|| Print ISSN: 2589-7837 || Online ISSN: 2581-3935 ||

International Journal of Medical Science and Diagnosis Research (IJMSDR)

Available Online at www.ijmsdr.com

Volume 3, Issue 3; March: 2019; Page No. 53-57

crossref DOI: https://dx.doi.org/10.32553/IJMSDR/v3i3.11

FREQUENCY DISTRIBUTION OF CLINICAL ENTITIES, CLINICAL PICTURE PARADIGM, AND POTENTIALLY PATHOGENIC BACTERIAL ISOLATES IN CASES OF ABDOMINAL SURGERIES THAT DEVELOP SURGICAL SITE INFECTIONS (SSIS) – A NOTEWORTHY EXPERIENCE IN A TEACHING INSTITUTION IN DELHI.

Balvinder Singh Arora[1], Santhosh Rajan[2], Ravinder Singh Mohil[3], Neeraj Narayan Mathur[4]

[1]Director & Professor, Department of Microbiology, Vardhman Mahavir Medical College & Safdarjung Hospital, New Delhi

[2]Senior Resident, Department of Microbiology, Vardhman Mahavir Medical College & Safdarjung Hospital, New Delhi

[3]Consultant, Department of General Surgery, Safdarjung Hospital, New Delhi

[4]Director & Professor, Department of Otorhinolaryngology, Safdarjung Hospital, New Delhi & Principal - Vardhman Mahavir Medical College & Safdarjung Hospital, New Delhi

Conflicts of Interest: Nil

Abstract:

Emergency abdominal surgeries entail different types of clinical entities that need be operated on emergency basis. Such entities show wide variations locally as well as globally[1]. Several of such emergency abdominal surgeries go on to develop Surgical Site Infections (SSIs) leading to post-operative complications of serious concern causing considerable morbidity and mortality[2]. These SSIs are, broadly, placed under nosocomial infections category and account for approximately 10-40% of all health care associated (HAI) infections[1-4]. Since the clinical picture and surgical entities exhibit variations, therefore the aim of the study was to estimate the frequencies of different types of clinical entities and their presentations' variations along with the elucidation of the types of potentially pathogenic bacteria, in adult patients who have undergone emergency abdominal surgery as well as elective. The present study was carried out in the department of Microbiology, VMMC & Safdarjang hospital, New Delhi from November, 2015 to January, 2017. A total of 50 cases that developed the SSIs were selected as per CDC criteria for wound selection. Ileal perforation peritonitis emerged as the major clinical entity followed by duodenal ulcer perforation. Clinically, pus discharge was the most important sign followed by abdominal pain & fever (24%). Among signs, abdominal guarding was followed by abdominal distension and decreased bowel sounds (4%). E. coli was the most common isolate followed by Klebsiella pneumoniae. Among gram positive - Staphylococcus aureus emerged as the most common isolate. Awareness in any given institution, whether large or small, about the most common clinical entities and their clinical presentations helps surgeons to be better prepared to handle the emergency situations. Along with this, awareness additional information about the likely underlying potential bacterial pathogen helps surgeon to initiate the right kind of antimicrobial empirical therapy in a timely manner so that the morbidity and mortality reduction due to SSIs can be reduced as much as possible. Such studies need be carried out, at least, on periodic basis to assess the changes and introduce modifications in policy management on SSIs.

Key words: clinical entities, presentation, surgical emergencies, SSIs.

Introduction

Surgical site infections (SSIs) especially after emergency abdominal surgeries continue to be post-operative complications of serious concern as these cause considerable morbidities and deaths.[1] SSIs are also listed, broadly, as the third commonest nosocomial infections.[2] In 2002, US

Corresponding author: Balvinder Singh Arora

Center of Disease Control have estimated that about 27 million operations are performed each year in United States which result in approximately 300000 SSIs every year and cause approximately 8000 patient deaths.[2,3] These infections concern 2 million cases annually worldwide [2-4]. Clinically, several different types of entities have been reported in literature but these show geographical variations and also intra institutional variations.[5] Clinical presentations also show variations. Role and type of organism with pathogenic potential involved also vary and require regional studies on periodic basis.[6] Therefore, the objective of the study was to know the types and the frequencies of clinical entities that need emergency abdominal surgeries and subsequently develop post-surgical SSIs along with varied clinical presentations in our institution. An additional objective was to know which are the most common, whether one or two bacteria, with likelihood of being an underlying pathogen responsible for causing such SSIs.

METHODS

Study design: It was a hospital based ethically approved observational study carried out in Department of Microbiology in collaboration with Department of Surgery at Vardhman Mahavir Medical College & Safdarjung hospital, New Delhi from November, 2015 to April, 2017. The study group included 50 surgical patients who developed SSIs after abdominal surgeries – emergency as well as electives with (42 emergency and 08 electives). For wound selection CDC criteria was followed. The division of age groups was done arbitrarily with class interval of 10 years in the range 11 to 80 years

RESULTS

Peak incidence was observed in third decade of life with the mean age as 28.96 years. SSIs development among males was 78% and in females only 22% with male to female ratio as 3.5:1. Superficial SSI was seen in 54% while deep SSIs developed in 46% of cases. SSIs were more in emergency abdominal operations accounting for 84% compared to elective operations as 16% only. Clinical spectrum of diseases included in the study is shown in Table I.

