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Clinical Study on Surgical Site Infections in a Rural Medical College Hospital at Purulia

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ABSTRACT
Surgical site infection (SSI) is one of the main causes of morbidity and death among patients who have undergone surgery, despite the fact that it may be prevented in some circumstances. Our goals are to find out which risk variables affect the surgical site infection (SSI) rate in a tertiary care setting and to look into the incidence of SSIs. The purpose of this research is to ascertain the many risk variables that impact the rate of surgical site infections (SSI) and to look into the prevalence of these illnesses. This is an observational study conducted in the Department of General Surgery, Deben Mahata Government Medical College and Hospital. Purulia 0. from July 2021 to June 2022. In our study, 8 (80.00%) patients had Superficial Incisional SSI and 2 (20.00%) patients had Deep Incisional SSI. In our study, 39 (39.00%) patients had General anesthesia and 61 (61.00%) patients had Spinal anesthesia. Surgical site infections are the third most common infection associated with hospitals, accounting for 14–16% of all infections that occur in inpatient settings. Surgical site infections are the most prevalent cause of surgical infections, making up 38% of all postoperative infections in patients who have had surgery.

INTRODUCTION

Surgical site infection (SSI) is a major cause of morbidity and mortality among postoperative patients. But if doctors, nurses and hospital personnels appropriately evaluate patients and resources and take the required safety measures during the pre-, intra- and post-operative phases of the operation, it can be prevented in most cases[1].

Surgical site infections are defined by the CDC as follows: infections that affect the deeper tissues (deep incision or organ space) and infections that affect the surface tissues (skin and subcutaneous layer) of the incision are classified as clinically distinct categories[2]. An infection is classified as a surgical site infection (SSI) in patients without implants 30 days after the surgery; however, in patients with implants, this period may extend up to a year[3]. Surgical site infections (SSIs) continue to be a major cause of morbidity and death in resource-constrained countries such as India, despite recent breakthroughs in aseptic techniques[4].

Surgical site infections (SSIs) are postoperative wound infections brought on by bacterial contamination during or following surgery. The likelihood of wound infection is mostly determined by the degree of contamination, although other factors also influence how this process unfolds. Because these risk variables significantly contribute to the occurrence of SSIs, they are investigated in this study[5].

Before surgery, the usage of antibiotic prophylaxis has changed significantly during the last 20 years. In both clean-contaminated and elective clean surgical operations involving foreign bodies, it is often recommended to inject a single dosage of a cephalosporin-such as cefazolin, cefotaxime, ceftriaxone, etc.-into the operating suit just before the incision. One of the main causes of morbidity and cost burden on the healthcare system remains to be surgical site infections[6].

We carried out an observational research in a Rural Medical College Hospital to determine the main risk factors linked to SSIs and to look into the frequency of these events in general surgery.

MATERIALS AND METHODS

This observational study was carried out in the Department of General Surgery of Deben Mahata Government Medical College and Hospital. Purulia. from July 2021 to June 2022.

Primary objectives: To study prevalence of SSI and to determine various risk factors influencing the SSI rate in general surgeries in a Rural Medical College hospital.

Study design: An observational study.

Study period: July 2021 to June 2022.

Study setting: Department of General Surgery, Deben Mahata Government Medical College and Hospital. Purulia.

Inclusion criteria:

- Patients admitted in the general surgical department that underwent surgical procedures under either spinal or general anesthesia.
- Patients who developed infection post operatively at he surgical site when followed up to 30 days of surgery.

Exclusion criteria:

- Preoperatively infected cases.
- Postoperatively infected cases at surgical site but beyond 30 days of operation.
- Old cases operated at another hospital and came to our hospital already with infection.

Patient evaluation and case selection: After taking detailed history, thorough clinical examination carried out, relevant investigations and informed written consent were recorded and provisional diagnosis was made for all patients and operative procedure planned and recorded.

Preoperative preparation:

- Nil by mouth for 6 hours.
- Preoperative hair removal of surgical site was done.
- Xylocaine sensitivity test with 0.1 ml of 2% Xylocaine was done.
- Injection Tetanus toxoid 0.5 ml given intramuscular.
- Inform written consent was taken.
- Preoperative dose of antibiotic was given.

Operative procedure:

- Patient was given either SA or GA according to anesthesiologist
- Various operative procedures were performed according to diagnosis made after thorough evaluation.

