SUPERFICIAL SURGICAL SITE INFECTION IN EMERGENCY ABDOMINAL SURGICAL PROCEDURES. A REANALYSIS OF MICROBIOLOGY AND ANTIBIOTIC SENSITIVITY

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ABSTRACT

BACKGROUND: Surgical site infection is regarded as the most common hospital acquired infections among the surgical patients and carries a significant impact on patient's morbidity and mortality.

OBJECTIVES: The aims of this study were to know about the common pathogens causing surgical site infection after emergency abdominal surgery and their sensitivity to various antibiotic groups.

METHODOLOGY: This was a prospective cross sectional observational study of 6 months duration, carried out from July 2012 to December 2012 in the department of general surgery, Hayatabad Medical Complex, Peshawar. All the patients who underwent emergency abdominal surgery during this period were included in the study. Wounds were classified as clean, clean contaminated, contaminated and dirty. Superficial Surgical site infection was diagnosed using the criteria set by the Center for Disease Control and classified according to the Southampton scoring system.

RESULTS: A total of 256 emergency abdominal surgeries were performed. Out of these, 37 patients developed wound infection, showing that 14.45% of the patients undergoing emergency abdominal surgery developed wound infection. The culture report suggested E.coli as the most common pathogen accounting for 19(51.35%) cases of SSI followed by pseudomonas, Staph.aureus and klebsiella accounting for 8(21.62%) cases, 6(16.21%) cases and 1(2.7%) cases respectively. No growth was obtained in 2(5.4%) cases and mix growth was obtained in 1(2.7%).

CONCLUSION: Gram negative flora of the gut is responsible for SSI in emergency surgical procedures and this flora is most sensitive to piperillin/tazobactam, cefoparazone/sulbactam and meropenam.

KEY WORDS: Surgical site infection, pathogen, emergency abdominal surgery

INTRODUCTION

Surgical site infection (SSI) is defined as an infection occurring within 30 days after the operation within the field of surgery. It is regarded as the most common hospital acquired infections among the surgical patients and carries a significant impact on patient's morbidity and mortality as well as increasing the healthcare costs.^{1,2} SSIs is the second most common type of nosocomial infection accounting for 20–25% of the total and develops in 2%–5% of patients undergoing surgical procedures every year in the United States resulting in at least 500,000 infections, 3.7 million excess hospital days, and US\$ 1.6 billion in extra hospital charges.^{3–6} So decreasing the incidence of surgical site

infections not only reduces the morbidity but also decreases the hospital stay and costs. Despite this data, it is thought that internationally, the frequency of SSI is difficult to monitor because criteria for diagnosis might not be standardised.⁷

SSIs have been categorized by the CDC into 3 categories: superficial, deep, and organ/space infections. Superficial infections involve the skin or subcutaneous tissue; deep infections involve the muscle or fascia; and organ/space infections involve the body cavity such as the pleural cavity or liver bed.⁴

In the west, many hospitals have developed their own guidelines for the prevention and control of

SSI and many of these local guidelines have improved the quality of post-op care.⁶ Unfortunately majority of our hospitals have failed to develop such guidelines and many hospitals have adopted guidelines developed by the western hospitals. This is especially true about the antibiotic prophylaxis.

The studies carried out in Karachi showed pseudomonas as the chief pathogen, followed by Staph.aureus and E.coli.⁵ Another study in Jinnah postgraduate center showed somewhat different results with E.coli as the most common Pathogen followed by Pseudomonas and Staph.aureus.⁷ A study carried out in LRH showed that E.coli was the most common organism followed by pseudomonas and staph.aureus.⁸

The rationale behind this study was the diversity of data regarding the frequency of pathogens causing surgical site infection after emergency abdominal surgical procedures and secondly, to analyze their antibiotic sensitivity so that a local antibiotic prophylaxis regimen may be instituted.

METHODOLOGY

This was a prospective observational study of 6 months duration, carried out from July 2012 to December 2012 in the department of general surgery, Hayatabad Medical Complex, Peshawar. All the patients who underwent emergency abdominal surgery during this period were included in the study. Wounds were classified as clean, clean contaminated, contaminated and dirty. Superficial Surgical site infection was diagnosed using the criteria set by the Center for Disease Control and classified according to the Southampton scoring system. All patients with Southampton grade 3 and above were considered as having surgical site infection. Wound swabs were obtained from the patients having SSI using standard aseptic techniques and sent for culture and sensitivity testing to the Hayatabad Medical Complex laboratory.

