ORIGINAL ARTICLE

FREQUENCY OF POST-OPERATIVE SURGICAL WOUND INFECTION IN PATIENTS AT AYUB TEACHING HOSPITAL, ABBOTTABAD, PAKISTAN

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ABSTRACT

BACKGROUND: Surgical wound infection is the most common nosocomial infection. The surgical wound infection frequency and rate depends upon certain risk factors such as associated medical condition (diabetes, hypertension, antibiotics use, surgical procedures, and post-operative hospital stay). The aim of this study was to determine the frequency of surgical wound infections at a tertiary care hospital.

METHODS: This was a 6 months cross sectional study conducted in surgical unit of Ayub teaching hospital, Abbottabad. During the study period data was collected on a predesigned questionnaire for all the patients who underwent surgery in the surgical ward of Ayub teaching hospital. 200 patients were selected by non-probability convenient sampling technique. Infected cases were identified using CDC, USA definition for surgical site infections. SPSS version 16 was used to analyze collected data.

RESULTS: 62 (31.0%) out of 200 patients had developed surgical wound infection while the remaining 138 (69.0%) patients had no sign of surgical wound infection. The frequency of surgical wound infection was found high in elective procedures 36 (18.0%) as compared to emergency surgical procedures 26 (13.0%). Frequency of surgical wound infection in males was 41 (20.5%) while females had 21 (10.5%).

CONCLUSION: Surgical wound infections prolong the hospital stay, increases the treatment cost, bed occupancy in ward and patient morbidity. Age, Diagnosis/reason for operation, electivity of procedure and associated medical conditions were identified as the main contributing factors towards the development of surgical wound infections

KEY WORDS: Surgical wound infection, Fever, Wound discharge.

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INTRODUCTION

Post-operative wound infection or surgical wound infection is defined as an area of inflammation over the wound with serous or purulent discharge with or without widespread cellulitis, pain and fever. After urinary tract infection, surgical wound infection is the 2nd common nosocomial infection, accounting for 17%-39% of all the hospital acquired infections.[1] Surgical site infection varies from as low as 2.8% to as high as 49.5%, this high rate is may be due to some researcher include all the wound types. Despite modern techniques, sterilize instruments, improved operating room and great efforts of infection prevention strategies, still surgical site infection (SSI) remains as nosocomial infection and rising globally even in hospitals of standard protocol and modern facilities of preoperative preparation and antibiotic prophylaxis.[2]

Post-operative surgical wound infections occur within 30 days after the operative procedure (except in some cases of implants). Occurrence of SSIs also indicates the failure of pre and inter-operative antibiotic prophylaxis and also poor post-operative wound care. The Center for Disease Control (CDC) USA classified the surgical wound infections into 3 groups i-e superficial incisional surgical site infections, deep incisional surgical site infections, organ/space surgical site infection apparently related to the operative procedure and infection involves any part of the body, excluding skin incision, fascia, muscle layer that is operated or manipulated during operative procedure. Skin causes the superficial site infections which are easily contaminated by hospital flora containing nosocomial species of bacteria while deep SSIs are caused by contamination from endogenous visceral flora or skin contaminants gaining entry and in fascia and muscles through incision operative sites.[3]

A nosocomial infection is one which is acquired from hospital or health care center by the patient who is admitted for some other reason. The site of infection may be limited to suture or may be it spreads in the body depending upon the microbes and conditions. Surgical site infec-

tions may be primary if originate during surgery or secondary if occurs in the ward or result of some other complication.[4]

In actual practice we found that prophylactic antimicrobial agents are often not administered at the optimal time to ensure their presence in effective concentrations throughout the operative period. [5] It has been establish that prophylactic antibiotic administration reduce the post-operative wound infection rate. Infection will be superficial if there is erythema and induration of the wound with or without mild fever and slight wound discharge which resolved with local wound care, with or without antibiotic therapy for about 7-10 days. Deep infection is defined as to be present if there is serous or purulent drainage necessitating prolonged use of antibiotic (more than two weeks) and/or needed reoperation for drainage.[6]

Post-operative wound infection has been a problem since surgery was started as a treatment modality.[7]

