



Prevalence of Infection in Closed Fracture Treated With Various Internal Fixation Devices in Early Postoperative Period

KEYWORDS

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ABSTRACT **INTRODUCTION** : Postoperative infection could be devastating as they consume enormous amount of limited resources and manpower. They are also associated with functional disability, poorer quality of life and may be potentially fatal. The rate of infection is influenced by numerous factors and varies according to the procedure performed. In the current literature, there is much controversy over the use of prophylactic antibiotics because of the associated risks of antibiotic administration and questions regarding their effectiveness.

AIM & OBJECTIVES : To find out our infection rate after clean and clean-contaminated surgery and common organisms involved in different wound infections

INTRODUCTION

Although surgical techniques and immune response to the variety of materials are not part of this study, issues related to implant's biocompatibility with respect to osteointegration, cytokines, and modified surfaces are the focal points. Osteointegration is defined as "direct structural and functional connection between ordered, living bone, and the surface of a load-carrying implant," whereas the term biocompatibility is defined as "the state of mutual coexistence between a biomaterial and the physiological environment such that neither has an undesirable effect on the other".

Acute phase complications are those which arise within the first 2 weeks after surgery and include wound dehiscence, infection and post-operative bleeding. The bleeding may be reactive or secondary to wound infection. Life-threatening chronic phase complications occur more than 2 weeks after surgery and include relapse of the segments which may correlate with the magnitude of movement. Loose fixation can result in implant exposure, unfavorable function and wound infection

AIM & OBJECTIVES

1. To find out our infection rate after clean and clean-contaminated surgery
2. To find out common organisms involved in different wound infections
3. To find out the risk factors for postoperative wound infections.

REVIEW OF LITERATURE

In general, the incidence of infection following orthopedic surgery is low and infections encountered in the early post-operative period can be managed with local wound care and antibiotics (Epker & Gallagher 1980, Abbott 1997).

Peterson (1990) has classified patients with host defense problems into 3 (Three) categories. The first category includes patients with poorly controlled metabolic diseases such as diabetes mellitus, end-stage renal disease, alcoholic cirrhosis and malnutrition syndromes.

The length and extent of the surgery is another vital factor. Some authors have asserted that there is an increased

postoperative infection rate when the operating time exceeds 4 hours.

Peterson (1990) and Flynn & Lawrence (1979) have categorized surgical procedures according to the expected degree of contamination. A class I wound is described as a clean wound, which is non-traumatic, with no inflammation, asepsis and no transaction of the respiratory, gastro-intestinal or genitourinary tract. The expected infection rate is 2%. A class II wound is a clean, contaminated wound, which is also non traumatic, but with a minor break in aseptic technique, or in which the respiratory, gastrointestinal or genitourinary tract is entered but without spillage of bacteria into the wound.

It is a serious matter to note that currently there is an emergence of MRSA (methicillin resistant Staphylococcus aureus) and recently even VRSA (vancomycin resistant Staphylococcus aureus) and VRE (vancomycin resistant enterococci) due to antibiotic misuse and this has lead to a number of deaths.

The cephalosporins are a group of bactericidal drugs which act by interfering with bacterial cell wall synthesis. Cephalosporin is the antibiotic of choice and is highly effective against sensitive microorganisms such as gram-positive cocci, gram-positive rods and spirochetes. It is the drug of choice for streptococcal, pneumococcal, gonococcal and meningococcal infection. It is not acid stable; hence it is used by the intra-venous route. Cephalosporins can be inactivated by penicillinase producing organisms, mainly staphylococcus.

Cephalosporin's are broad spectrum antibiotics with similar activity as penicillins, but are also effective against Staphylococci, E.coli, Klebsiella and enterobactor. They are the one of the drugs of choice.

The ability of antibiotics to penetrate into the various tissues. the tissue-specific half-life or even the ability to accumulate in tissues will give the information on whether a chosen antibiotic reaches sufficient levels or not and will decide if and after what time interval a repeat dose is required.

Studies by various authors (Peterson et al 1976, Rugles & Hann 1984, Marlis& Karabouta 1984, and Fridrich et al 1994) regarding the use of antibiotics in orthopedic surgery have produced conflicting conclusions. Yratorza (1976) reviewed 148 patients and reported an infection rate of 4% with prophylactic antibiotics.

Fridrich et al (1990) divided his study sample into 2 groups. The first group had 1week of antibiotics, while the second group had antibiotics pre operatively, intraoperatively, and postoperatively in the recovery room. The result was that there was no significant difference in infection rates between the 2 groups. In another study by the same author, the incidence of infection varied from 3 to 7% for orthopedic surgery with antibiotic prophylaxis and 52.6% for other group not receiving antibiotics.