RESULTS

During the 6 months of the study period, a total of 256 emergency abdominal surgeries were

performed. Out of these, 37 got infected, showing that 14.45% of the patients undergoing emergency abdominal surgery developed wound infection. 23 (62.16%) were males and 14(37.83%) being females. 8(3.125%) patients were diabetic. Range of age was 8-75 years.

Graph 1: Pie chart showing male:female ratio of wound infection

Culture and sensitivity was performed in all the cases. 33 patients got diagnosed as having SSI within the admission while 4 patients presented with SSI after being discharged from the ward.

Thirty two had grade 3 infection whereas four had grade 4 and one had grade 5 infection. The culture report suggested E.coli as the most common pathogen accounting for 19(51.35%) cases of SSI followed by pseudomonas, Staph aureus and klebsiella accounting for 8(21.62%) cases, 6(16.21%) cases and 1(2.7%) cases respectively. No growth was obtained in 2(5.4%) cases and mix growth was obtained in 1(2.7%).

Table 1: key for grading wound infection.

Grades of wound infection	Type of wound	N (%age)
Grade 1	No discharge No inflammation	00
Grade 2	Minimal discharge No inflammation	00
Grade 3	Minimal discharge Minimal inflammation	32(86.4%)
Grade 4	Purulent discharge Moderate inflammation	04(10.8%)
Grade 5	Purulent discharge Severe inflammation	01(02.8%)

Pathogens responsible for wound infection according to culture report

The sensitivity report suggested that most of the organisms are resistant to the commonly used prophylactic antibiotics i.e ceftriaxone and metronidazole. E.coli was found to be most sensitive to piperacillin/ tazobactam, cefoparazone/ sulbactam and meropenam having a sensitivity pattern of 16(88.89%) cases, 15(83.34%) cases and 15(83.34%) cases respectively. Pseudomonas was also found to be most sensitive to piperacillin/tazobactam, cefoparazone/sulbactam and meropenam showing a sensitivity spectrum of nine cases, 8 cases and 6 cases respectively. For Staph aureus, four (66.67%) cases were sensitive to tazobactam/piperacillin, four (66.67%) cases were sensitive to cefoparazone/sulbactam, 3 cases were sensitive to ciprofloxacin, 4(66.67%) were sensitive to ceftriaxone. All the cases of Staph aureus showed a remarkable sensitivity to linezolid, vancomycin and fusidic acid reaching 100%.

DISCUSSION

Post-operative wound infections are the most common nosocomial infections and carry a big impact on patient morbidity as well as hospital costs. The rate of wound infection in our study was 14.45% which was higher than the SSI rate reported in the west; 7%.⁶ In our study, E.coli was found to be the most common pathogen

followed by pseudomonas, Staph aureus and klebsiella accounting for 21.62% cases, 16.21% cases and 2.7% cases respectively. These results were similar to a study carried out in lady reading hospital Peshawar except that our study showed 2.7% of cases being caused by klebsiella whereas the study in LRH did not show Klebsiella as a causative organism in SSI.⁸ The studies carried out in Karachi showed pseudomonas as the chief pathogen, followed by staph. aureus and E.coli.⁵ Another study in Jinnah postgraduate center karachi showed results somewhat in accordance to our study with E.coli as the most common Pathogen followed by Pseudomonas, Staph. aureus and klebsiella.

The most probable reason for the high rates of gram negative organisms induced wound infection appears to be the fact that our study population included those patients who had undergone emergency abdominal surgery and these organisms constitute the normal flora of the gut⁹⁻¹¹.

In our study, it was found that the organisms showed very little sensitivity to the usual preoperative antibiotic regimen consisting of ceftriaxone and flagyl. E.coli was found to be most sensitive to piperacillin/ tazobactam, cefoparazone/ sulbactam and meropenam. Pseudomonas was also found to be most sensitive to piperacillin/ tazobactam, cefoparazone/ sulbactam and meropenam. Staph.aureus showed a very high sensitivity to linezolid, vancomycin and fusidic acid but still more than 66% of staph.aureus are sensitive to piperacillin/tazobactam and cefoparazone/ sulbactam. This was also in accordance to the study in Lady Reading hospital¹².

The increased resistance of these organisms to ceftriaxone, cephradine, ampicillin and amoxicillin/sulbactam is most probably due to the injudicious and extensive use of these antibiotics in the empirical treatment of many infections. Literature suggests that antibiotic resistance is proportional to the antibiotic use.¹³⁻¹⁵

CONCLUSION

The usual antibiotic prophylaxis containing ceftriaxone has become increasingly ineffective against most of the pathogens. So an antibiotic regimen containing cefoparazone/sulbactam or piperacillin/tazobactam should be used in patients undergoing emergency abdominal surgery.

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