ORIGINAL ARTICLE

Orthopedic Implant Related Surgeries: Early Surgical Site Infection Bacterial Pathogenecity

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ABSTRACT

Aim: To estimate the bacterial pathogen frequencies at surgical site infection among patients with orthopaedic implant surgeries

Methods: This descriptive study was carried out at Department of Orthopedics, Qazi Hussain Ahmad Medical Complex, Nowshera and King Abdullah Teaching Hospital, Mansehra from January 2017 to December 2017 and comprised 200 cases. The patient's demographics, length of hospital stay, provisional diagnosis, procedure performed, culture sent and micro-organism isolated were recorded. All patients with close fractures of long bones for elective surgery, age 5 to 75 years both sexes were included. Patients with soft tissue operations, emergencies and non-implant surgeries were excluded.

Results: There were 200 patients Out of which, 154(77%) were male and 46(23%) were females. Among these, infectious micro-organisms were isolated from 18 (9%) patients. Klebsiella species were found to be most prevalent 7 cases (38.8%) followed by pseudomonas aeruginosa 5 cases (27.8%), coagulase negative staphylococci 4 cases (22.2%) and methicillin susceptible S. aureus 2 cases (11.2%) in the descending order. Twelve (66.6%) of these patients were treated in the ward for more than 2 weeks and most common isolate in correlation with the prolong stay was pseudomonas aeruginosa.

Conclusion: Klebsiella was the most common bacterial agent for causing early surgical site infections. The frequency of various bacterial infections at SSI among patients admitted for closed fracture procedure was upto 9%. Patients having a prolonged hospital stay were more prone towards pseudomonas aeruginosa infection.

Keywords: Incidence, Surgical site infection, Orthopedic implants, Micro-organism, Closed fracture

INTRODUCTION

The Surgical Site Infection (SSI) evolve in thirty days after surgery or within 1 year if an implant was positioned and contamination visible to be associated to the surgery.[1] Surgical site infection is also explained as microbial contamination of the surgical lesion. In orthopedic implant surgery, the surgical site infection is a destructive complication for both surgeon and the patient. Surgical site infection is a frequent post-operative incident with frequency rate from 1-2% to 22% subsequent to orthopedic implant surgeries[2-4]. Illness in orthopedics increased case cost by 300% lengthen the utilization of antibiotic as well as amplify disease and treatment[5]. In implant surgeries, it is very difficult to get rid of infection, because fixation provide exterior for bacterial devotion & origination of biofilm that slow down diffusion of antibiotics[6]. Obesity, smoking, superior age, low immunity, diabetics, impairment, anemia and different body infections are the main source for factors due to which the infections is occur.[7]

Earlier surgical site infection (SSI) present within thirty days from the procedure of surgery. However, if an infection occurs between one and three months than it is narrated as intermediate and late if it develops more than three months after surgery[8]. Highly virulent microorganisms e.g., Staphylococcus aureus and gram negative bacilli are mostly cause of early infections. On the other hand, late surgical site infections are sourced by low virulence microorganism like coagulase-negative staphylococci[9]. The pathogenesis of infection in fractures fixation devices is related to micro-organisms which rise in biofilm due to which its elimination is difficult.[10] The aseptic measures and use of antibiotics reduced the rate of infection in early 19th century.

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MATERIALS AND METHODS

This descriptive study was carried out at Department of Orthopedics, Qazi Hussain Ahmad Medical Complex, Nowshera and King Abdullah Teaching Hospital, Mansehra from January 2017 to December 2017 and comprised 200 cases. Patients who have close fractures of long bones planned for elective surgery, age 5 to 75 years both male and female were included. Patients, who had soft tissue surgery, emergency cases and non-implant surgeries, were excluded. Patients were included in this study after obtaining written consent during post-operative period. As per local protocol, antibiotics were given to the patients. Pus culture was also taken where needed under aseptic conditions. Till discharge, the patients were also follow-up for wound infections after operation. Further, in accordance with protocol, proper followed-up was also done after surgery to evaluate the post-operative wound infection up to thirty days. Data was compiled on a proforma covering patient's demographics, length of hospital stay, co-morbidities, provisional diagnosis, procedure performed, culture sent and micro-organism isolated for analysis.

RESULTS

There were 154(77%) males and 46(23%) females with patients of signify age was 39.38±13.45 years (Table 1). Among 200 patients, only 18 patients (9%) have infections while 182 patients (91%) have no infection (Table 2).