Any purulent discharge from a closed surgical incision along with the signs of inflammation of the surrounding tissue should be considered as a wound infection, irrespective of whether micro-organism can be cultured.[8] In addition to patient discomfort and morbidity associated with established wound sepsis, there are consequences of such infections that are more easily identified and quantitated, namely time and money. Estimates of prolongation of hospital stay for individual patients due to surgical wound infections range from 6 to 14 days.[9]

The rate of post-operative wound infection varies from hospital to hospital. Ward infections are mostly superficial and frequently follow the dressing of wound in the ward. Similarly, skin infections such as boils or abscesses which develop at other sites then operative site indicate that the infection is acquired in the ward. The virulence and invasive capability of the organisms have been reported to influence the risk of infection, but the physiological state of the tissue in the wound and immunological integrity of the host seem to be of equal importance in determining whether infection occurs.[10]

Infection surveillance and control strategies often are inconsistent in developing countries. Recent reports have suggested that age is not an independent risk factor for SSI. It has been suggested that prospective incision surveillance with feedback to individual surgeons reduces SSI rates. It is important to have antibiotic protocols and institute clear SSI surveillance and infection control guidelines. Patient experience considerable pain, discomfort, inconvenience, cost and occasionally death.[11]

Success in surgery depends on prevention and proper management of the wound. Surgical wound infections are associated with great morbidity and mortality. Absolute prevention of surgical wound infection seems to be an impossible goal.[12] These infections are usually caused by exogenous and/or endogenous microorganisms that enter the operative wound either during the surgery (primary infection) or after the surgery (secondary infection). Primary infections are usually more serious, appearing within five to seven days of surgery. Majority of SSIs are uncomplicated involving only skin and subcutaneous tissue but sometimes can progress to necrotizing infections. The usual presentation of infected surgical wound can be characterized by pain, tenderness, warmth, erythema, swelling and pus formation.[13]

A surgical-site infection is defined by any of the following conditions which occurs within 30 days after the operation: the wound drain purulent material; the wound drain serosanguineous material, the edges of the wound and surrounding tissues are erythematous, and the wound culture yield a pathogen; or a physician states in the medical record that the surgical site is infected. Patients who are carriers are at high risk for staphylococcus infections after invasive surgical procedures than those who do not carry this organism.[14]

The factors which effect the surgical wound infections are site, the duration of pre-operative hospital stay, complexity of surgery, wound contamination, the patient underlying illness, the use and non-use of prophylactic antibiotics, the patient temperature during surgery, the presence of hypovolemia, the degree to which pain is control post-operatively and the oxygen tension in tissue.[15]

Hypothermia may increase patient's susceptibility to perioperative wound infections by causing vasoconstriction and impaired immunity.[16] Bacteriological studies have shown that surgical site infection are universal and the bacteria involve vary with the geographical location, bacteria resident on the skin, clothing at the site of wound, time between wound and examination.[17]

The rate of postoperative wound infection without prophylactic antibiotic is high as compared to the use of prophylactic antibiotic. In orthopedics, the surgical site infection after implant surgery is a disaster both for the patient and surgeon. This may lead to increased antibiotic use, prolonged hospital stay, repeated debridement; prolong rehabilitation, morbidity and mortality.[18]

Diabetes mellitus has been established as an independent risk factor for post-operative surgical wound infection with infection rates two to five times more prevalent than in the non-diabetic population. Diabetic patients are more prone to surgical wound infection.[19] Obesity is known to be a well-established risk factor for postoperative wound infection. Increased rate of surgical site infection (25%) is also noted amongst smokers.[7]

Data from the International Nosocomial Infection Control Consortium, and findings of two systematic reviews on hospital-acquired neonatal infections and ventilator-associated pneumonia, suggested not only that risks of health-care-associated infection are significantly higher in developing countries but also that the effect on patients and health-care systems is severe and greatly underestimated.[20]

The presence of suture material in a surgical wound is known to cause an adverse effect on the local tissue condition, and increases the susceptibility to infection. The variations in the sutures capillarity and fluid absorption properties determine bacterial transport along the suture filaments and correlate with the in vivo study of experimental wound infection.[21]

