VOLUME - 13, ISSUE - 06, JUNE - 2024 • PRINT ISSN No. 2277 - 8160 • DOI : 10.36106/gjra

Original Research Paper

Pharmacy

A STUDY ON SURGICAL SITE INFECTIONS AND ITS ANTIBIOTIC SUSCEPTIBILITY IN A TERTIARY CARE HOSPITAL

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ABSTRACT

Background: Surgical site infections (SSI) are a major cause of hospital acquired infections causing morbidity and mortality worldwide. In development across countries 5.6% surgical procedure produce surgical site infection (SSI) these are more complicated by increasing prevalence of multidrug resistant organisms. **Objective:** The aim of the study was to investigate the risk factor and identification of growth of bacterial agents and their antimicrobial susceptibility. **Methods:** The study was a prospective hospital based study on a total 200 patient who underwent surgery. The study was conducted at Government Cuddalore Medical College and Hospital. Data were collected from the case sheets of the respective patients. Data were collected and analyzed with the use of statistical data. **Result:** Out of 200 cases, 12 cases developed Surgical site infection (SSI) due to development of microorganism such as Escherichia coli, Methicillin resistance staphylococcus aureus (MRSA), Pseudomonas, Klebsiella, Staphylococcus aureus. Diabetes and hypertension were the associated risk factors in these cases. The incidence rate of SSI is 6%. **Conclusion:** Surgical site infection (SSI) most commonly seen in older people. Control of factors influencing SSI and bacterial contamination decreases the incidence of SSI.

KEYWORDS : Surgical site infection, risk factors, drug susceptibility, incidence, organism.

INTRODUCTION

Surgical site infections (SSI) are a leading cause of morbidity and mortality around the world. Around 5.6% of surgical procedures develop SSIs, mostly in developing countries. Each year, a significant amount of morbidity and mortality is caused by infection at or around the surgical site, which occurs within 30-90 days of an operative procedure.

Despite improvements in surgical techniques, sterilization of instruments, operation theatre practices, and the best efforts of infection prevention strategies, SSIs remain a major cause of hospital acquired infection. These are further complicated by an increasing prevalence of multidrug resistant organisms. Surgical site infections (SSI) are the third most commonly reported nosocomial infection. 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 factor, wound factors and surgery related factors are implicated in the causation of SSI.

Most probably, it is the patient endogenous flora that is responsible for many SSIs, and the commonly isolated growth of microorganisms include methicillin resistance Staphylococcus aureus, Escherichia coli, Klebsiella, Pseudomonas, Staphylococcus aureus.

However, the aim of the study is to know the incidence of surgical site infection in general surgeries and risk factors associated with SSI and identification of growth of bacterial agents and their antimicrobial susceptibility in tertiary care hospital.

MATRIALS AND METHODS

Study location: this study was carried out at the surgery, orthopedics, obstetrics and gynecology department at GCMCH in Chidambaram.

Study design: A Prospective study.

Sample size: Patients who were underwent surgery above 18 years of age in the department of surgery, orthopedics, obstetrics and gynecology from September 2023- February 2024.

Data collection: data were collected from patient case sheets. Data collection form includes age, gender, diagnosis, type of surgery, comorbidities, isolated organism, antibiotic susceptibility and resistance.

RESULT

A total of 200 cases were included in the study. In that 200 cases 12 patients were developed surgical site infection (SSI). The mean patient age ranged from 18-80; however the majority (66.6%) of the study group was aged between 40 and 80. The majority of patients were male (75%). Out of 12 cases 4 (33.3%) had patient related risk factors and 8 (66.6%) cases did not associated with risk factors. Among the study group 3 (25%) had uncontrolled diabetes, 1 (8.3%) had hypertension and hypothyroidism.

During the study period of these 200 cases, 15 cases showed symptoms of redness and discharge at the site of incision. Wound swabs collected showed culture positive in 12 cases. These cases had undergone surgeries wound debridement, conservative, emergency laparotomy with peritoneal lavage, emergency open appendectomy, peritoneal lavage with grahams omental patch repair, laparoscopic with peritoneal lavage and loop ileostomy.

Out of 12 positive cultures E. coli was isolated from 5 patients and Methicillin resistance Staphylococcus aureus was isolated in 3 patients, Staphylococcus aureus was isolated in 2 patients, Klebsiella species was isolated in 1 patient, Pseudomonas aeruginosa was isolated in 1 patient.

Antibiotic susceptibility pattern of E. coli isolate showed resistance to piperacillin + tazobactam (100%), amoxyclav (80%), cephalosporin antibiotics (75%) were sensitive to aminoglycoside (100%). Both isolate Staphylococcus aureus and methicillin resistance Staphylococcus aureus were sensitive to linezolid (100%), Pseudomonas were sensitive to aminoglycoside and ciprofloxacin.

All surgical site infection case were treated with appropriate antibiotic and discharged after wound healing and without any further complication.

Gender Wise Distribution

From 12 patients, 8 patients were male and 4 patients were female developed surgical site infection.

Age Wise Distribution

In this study the most common age group developed surgical site infection are 40-50 years old which accounts 4 (33.3%) followed by age group 20-40 years old was 3 (25%) patients, 50-65 years old was 2 (16.6%) patients, 66-80 years old was 2 (16.6%), 18-20 years old was 1 (8.3%) respectively.