Among these, infectious micro-organisms were isolated from 18 (9%) patients. Klebsiella species were found to be most prevalent in 7 cases (38.8%) followed by pseudomonas aeruginosa 5 cases (27.8%), Coagulase negative staphylococci 4 cases (22.2%) and Methicillin susceptible S. aureus 2 cases (11.2%) [Table 3]. Twelve (66.7%) of these patients were treated in the ward for more than three weeks and most common isolate in correlation with the prolong stay was pseudomonas aeruginosa. The length of hospital stay in patients with bacterial isolates is shown in Table 4.

Table 1: Patients demographic information (n=200)

Variable	No.	%age
Gender		
Male	154	77.0
Female	46	23.0
Age (years)		
5 – 30	45	22.5
31 – 60	129	64.5
61 – 80	26	13.0
Mean±SD	39.38±13.45	

Table 2: Frequency of surgical site infections (n=200)

Surgical site infection	No.	%age
No infection	182	91.0
Infection	18	9.0

Table 3: Isolated micro-organism (n = 18)

Micro-organism	No.	%age
Klebsiella	7	38.8
Pseudomonas aeruginoa	5	27.8
Coagulase negative Staphylococci	4	22.2
Methicillin susceptible S. aureus	2	11.2

Table 4: Length of stay in patients with bacterial isolates (n=18)

Micro-organism	Hospital stay >14 days		Hospital stay ≤14 days	
	No.	%	No.	%
Klebsiella	5	38.8	3	16.7
Pseudomonas aeruginoa	3	16.7	-	
Coagulase negative Staphylococci	2	11.2	3	16.7
Methicillin susceptible S. aureus	2	11.2	-	

DISCUSSION

The incidence rate of surgical site infections found in this study is 9%, which is higher than acknowledged average for post-operative wound infection. The average for post-operative wound infection is less than 1%. The infection rate which we describe in this study is similar to another study which contained infection rate of 5%[10] and is lower than other studies by Dhillon[11] who found infection rate of 6.8% while Onche[12] found infection rate as 7.5 % and Ngim[13] found infection rate as 9.38%.

Marston described 5% superficial and 0.25% deep infections in replacement of hip.[14] In view of other studies, the overall superficial and deep infection rate are 7.8% and 10%[15] but we described 7.1% infection in our study. As juxtapose to the use of prophylactic antibiotic, the frequency of post-operative lesion without prophylactic antibiotic is higher[16]. Our rate of infection with prophylactic antibiotic is 9% which is superior as compared to other study i.e., 3.97%[17]. The differences in frequency rate of surgical site infection in other studies may be linked to different surgical set-ups, different inclusion criteria, as well as facilities available.

We also found that surgical site infection is mostly common in patients of higher ages. Probably in higher age patients have low resistance, rising catabolism, growing co-morbidities and little lesion healing rates[18] Apanga[19], Masagala[20], Afifi[21], Akinyoola[22], and Khan[23] also reported that prevalence of surgical site infections mostly common in old aged patients.

The administration timing of antibiotics prophylaxis is serious issue in growth of surgical site infection. The time of antibiotics given is two hours or extra, earlier the surgery or postoperatively was absolutely linked with a prominent rate of surgical site infection. The antibiotics should be managed preferably during thirty minutes and definitely during 2 hours of the instance of surgery cut[24]. As a result the choice of precise antibiotics and time of management can reduce the frequency of surgical site infection to the large level.

Although elimination of Staphylococcus aureus nasal carriage with mupirocin was established to be effectual, it reduced the rate of surgical site infections[25]. Dressing, instruments and bed sheets also play a essential role as stockpile of S. aureus. Singh[26] indicate gram negative infections as main risk and inaccessible gram negative organisms.

This study has some limitations as it covered a period of 6 months and thus may not account for seasonal variations. We have followed post-operative patients for less period of time, but in embed surgeries, surgical site infection can evolve one year after surgery.

CONCLUSION

In orthopedic patients, the surgical site infection is a significant problem. Infection rate entirely elevated and required appropriate and precise procedures to control it as it has a huge budgetary load on patients as well as on resources of hospital. It could also lead to mortality and morbidity in the patients. The possible risk factors for surgical site infection is old age, long period of pre-operative stay in hospital, lengthy period of surgery as well as use of intra-operative negative suction.

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