One of the biggest threats to a successful outcome following joint arthroplasty surgery is infection of the prosthesis or deep wound infection (DWI). Some intra-operative factors such as excessive intra-operative blood loss, duration of procedure were also reported as possible risk

factors for DWI. Among the postoperative factors, hematoma, days of post-operative drainage, other sites of infection, postoperative transfusion, and anticoagulant use were also reported as possible predictors of DWI.[22]

The incidence of infection varies from surgeon to surgeon, from hospital to hospital, from one surgical procedure to another, and—most importantly—from one patient to another. The pathogens isolated from infections differ, primarily depending on the type of surgical procedure. More of the pathogens show antimicrobial-drug resistance, especially methicillin-resistant S. aureus.[23]

The most critical factors in the prevention of postoperative infections, although difficult to quantify, are the sound judgment and proper technique of the surgeon and surgical team, as well as the general health and disease state of the patient. Improvements in the timing of initial administration, the appropriate choice of antibiotic agents, and shorter durations of administration have more clearly defined the value of this technique in reducing postoperative surgical site infections.[24]

The objective of this study was to determine the frequency of surgical wound infections at a tertiary care hospital.

MATERIAL & METHODS

This was cross-sectional study performed in Surgical unit of Ayub teaching hospital, Abbottabad. The duration of study was 6 months from 15 December 2015 to 15 May 2016. Total 200 patients who underwent different surgical procedures from all the 3 surgical units were included in the study.Sampling technique was Non-probability convenient sampling. Data was collected from all post-operatives cases, including both male and females of all ages. Non-cooperative patients were excluded. Data was collected using a proper questionnaire which included bio-data, socio-economic status, associated medical conditions, name of surgical procedure, duration of hospital stay, wound discharge and change of dressing. Data after collection was entered and analyzed using statistical software SPSS version 16.0. Mean and Standard deviation were calculated for continuous quantitative variables such as age and monthly income. Frequency and percentages are calculated for categorical variables.

RESULTS

Out of 200 patients only 62 (31%) had surgical wound infection while the remaining 138 (69%) patients did not have infection after surgeries. Most of the patients 46 (23.0%) in our study were found in the younger age group i-e 21-30 years of age. The mean age of patients in our study along with standard deviation was 37.29±18.603 years. The high frequency 21 (10.5%) of surgical wound infection was found in age group from 21-30 years and the second group 15 (7.5%) is 41-50 years. Number of males was higher than females similarly males had high frequency of surgical wound infection i.e 41 (20.5%) while females had 21 (10.5%).

TABLE 1: DEMOGRAPHIC AND CLINICAL CHARACTERISTICS OF PATIENTS WITH SURGICAL WOUND INFECTION

Demographic & Clinical characteristics	Frequency of infection(n=200)
Total patients	200
No. of surgical wound infection	62 (31.0%)
Gender	
Males	41 (20.5%)
Females	21 (10.5%)
Type of surgery	
Elective	36 (18.0%)
Emergency	26 (13.0%)
Associated medical condition	
None	48 (24.0%)
Diabetes	4 (2.0%)
Hypertension	10 (5.0%)
Kind of wound infection	
Superficial 49	(24.5%)
Deep	13 (6.5%)
Diagnosis/reason for operation	
Gastrointestinal problems	28 (14.0%)
Abdominal problems	7 (3.5%)
Hepatobilary problems	7 (3.5%)
Other	20 (10.0%)
Surgical procedures	
Excision	32(16.0%)
Laprotomy	15 (7.5%)
Minimally invasive procedures	7 (3.5%)
Others	8 (4.0%)
Socio-economic status	
Upper class	6 (3.0%)
Middle class	14 (7.0%)
Lower class	42 (21.0%)

DISCUSSION

Despite the advances in surgical techniques and better understanding of the pathogenesis of wound infection, management of Surgical wound infection remains a significant concern for surgeons and physicians in a health care facility. Patients with surgical wound infection face additional exposure to microbial populations circulating in a hospital set up which is always charged with microbial pathogens.[13]

According to our study 62 out of 200 patients developed surgical wound infection while the remaining 138 patients had no sign of surgical wound infection. The frequency of surgical wound infection found in the conducted study was 31% which is much higher than other studies reported 7.32%[25] and 16.16%[3] but is lower than 38.7%[26] and 49.50% reported by Agarwal PK et al[2]. Post-operative wound complication is a misfortune for surgical patients, leading to considerable patient morbidity, compromising the patient's recovery, increasing the cost of treatment and prolonging the patient's hospital stay by about 7-10 days.[1]

