Incidence of Postoperative Wound Infection in Orthopaedic Surgery - An in Vivo Study

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Research Article

Abstract: **Objectives:** Therefore, the present study was planned with an objective to analyze the incidence of postoperative wound infections. An additional objective was to evaluate the efficacy of different measures taken by surgeons prior to Surgery to prevent infection. **Methods:** Hundred individuals between 18-50 years of age were evaluated based on the surgery's they underwent at Father Muller Medical College, Mangalore between 2010 – 2012. The data received was recorded in individual patient proform as obtained on admission and on outpatient basis. **Results:** The overall incidence in this study was 4%. Maximum incidence was observed in 41-50 age group (96%), followed by in the age group of 21-30 yrs (94%).Out of 56 patients with spinal anaesthesia, the incidence of infection was noted in 4 cases. The mean preoperative stay in infected cases was 4.50 days, when compared to 3.06 days in non infected cases whereas mean post operative stay in infected cases was 7.75 days, when compared to 10.16 days. **Conclusions:** Prophylactic regimens should be recommended for a wide variety of surgical procedures. Marked variations exist in the spectrum of infecting pathogens and in the degree of antimicrobial resistance.

Keywords: Wound Infection, Orthopaedic Surgery

Introduction

Essential enhancements for preventing and controlling wound "sepsis" were provided by the antibiotic revolution of the 1940s, ushering in the highly technical, highly invasive, and highly successful era of modern surgery. The importance of the timing of antibiotic administration in prophylaxis of surgical wound infection was focused in 1960s. Hand hygiene during healthcare delivery can be performed either by hand washing or by handrubbing. The American Academy of Orthopaedic Surgeons (AAOS) recommends the following, the antibiotic used for prophylaxis should be carefully selected, consistent with current recommendations in the literature, taking into account the issues of resistance and patient allergies; Timing and dosage of antibiotic administration should optimize the efficacy of the therapy and Duration of prophylactic antibiotic administration should not exceed the 24-hour post-operative period. Therefore, the present study was planned with an objective to analyze the incidence of postoperative wound infections. An additional objective was to evaluate the efficacy of different measures taken by surgeons prior to Surgery to prevent infection by evaluating the effectiveness of usage of preoperative and postoperative systemic antibiotics, the role of sterile measures such as scrub suits, masks, sterile gloves, gowns, drapes and operation theatre environments, in reducing the surgical site infection and in assessing the efficacy of surgical asepsis in Orthopaedic surgeries.

Materials and Methods

This prospective study was conducted in the Department of Orthopaedics, Fr. Muller Medical College, Mangalore from April 2010 to July 2012. A total of 100 patients underwent elective Orthopaedic surgeries were included in the study. Effectiveness of usage of preoperative and postoperative systemic antibiotics, the role of sterile measures such as scrub suits, masks, sterile gloves, gowns, drapes and operation theatre environments, in reducing the surgical site infection and in assessing the efficacy of surgical asepsis (that is surgeons hand scrub, antibiotics used prior to surgery, shaving prior to surgery and use of antibiotics prior to surgery) in Orthopaedic surgeries were assessed. The inclusion criteria were patients aged 18 years and above and patients that were taken up for elective surgeries (major or minor procedures). The exclusion criteria were patients who were immune compromised, patients on long term corticosteroids, immunosuppressive treatment and patients with open fractures needing external fixation devices. Individuals between 18-50 years of age, that underwent surgeries at Father Muller Medical College, Mangalore between 2010 – 2012 and the data received was recorded in individual patient proform as obtained on admission and on outpatient basis. Patients were informed about the study in their vernacular language. Third generation Cephalosporin, i.e; Ceftriaxone and a combination of Ceftriaxone and Sulbactam were used for all the patients. All patients received Injection Ceftriaxone 1.5 gm the day of the surgery. All routine aseptic precautions were taken like using autoclaved gowns, drapes, sterile gloves and instruments. Standard surgical scrub is done for 5 minutes before performing the operation. Injection Ceftriaxone was continued in the

postoperative period. The wound was inspected for any evidence of infection starting from the 3rd day and then 12th post operative day. Patients were followed up till discharge. For the patient who satisfied any of the criteria for wound infection, wound swab was sent to the clinical microbiology laboratory for routine culture methods. The incidence rate was calculated for each wound separately. Collected data was analyzed by 't'-test and Chi-Square test. About 100 adult patients who were taken up for elective procedures, at Father Muller Medical College Hospital were evaluated and assessed preoperatively, intraoperatively and postoperatively for a period ranging 6-24months.

Figure 1: Flow chart for collection of data

Results

Total of 100 patients were enrolled for this study, out of which 4 patients were found to have infection at the operative site on postoperative day 3. The overall incidence in this study was 4 %. On analysis of incidence in relation to age for infection in this study, it was found that maximum incidence was in 41-50 age group (96%), the next largest group being 21-30 yrs(94%) and 61-80 yrs (88.2%) had least incidence. This study showed female preponderance for infection which was found to be statistically not significant with p value 0.239. In this study, out of 56 patients with spinal anesthesia, the incidence of infection was noted in 4 cases which is statistically not significant. The mean preoperative stay in infected cases was 4.50 days, when compared to 3.06 days in non infected cases which is statistically not significant.

