REVIEW ARTICLE

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ISOLATES FROM WOUND INFECTIONS AT FEDERAL MEDICAL CENTRE, BIDA.

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ABSTRACT

A total of 589 wound swabs from 334 patients in Federal Medical Centre, Bida were studied. Samples were collected between Jan 2002 to Dec. 2003. Swabs were plated within one hour after collection unto blood, chocolate and Mac Conkey after plate, and incubated aerobically for 24hrs. The chocolate plated swabs were incubated under increased carbon dioxide for 24hrs. Organism were identified using morphological and biochemical characteristics according to Cowon and Steel's manual for identification of medical bacterial. Organism isolated were subjected to antibiotic susceptibility testing by disc diffusion using modified Kirby-Bauer method.

The number of swabs that were culture positives were 441 (74.9%). Out of these 441 samples 334 (75.7%) grew one organism each, 99 samples (22.4%) grew two organisms each while 8 samples (1.8%) grew three organisms each. The 3 commonest organisms isolated were *Staphylococcus aureus* (45.5%), *Escherichia coli* (21.8%), *Pseudomonas aeruginosa* (14.9%) which together constitute 82.2% of the isolates.

There is a high level of antibiotic resistance. Ciprofloxacin is the drug of choice for the gram positive bacteria with susceptibility of 68.3%. Ofloxacin is the drug of the choice for the gram negative bacteria with susceptibility of 76.3%

INTRODUCTION

Infection constitutes a major cause of morbidity and mortality among surgical patients especially those subjected to emergency operations for acute abdomen (1). Wound infection is an important source of concern all over the world (2). Hospitals in the United States of America have stressed the importance of continued surveillance of all hospital acquired (nocosomial) infections (3). In Nigeria a surveillance programme on nocosomial wound infections was commenced at University College Hospital Ibadan, Nigeria in 1976 by Montefiore et al (4). Medical literature reveals that there is a shift in microbial agents responsible for surgical infection predominantly from gram positive to gram-negative nocosomial pathogens (5-8). This changing pattern of pathogens is thought to be due to use of antimicrobial agents in the treatment of prevailing infections in the hospital (9). The objective of each study was to provide the hospital community with meaningful data on the prevalence and incidence of nocosomial infections in different areas of hospital (10). These would allow adequate control measures to be formulated and constantly applied to help keep the incidence of such infection to a maximum (11).

In the study conducted by Olumide et al, most common bacteria pathogen were *Escherichia coli* 30%, *Staphylococcus aureus* 17% and *Klebsiella species* 13 % respectively (12). Federal Medical Centre, Bida is a young generation tertiary health institution in Niger State. No previous study on surgical wound infection has been carried out. The objectives of this study are to identify the common aerobic pathogens wound infections and

the antimicrobial susceptibility patterns of such agent in Federal Medical Centre, Bida.

MATERIALS AND METHODS

Swabs from surgical site infections were collected using swab sticks from January, 2002 to December 2003. The specimens were submitted soon after collection from the surgical wards to the Microbiology Laboratory and processed within one hour of obtaining them by inoculation on Blood, chocolate and Mac Conkey agar plates and incubated for 24 hours. The blood and chocolate plates were incubated under increased carbon dioxide jar (13). Cultures were observed for growth if there were no growths, the cultures were re-incubated for another 24hrs before being discarded if there was no growth. Isolates from cultures were identified using standard methods according to Cowon and Steels manual for identification of medical bacteria (14).

Each organism isolated was subjected to antibiotic susceptibility testing with disc diffusion using maltodisc by Kirby-Bauer modified method (15).

RESULT

A total of five hundred and eighty-nine wound swabs were processed, out of which four hundred and forty-one (74.9%) were culture positive (Table 1). Three hundred and thirty four samples (75.7%) yielded single bacterial organisms, ninety-nine (22.4%) samples grew two organisms each and eight (1.8%) grew three organisms each.

The commonest organisms were *Staphylococcus aureus* 253 (45.5%), *Escherichia coli* 121 (21.8%) and *Pseudomonas aeruginosa* 83 (14.9%) (Table 1).

