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SURVEILLANCE OF SURGICAL SITE INFECTIONS IN KARACHI, PAKISTAN

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ABSTRACT

Surgical site infections (SSIs) are related with considerable health care costs and patient inconvenience. Surgical site infections seem to be frequent and involve multiple organ system. The object of this work was to estimate various factors related with infections after surgery. In this research work the occurrence and pattern of infections in a group of patients after surgery were characterized. Data were obtained from different hospitals of Karachi, Pakistan from July to December 2009. We collected the data from 230 patients from which only 42 patients showed surgical site infections. Information's were extracted from patient medical records, operation and diagnostic imaging reports and from the culture sensitivity test results. From 42 patients, 54.76% were male and 45.27% were female. The occurrence of surgical site infection was higher i.e. 45.23% in age group ranged from 65-80 years as compared to the other categories of age group ranged from 1-65 years. In the present study we also analyzed that diabetes 30.95% and obesity 21.42% were the major threat related with these infections. From the assessment of 42 bacterial isolates *Staphylococcus Aureus* 23.80% followed by *Escherichia Coli* 16.66%, *Pseudomonas Aeruginosa* and *Enterobacter Species* 14.28% were the main cause of these infections. In the present study we also evaluated that in 30 surgical cases 71.42% the duration of surgery were more than 2 hours. Data from clinical outcomes of patients indicated that 23 patients 54.76% showed fever and 19 patients 45.23% showed pus leaking. Present study suggested that by adopting multidisciplinary approaches such as use of sterilized methods, sophisticated surgical techniques and use of appropriate antibiotics prophylactic use can decrease the risk of these infections.

Key Words: Surgical techniques, prophylactic antibiotics, Surgical site infections.

INTRODUCTION

In the mid of 19th century, patients showed multiple symptoms after surgery such as fever, infection and finally death [1]. Infections of tissues or spaces are due to the exposure during the surgeries [2,3]. Mainly three factors are linked with the expansion of infections after surgery including the extent of exposure of microorganism during surgical period, length of the surgical procedure and factors including starvation, diabetes and fatness [4]. Various bacteriological studies have shown that infection rate after surgery is widespread and the presences of various bacterial types are related to ecological positions [5] and are of enormous concern throughout the world [6]. Enhanced resistance of microorganisms against different antibiotics [7], the persistent capability of the organisms [8], expanded hospital stay [9,10] and nosocomial infections facilitated the frequency of infections after

surgery [11]. Majority of SSIs are due to the pathogens developed from the patients endogenous flora for example *Staphylococcus aureus* and also due to the various pathogens related to the procedure including *Streptococci* and Gram negative *bacilli*. Frequency of SSIs is remarkably increased due to the presence of methicillin-resistant *Staphylococcus aureus* [12,13] or by *Candida albicans* [14]. Prophylactic used of antibiotics [15] reduces the activity of various microorganisms after surgery [16,17]. Various factors associated with SSIs such as patient factors like geriatric age, anemia, radiation, inappropriate prophylactic use of antibiotic [4] and low serum albumin concentrations [18], local factors like reduced skin preparation and use of contaminated instruments [4,18]. There are various techniques which are used to manage the outcomes of these infections [19] to avoid massive clinical load from the patients [20].

Therefore in this research work the aim of investigation is to find out the status of infections after surgery, identify the variety of factors linked with the expansion of SSIs, evaluating the pathogens isolated from post operative patients, investigating the length of surgery and determining the prophylactic use of antibiotic in surgical events.

MATERIALS AND METHODS

Present work was carried out in various hospitals located in different region of Karachi, Pakistan. Data was collected during July to December 2009 from 230 surgical patients only 42 patients showed surgical site infections. Collection of information based on age, sex, various factors related with SSIs, duration of surgery, identifying pathogens which were isolated from the patients and investigating clinical outcomes from the patients. Data were collected from patient's medical records, operation and diagnostic imaging reports and from the culture sensitivity test results. Statistically data were assessed by t-test.

RESULTS AND DISCUSSION

Infections after surgery were related to the wound [21] based on number of contributing factors such as prolonged length of hospitalization, extended duration surgery leads to an increased exposure of the surgical site to the environment [22]. In the present study we determined the rate of infections in numerous patients after surgery. During the study period we analyzed 42 patients from which 23 patients (54.76%) were male and 19 patients (45.27%) were female were found to have SSIs as given in figure 1. Results showed no vital characteristic in the incident of surgical site infection between males and females. Table 1 showed the infection rates after surgery relative to age. The age group were divided into four categories: 1-25, 25-55, 55-65 and 65-80 years. Results indicated that infection rates after surgery were higher in age group ranged from 65-80 years were 45.23% , from 55-65 years were 30.95%, from 25-55 years were 16.66% and from 1-25 years were 7.14%. Significant difference were found based on the analysis of t –test (P=0.058 at 90% Confidence Interval).

