Clinical Study of Surgical Site Infection

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Abstract: Background and objective: Study most common organisms encountered and their sensitivity and resistance to antibiotics in postoperative wound infection. Methods: 70 cases of postoperative wound infection were analyzed. Appropriate history and examination was done. Culture and sensitivity reports were reviewed. Results: Most common organism encountered is Pseudomonas (34.3%) most sensitive antibiotic is amikacin (80%) and most resistant antibiotics are Colistin (72.9%). Interpretation and Conclusion: Most common organism in post operative wound infection is Pseudomonas. Most sensitive antibiotic is Amikacin and most resistant is Colistin.

Keywords: Surgical Wound Infection; Anti-bacterial Agents; Amikacin; Drug resistance, microbial

1. Introduction

Surgical wound infections continue to consume a considerable portion of health care finance. Even though the complete elimination of wound infections is not possible, a reduction of the observed wound infection rate to a minimum level could have marked benefits in terms of both patient comfort and resources used. The modern surgeon cannot escape the responsibility of dealing with infections and in dealing with them, of having the knowledge for the appropriate use of aseptic and antiseptic technique, proper use of prophylactic and therapeutic antibiotics, and adequate monitoring and support with novel surgical and pharmacologic as well as non pharmacologic aids.

2. Methodology

The clinical study of surgical infection was conducted at Yenepoya Medical College & Hospital during the period of October 2013 to October 2015.

Inclusion criteria: Only those cases which will be operated in Yenepoya Medical College & Hospital will be taken into consideration.

Age limits: 15-80years

Exclusion criteria: Wound site previously infected will be excluded

3. Materials and Methods

An elaborate study of these cases with regard to date of admission, history, clinical features of wound infection, special investigation, type of surgery, preoperative preparation and postoperative management is done till patient is discharged from hospital.

In history, presenting complaints, duration, associated diseases, personal history including diet, smoking, and alcoholism were noted.

Preoperative findings which include preoperative bath, skin preparation, type and time of preparation (<24 or > 24 hours) preparation of bowel, preoperative antibiotics, steroid medication were noted. Operative findings which include, wound irrigative drain and its type (open or closed) noted.

Postoperative findings which include, day of diagnosis of infection, day of 1st dressing and frequency of change of dressing, local application of antibiotics and postoperative antibiotics.

Findings on the day of diagnosis of wound infection were noted which included fever, erythema, discharge, type of discharge.

Wound infection was diagnosed on the basis of definitions given in Oxford textbook of Surgery 2^{nd} edition, swab for culture and sensitivity is collected and sent to laboratory with appropriate specimen (discharge).

The reports for all 70 cases are made into a chart. Each organism cultured is noted and the number of times it is isolated in written correspondingly. This gives the commonest microorganisms in our hospital setting.

Most Sensitive and Resistant Antibiotics:

After the culture of micro-organism, sensitivity test is done. Sensitivity test is done in our laboratory by using;

Blood agar plate,
Mueller's hinston plate

These plates are incubated over night and then the sensitivity is confirmed.

These reports were charted and separate graph was prepared showing the sensitivity and resistance of individual antibiotic. One more graph was prepared by giving one point for each time antibiotic is sensitive and one point for each time antibiotic is resistant. This graph shows the most effective antibiotic which is having highest positive value.



Culture Plate



Antibiotic Sensitivity Test

4. Observation and Results

Age wise distribution of study subjects:

In this study majority of patients belonged to the age group between 41- 50years. Youngest patient was 15 years old and oldest was 80years. The mean age of the patient affected was 44 years.

	Age	Percent
<20	7	10%
21-30	11	15.7%
31-40	13	18.6%
41-50	16	22.9%
51-60	9	12.9%
61-70	7	10%
71-80	7	10%
Total	70	100%



Signs and Symptoms:

The most common presentation in present series is discharge. Total 51 cases presented with discharge through the wound.

		Count	Column N %
Fever	-	33	47.10%
.0.	+	37	52.90%
Erythema	-	47	67.10%
~ ~ (+	23	32.90%
Discharge	-	19	27.10%
	+	51	72.90%

Type of Discharge



The most common type of discharge was purulent type with percentage of 31.40% In 22 case the least common type of discharge was Serosanguinous. Only patient presented with Serosanguinous discharge with percentage of 20% In 14 case.

International Journal of Science and Research (IJSR) ISSN (Online): 2319-7064 Index Copernicus Value (2013): 6.14 | Impact Factor (2015): 6.391

Discharge Type	Nil	18	25.70%
	Purulent	22	31.40%
	Seropurulent	16	22.90%
	Serosanguinous	14	20.00%



Antibiotics given:

Out of 70 cases 65 cases (92.90%) had received preoperative antibiotics. Whereas, 5 cases (7.10%) not received preoperative antibiotics and all case received postoperative antibiotics.

Antibiotic

		Case	Column N %
PRE OP ANTIBIOTIC	NO	5	7.10%
	YES	65	92.90%
POST OP ANTIBIOTIC	YES	70	100.00%



Microorganism:

Most common microorganism encountered in present series is pseudomonas 24 cases (34.30%). Least common micro organism is Staphylococcus i.e 2 case (2.90%).

Table 10: Showing Microorganisms

Microorganism	Acinetobacter	3	4.30%
	E.Coli	12	17.10%
	Kleibsiella	12	17.10%
	Proteus	12	17.10%
	Pseudomonas	24	34.30%
	Staphylococcus	2	2.90%
	Streptococci	5	7.10%



Antibiotics:

Most sensitive antibiotic in present series is Amikacin. Other common sensitive antibiotics are amoxycillin, chloramphenicol, , cefotaxime, azithromycin.

