. This is in line with earlier research.11, 12 Infection rates are 28.1% for patients in class II and 50% for those in class III. As shown in earlier research, contaminated and filthy wounds were linked to SSI in our investigation.

In a contaminated wound, the infection rate is 91.7% (11/12), whereas in a dirty wound, it is 50% (1/2). Surgery lasting longer than two hours is substantially linked to SSI. Our results were consistent with reports from other investigations.8, 10, 11, When the surgery took longer than two hours, the infection rate among the inpatients was 19.7% (14/71). Not a single surgical patient In our investigation, SSI was produced in less than two hours (0/29). According to our study, SSI is linked to drain installation that lasts longer than four days. Numerous researches reported similar findings.8, 10, 12,

Patients who had a drain in situ for longer than four days had a 60.9% infection rate. Acute appendicitis with or without an abscess is the most frequent illness condition in our study, and the most common surgical operation that was seen was an emergency open appendectomy. The most common conditions when SSI was seen were duodenal perforation and appendicular abscess. On the fourth and fifth postoperative days after surgery, respectively, SSI was recorded for nine and five patients. Once the patients were released from the hospital, none of them experienced SSI. Most of the time, endogenous flora is the cause of infection. Our study's conclusion was that the gastrointestinal tract's opening raises the possibility of Gram-negative bacteria. E. Coli was the most often isolated organism.

In half of the swab cultures, it was isolated. This is in line with what Satyanarayana V et al. and Raka L et al. found.13, 14 The next most often isolated species were proteus mirabilis and pseudomonas. Five patients' swab cultures yielded the isolation of several organisms. Piperacillin and Tazobactum, Imipenam, and Colistin were proven to be effective against E. coli. Other organisms found in swab cultures included MRSA, Staph aureus, and Klebseilla. In our analysis, three patients' swabs were sterile. Thirteen of the patients who developed SSI had superficial SSI. One patient developed SSI in organ space. Not a single patient experienced profound incisional SSI. For nine (64.3%) of the patients with SSI, secondary wound closure was performed. having good granulation tissue and persistent wound dehiscence, where spontaneous closure did not take place. Every single SSI patient had a post-operative stay that lasted longer than seven days.

CONCLUSION

Our research forces us to examine the weaknesses in our surgical and infection control practices, allowing us to develop policies that would lower the rate of wound infections. Preoperative hospital stays should be shortened, antibiotics should be administered appropriately, patients should be adequately prepared before surgery, the length of the procedure should be kept to a minimum, drains should be used carefully, sepsis should be maintained intraoperatively, and proper operating room discipline should be followed.

Even though surgical site infections cannot be totally eradicated, postoperative morbidity and mortality as well as the waste of medical resources could be greatly decreased by bringing the infection rate down to a low level. To find the holes in our infection control procedures and, consequently, pinpoint areas of concentration to lessen the burden of SSIs, a specialized system of infection surveillance must be put in place. Customizing infection control policies for various setups will also be beneficial.

It is necessary to take the necessary precautions to lower the incidence of SSI, which are mainly caused by the care procedures given during hospitalization. To lower surgical site infections, it would be ideal to have a strong antibiotic policy, shorten operations by adequately teaching personnel on acceptable surgical methods, implement appropriate intraoperative infection control measures, and provide surgeons with pertinent data regarding SSIs.

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TABLES

Parameters	**Subgroup**	**SSI present frequency (%)**	**SSI absent frequency (%)**	X^2	**DF**	**'P' value**
Age group	13-35	4(8.5)	43(91.5)	2.355	2	0.308
	36-65	9(18.4)	40(81.6)			
	>65	1(25.0)	3(75.0)			
Gender	Male	10(17.5)	47(82.5)	1.383		0.240
	Female	4(9.3)	39(90.7)			
DM	Yes	3(25.0)	9(75.0)	1.370	1	0.242
	No	11(12.5)	77(87.5)			
Smoking	Yes	6(42.9)	8(57.1)	11.259	1	0.001
	No	8(9.3)	78(90.7)			
BMI	<18.5	2(18.2)	9(81.8)	0.332	2	0.847
	18.5-25	12(13.6)	76(86.4)			
	>25	0	1(100)			
Random blood sugar	<200	14(14.4)	83(85.6)	0.503	1	0.478
	≥200	0	3(100)			
Hb male	<13	5(19.2)	21(80.8)	0.131	1	0.718
	≥13	5(15.6)	27(84.4)			
Hb female	<12	3(10.3)	26(89.7)	0.073	1	0.787
	≥12	1(7.7)	12(92.3)			
Albumin	<3.5	7(20.0)	28(80.0)	1.610	1	0.204
	≥3.5	7(10.8)	58(89.2)			
Pre op- Stay duration (days)	≥3	10(10.5)	85(89.5)	19.042	1	0.00
	<3	4(80.0)	1(20.0)			
ASA	I	3(4.7)	61(95.3)	14.218	2	0.001
	II	9(28.1)	23(71.9)			
	III	2(50.0)	2(50.0)			
Type of procedure	Emergency	10(12.0)	73(88.0)	1.545	1	0.214
	Elective	4(23.5)	13(76.5)			
Type of wound	Clean	0	1(100)	72.013	3	0.00
	Clean contaminated	2(2.4)	83(97.6)			
	Contaminated	11(91.7)	1(8.3)			
	Dirty	1(50.0)	1(50.0)			
Duration of surgery	≤2	0	29(100)	6.649	1	0.0
	>2	14(19.7)	57(80.3)			
Post-op- Stay duration (days)	<3	0	3(100)	54.499	2	0.0
	3-7	0	74(100)			
	>7	14(60.9)	9(39.1)			
Drain placement (days)	<4	0	8(100)	8.879	1	0.0
	>4	14(60.9)	9(39.1)			
p<0.001; NS–Not Significant						

Table: Relationship between clinical parameters and incidence of SSI