The association of diabetes with the risk of SSIs is high [23-25]. Similarly, complicated diabetes [26] and obesity [27], nicotine [28] and steroids [29,30] may facilitate surgical site infections (SSIs). In the present study we analyzed that diabetes, fatness, use of corticosteroids and foreign body involvement were related with infections associated with surgical site as shown in table 2. Results indicated that diabetes 30.95%, obesity 21.42%, use of corticosteroids 19.04% and foreign body involvement 11.90% were the main cause of infections after surgery as compared to other factors such as hair removal with razor 7.14%, malnutrition and irradiation of site 4.76%. There is a significant correlation between above mentioned factors and occurrence of infections after

surgery (P=0.009 at 90% CI). The antibiotic prophylaxis is a short use of antimicrobial agent started before surgery [31]. Several scientists indicated that the SSIs rate were high without the prophylactic use of antibiotic [32,33]. It was also found that the infection rate of deep (organ/space) was much lower after the prophylactic use of antibiotic than reported earlier [34]. Cephalosporin is the mainly used antibiotic prophylactic compound [35]. The other most commonly used compounds are Cefazoline and Metronidazole [36]. These drugs have broad spectrum of activity [37]. The frequently prescribed prophylactic antibiotics given to the patients were shown in figure 2. It was found from the patient's medical records that the most commonly recommended antibiotic given prophylactically were cephalosporin 60%, penicillin 30% and aminoglycosides 10% as shown in figure 2. Surgeon's should ensured sufficient tissue and serum level of antibiotic before surgery, while attentions were also given on history of antibiotics and past history of patient's allergic reactions.

Several authors reported that the most causative pathogens of surgical site infections (SSIs) are *Pseudomonas Aeruginosa* [35] and *Staphylococci* [38]. The contribution of microorganisms in surgical site infections (SSIs) is becoming very severe in developing countries because of less hygienic measures. In the present study most frequent infectious microorganisms that were isolated by culture sensitivity test after surgery were *Staphylococcus Aureus* 23.80%, *Escherichia coli* 16.66%, *Pseudomonas Aeruginosa* 14.28% and *Enterobacter specie* 14.28% and while *Staphylococcus Lugdunensis* 9.52%, *Acinetobacter Lwoffii* 7.14%, *Bacillus* 4.76%, *Salmonella*, *Serratia*, *Enterococcus* and *Moraxella Catarrhalis* species were 2.38% (P=0.002 at 90% CI) these species were rare in causing surgical site infections as shown in table 3 and figure 3. One of the main reason of surgical site infections (SSIs) is prolonged hospital stays [1] and extended duration surgery resulted in an enhanced contact of the surgical site to the environment which may decrease the patient internal host defense mechanism [39] as a result patients will become more prone to nosocomial infections after the surgery [40]. The association between length of surgery and infections after surgery were presented in table 4. Results indicated that in 30 cases 71.42% the length of surgical period was more than 2 hrs and in 12 cases 28.57% the duration of surgery was less than 2 hrs. No significant difference were found based on the analysis of t –test (P=0.258). In the present study 11 out of 42 patients were admitted with infections associated with surgical site after the release from the hospital and remaining 31 patients were found to have infections immediately after four to five days of surgery, data from clinical outcomes indicated that 23 patients (54.76%) found to have increased fever above 101°F, 19 patients (45.23%) showed discharge of pus from the site of infection as shown in table 5.

Table I: Table showed the incidence of surgical site infections (SSIs) relative to age.

Age in years	No. of cases	Percentage (%)	P value*(n=42)
1-25	3	7.14	0.058
25-55	7	16.66	
55-65	13	30.95	
65-80	19	45.23	

*t-test

Table II: Showed the association of different factors related with infections after surgery.

Factors	No. of Cases	Percentage (%)	P value
Diabetes	13	30.95	0.009
Corticosteroids use	8	19.04	
Obesity	9	21.42	
Malnutrition	2	4.76	
Foreign body	5	11.90	
Hair Removal with razor	3	7.14	
Irradiation of site	2	4.76	

Table III: Showed the frequency of microorganisms isolated from patients.