Surgical procedure: Surgeries were done according to the disease process as follow:

- Hernioplasty
- Appendectomy
- Exploratory laparotomy
- Suprapubic cystolithotomy
- Open prostatectomy
- Eversion of sac
- Modified Radical Mastectomy (MRM)

- Orchidectomy
- Ureterolithotomy
- Pyelolithotomy
- Cholecystectomy

Postoperative management: IV antibiotic was given at least for first three days of operation and shifted to oral antibiotics to be decided by operating surgeon as per requirement of patient according to surgery.

Generally, on 5th day check and dressing of wound ofsurgery like exploratory laparotomy, pyelolithotomy, cholecystectomy was done and 3rd day for surgery like herniotomy, hernioplasty, appendectomy, suprapubic cystolithotomy was done and afterwards daily dressing was performed. Any evidence of infection noted in post-operative period was recorded and pus culture sent on the same day. Daily dressing and cleaning were performed till wound infection cleared and then patient is discharged and followed up to 30 days of surgery.

Follow up:

- Every patient was reviewed in outpatient basis as follows – after fifteen days, one month.
- Patient were asked for any evidence of infection and watch for any signs of infection on surgical site on every visit.
- All above data was entered into the proforma of this thesis which was approved by Ethical Committee.

Consenting: Patients were included in this study only after taking proper informed written consent. They were not denied for treatment even if they did not give consent to be included in the study.

MATERIALS AND METHODS

Total 93 patients with major surgical procedure suspected of surgical site infections within 30 days of operative procedure in post operative period were included in our study. All patients underwent preoperative evaluation at least a day before surgery. After taking detailed history, thorough clinical examination carried out, relevant investigations and informed written consent were recorded and provisional diagnosis was made for all patients and operative procedure planned and recorded.

Further, when and what type of operative procedure done, how much time taken for the operative procedure, type of anesthesia given, who did the operative procedure, preoperative preparation done or not and preoperative period were recorded for all the cases.

Generally, on 5th day check and dressing of wound of surgery like exploratory laparotomy, pyelolithotomy, cholecystectomy was done and 3rd day for surgery like herniotomy, hernioplasty, appendectomy, suprapubic cystolithotomy was done and afterwards daily dressing was performed. Any evidence of infection noted in post- operative period was recorded and pus culture sent on the same day. Daily dressing and cleaning were performed till wound infection cleared and then patient is discharged and followed up to 30 days of surgery.

RESULTS

In our study, 8 (80.00%) patients had Superficial Incisional SSI and 2 (20.00%) patients had Deep Incisional SSI. The value of z is 2.6833. The value of p is 0.00736. The result is significant at $p<0.05$ (Table 1).

In our study, 39 (39.00%) patients had General anaesthesia and 61 (61.00%) patients had Spinal anaesthesia. The value of z is 3.1113. The value of p is 0.00188. The result is significant at $p<0.05$ (Table 2).

In our study, 74 (74.00%) patients had Elective surgery and 26 (26.00%) patients had Emergency surgery. The value of z is 6.7882. The value of p is <0.00001. The result is significant at $p<0.05$ (Table 3).

In our study, 2 (2.00%) patients had Left inguinal hernia Diagnosis, 11 (11.00%) patients had Acute appendicitis Diagnosis, 3 (3.00%) patients had Appendicular perforation Diagnosis, 1 (1.00%) patient was Bilateral inguinal hernia Diagnosis, 2 (2.00%) patients had BPH Diagnosis, 1 (1.00%) patient was Carcinoma LT breast Diagnosis, 3 (3.00%) patients had Cholelithiasis Diagnosis, 3 (3.00%) patients had Epigastric hernia Diagnosis, 3 (3.00%) patients had Incisional hernia Diagnosis, 2 (2.00%) patients had Left hydrocele Diagnosis, 12 (12.00%) patients had Left inguinal hernia Diagnosis, 5 (5.00%) patients had Left renal calculus Diagnosis, 7 (7.00%) patients had Perforation peritonitis Diagnosis, 1 (1.00%) patient was Right carcinoma breast Diagnosis, 4 (4.00%) patients had Right hydrocele Diagnosis, 16 (16.00%) patients had Right inguinal hernia Diagnosis, 5 (5.00%) patients had Right renal calculus Diagnosis, 1 (1.00%) patient was Right ureteric calculus Diagnosis, 2 (2.00%) patients had RT testicular torsion Diagnosis, 1 (1.00%) patient was SAIO Diagnosis, 7 (7.00%) patients had Umbilical hernia Diagnosis and 8 (8.00%) patients had Vesical calculus Diagnosis (Table 4). The value of z is 3.8033. The value of p is 0.00014. The result is significant at $p<0.05$.

