Original Article

Frequency of Wound Infection in Clean Orthopaedic Surgery Using Single Dose Antibiotic Prophylaxis

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ABSTRACT

Introduction: Wound infection is the disastrous complication after clean orthopaedic surgery. Role of prophylactic single dose parenteral antibiotic is still controversial in prevention of this morbidity.

Objective: Frequency of wound infection in patients underwent open reduction and internal fixation of long bone clean orthopaedic fracture using single dose antibiotic prophylaxis.

Study Design: case series study.

Place and Duration of Study: This study was conducted at the Department of Orthopaedic Unit 1, Civil Hospital, Karachi from 11th August 2010 to 10th February 2011.

Patients and Methods: A total of 231 patients having long bone clean orthopaedic fracture were selected. Patients diagnosed as clean orthopaedic cases and determination of fractures on X-ray with intact skin over fractures were included in the study. Patients with open fracture having co-morbidities already on antibiotics were excluded from the study. Open reduction and internal fixation was carried out using single prophylactic dose of injection cepharadine (2 grams). Wound infection was assess on 5th postoperative day according to Southampton wound grading system.

Results: There were 191 males and 40 females with mean age 36.70 years. Out of 231 patients, 213 had no infection while 18 cases had wound infection on 5th postoperative day.

Conclusion: The use of single dose prophylactic antibiotic prophylaxis is effective in preventing wound infection after management of clean long bones orthopaedic fractures.

Key words: Wound infection, Clean orthopaedic surgery, Antibiotic prophylaxis.

INTRODUCTION

Wound infections are the second most common cause of hospital acquired infection.[1] The National Research Council classified surgical wound infections into four major types, based on peri-operative bacterial contamination: (1) clean, (2) clean contaminated, (3) contaminated and (4) dirty wound infection.[2] Clean cases are those in which skin remains intact without break over fracture site.[3] The reported rate of wound infection after clean orthopaedic surgery is from 5-12%.[4-5]

Surgical wound infection causes postoperative complications and significant postoperative morbidity and mortality, prolongs hospital stay, and adds between 10% and 20% to hospital costs.[6] The history of wound infection took a pathophysiological direction when Lister first introduced antiseptic procedures in surgery.[7] Many methods have been employed for the control of contamination and growth reduction of micro-organisms.[8] The role of perioperative antibiotic prophylaxis in clean orthopaedic surgery is well established.[9] With the advent of aseptic surgery, there is increasing consensus among the orthopaedic surgeons to use single dose antibiotic prophylaxis for clean orthopaedic surgery.[10] In developing country like Pakistan, a 3-5 dose of regimen is still in practice as a precautionary measure.[11] In a study, Ali and Raza[12] showed that rate of wound infection after clean orthopaedic surgery is 8% using single dose prophylaxis versus 6% with 3-dose regimen. Additional antibiotic dosage not only increases the costs and side effects but also decreases the body resistance.[13] Therefore, the rationale of this study was to determine the frequency of wound infection in clean orthopaedic surgery using single dose antibiotic prophylaxis which will help in gaining the confidence of local surgeon to use single dose prophylaxis in our setup.

PATIENTS AND METHODS

This case series study was carried out from 11th Agusut 2010 to 10th February 2011 in the Department of Orthopaedic Unit 1, Civil Hospital, Karachi. A total of 231 patients having long bone clean orthopaedic fracture were selected. Patients diagnosed as clean orthopaedic cases and determination of fractures on X-ray with intact skin over fractures was included in the study. The patients with open fracture having co-morbidities already on antibiotics were excluded from the study. Operative procedures were performed by three assistant professor of the unit with similar clinical experience and expertise. Postoperative, apart from intravenous fluids, parenteral analgesics, and antiemetics, no additional dose of antibiotic was given

to the patient. Open reduction and internal fixation was carried out using single prophylactic dose of injection cepharadine (2 grams). Spinal or general anaesthesia was instituted as per requirement. The patient was assessed for wound infection of the operative site on 5th postoperative day. The wound examination findings were graded according to Southampton wound grading system. The SPSS version 15 was used to analyze the data.

RESULTS

Two hundred and thirty one patients having long bone fractures were included in the study. There were 191 (82.7%) males and 40 (17.3%) females with male to female ratio was 4.8:1. Age of the patients ranged between 18-70 years. Overall mean±SD age of the patients was 36.70±13.35 years (Table 1).

Table No. 1: Frequency distribution of age and sex (n=231)

Parameter	No.	%age
Age (years)		
18 – 30	131	44.2
31 – 40	40	17.3
41 – 50	42	18.2
51 – 60	39	16.9
61 – 70	8	3.5
Sex		
Male	191	82.7
Female	40	17.3

Table No.2: Frequency distribution of long bones involved with respect to final outcome

Long bone involved	No infection (n=213)	Wound infection (n=18)		
	No.	%	No.	%
Femur (n=133)	129	55.8	4	1.7
Tibia/Fibula (n=41)	35	15.2	6	2.6
Humerus (n=22)	18	7.8	4	1.7
Radius/Ulna (n=35)	31	13.4	4	1.7

Table No.3: Duration of time from fracture to surgery with respect to final outcome

Duration (days)	No infection (n=213)		Wound infection (n=18)	
	No.	%	No.	%
≤10 days (n=130)	118	51.1	12	5.2
>10 days (n=101)	95	41.1	6	2.6

Wound infection rates with respect to long bones involved and duration from fracture to surgery are presented in Tables 2 and 3 respectively. Wound infection occurred more in open reduction and internal fixation of fracture of tibia/fibula (2.6%). However, wound infection rates were high (5.2%) in those patients whom surgery was performed ≤10 days after fracture.