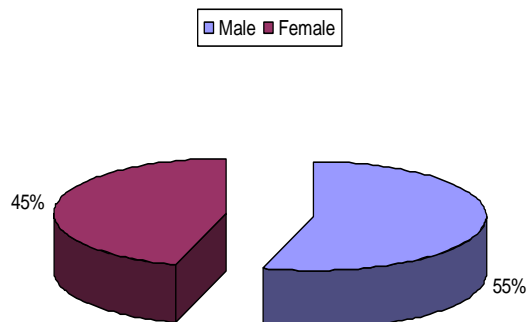
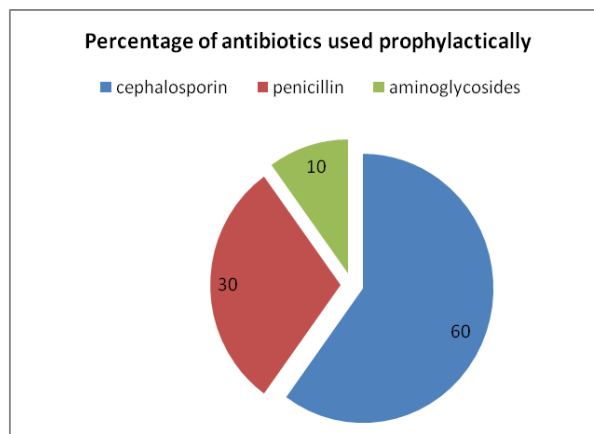
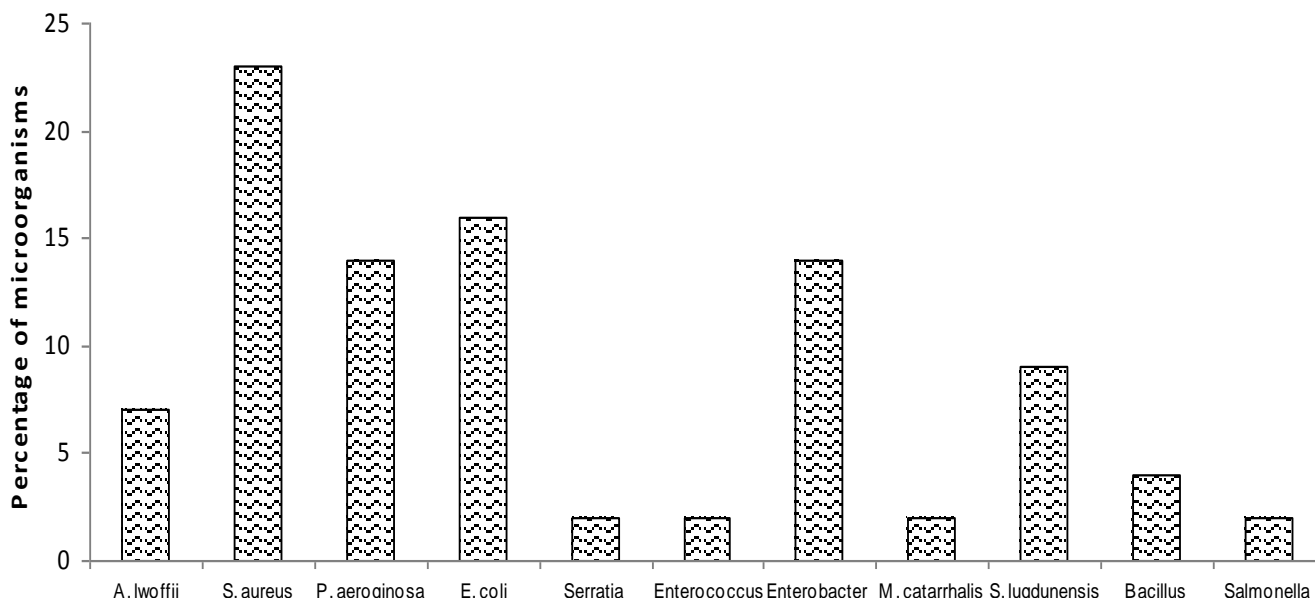
Microorganisms	No. of cases	Percentage	P value
<i>Acinetobacter Lwoffii</i>	3	7.14	0.002
<i>Staphylococcus Aureus</i>	10	23.80	
<i>Pseudomonas Aeroginosa</i>	6	14.28	
<i>Escherichia Coli</i>	7	16.66	
<i>Serratia Specie</i>	1	2.38	
<i>Enterococcus Speice</i>	1	2.38	
<i>Enterobacter Specie</i>	6	14.28	
<i>Moraxella Catarrhalis</i>	1	2.38	
<i>Staphylococcus Lugdunensis</i>	4	9.52	
<i>Bacillus Specie</i>	2	4.76	
<i>Salmonella Specie</i>	1	2.38	

Table IV: illustrate the relationship between length of surgery and infections after surgery.

Duration of surgery OF SURGERY	No. of cases	Percentage (%)	P value
Less than 2hrs	12	28.57	0.258
More than 2hrs	30	71.42	

Table V: demonstrate the clinical outcomes of patients after surgery.

Parameters	No. of patients	Percentage (%)
Fever	23	54.76
Puss leaking	19	45.23

Figure 1: The percentage of surgical site infection in male and female.**Figure 2: Percentage of antibiotics used prophylactically****Figure 3: Percentage of microorganisms isolated from the patients**

CONCLUSION

Present surveillance study concluded that all the consultants and surgeons should pay attention to postoperative patient care strategies. They should focus on

declining the possibilities of contamination during surgery. This highlights the requirement for an approach related to the methods which are necessary for preoperative and postoperative patient care.

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