Most resistant antibiotics are Colistin, other resistant imipeneam, ceftriaxone, amoxyclav

/	Sensitive / Resistant	Count	Column N %
Ampicillin	R	31	44.30%
	S	39	55.70%
Amoxycillin	R	22	31.40%
	S	4 8	68.60%
Amikacin	R	14	20.00%
	S	56	80.00%
Chloramphenicol	R	21	30.00%
× ~	S	49	70.00%
Cefotaxime	R	28	40.00%
~~~	S	42	60.00%
Ciprofloxacin	R	34	48.60%
15/	S	36	51.40%
Ceftriaxone	R	43	61.40%
	S	27	38.60%
Doxycycline	R	33	47.10%
	S	37	52.90%
Erythromycin	R	38	54.30%
	S	32	45.70%
Gentamycin	R	33	47.10%
	S	37	52.90%
Piperacillin	R	35	50.00%
	S	35	50.00%
AZITHROMYCIN	R	31	44.30%
	S	39	55.70%
AMOXYCLAV	R	42	60.00%
	S	28	40.00%
IMIPENEM	R	42	60.00%
	S	28	40.00%
SULBACTUM	R	40	57.10%
	S	30	42.90%
Colistin	R	51	72.90%
	S	19	27.10%

Table 11: Showing Anti	biotic Sensitive and Resistant
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Antibiotic resistant/sensitive



1.1.1

91.7

## 5. Discussion

The present study was conducted in YENEPOYA MEDICAL COLLEGE AND HOSPITAL. This is cross sectional type of study.

#### Microorganism:

Most common organism encountered in postoperative wound infection in this study is PSEUDOMONAS, in 24 cases accounting for 34.30%. The second common organism in this study is E.Coli, in 12 cases accounting for 17.10%. The least common organism was STAPHYLOCOCCUS and ACINETOBACTER.

AUTHOR	BHIRUD et al	<b>TRIPATHY</b> et al	MY STUDY
Commonest	E coli	DELIDOMONAS	DSELIDOMONIAS
Organism	E COII	PSEUDOMONAS	PSEUDOWONAS

Tripathy et al, shows PSEUDOMONAS as commonest organism inpostoperative wound infection. Our values match with the observations by tripathy et al.

Bhirud et al, shows that Ecoli as predominant microorganism isolated i.e. 40% and  $2^{nd}$  most common organism

#### Antibiotics Sensitivity and Resistance

Author	Kowl et al101	Tripathy	My study
Antibiotic	Cloxacillin	Co-trimoxazole	Amikacin
Sensitive	Cotrimoxazole	Chloramphenico	Amoxycillin,
	Chloramphenico	Gentamicin	ChloramphenicoL,
	Cephaloridine		Cefotaxime,
	Gentamicin		azithromycin.
	Kanamycin		
Antibiotic	Piperacillin	Penicillin	Colistin
resistant	Ceftriaxone	Tetracycline	imipenem,
	Ampicillin	Ampicillin	ceftriaxone,
	_	Erythromycin	amoxyclav

In our study the common sensitive antibiotics are Amikacin, Amoxycillin, ChloramphenicoL, Cefotaxime, azithromycin.

The common resistant antibiotics are Colistin imipenem, Ceftriaxone, amoxyclav. The reason for sensitivity of the antibiotics in our series is probably due to their broad spectrum and less routine use due to unavailability of oral preparation, cost. Therefore less commonly prescribed as outpatient. The reason for resistance of antibiotics in our series is probably due to their more common use in outpatient department and indoor patients for prolonged period.

Kowli et al, shows gentamycin, Cloxacillin, cotrimoxazole, Chloramphenicol more sensitive antibiotic postoperatively for gram positive aerobes and cephaloridine, Gentamycin, Kanamycin sensitive against gram negative aerobes.

Tripathy et al, observed that organisms were less sensitive to penicillin, tetracycline, ampicillin and erythromycin in that order of descending magnitude as compared to cotrimoxazole, gentamycin and chloramphenicol.

#### **Type of Surgery**

Type of operation	Bhirud et al	My study	Percentage
Clean	4	15	21.4%
Clean contaminated	7	23	32.9%
Contaminated	16	10	14.3%
Dirty	47	22	31.4%

In present study, the wound infection rate for clean, clean contaminated, contaminated and dirty cases is 21.4%, 32.9%, 14.3% and 31.4% respectively. The reason for this increasing rate of wound infection is probably, increasing contamination during surgery.

#### To Reduce SSI:

The principle of disinfection should be followed meticulous.

While operating ACUTE APPENDICITIS extra care should be taken ensure that the operating field should not be contaminated with pus. In obstructed hernia toxic fluid should let out first from fundus of sac.

# 6. Conclusion

- Majority of patients belonged to age group of 41-50 years which account for 22.9%.
- Out of 70 cases, 14 cases were having ACUTE APPENDICITIS accounting for 20%.
- Most of the patients presented with discharge through the wound. The most common type of discharge was purulent. Total 53 cases (72.9%) presented with discharge.
- 23 cases out of 70 have undergone surgery which is classified as clean contaminated accounting for 32.90%.
- Out of 70 cases 65 (92.90%) cases received preoperative antibiotics, 5% not received preoperative and all cases resived postoperative antibiotics.
- In 34.30 % (24) cases Pseudomonas was the microorganism found on culture.
- More sensitive antibiotics are Amikacin, Amoxycillin, ChloramphenicoL, Cefotaxime.
- More resistant antibiotics are Colistin, IMIPENEM, Ceftriaxone, amoxyclav

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