The gram positive organisms were most sensitive to Ciprofloxacin (68.3%) followed by Ofloxacin (66.8%) Table IV, while gram negative organism were most sensitive to Ofloxaxin (76.3%) followed by Pefloxacin (65.8%) Table V

Table I: Organisms Isolated

Organism	No of Isolates	Percentage
Staphylococcus aureus	253	45.5
Escherichia coli	121	21.8
Pseudomonas aeruginosa	83	14.9
Klebsiella aerogenes	44	7.9
Proteus species	44	7.9
Streptococcus pyogenes	7	1.3
Corynebacterium species	2	0.4
CONS	2	0.4
Haemophilus influenzae	1	0.2
	Total 556	**100**

CONS: Coagulase Negative Staphylococci

Table II: Antibiotic Susceptibility of Gram Positive Bacteria

Antibiotic	S. aureus				Str. pyogenes				Corynebacterium			
	T	S	R	%	T	S	R	%	T	S	R	%
Augmentin	49	1	48	2.0	2	1	1	50.0	1	1	0	100
Amoxycillin	38	3	35	7.9	0							
Tetracycline	130	30	100	23.1	2	1	1	50.0	1	1	0	100
Gentamicin	248	92	156	37.1	5	1	4	20.0	2	0	2	0
Ofloxacin	227	151	76	66.5	4	4	0	100.0	1	0	1	0
Ciprofloxacin	132	88	44	66.7	5	5	0	100.0	2	2	0	100
Cotrimoxazole	209	53	156	25.4	5	1	4	20.0	1	0	2	0
Ampicillin	185	1	184	0.5	5	0	5		2	0	2	0
Cloxacillin	127	1	126	0.8	4	0	4		2	0	2	0
Penicillin	144	0	144	0.0	4	0	4		2	0	2	0
Erythromycin	194	64	130	33.0	5	5	0		2	0	2	50
Chloramphenicol	82	11	71	13.4	2	0	2					
Pefloxacin	131	87	44	66.4	2	1	1					
Cefuroxime	174	47	127	27.0	2	2	0					
Ceftazidime	120	21	99	17.5	1	1	0					
Axithromycin	104	47	57	45.2	1	1	0					
Clindamycin	105	58	47	55.2	1	1	0					
Ceftriaxone	132	75	57	56.8	2	2	0					
Doxycycline	23	7	16	30.4								
Cefalexin	20	11	9	55.0								

Antibiotic	E.coli				Aeruginosa				Klebsiellaerogenes				Proteus spp				H. influenzae			
	T	S	R	%	T	S	R	%	T	S	R	%	T	S	R	%	T	S	R	%
Augmentin	38	8	30	21.1	21	0	21	0	20	2	18	10	8	1	7	12.5				
Amoxycillin	36	0	36	0.0	24	0	24	0	20	1	19	5	11	0	11	0				
Tetracycline	117	25	92	21.4	23	0	23	0	25	4	21	16	25	0	25	0				
Gentamicin	122	42	80	34.4	77	25	52	32.5	50	19	31	38	39	18	21	46.2				
Ofloxacin	120	91	29	75.8	80	61	19	76.3	32	25	7	78.1	33	30	3	90.9	1	1	0	100
Ciprofloxacin	57	36	21	63.2	45	23	22	51.1	26	20	6	76.9	21	16	5	76.2	1	1	0	100
Contrimoxazole	115	13	102	11.3	43	0	43	0	27	7	20	25.9	31	4	27	12.9	1	1	0	100
Chloramphenicol	28	3	25	10.7	13	0	13	0	10	2	28	20	6	2	4	33.3	1	0	1	0
Colistin	52	10	42	19.2	15	2	13	13.3	11	5	45.5	11	0	11	0					
Pefloxacin	4	3	1	75.0	57	38	13	74.5	12	7	5	58.3								
Cefluroxime	59	11	48	18.6	36	11	25	30.6	14	2	12	14.3	14	3	11	21.4				
Ceflazidime	101	24	77	23.8	35	11	24	31.4	13	4	9	30.7	19	8	11	42.1				
Azithromycin	61	21	40	34.4	42	5	37	11.9	16	7	9	43.8	19	2	17	10.5				
Clindamycin	85	7	78	8.2	46	3	43	6.5	8	0	8	0	17	1	16	5.9				
Ceftriaxone	67	36	31	53.7	54	21	33	38.9	16	10	6	62.5	22	13	9	59.1				
Doxycycline	11	56	6	45.5					4	2	2	50.0	4	0	4	0				

Key:

T = number of isolates tested

S = number of isolates sensitive to antibiotic

R = number of isolates resistant to the antibiotic

% = percentage sensitivity

Table III: Antibiotic Susceptibility of Gram Negative Bacteria

Key:

