Original Research Article

Study of incidence of postoperative wound infection in orthopaedic surgery

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Abstract

Background: To study the incidence of postoperative wound infections and the toll it takes on Orthopaedic surgeries. **Materials and Methods:** This prospective study was conducted in GSL Medical College, Lakshmipuram, Rajamahendravaram over a period of 1 year, between July 2018 – June 2019. Signs of infection such as redness, pus discharge, fever, loosening of implant, raised ESR levels or raised CRP levels on the third day, twelveth day, at the end of three months and six months were studied. Inclusion criteria- Patients aged 18 years and above undergoing elective orthopaedic surgery. **Exclusion criteria-** Immunocompromised patient, Patients on long term cortico-steroids and immunosuppressive treatment, Patients with open fractures, Diabetic patients **Results and conclusion:** Of the 100 patients in this study, the overall incidence in the study is 4%, which compares favorably with studies of Marston et al. who reported 5% superficial and 0.25% deep infection in 413 replacements in ideal circumstances. This study did not show any statistically significant correlation between age, scrub time, spirit used with respect to incidence of infection The incidence of infection by gram–ve bacteria was higher than that of gram +ve bacteria. Antimicrobial use is widespread and inconsistent with published guidelines. Pathogens isolated are often resistant to commonly used antimicrobials The actual incidence of infection could be significantly higher than that showed by the study as the patients were only followed up at 3 months, after being discharged from hospital and not in between.

Key Words: post operative wound infection, incidence, orthopaedic surgery.

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INTRODUCTION

In 1862, Louis Pasteur's ingenious experiments into the nature of putrefaction were officially endorsed by the Paris Academy of Science. The endorsement signaled an end to the long-held belief that the exposure of organic material to air brought about the "spontaneous generation" of microorganisms, and the concepts of "sepsis" and "asepsis" became firmly established. A scant three years later, in what must be regarded as a paradigm of applied science, Joseph Lister demonstrated the incredible implications of antisepsis in his practice of Orthopaedic surgery. For the first time in recorded history, major surgical procedures could be performed with a reasonable expectation of primary wound healing and recovery. 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. As noted by McDermott and Rogers1 the greatest impact of the antibiotic revolution may be related, in the long run, to its essential role in supporting the advancements of modern surgery. Indeed, surgery as we know it today would be impossible in an environment in which infection was likely or, once established, untreatable. Robert Koch (Professor of Hygiene and Microbiology, Berlin, 1843-1910) first recognized the cause of infective foci as secondary to

microbial growth in his nineteenth century postulates. Joseph Lister (Professor of Surgery, London, 1827-1912) and Louis Pasteur (French bacteriologist, 1822-1895) revolutionized the entire concept of wound infection. Lister recognized that antisepsis could prevent infection (Lister, 1867). He placed carbolic acid into open fractures to sterilize the wound and prevent sepsis and hence the need for amputation. In 1871, Lister began to use carbolic spray in the operating room to reduce contamination

AIMS OF THE STUDY

To study the incidence of postoperative wound infections and the toll it takes on Orthopaedic surgeries 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.
- To assess the efficacy of surgical asepsis (surgeons hand scrub, alcohol based agents, antibiotics and shaving) in Orthopaedic surgeries.

RISK ASSESSMENT

Exposure to blood, body fluid, and pathogens is common in the operating room. The risk of transmitting a pathogen to an otherwise healthy patient exists as does the possibility of adding to the morbidity and mortality of already ill patients. The

CDC's National Nosocomial Infections Surveillance (NNIS) system developed and uses an SSI risk index ranging from zero to three points. The patient's risk index points are assigned based on the surgical wound classifications, ASA classification system, and length of the surgical procedure.

MATERIALS AND METHODS

This is a prospective study which was conducted in the Department of Orthopaedics, GSL Medical College, Rajahmundry from July 2018 to June 2019. A total of 100 patients who underwent surgeries were included in the study.

Inclusion criteria

The inclusion criteria were patients aged 18 years and above and patients that were taken up for elective surgeries (major or minor procedures).

Exclusion criteria

The exclusion criteria were patients who were immunocompromised patients on long term corticosteroids, immunosuppressive treatment and patients with open fractures needing external fixation devices.

Antibiotic selection – 3rd generation cephalosporin a combination of ceftriaxone and sulbactam is used in all patients

Pre operative preparation All patients received Injection Ceftriaxone and sulbactam1.5 gm the day of the surgery. Aseptic precautions in the operation theatre. All routine aseptic precautions were taken like using autoclaved gowns, drapes, sterile gloves and instruments. Standard surgical scrub was done for 5 minutes before performing the operation.

Figure 1

Operative

the incision site was painted with 5% povidone iodine and spirit. The principles of surgery were followed in all cases such as minimum tissue handling and maintenance of adequate haemostasis. Drains were used whenever necessary. Skin closure was done with suture material or skin staples. Betadine ointment or Neosporin ointment was used to cover the sutures /staples followed by adhesive dressing.

Postoperative

Signs of infection such as redness, pus discharge, fever, loosening of implant, raised ESR levels or raised CRP levels on the third day, twelveth day, at the end of three months and six months were studied. 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.

RESULTS

Out of 100 patients 4 had infection on 3rd postoperative day. Actual incidence Is 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 out of 35 females 3 got infected , out of 65 males 1 got infected. Correlation between duration of surgery and incidence of infection in major surgeries was found to be statistically significant with p value 0.0208.

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..2who 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 antibiotic3 . 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% 4 . In my study the advanced age (41-50 age group (96%), prolonged surgery time were responsible for infections as reported in other studies3. 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..5 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 2 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 .6 Literature shows that 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.6 Most of the wound infections fell in Class II of the classification of surgical site infections which was statistically not significant.

SUMMARY

- This study shows that the incidence of infection is not very high in our hospital.
- This study did not show any statistically significant correlation between age, scrub time, spirit used with respect to incidence of infection.
- The incidence of infection by gram –ve bacteria was higher than that of gram +ve bacteria.
- Antimicrobial use is widespread and inconsistent with published guidelines.
- Pathogens isolated are often resistant to commonly used antimicrobials.
- The actual incidence of infection could be significantly higher than that showed

by the study as the patients were only followed up at 3 months and then at 6 months, after being discharged from hospital and not in between.

CONCLUSION

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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