A recent study was conducted by Zijderveld et al (1999) preoperative prophylaxis in orthopedic surgery. It was mentioned that the expected incidence of wound infection is in the range of 10-15%. The study discussed the controversy about use of antibiotics routinely. A randomized, double-blind and placebo-controlled clinical study was performed on 54 patients. 1 8 patients received Augmentin, 1 7 received Cefuroxime and 19 received placebo treatment. The drugs were given 30 minutes before surgery. The outcome parameters included.

METHODOLOGY

DESIGN AND DURATION : Observational descriptive study from October 2013 to October 2015.

PATIENTS : 200 patients who underwent clean and clean-contaminated surgery.

INCLUSION CRITERIA:

- Patients with age more than 14 years.
- Patients of either sex.

EXCLUSION CRITERIA:

- Patients operated in emergency.
- Patients undergoing re-operation.
- Patients failing to come for follow-up of upto 30days since the day of operation.
- Patients with Diabetes Mellitus, Immunocompromised patients and patients on Immunosuppressive medications.

OBSERVATION & DATA ANALYSIS

Presence of early Post – Operative infection	Duration of Surgery in Minutes									Total (%)
	30	45	60	75	90	120	150	180	240	
Present	0 (0)	2 (8.7)	1 (0.9)	1 (50)	2 (3.9)	3 (25)	1 (100)	1 (100)	1 (100)	12 (6)
Absent	1 (100)	21 (91.3)	105 (98.1)	1 (50)	51 (96.1)	9 (75)	0 (0)	0 (100)	0 (0)	188 (94)
Total	1 (100)	23 (100)	107 (100)	2 (100)	52 (100)	12 (100)	1 (100)	1 (100)	1 (100)	200 (100)

Table-1
Comparison of presence of early post operative infection & Duration of Surgery in Minutes

Presence of early Post – Operative infection	Time interval between Injury and Operation			Total (%)
	Up to 2 days (%)	3 – 5 days (%)	> 5 days (%)	
Present	1 (2.3)	6 (5.2)	5 (12.5)	12 (6)
Absent	42 (97.7)	111 (94.8)	35 (87.5)	188 (94)
Total	43 (100)	117 (100)	40 (100)	200 (100)

Table-2
Comparison of presence of early post operative infection & Time interval between Injury and Operation

Table 3
Distribution of presence of early post operative infection & organism culture.

Presence of early Post – Operative infection	Organism cultured from discharged				Total (%)
	Staphylococcus Aureus (%)	E. Coli (%)	Klebseilla (%)	No Organism	
Present	7 (58.3)	2 (16.7)	2 (16.7)	1 (8.3)	12 (100)

DISCUSSION

A study was performed on total 200 patients who underwent orthopedic surgery by various internal fixation devices for closed fractures.

With regard to the microbiology, in our study the majority of infections (7{58.3%} out of 12) mainly caused by staphylococcus aureus with sensitivity to 3rd generation cephalosporins, Gentamicin, Vancomycin, linezolid, doxycycline whereas 2(16.7%) infections caused by E.coli, 2(16.7%) caused by klebsiella species and in 1(8.3), no organism was found so antibiotic prophylaxis should be directed to staphylococcus aureus due to its high prevalence in infections. In this study, there were a total of 12 patients who developed postoperative infection after orthopedic surgery resulting in an infection rate of 6%.

In our study there was a significant relation with occurrence of infection and duration of surgery as 8 out of 12 infections (8 out of 68 surgeries[66.6%]) occurs in a surgery in which duration of operative time is greater than 90 minutes. In remaining 4 cases there is no statistical significance regarding occurrence of infection(4 out of 132 surgeries[3.03%]).

In our department, preoperative shaving done before 6 hrs of surgery. In this study Preoperative local parts shaving is associated with increased risk of infection as 11 out of 168 patients in which preoperative shaving was done(6.5%) having postoperative infection and remaining 1 out of 32 patients(3.1%) in which no preoperative shaving. Patients' habits (tobacco chewing and smoking), nutritional status significantly affects risk of infection in this study as 10 out of 12(83.33%) postoperative infections occurs in patients having habits like tobacco chewing and smoking. As the same as above 9 out of 12(75%) patients having postoperative infections had fair and poor nutritional status.

CONCLUSION

factors that were significantly affects the prevalence of infection after orthopedic surgery.

Site of implant insertion (intramedullary vs extramedullary)
Pre-operative local parts shaving Nutritional status Pre &

post operative hospital stay. Duration of surgery. site of fracture in the body

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