Table 1: Type wise distribution of SSIs in this study

Type of SSI	SSI Cases	Percentage
Superficial Incisional	8	80.00%
Deep Incisional	2	20.00%
Organ /Space	0	0%
Total	10	100

Table 2: Distribution of study cases according to type of anaesthesia

Type of anaesthesia	Frequency	Percentage
General	39	39.00%
Spinal	61	61.00%
Total	100	100

Table 3: Distribution of study cases according to nature of surgery

Nature of surgery	Frequency	Percentage
Elective	74	74.00%
Emergency	26	26.00%
Total	100	100

Table 4: Diagnosis wise distribution in this study, n = 93

Diagnosis	Frequency	Percentage
Left inguinal hernia	2	2.00%
Acute appendicitis	11	11.00%
Appendicular perforation	3	3.00%
Bilateral inguinal hernia	1	1.00%
BPH	2	2.00%
Carcinoma LT breast	1	1.00%
Cholelithiasis	3	3.00%
Epigastric hernia	3	3.00%
Incisional hernia	3	3.00%
Left hydrocele	2	2.00%
Left inguinal hernia	12	12.00%
Left renal calculus	5	5.00%
Perforation peritonitis	7	7.00%
Right carcinoma breast	1	1.00%
Right hydrocele	4	4.00%
Right inguinal hernia	16	16.00%
Right renal calculus	5	5.00%
Right ureteric calculus	1	1.00%
RT testicular torsion	2	2.00%
SAIO	1	1.00%
Umbilical hernia	7	7.00%
Vesical calculus	8	8.00%
Total	100	100

DISCUSSION

This is an observational study conducted in the department of General Surgery, Deben Mahata Government Medical College and Hospital. Purulia. from July 2021 to June 2022.

Surgical site infections (SSIs) are classified clinically by the CDC into two groups: infections affecting the superficial tissues of the incision (skin and subcutaneous layer) and deeper tissues (deep incision or organ space)[7].

Bacterial contamination during or after surgery results in surgical site infections (SSIs), formerly known as post-operative wound infections[5].

Upon examination, we found that 8(80.00%) of the patients had superficial incisions. This had statistical significance (z=2.6833) and p=0.00736).SSI rates have been reported to vary from 2.5 to 41.9% worldwide, contingent on the research. Reichman et al. reported 15% of SSIs in 2009[8], which is similar to the results of Pathak et al.'s 2014 study[9], which found that SSI rates were 6.7% for smokers and 3.8% for non-smokers.

WHO.[10] states that rates of SSIs in affluent nations have been observed to range from 1.2 to 5.2%. Prior research conducted in India has revealed SSI percentages that vary from 4 to 30%.

We discovered that the majority of patients [61(61.00%)] received spinal anesthesia. The result was statistically significant (z=3.1113, p= 0.00188).Similar to our study, the National Academy of Science also found that individuals with diabetes mellitus had a greater risk of infection[11]. Numerous investigations employing various surgical techniques have produced comparable findings, including Xue *et al*.[12], Uzun *et al*.[13] and Giles *et al*.[14].

According to our analysis, the majority of the patients underwent elective surgery [74(74.00%)]. and it was statistically significant (p<.00001), (z=6.7882), which is similar to Satyanarayana et al.'s 2011 research, where the rate of surgical site infections (SSIs) was 7.6% for elective procedures and 25.2% for emergency procedures. Other studies, including the one by Lilani *et al*.[15], have found similar results, with a greater risk of SSIs in emergency procedures compared to elective surgeries.

We found that, significantly higher of patients had Right inguinal hernia [16 (16.0%)] it was statistically significant (p= 0.00014), (z=3.8033) The data are comparable to the study by Lekshmi et al.[16] in which the frequency of SSIs was 91.8% for superficial incision and 5.4% for deep incision.

CONCLUSIONS

Surgical site infections represent 14–16% of all infections that occur in inpatient settings, making them the third most prevalent illness linked to hospitals. Surgical site infections account for 38% of all postoperative infections in individuals who have had surgery, making them the most prevalent cause of surgical infections. Even with the special precautions taken to preserve asepsis, the majority of surgical wounds are thought to be somewhat contaminated. The study's findings suggested the following improvements or actions for surgical interventions: shortening the procedure's length by using the right surgical methods and ensuring that staff members receive ongoing training, particularly when using novel tools or procedures. Additionally, it is advised to use drains sparingly. Emergency surgical procedures, which have a significant risk of infection and need general anesthesia, require special consideration.

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