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Post Operative Infection in Surgical Wards and Factors Influencing the Infection Rate in Tertiary Care Hospital

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Abstract
A prospective study of 1428 surgical wounds was conducted. All the wounds were examined for presence of infection and those with infection were studied bacteriologic ally. The overall infection rate is 4% (58). Klebsiellapneumoniae was commonest (36%) followed by staphylococcus aureus (24%), Escherichia coli (13.5%), Enterococcus (10%), pseudomonas aeruginosa (8.5%) and proteus mirabilis (6.5%). The two most important factors that influence the incidence of wound infection are surgical technique and the nature of the wound.

Keyword: *Surgical wound, postoperative wound infection*

Introduction

Surgical would infections are the commonest nosocomial infections after urinary tract infection and wound infection is a preventable complication. It is a cause of much morbidity and expense.[1,2]Wounds usually become infected at the time of the operation or from endogenous source.

A wide range of factors have been proven to influence wound infection. Some of these factors include pre-existing illness, wound class, wound contamination, extremes of ages, malignancy, metabolic diseases, malnutrition, immune-suppression, cigarette smoking, remote site infection, length of surgical operation, emergency procedures and long duration of pre and postoperative hospitalization amongst others [3,4,5,6].

Material and Methods

The present study is conducted in tertiary hospital Gulbarga. The study group includes

A. Clean – No entry into respiratory, gastrointestinal, genito-urinary tract.
B. Clean – Contaminated – involves entry into respiratory, gastrointestinal or genitourinary tract but without major contamination of surgical field.
C. Contaminated – This includes procedures with major breaks in the technique with spillage of gastrointestinal contents and traumatic wounds.
D. Dirty – Infected process already exists.

Details of the surgeries including the pre-operative hospitalization, duration of surgery, whether it was emergency or elective and antibiotic therapy received were recorded.

Swabs were obtained from the infected wounds and were processed without delay using standard microbiological methods. The bacterial growths were subjected to antibiotic sensitivity testing by disc diffusion method on Mueller Hinton agar. [7]

Results

The overall prevalence of infection in surgical wounds was 4%. (Table 1) The infection rate in wounds following clean contaminated surgeries was significantly higher than those following clean surgeries (Table-2). The infection rate in surgeries of 1-2 hour duration was significantly higher than those of less than 1 hour duration (Table-3). The infection rate was highest in post appendectomy wounds while it was lowest in wounds following surgeries for hydrocele.

Ciprofloxacin, Cefuroxime and Cefotaxime proved to be some effective antibiotics against gram negative bacilli, Polymyxin-B and Ceftazidime showed the highest efficacy of 100% against pseudomonas aeruginosa. Methicillin (cefoxitin) resistance was noted in 6% of staphylococcus aureus. (table – 4 & Table -5)

Table-1: Infection rate in various surgeries

Surgery	Surgeries performed	Number of infected	Percentage of Infection rate
Hydrocele surgeries	327	3	1
Hernia surgeries	78	4	5
Appendectomy	48	7	14
L.S.C.S.	580	12	2
Laprotomy	62	8	12
Mastectomy	45	4	8
Prostatectomy	220	14	6
Amputation	28	3	10
Renal Surgeries	15	1	6
Hepatobillary	25	2	8
TOTAL	1428	58	4%

Table-2: Analysis of infection rate in relation to the wound type

Type of Surgery	Surgeries performed	Number of infected	Percentage of Infection rate
Clean	1298	49	3.5
Clean contaminated	130	9	7
Total	1428	58	

Table-3: Duration of surgery and infection rate

Duration of Surgery	Surgeries performed	Number of infected	Percentage of Infection rate
0-1 Hour	723	12	1.6
1-2 Hour	424	23	5
2 Hour or more	281	23	8
TOTAL	1428	58	

Table-4: Pathogen causing surgical wound infection

Organism	Number of Isolated 58	Percentage
Klebsiella Pneumonia	21	36
Pseudomonas aeruginosa	5	8.5
Proteus mirabilis	4	6.5
Enterococcus	6	10
Staphylococcus aureus	14	24
Escherichia coli	8	13.5

Table-5a: Antibiotic resistance pattern of the isolates

Antibiotic	Staphylococcus aureus isolated 14		Enterococcus isolated 6	
	No	Percentage Sensitivity	No	Percentage Sensitivity
Penicillin	2	14	2	33
Cefoxitin	13	94	--	--
Erythromycin	5	36	3	50
Ampicillin	6	42	3	50
Cephalexin	8	56	2	33
Tetracycline	3	21	3	50
Linezolid	14	100	6	100
Ofloxacin	11	78.5	5	86
Cotrimoxazole	8	56	1	16.5
Chloramphenicol	4	28	4	66
Cloxacillin	13	96	--	--
Vancomycin	14	100	6	100

Table-5b: Antibiotic resistance pattern of the isolates

Antibiotic	KlebsiellaPneumoniae isolated 21		Escherichia Coli isolated 8		Proteus mirabilis isolated 4		Pseudomonas aerugenosa isolated 5	
	No	Percentage Sensitivity	No	Percentage Sensitivity	No	Percentage Sensitivity	No	Percentage Sensitivity
Ampicillin	0	0	1	12.5	2	50	--	--
Cephalexin	13	61	2	25	2	50	0	0
Chloramphenicol	8	38	4	50	2	50	0	0
Carbencillin	--	--	--	--	--	--	2	40
Amikacin	4	19	7	87.5	3	75	4	80
Cotrimoxazole	2	9.5	5	62.5	1	25	0	0
Ofloxacin	19	90	7	87.5	3	75	2	40
Norfloxacin	16	76	6	75	3	75	1	20
Ceftazidime	19	90	7	87.5	3	75	5	100
Cefotaxime	19	90	8	100	4	100	4	80
Cefuroxime	21	100	8	100	4	100	3	60
Ceftriaxone	21	100	8	100	4	100	4	80
Polymyxin-B	--	--	--	--	--	--	5	100

Discussion

The overall infection rate in the present study is 4%. The overall infection rate is less compared to other studies. The prevalence rate in this study was comparable to Ntsama EC et al in African countries were infection rates was 9.1%[8] The infection rate is more in clean contaminated (7%) as in amputation and appendectomy than clean surgical would (3.5%) in rest of the surgeries. The source may be endogenous or exogenous. Endogenous source may be from G.I. tract. The infection rate is more in appendectomy wounds.[12]The risk factor may be endogenous source or inflammatory process.

In the present study, patients that had longer duration of surgery like amputation , hepatobiliary surgery etc., >2 hours, had increased risk of postoperative infection when compared with those that had shorter duration of surgery. Some other reports are in agreement with the finding in this study.[9,10]

The rate of infection is directly related to the duration of surgery. The longer duration predisposes to contamination of clean surgical wound from environmental sources by sedimentation of bacteria. The other risk factor for hospital infection is longer stay in the hospital.[11]Longer stay in hospital causes colonization of hospital microorganism. The low incidence in our study may be to strict asepsis and administration of antibiotic during pre-operation and early postoperative.[12, 13]

The commonest organism isolated is Klebsiellapneumoniae and the strains are multidrug resistant strain.[14]

Conclusion

Strict asepsis and scrupulous technique are important in the prevention of infection following surgery. The commonest organism is isolated is Klebsiellapneumoniae and the strains are multidrug resistant. It is important to employ strict infection control policies by a functional well funded infection control committee. This committee should be able to monitor surveillance studies in the locality with a view to issuing guidelines to circumvent established risk factors. This would bring the level of surgical site infection to an acceptable level.

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