Table I: Distribution of disease entities in 50 cases who developed SSIs following abdominal surgery.

Clinical diagnosis	Number of cases (%)
Ileal perforation peritonitis	34 (68%)
Duodenal ulcer perforation peritonitis	5(10%)
Incisional hernia	3(6%)
Inguinal hernia	2(4%)
Umbilical hernia	1(2%)
Stomach CA	1(2%)
Acute pancreatitis	1(2%)
Liver abscess	1(2%)
Rectal CA	1(2%)
Emphysematous pyelonephritis	1(2%)
Total	50(100%)

Ileal perforation peritonitis was found to be the major cause of hospital admission accounting for 68% of admission. It was followed by duodenal ulcer perforation (5%). Clinically, pus discharge (100%) was the most important observation followed by abdominal pain (92%), fever (24%). Few patients developed nausea (4%), vomiting (4%), and loss of appetite (4%). Among signs, 68% of patient showed signs of abdominal guarding followed by abdominal distension (30%), localized warmth (22%), and decreased bowel sound (4%). Therefore, clinically, overall, pus discharge was most predominant symptom followed by fever and abdominal guarding as the most predominant sign. Among a total of 50 specimens of pus/exudate were collected from the 50 cases of SSI in abdominal surgery cases, bacteriological diagnosis could be made in 47 cases while in 1 case only fungus was isolated. Two (02) specimens were bacteriologically sterile. One bacterium was isolated in 46 cases (92%) while two were isolated in only 03 cases (6%) while in one case *Candida* was the lone isolate. *E. coli* (28.5%) was the most common isolate followed by *Klebsiella pneumoniae* (26.5%). Among gram positive - *Staphylococcus aureus* (6.1%) was the most common isolate. Part of the data has been reported by authors in volume 3, issue 2; February: 2019; page no. 159-163 in International Journal of Medical Science and Diagnostic Research (IJMSDR).

Table II: Clinical presentations of 50 cases of SSIs

Signs	No of cases (n=50; %)	Symptoms	No of cases (n=50; %)
Pus discharge	50 (100%)	Abdominal pain	46(92%)
Guarding/rigidity of abdomen	34(68%)	Abdominal distension	15(30%)
Temperature	11(22%)	Fever	12(24%)
Palpable bowel loops	6(12%)	Nausea &vomiting	2(4%)
Abdominal mass	5(10%)	Loss of appetite	2(4%)
Absence of bowel sounds	2(4%)	-	-

DISCUSSION

Clinically, in all the 50 selected cases, pus discharge (100%) was the most important observation followed by abdominal pain (92%), fever (24%). Few patients developed nausea (4%), vomiting (4%), and loss of appetite (4%). Among signs, 68% of patient showed signs of abdominal guarding followed by abdominal distension (30%), localized warmth (22%), and decreased bowel sound (4%). Therefore, clinically, overall, pus discharge was most predominant symptom followed by fever and abdominal guarding as the most predominant sign. It is well known observation recorded in literature that SSIs produce diversity of clinical manifestations.[5] It is well documented that typical presenting features are non-specific but in most cases includes cardinal manifestation of inflammation such as warmth, erythema, edema, pain and dysfunction.[5,7] Most severe infections present signs and symptoms including temperature $>40^0$C or $<35^0$C, hypotension, heart rate >100 beat/min with rapidly progressive course and extreme pain.[8,9] In severe cases, crepitus and flatulence secondary to gas or fluid collection may be seen with subsequent necrosis of the dermis, bullae formation with hemorrhagic fluid collections apparently deep violet in color – all these are important observations. Skin anesthesia may be a late finding in severe SSIs and finally ulcers may develop in areas of high mechanical pressure which may progress to ischemia and necrosis.[7-9] In the present study, SSIs were found to develop in disease entities which included ileal perforation peritonitis (68%), duodenal ulcer perforation(10%), incisional hernia(6%), inguinal hernia(4%), umbilical hernia(2%), stomach cancer(2%), acute pancreatitis(2%), liver abscess(2%), rectal carcinoma(2%) and emphysematous pyelonephritis(2%). Indian researches [1,10,11] have well document SSIs occurrence in bowel surgeries including appendectomy, hernia, hydrocele as compared to surgeries on other organ system viz. in study by Praveen kumar et al[10] bowel surgeries and appendicular surgeries compromise >50%, while work done by Ashish Prathak et al[1] have recorded most common procedures, to the extent to 45%, on abdominal surgery as underlying causes of SSIs. In our study no death was recorded. Since one of the objectives of study was to know the two most common bacterial isolates with pathogenic potential, it was found that – among gram negative *E. coli* (28.5%) was the most common isolate followed by *Klebsiella pneumoniae* (26.5%). Among gram positive - *Staphylococcus aureus* (6.1%) was the most common isolate. It is in accordance with many Indian studies viz. in a study by S. Mohanty et al [12] - Gram negatives were nearly 55% and Gram positive were 45%; in a study by Mantravadi HB et al[13] – nearly 60% were gram negative and 40% were gram positive. It is well recorded in literature that typical organism that colonize skin above waist are gram positive species such as *Staphylococcus epidermis, Staphylococcus aureus, Streptococcus*

