

# Prophylactic Role of Local Gentamicin in Orthopaedics Elective Surgeries: An Observational Study

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## ABSTRACT

**Introduction:** Surgical site infection (SSI) is defined as microbial contamination of the surgical wound within 30 days of an operation or within 1 year after surgery if an implant is placed in a patient.

**Material and methods:** This study includes patient with close fracture of bone, age 18 to 60 years, both male and female. Patients were divided in two groups where three hundred patients enrolled in each group. Written informed consents were taken prior to study. In First group, patients operated during January to March included. These patients not received pre-closure local gentamicin. In second group, patients operated during a period of April to June are included and these patients received injection gentamicin infiltrated locally at surgical operative site during closure.

**Results:** Out of the 600 operated patients included in this study, 31 patients developed infections. The infection rate was 05.16%. Although Infection rate with and without local gentamicin was 03.67% and 06.67% respectively.

**Conclusion:** Implant at fracture site give suitable environment for bacterial growth so strictly preoperative sterilization precautions must be followed in operation theatre and local use of gentamicin at surgical site will helpful to significantly reduced the infection rate.

**KEY WORDS:** Elective implant surgery, Gentamicin, Surgical site infection.

## INTRODUCTION

Surgical Site infection (SSI) is defined as microbial contamination of the surgical wound within 30 days of an operation or within 1 year after surgery when implants placed in patients.<sup>[1]</sup> These infections increased morbidity, mortality, extended hospital stay and economic burden to the hospital resources.<sup>[2,3]</sup> In orthopedic implant surgeries, the SSI is destructive complication for both surgeon and patients.<sup>[4]</sup> It is very difficult to prevent infection in implant surgeries because fixation provide

exterior environment for bacteria and also formation of biofilm on implants which slow down the diffusion of antibiotics. Obesity, smoking, advance age, immune impairment, diabetes, anemia and infections of other part of the body are some main factors due to which the SSI can be occurred.<sup>[5,6]</sup>

In present study, Proper hand washing, less traffic and adequate temperature in operation theatre, Prophylactic antibiotics given at proper time with correct strength are some important measures which were taken for controlling surgical site

infections.<sup>[7]</sup> In operation theatre, proper scrubbing, Painting and draping of surgical part has been done with proper sterilization precautions before starting surgery and then after surgery local gentamicin were injected at surgical sites before closure.<sup>[8,9]</sup>

The aim of our study is to assess the prevalence and incidence rate of surgical site infection in orthopedic elective implant surgeries with prophylactic use of local gentamicin in infection control measures at tertiary care hospital in western region of Rajasthan.

## MATERIALS AND METHODS

The Present prospective study was conducted from January 2017 to December 2018. This study included both male and female patients of age group 18 to 60 years with close fracture of bones. Patient present with open injuries, soft tissue injuries, emergency, non-implant surgeries, comorbid patient, antibiotic defaulter patients and also those who leave against medical advice were excluded from this study. Also written informed consents were taken prior to study.

As per hospital protocol pre-operative injection ceftriaxone was given 2 gm IV one hour before surgeries and then post-operative 1 gm IV BD for five days. Then after, Patients discharged with oral antibiotic cefuroxime 500 mg BD for five days and extended if infection found.

In present study, Patients is divided into two groups in which three hundred patients enrolled in each group. In Group A, patients included who were not received pre-closure local gentamicin whereas in Group B, those patients kept who received injection gentamicin infiltrated locally at surgical operative site during the closure. Further, according to the hospital protocol surgical site evaluated at postoperative day 3<sup>rd</sup>, day 15<sup>th</sup>, one month and later on monthly interval till one year. During the follow up, if infection found, antibiotics stopped for 48 hours and pus sample sent to microbiology lab for culture and sensitivity test. Further

antibiotics were given according to culture and sensitivity.