T = number of isolates tested

S = number of isolates sensitive to antibiotic

R = number of isolates resistant to the antibiotic

% = percentage sensitivity

Table IV: Antimicrobial Susceptibility Patterns of Gram Positive Organism

Antimicrobial Agents	No Tested	No Sensitive	Percentage sensitivity
Ciprofloxacin	139	95	68.3
Ofloxacin	232	155	66.8
Pefloxacin	133	88	66.2
Ceftriaxone	134	77	57.2
Ceftazidime	121	22	18.2
Clindamycin	106	59	55.7
Augmentin	52	3	5.8
Cloxacillin	133	1	0.8
Erythromycin	201	70	34.8
Tetracycline	133	32	24.1
Gentamicin	255	93	36.5
Choramphenicol	84	11	13.1
Cotrimoxazole	216	54	25

Key:

No tested = Total number of isolate tested

No Sensitive = Total Number of isolate sensitive to antimicrobial agent

Percentage sensitive = Percentage of Isolate sensitive to the antimicrobial agent

Table V: Antimicrobial Susceptibility Pattern of Gram Negative Organism

Antimicrobial agents	No Tested	No Sensitive	Percentage sensitivity
Ciprofloxacin	150	96	64.0
Ofloxacine	266	203	76.3
Pefloxacine	73	48	65.8
Ceftriazone	159	80	50.3
Ceftazidine	168	47	28.0
Cefuroxime	123	27	22.0
Clindamycin	156	11	7.1
Tetracycline	190	29	15.3
Cotrimoxazole	217	25	11.5
Gentamicin	288	104	26.1
Chloramphenicol	58	5	8.6
Colistin	89	17	19.1
Azithromycin	138	35	25.4

Key:

No tested = Total number of isolate tested

No Sensitive = Total Number of isolate sensitive to antimicrobial agent

Percentage sensitive = Percentage of Isolate sensitive to the antimicrobial agent

DISCUSSION

Out of the 556 isolates obtained from wound swab cultures 264 (47.5%) were gram positive organisms while 292 (52.2%) were gram negative organisms. This result agrees with other studies that gram negative organisms are the predominant agents of surgical wound infection. The study also agree with other studies that *S. aureus* (45.5%) is the most important aerobic agent of wound infection (4-16) This was followed by *E. coli* (21.8%), *Ps. aeruginosa* (14.9%), *Kl. aerogenes* (7.9%), and *Proteus species* (7.9%). Similar reports for *S.auereus* has a higher incidence in our report. *S. aureus* 31.60%, *E. coli* 25.97%, *Ps. aeroginosa* 21.21%. Johnson (15+) reported a similar incidence for *S. aureus* as obtained in this study: 42% and 45% respectively. *S. aureus* is an important nosocomial pathogen as well as body flora in the anterior nares pubis, axilla from where it may contaminate wounds by autogenous infection or from contaminated formites especially when personal hygiene is poor.

E. coli is the second most important agent of wounds infection in this study, constituting 21.8% of the isolates. This figure is higher than 26% obtained by Njoku Obi in Enugu (9) but slightly lower than 25.97% obtained by Wariso in Port Harcourt (2) . The Enterobacteri *E. coli, Proteus species* and *Klebsiella, species* in this study constitute 37.6% obtained by other (2) in Port Harcourt. The relatively high incidence of *E. coli* and the Enterobacteria may be indicative of faccal contamination and a reflection of poor hygiene (2). A good measure of control of wound infection can be established by reducing traffic in the wards, detection and isolation of patient with wound infection, more stringent measures at the aseptic procedures during wound dressing and establishment of an adequate hospital infection control unit.

There is need for continual surveillance for bacteria agents of wound infection and their antimicrobial susceptibility testing. This is basic to the control of hospital acquired wound infections as this is the method by which the changing patterns of wound pathogens and their antimicrobial susceptibility patterns may be detected and controlled.

The bacterial isolates from the present study show a high level of antibiotic resistance. The unrestricted use of antimicrobial agents by the

populace and activities of quacks as health care givers may be responsible for the development of more resistant strain of the pathogens to most of the available study, only the quinolones may be used empirically for treatment of wound infection in Bida community.

These are ciprofloxacin for gram positive organisms and ofloxacin for the gram negative organism. Pefloxacin with susceptibility of 66.2% for gram positive organisms and 65.8% for gram negative organisms is much cheaper than ofloxacin and ciprofloxacin and may be preferred when considering cost.

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