DISCUSSION

Long bones fractures are frequently encountered in orthopaedic practice as a consequence of blunt and penetrating trauma. Open reduction and internal fixation is the primary treatment strategy in management of closed long bones fractures.[14] Among various complications, surgical site infection is prove to be disastrous in the presence of metallic implants.[15] The results of current study showed a 7.8% of wound infection rates after open reduction and internal fixation of clean long bones fracture using single dose prophylactic antibiotics. Most of the long bones fractures are encountered in young age group. Dai et al[16] reported that majority of the afflicted patients were between 18 to 30 years of age group with mean being 36.70 years. Ilyas et al[17] also noticed average age of 33 years in their case series, which is nearly comparable to results of this study. The sex ratio distribution in the present study was also in keeping with other literature. Ghauri et al[18] observed 85% of males and 15% of females in their prospective study management of aseptic non-union of diaphyseal fractures of long bones. Whereas in the in the present study, 82.7% of males and 17.3% of females had their long bones fractures.

The role of prophylactic antibiotics in clean orthopaedic surgery has been well established.[9] Percin and associates[19] evaluated a role of single dose parenteral cefazolin prophylaxis in 228 orthopaedic and traumatologic surgical patients. Both major and minor wound infections were reduced in single dose antibiotic treated group. Whereas in the present study, out of 231 clean orthopaedic long bones fracture receiving single parenteral dose of cepharadine, 18 (7.8%) cases demonstrated wound infection on fifth postoperative day according to Southampton wound grading system, which is comparable to the study conducted by Ali and Raza.[12]

CONCLUSION

This study concluded that single antibiotic prophylaxis is effective in preventing wound infection after open reduction and internal fixation of clean long bones orthopaedic fractures. Therefore, this therapeutic strategy is suitable and should be considered in avoiding wound infection after all clean long bones orthopaedic fractures.

REFERENCES

1. Burke JP. Infection control – a problem for patient safety. N Engl J Med 2003; 334: 651-6.
2. Chapter IV. Factors influencing the incidence of wound infection. Ann Surg 1964; 160: 32-5.

3. Bajwa GR, Khan AH. Wound infection. Professional Med J 2009; 16: 336-40.
4. Maksimovic J, Markovic-Denic L, Bumbasirevic M, Marinkovic J, Vlajinac H. Surgical site infections in orthopaedic patients: prospective cohort study. Croat Med J 2008; 49: 58-65.
5. Thu LT, Dibley MJ, Ewald B, Tien NP, Lam LD. Incidence of surgical site infections and accompanying risk factors in Vietnamese orthopaedic patients. J Hosp Infect 2005; 60:360-7.
6. Nandi PL, Soundara RS, Mak KC, Chan SC, So YP. Surgical wound infection. Hong Kong Med J 1999; 5: 82-6.
7. Tan SY, Tasaki A. Joseph Lister (1827-1912): father of antisepsis. Singapore Med J 2007; 48: 605-6.
8. Lee J, Singletary R, Schmader K, Anderson DJ, Bolognesi M, Kaye KS. Surgical site infection in the elderly following orthopaedic surgery: risk factors and outcomes. J Bone Joint Surg Am 2006; 88: 1705-12.
9. Fletcher N, Sofianos D, Berkes MB, Obremskey WT. Prevention of perioperative infection. J Bone Joint Surg Am 2007; 89: 1605-18.
10. Hills T, Weston V. Surgical antibiotic prophylaxis guidelines within orthopaedic surgery for adult patients. Nottingham Antibiotic Guidelines Committee 2009; 1-5.
11. Jamali AR, Mehboob G, Majid A, Bhatti A, Minhas S, Raja A, et al. Postoperative wound infections in orthopaedic surgery. J Coll Physicians Surg Pak 2001; 11: 747-9.
12. Ali M, Raza A. Role of single dose antibiotic prophylaxis in clean orthopaedic surgery. J Coll Physicians Surg Pak 2006; 16: 45-8.
13. Yousuf M, Hussain M. Need and duration of antibiotic therapy in clean and clean contaminated operations. J Pak Med Assoc 2002; 52: 284-7.
14. Yeap JS, Lim JW, Vergis M, Au-Yeung PS, Chiu CK, Singh H. Prophylactic antibiotics in orthopaedic surgery: guidelines and practice. Med J Malaysia 2006; 61: 181-8.
15. Ariza J, Euba G, Murillo O. Orthopedic device-related infections. Inferm Infec Microbiol Clin 2008; 26: 380-90.
16. Dai ZY, Li Y, Lu MP, Ghen L, Jiang DM. Clinical profile of musculoskeletal injuries associated with the 2008 Wenchuan earthquake in China. Ulus Travma Acil Cerrahi Derg 2010; 16: 503-7.
17. Ilyas M, Idress M, Tareen S. Interlocked intramedullary nailing of long bones. Professional Med J 2008; 15: 449-54.
18. Ghauri SK, Akram M, Bashir F. Simple pain of treatment for aseptic non-union of diaphyseal fractures of long bones. Ann King Edward Med Coll 2004; 10: 217-9.
19. Percin S, Akbas L, Akbas A. A single preoperative dose of cefazolin versus postoperative amoxicillin and gentamycin combination in prophylaxis of orthopaedic and traumatologic surgery. Mater Med Pol 1992; 24: 24-7.

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CORRIGENDUM

It is to clarify that the name of Furrakh Mustafa Memon, Asstt. Prof. of Anatomy, DMC, DUHS, Karachi appeared in our Journal Medical Forum Monthly, April, 2012 (page 69) in Article "The Role of Vitamin 'C' on the Thickness of the Epidermis after X-Irradiation of the Guinea Pigs A Morphological Study under Light Microscope" may be read as second author instead of first author and Ghulam Mujtaba Kolachi may be read as first author instead of second author.

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