## RESULT

This study includes total 600 patients in which 484 (80.67%) patients were males and 116 (19.33%) were females. The demographic information is shown in table 1. Out of the 600 operated patients included in this study, 31 patients developed infections. The overall infection rate was 05.16% in which Infection rate with and without using local gentamicin was 03.67% and 06.67% respectively. *Staphylococcus aureus* was the most common isolated microorganism in 19 (61.29%) patients followed by *Klebsiella spp.* in 06 (19.34%) patients, *Pseudomonas aeruginosa* in 04 (12.90%) patients and *Escherichia coli* species in 02 (06.45%) patients.

**Table 1: Sociodemographic information**

Patient Demographic information (n=600 Pts)			
Gender	Male	484	80.67%
	Female	116	19.33%
Age	18-40	439	73.17%
	40-60	161	26.83%

**Table 2: Infection rate**

Time Interval	Total Patients	No. of infected patients	Infection rate(%)
January to March (Without gentamicin)	300	20	6.67
April to June (with local gentamicin)	300	11	3.67

**Table 3: Isolated Microorganism**

Isolated Microorganism (N= 31 (5.16))		
Microorganism	No.	%
<i>Staphylococcus aureus</i>	19	61.29
<i>Klebsiella spp.</i>	6	19.35
<i>Pseudomonas aeruginosa</i>	4	12.90
<i>Escherichia coli</i>	2	6.45

## DISCUSSION

The SSI incidence rate found in this study was 05.16% which is below the reported worldwide incidence of 07.86 to 41.9%.<sup>[10]</sup> The infection rate is similar to other study by tago IA *et al* in which infection rate was 05% and is lower than other study by Dhillon KS who found 06.8% as infection rate.<sup>[11,12]</sup>

In this study, SSI was more common in younger patients, whereas other studies reported SSI to be high in patients of over

55 years of age. This is because the majority of patients included, were operated due to trauma and it has been reported that preoperative soft-tissue damage is a major risk factor for developing SSI and also suggested that the higher the American Society of Anesthesiologists (ASA) score, the higher the risk of infection.<sup>[13]</sup> Also In old age group patient's low immunity, comorbidities and low wound healing power increase SSI rate. Some studies done by Apanga, Masagala *et al* and Afifi also reported that surgical site infection occurs more common in old aged patients.<sup>[14,15,16]</sup>

The movement and number of staff in the operating room is long known to influence the incidence of SSI. In our patients, we have practiced to reduce the staff in the operating room to essential staff only. The choice of precise antibiotics and time of management of surgery can reduce the frequency of surgical site infection to the large level. Abdel Fattah reported a 12-month study on nosocomial infection at a military hospital in which the incidence of SSI was 12.9% whereas Khairy *et al* reported an incidence of 06.80% after a prospective study.<sup>[17,18]</sup> In both studies, the incidence appears higher than in present study.

In this study, *Staphylococcus aureus* and gram's negative bacteria were the predominant causative agents, these findings are similar to other study done by Thu LT.<sup>[19]</sup>

The limitation of present study is that we cannot differentiate infection rate in close and open procedure we have done, which influence the fracture site soft tissue healing. In close nailing procedure we don't intervene soft tissue healing at fracture site whereas in open procedure we go to fracture site through soft tissue overlying it, in which some soft tissue injury occurred which can impaired healing.

## CONCLUSION

SSI is a very drastic problem in orthopedics patients. Implants at fracture site give suitable environment for bacterial

growth so strictly preoperative sterilization precautions must be followed in operation theatres where well trained OT staff, less traffic in OT, hand hygiene, surgical part scrubbing, painting and draping, preoperative antibiotics strictly required. These measures reduce infection rate but according to this study local use of gentamicin at surgical site reduced infection rate significantly. The most common bacteria found is *Staphylococcus aureus*, source of that may be skin bacteria, break in sterilization chain. Patients which require long term stay in hospital have chances of *Pseudomonas* infection at surgical site so long term stay should be avoided, only patient who need hospital care should be keep hospitalized and other patient who don't require hospital care should be discharged.

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