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A STUDY OF SURGICAL SITE INFECTIONS CASES IN ORTHOPEDIC WARD

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ABSTRACT: AIMS AND OBJECTIVES: Study was conducted to find out incidence of surgical site infection rate in orthopedic cases, evaluate various factors contributing to infection, identifying causative pathogens and their antibiogram patterns. **MATERIAL METHOD:** All Clean and clean contaminated operative cases admitted in orthopedic ward in study period of 18 months were included. Preoperative, operative and post-operative management protocols of the cases were recorded in detail. **RESULTS:** Total of 474 cases were studied of which 8 were infected. SSI rate was 1.69%. Staphylococcus aureus and Staphylococcus epidermidis were the commonest pathogen isolated from the infected wound. 42.94% were MRSA among them. **CONCLUSION:** SSI rate of a hospital can be reduced easily by following proper pre-operative protocol for the patient. Those patients with surgical site infection can be treated effectively by following the antibiotic policy as provided by the Department of Microbiology.

KEYWORDS: Antibiotics, Hospital stay, Surgical site infection (SSI), MRSA, orthopedic cases.

INTRODUCTION: This study was conducted for 18 months from November 2011 to 2012 in Medical College with aim of evaluating the rate of surgical site infection in the hospital and also the various factors contributing the infection.

MATERIAL METHOD: Study group included patients of orthopedic ward. Depending on CDC criteria for defining type of wound, the surgeries were categorized respectively.¹ All clean, clean contaminated and planned operatives were a part of this study. Contaminated and dirty operatives and those operated under an emergency were not included.

Within 24 hr. of admission, normal flora of patients were studied and recorded. Other patient's details including method of preoperative preparation, type of pre and post-operative antibiotic prophylaxis, use of drain, total days of pre and post-operative hospital stay were also noted.

Wound infection was identified by the presence of signs and symptoms.² The sample from the infected wound was collected and inoculated on Blood agar, Macconkey agar, and incubated for 18 – 24 hours at 37 C. Organism responsible were identified by colony morphology and biochemical reactions.³

Isolated organisms were subjected to a battery of antibiotics. Antibiotic susceptibility testing was done using Kirby Bauer disk diffusion method according to CLSI (Clinical Laboratory Standard Institute) guidelines.⁴

Antibiotic used were Ampicillin(10 mcg), Penicillin(10 units), Cotrimoxazole (1.25/23.75mcg), Ciprofloxacin (5mcg), Amoxy-Clavulanic acid(20/10mcg), Tetracycline(30mcg), Vancomycin (30mcg), Oxacillin (1mcg), Cefotaxime (30mcg), Ceftriaxone(30mcg), Gentamicin(10mcg), Amikacin (30mcg), Imepenem (10mcg), Piperacillin (100mcg), Piperacillin-tazobactam (100/10mcg).

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RESULTS AND OBSERVATIONS: A total of 474 cases were included among which 08 cases i.e. 1.69% cases were infected. The observations were as follows.

Organisms isolated	Number of isolates
Staphylococcus aureus	03
Staphylococcus epidermidis	02
Proteus mirabilis	02
E. coli	01
Sterile	02

Table 1: Organism isolated from infected wounds

Operation performed	Total cases	Infected cases	SSI rate
Interlock femur nailing	42	00	00
Interlock tibial nailing	12	02	16.67%
Ostinmoore's prosthesis	58	00	00
Dynamic hip screw	22	00	00
Hemiarthroplasty	23	00	00
Radius plating	47	00	00
Ulnar plating	61	00	00
Humerus plating	45	00	00
JESS external fixator	23	01	4.35%
Pedicular screw fixation	18	02	11.11%
Laminectomy	26	01	3.85%
Discectomy	10	00	00
Radial distractor	09	00	00
Open reduction of femur	40	02	5.0%
Femur plating	38	00	00
Total	474	08	1.69%

Table 2: Distribution of Surgical site infection (SSI) cases in various surgeries

Preoperative days of hospitalization	Total case admitted for surgery	Total case infected	SSI percentage
0 – 1	00	00	00
2 – 7	398	06	1.51%
8 – 14	76	02	2.63%
15 onwards	00	00	00