Age group	No of Patients
18-20	1 (8.3%)
20-40	3 (25%)
40-50	4 (33.3%)
50-65	2 (16.6%)
65-80	2 (16.6%)

Organism Isolated From Surgical Site Infection

Organism isolated	No of cases %
E. coli	5 (41.6 %)
Methicillin resistant staphylococcus aureus	3 (25 %)
Staphylococcus aureus	2 (16.6 %)
Klebsiella species	1 (8.3 %)
Pseudomonas aureus	1 (8.3 %)

The isolated organisms from SSI were E. coli (41.6%), methicillin resistant Staphylococcus aureus (25%), Staphylococcus aureus (16.6%), Klebsiella species (8.3%), Pseudomonas aeruginosa (8.3%). Based on the isolated organisms, antibiotic sensitivity test was done. Medication was prescribed to patients with surgical site infection.

DISCUSSION

Surgical site infections that occur following a surgery at the surgical site within 30-90 days of surgical procedure. Infection could be superficial, involving skin and subcutaneous tissue, or a serious infection involving deeper tissues, organs, or the implant itself. In low and middle income countries, SSIs is the most surveyed and most common type of infection, with incidence rates ranging from 1.2-23.6 per 100surgical procedures.

In this study total 200 cases were included. Out of 200 patients, 12 patients had surgical site infection SSI.

In our study incidence of SSI increased with age. Most of the studies in literature show an increase in the incidence of SSI with increasing age and development of comorbidities. Increased SSI was observed in the surgeries, the high rate of surgeries can be attributed to poor management and the underlying conditions.

In the present study SSI were recorded in the age group 18-80 years. However gender was not a significant factor for prediction of SSI risk.

The majority of SSI infections are mainly because of patient endogenous flora. The etiological agents will also depend on the type and location of the surgery. Various studies have reported that E. coli and MRSA was the most frequent microbial flora associated with surgical site infection SSI.

In a hospital there are various factors affecting the development of antimicrobial resistance. Various factors like irrational use of antibiotics, inadequate sanitary conditions will favor development of antimicrobial resistance. Hence, understanding the sensitivity pattern of the causative agent is crucial to initiate appropriate treatment. In the present study E. coli was found to be sensitive to aminoglycoside (100%). Both isolate Staphylococcus aureus and methicillin resistance Staphylococcus aureus were sensitive to linezolid (100%), Pseudomonas were sensitive to aminoglycoside and ciprofloxacin.

S. No	Diagnosis	Surgery	Signs and symptoms	Organism isolated	Sensitivity	Associated risk factors
1	Tendoachillus cut injury R side (64/m)	Debridement	Redness, wound discharge	MRSA	Linezolid, clindamycin, clotrimazole	-
2	Hollow viscous perforation (22/m)	Emergency laparotomy	Redness, wound discharge	Pseudomonas	Gentamicin, ciprofloxacin, tobramycin	-
3	Gastric antral perforation (18/m)	conservative	Redness, wound discharge	E. coli	Fluoroquinolone, cephalosporin	-
4	Post op case of incarceration incisional hernia/superficial/ SSI (40/f)	conservative	Redness, wound discharge	E. coli	Aminoglycosides, piperacillin + tazobactam, ofloxacin	Hypertension, bronchial asthma
5	Acute appendicitis (22/f)	Emergency open appendectomy secondary suturing	Redness, wound discharge	klebsilla	Aminoglycosides, cephalosporin, pipericillin+tazobactom, fluroquinolones	-
6	Acute appendicitis with appendicular perforation (46//f)	Emergency open laparotomy with peritoneal lavage	Redness, wound discharge	E. coli	Aminoglycoside, nitrofurantoin	DM, hypertension, hypothyroidism
7	Gastric antral perforation with peritonitis (80/m)	Peritoneal lavage with grahams omental patch repair	Redness, wound discharge	MRSA	Linezolid, chloramphenical	DM
8	Emergency LSCS (26/f)	Emergency LSCS	Redness, wound discharge	MRSA	Linezolid, chloramphenical	-
9	Recurrent ileal perforation with peritonitis (62/m)	Laparoscopic with peritoneal lavage and loop ileostomy	Redness, wound discharge	E. coli	aminoglycosides	-
10	Post traumatic raw area leg (47/m)	Wound debridement	Redness, wound discha	Staphyloccus aure	Linezolid, chloramphenicol, ciprofloxacin	-

	e (75/m)	on with wound debridement	rge wound discharge	us	clotrimazole	
11	Fourniers gangeren	Scrotal explorati	Redness,	E. coli	Aminoglycoside,	DM
12	PIRA R leg (45/m)	Wound debridement	Redness, wound discharge	Staphylococcus aureus	Linezolid, ciprofloxacin, chloramphenicol	-

Numerous studies have estimated that approximately 60% of SSIs can be prevented by using evidence based guidelines. Berrios-Torres et al. have recommended pre- operative full body bath; surgical prophylaxis as per clinical practice guidelines; surgical site skin preparation using alcohol based agent; maintaining glycemic levels less than 200mg/dl; maintaining normothermia; and administration of increasing fraction of inspired oxygen during surgery and after extubation in a patient undergoing surgery under general anaesthesia with endotracheal intubation and administration of blood products if required for preventing SSI. These guidelines can be incorporated into quality improvement programmes to have a holistic approach in prevention of SSIs and to improve patient safety.

CONCLUSION

Surgical site infections are most commonly seen in the older people and associated with risk factors. Factors influencing Surgical site infections diabetes, hypertension, irrational use of antibiotics, emergency surgeries. E. coli and MRSA was the most isolated organism in surgical site infection (SSI). Control of factors influencing surgical site infection and bacterial contamination decreases the incidence of surgical site infection (SSI) in surgeries.

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