The lower rate of surgical site infection was reported by some authors, may be due to differences in working conditions and hospital setup. The pre-existing illness increases the risk of surgical site infection due to increase in pre-operative hospital stay which favors the bacterial colonization and increase the infection rate. [2]

In the present study high incidence of surgical wound infection found in the middle age group 21-30 years was 10.5% and 7.5% in age group 41-50 years which is lower than found in another study 21-30 years of age group 12.6% and 27.3% in the age group of >51 years.[4]

In our study the infection rate was high in males 20.5% then females 10.5% as compared to another study where the infection rate was higher in females 11.6% than males 9.4%.[4] The predominance of male patients was also seen in another study with male: female ratio of 2.9:1.[13]

In this study 62 (31.0%) out 200 who had surgical wound infection 49 (24.5%) of them had superficial surgical wound infection while 13 (6.5%) patients had deep surgical wound infection. While in another study the percentage was quiet different 48 patients were infected in which 25 were superficial and 23 were deep infections, giving an infection rate of 3.56% and 3.27% respectively.[6]

In our study there were 25 patients with diabetes in which only 4 (16%) patients shows surgical wound infection, while 26 patients were with hypertension in which only 10 (38.5%) patients develop surgical wound infection. The rate of surgical wound infection in diabetic patients was 27.2% in another study.[12] Another study showed that 9 patients had proven diabetes mellitus in the series in which 3 (33.33%) patients had developed surgical site infection. The increased susceptibility to infection in diabetics is an established risk factor.[7]

Simple wound abscess was found more frequently in our study. In 40 (20.0%) patients who had surgical infection released pus from wounds which similar in presentation to another study conducted at Nawabshah.[12]

Post-discharge surveillance for wound infection is important and should be done. Santos et al in a 6-month prospective surveillance reported that the majority (52.7%) of surgical site infections were apparent only after patients had been discharged from hospital.[8] But in our study most of the infections appeared during the hospital stayed 48 (24.0%) while only 14 (7.0%) patients developed surgical wound infection after discharged from hospital at home.

Besides many factors that could contribute to higher surgical wound infection rates in Public sector hospitals like inappropriate infection control system, poor practices and indiscriminate use of antibiotics in the absence of proper guidelines, another important factor is the patient characteristics as most of the patients visiting public sector hospitals are from lower socioeconomic group with compromised nutrition and is described as one of the important factors making patients prone to infection.[25] As in the present study it was found that most of the patients were from poor class 145 (72.50%) and had high surgical wound infection frequency 42 (21.0%). One other reason for increased rates of surgical wound infection might be overcrowding of patients which is a common factor in all public sector hospitals of Pakistan where often extra beds are set up to meet the patient load.[25]

The frequency of surgical wound infection is found high in elective procedures 36 (18.0%) as compared to emergency surgical procedures 26 (13.0%).

In the present study most of the patients were diagnosed with gastrointestinal problems. The frequency of surgical wound infection was highest in gastrointestinal problems 28 (14.0%) while others problems had 20 (10.0%) similarly abdominal and hepatobilary had the same percentage of surgical wound infection 3.5%.

CONCLUSION

The frequency of surgical wound infection in surgical ward of Ayub teaching hospital Abbottabad is higher as compared to some other studies. It may be due poor hygiene, younger age group, gender, improper nutrition and post-operative care. The pre-existing illness and associated medical conditions such as diabetes and hypertension has also a very important role in the high frequency of a surgical wound infection. Hospital stay has implicated a crucial role in the delaying of surgical wound healing because hospital contain a lots of nosocomial pathogens. The socio-economic status have a big role in the surgical wound infection, as we have seen that most of the patients in our study was from poor class and they have a high frequency of surgical wound infection, it is because of they are unable take proper care of the patient due to costly treatment. Finally the overcrowding in the public hospitals (especially tertiary care hospitals) also have a role in the surgical wound infection as the patients cannot be given proper attention and guidelines.

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CONFLICT OF INTEREST

None declared.

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Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.