Table 3: Preoperative days of hospitalization and SSI rate

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Age in years	No. of cases operated	No. of cases infected	SSI percentage
< 9 years	15	00	00
10 – 20	24	00	00
21 – 30	73	00	00
31 – 40	170	01	0.59%
41 – 50	64	01	1.56%
51 – 60	65	03	4.62%
61 – 70	52	03	5.77%
71 – 80	09	00	00
> 81	02	00	00
Total	474	08	1.69%

Table 4: Age wise distribution of SSI rate

Duration in hours	No of cases	No of infected cases	SSI percentage
< 1 hour	396	01	0.25%
1 – 2 hour	55	03	5.45%
> 2 hour	23	04	17.39%

Table 5: Duration of surgery and SSI rate

Organisms	Resistance pattern in %						
	A	Cf	Ce	Ci	Ak	I	Pt
Proteus mirabilis	100	84	60.87	48.6	17	8	28
E.coli	100	100	64.53	39	9	21.5	12.09

Table 6: Resistance pattern of organisms isolated

Organisms	Resistance pattern in %						
	P	Co	At	T	Va	Ox	G
Staphylococcus aureus	64	71	38	88	00	42.9	13.6
Staphylococcus epidermidis	83.7	76.8	42	55	00	40.0	28.6

DISCUSSION: Surgical site infection (SSI) is the major cause of mortality and morbidity in surgical patients. These nosocomial infections continue to consume a considerable proportion of health care finances. The present study was to identify the pathogens responsible for surgical site infections and determining the factors influencing the infection rate.

The 474 cases of orthopedics were taken from 3 units of the department. The management protocol was same in all units. An infection rate of 1.69% was found. The results match with study reports of other workers.

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Author	Year	Country	SSI rate%
M J Gil-Egea et al ⁵	1987	Spain	1.4
Mary Oslon et al ⁶	1990	Minneapolis	3.0
A N Yalcin et al ⁷	1994	Turkey	2.9
SSI surveillance ⁸	2005	England	1.44

Organism commonly isolated was *Staphylococcus aureus* with 42.94% strains of MRSA. The SSI surveillance of England⁸ also isolated *Staphylococcus aureus* as frequent pathogen but only 30% strains were of MRSA. The normal flora of the patient posted for the orthopedic surgery was also studied but there was no similarity between strains of normal flora and pathogens causing infection.

Thus proving that skin was not the source of pathogen.

SSI rate was highest with tibial surgeries followed by spinal surgeries. Studies available included only a few orthopedic procedures. The list is as follows.

Procedure	Orthopedic surveillance 2005 ⁸	SSI surveillance 2005 ⁹	Present study
Joint prosthesis	1.24%	1.8%	00
Hemiarthroplasty	4.05%	4.5%	00
Open reduction of long femur	2.01%	3.0%	5%

There have been no cases of SSI found with joint prosthesis and Hemiarthroplasty. The SSI rate with open reduction of long bones is slightly more in comparison to the 2 surveillance reports conducted in England.⁹ The difference is significant and could be due to low standard population and operation setup.

SSI rate was more with tibial surgeries. The relative avascular nature of the bone might have predisposed to poor healing and wound infection. 2 cases of pedicular screw fixation were identified as infected. Only one sample showed presence of *Staphylococcus aureus* and *Staphylococcus epidermidis*. Out of 26 cases of laminectomy only one case developed infection. *Proteus mirabilis* was isolated from the infection. Only one case of open reduction of long bone showed presence of *E. coli* in the wound swab.

Duration of preoperative stay varied from 2 to 15 days depending upon the general condition of the patient. SSI rate was found to increase with the increase in the preoperative stay.

Age is an important contributing factor in the outcome of surgery. The patient subjected to elective procedure in this study were from the elderly group. Their general condition was already compromised. Hence the risk of infection in them was twice.

Surgical site infection has been more after the age of 31. Patients below this age did not show any trace of infection. SSI rate varied from 0.59% to 5.77%, increasing proportionately with the age. The highest SSI has been seen in the age group of 61 yrs. – 70 yrs.

In the surveillance study of orthopedic,⁸ maximum cases of infection were seen in the age group of more than 84 operated for Hemiarthroplasty and open reduction of long bone.

The SSI surveillance of England found same results. But the patients above the age group of 84 were very less hence the SSI rate could not be studied in them.

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Longer duration of surgery increase the SSI rate. This has again been proved by findings in this study on orthopedic cases. The protocol of orthopedic unit of administering antibiotics preoperative and intra operatively has also helped in reducing the infection.

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