pyogenes. Later two species are particularly significantly contributed to majority of SSIs above waist. On the other hand the typical organism that colonize skin below the waist are both gram (+) and gram (-) species. It is speculated the difference are secondary to proximity to the anorectal area where enteric species tend to gravitate and colonize this area of skin. It is specifically true of Enterobacteriaceae member and *Enterococcus species*. A composition of the flora is an underlying determinant to the type of organism isolated that in turn depends upon climate, gender differences, age factor, stress level (affecting immunity especially CMI, personal hygiene, nutritional status and extent of hospitalization), the microbiology of SSIs also varies with the mean of entry. The bacterial aetiology may be normal host flora transferred from instrument of entry or from environment. In addition, etiologies differ between community acquired and hospital acquired SSIs.

CONCLUSION

Ileal perforation peritonitis was found to be the major cause of hospital admission accounting for 68% of admission. It was followed by duodenal ulcer perforation (5%). Clinically, pus discharge (100%) was the most important observation followed by abdominal pain (92%), fever (24%). Among signs, 68% of patient showed signs of abdominal guarding followed by abdominal distension (30%), localized warmth (22%), and decreased bowel sound (4%). *E. coli* (28.5%) was the most common isolate followed by *Klebsiella pneumoniae* (26.5%). Among gram positive - *Staphylococcus aureus* (6.1%) was the most common isolate. It is an important conclusion that pus discharge from SSIs with abdominal pain and fever must be taken seriously as it may require repeat laparotomy to know the failure of the earlier carried out surgical procedure or else a new surgical entity may have developed requiring surgical intervention because translocation of microbes from multiple sites can complicate the entire efforts of the surgeon and the team. The SSIs must be taken care of with all possible interventions as per the surgeons experience and also the protocols for management of SSIs need be developed for all to follow. It will in all likelihood lead to reduction in morbidity and mortality, especially in developing countries like India.

REFERENCES

1. Ashish Pathak, DCH, DNB (Pediatrics), PhD, Erika A. Saliba, RN, MSc'Correspondence information about the author RN, MSc Erika A. SalibaEmail the author RN, MSc Erika A. Saliba, Shailendra Sharma, MS, Vijay Kumar Mahadik, DCH, Harshada Shah, MD, Cecilia Stålsby Lundborg, PhD. Incidence and factors associated with surgical site infections in a teaching hospital in Ujjain, India.
2. Awad SS. Adherence to Surgical Care Improvement Project Measures and post-operative Surgical site infections. Surg Infect 2012; 13(4):234-7.
3. Ata A, Lee J, Bestle SL, Desemone J, Stain SC. Postoperative hyperglycemia and surgical site infection in general surgery patients. Arch Surg 2010; 145:858-864.
4. Magill SS, Hellinger W, Cohen J, et al. Prevalence of healthcare-associated infections in acute care hospitals in Jacksonville, Florida. Infect Control Hosp Epidemiol 2012; 33:283–91.
5. Ki V, Rotstein C. Bacterial skin and soft tissue infections in adults: A review of their epidemiology, pathogenesis, diagnosis, treatment and site of care. The Canadian Journal of Infectious Diseases & Medical Microbiology. 2008; 19(2):173-184.
6. Jernigan JA. Is the burden of Staphylococcus aureus among patients with surgical-site infection growing? Infect Control Hosp Epidemiol 2004; 25: 457-60.
7. Stevens DL, Bisno AL, Chambers HF, et al. Practice guidelines for the diagnosis and management of skin and soft-tissue infections. Clin Infect Dis. 2005; 41:1373–406.
8. Eron LJ, Lipsky BA, Low DE, Nathwani D, Tice AD, Volturo GA. Managing skin and soft tissue infections: Expert panel recommendations on key decision points. J Antimicrob Chemother. 2003; 52:3–17.

9. Elston DM. Optimal antibacterial treatment of uncomplicated skin and skin structure infections: Applying a novel treatment algorithm. J Drugs Dermatol. 2005; 4(6):15 - 19.

10. Praveen kumar D, Neelima. Bacteriological profile of surgical site infection in rural hospital in R.R.district. Int J Pharm Bio Sci. 2013; 4(3):217-221.

11. Golia S, Asha S, Kamath B, Nirmala AR. A study of superficial surgical site infections in a tertiary care hospital at Bangalore. Int J Res Med Sci.2014; 2(2): 647-652.

12. Mohanty S, Kapil A, Dhawan B, Das BK. Bacteriological and antimicrobial susceptibility profile of soft tissue infections from northern India. Indian J Med Sci 2004; 58(1):10-15.

13. Mantravadi HB, Chinthaparthi MR, Shravani V. Aerobic isolates in pus and their antibiotic sensitivity pattern: a study conducted in a teaching hospital in Andhra Pradesh. Int J Med Sci Public Health. 2015; 4(8): 1076-1079.