The mean post operative stay in infected cases was 7.75 days, when compared to 10.16 days in non infected cases which is statistically not significant. Correlation between duration of surgery and incidence of infection in major surgeries was found to be statistically significant with p value 0.0208.

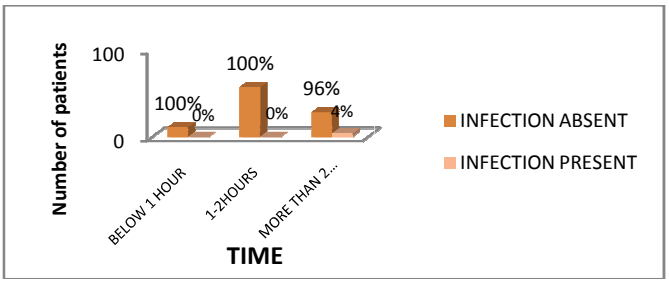

Figure 2: Incidence in relation to duration of surgery

Table 1: Incidence in relation to time of antibiotic administration and start of surgery

	x2 value and p value			Fishers exact test	
Age * Infection				0.622	NS
Sex * Infection		0.239	NS		
Surgery(major/mi				0.142	NS
Sprirt used * Infection	0.495	0.482	NS		
No. of individuals in theatre * Infection	0.150	0.698	NS		
Type * Infection				0.279	NS
Antibiotic * Infection	0.001	0.975	NS		
Duration between antibiotic adm and	0.219	0.0640	S		

Discussion

Of the 100 patients in this study, the overall incidence of surgical site infection in the study is 4%, which compares favorably with studies of Marston et al[6] who reported 5% superficial and 0.25% deep infection in 413 replacements in ideal circumstances. The rate of postoperative wound infection without prophylactic antibiotic is high as compared to the use of prophylactic antibiotic[7]. Recent international studies show further decline in the postoperative infection rate with prophylactic antibiotics which is 0.23%, 1.06%, 1.09% and 1.34%[8]. In my study the advanced age (41-50 age group (96%), prolonged surgery time were responsible for infections as reported in other studies[7]. In terms of the incidence of infection in relation to sex, there was marginal though statistically not significant higher incidence in females but no obvious or specific reason could be found to explain this. There was no correlation in terms of scrub time, chorhexidine used, spirit used and use of scrub brush. There was no significant correlation observed between the incidence of infection and type of anesthesia used and thus not considered to be a major factor. There was no significant relationship noted between the incidence of infection and the length of hospital stay. There was significant correlation noted between antibiotic administration and timing of surgery similar to guidelines stipulated by Woods RK, Dellinger EP et al.[9]. Correlation between

duration of surgery and antibiotic administration was found to be statistically significant with p value of 0.0208 which coincides with another study that stated that rate of infection was directly proportional to the length of the procedure where cases lasting one hour or less had a wound infection rate of 1.3% while that lasting for 3 hours or more it was 4%. This is comparable to my study, i.e; 4 cases (4%) got infected when procedures lasted more than 2 hours.[10] Literature shows that the timing of administration is critically important because the concentration of the antibiotic should be at therapeutic levels at the time of incision during surgical procedure, and ideally, for few hours post operatively (CDC1996). Study of the bacteriological profile shows most of the cases had single organism infection, the commonest organism isolated being Acinetobacter followed by Escherichia coli and Staphylococcus which is similar to organism profiles described in other studies.

The earliest occurrence of infection was on the third postoperative day.

Correlation between duration of surgery and time of antibiotic administration in relation to incidence of infection was found to be statistically significant, 4% infection present when there was a delay of more than 60 minutes. Literature shows that the risk of infection increases if there is a delay between starting of surgery and antibiotic administration[11].

Most of the wound infections fell in Class II of the classification of surgical site infections which was statistically not significant.Based on my prospective study of antibiotic prophylaxis, prophylactic regimens should be recommended for a wide variety of surgical procedures. There is marked variations in the spectrum of infecting pathogens and in the degree of antimicrobial resistance which exist among various hospitals. Moreover, variations in infecting pathogens and resistance patterns can and do occur over time within a given institution. Physicians and individual health care institutions must tailor routine prophylactic regimens based on carefully collected epidemiologic data regarding surgical wound infection. Equally important, many surgical procedures are far from routine, and numerous variations in perioperative circumstances will dictate deviations from established prophylactic regimens. Early re-explorations for postoperative bleeding, a history of penicillin or cephalosporin allergy, trauma and other emergency surgery and existing preoperative infections of non wound sites are important variables that may influence the choice and duration of perioperative prophylaxis. Studies are not available that can provide guidelines for such situations. A continuous assessment of failures of prophylaxis and a willingness to alter antiseptic and perioperative data are essential aspects of surgical wound prevention and antimicrobial prophylaxis.

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