

ANTIMICROBIAL AGENTS IN THE TREATMENT OF PYOGENIC OSTEOMYELITIS IN BASRAH PROVINCEHaider A Mousa*, Sundus S Bakr^o, Thamir A Hamdan[#].

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Summary A prospective study, included 126 cases with pyogenic osteomyelitis, was done to evaluate the antimicrobial susceptibility of the causative agents of osteomyelitis. In addition, to evaluate the benefit of antimicrobial agents that were given to the patients and the real susceptibility of the causative organisms. We found that, from 86 patients that were give antimicrobial agents, the organisms were totally resistant to the given antimicrobial agents in 48% of cases. In only 29% of cases, the organisms were sensitive to the given antimicrobial agents. In the remaining cases 23% which yielded mixed growth, only 10 isolates were sensitive to the given antimicrobial agents, while 12 isolates were resistant. Therefore, in 71% of the cases partially or completely inefficient antimicrobial regimen has been used to the patients with osteomyelitis. This study revealed that all of Staphylococcus aureus isolates, the commonest causative agents of hematogenous osteomyelitis, were susceptible to fusidic acid.

Introduction

Treatment of bone infection with antibiotics is one of the major advances in this century. Before the introduction of antibiotics, one-fourth to one-third of the patients died of acute hematogenous osteomyelitis, and 50% were seriously crippled for life, and a high proportion of patients with chronic osteomyelitis end up with amputation^{1,2}. Green in 1967³ pointed out the increasing rate of therapeutic failure, as resistance of organisms to penicillin appeared and increased. Therefore the antibiogram study is so important regarding the economical and health point of view, and the antibiotics which were used incorrectly resulted with definite cases of ill health. Furthermore the duration of therapy, as declared by many investigators, should be contin-

ued for at least four weeks for acute osteomyelitis^{4,5,6,7,8}.

Materials and Methods

This study included 126 cases that presented with hematogenous, exogenous, postoperative and mastoiditis groups of pyogenic osteomyelitis. In which positive bacterial cultures and antimicrobial susceptibility test were performed for all cases. The study was conducted at Basrah university Teaching hospital and extended from November 1992 to August 1993. The determination of bacterial susceptibility of different isolates to various antimicrobial agents was made by using diffusion disk method according to Kirby-Bauer technique⁹. The results were interpreted as resistant, sensitive or intermediate susceptibility, according to a table of interpretation for diameter of inhibition zone^{9,10}. The following unidisks and their codes were used: Ampicillin

(Am), Cefotaxime (CT), Chloramphenicol (C), Cloxacillin (CX), Colistin (CL), Co-treimoxazole (SXT), Doxycycline (DO), Erythromycin (E), Fusidic acid (FC), Penicillin G (P), Polymixin B (PB), Streptomycin (ST), Sulfamethaxazol (SM).

Results

The total number of studied cases was 126 that presented with hematogenous, exogenous, postoperative and mastoiditis group of pyogenic osteomyelitis. The invitro sensitivities of various gram-positive and gram-negative bacterial isolates to several antimicrobial agents were presented in table-1, and table-2. The number of cases with pyogenic bone infection that were give antimicrobial agents by their surgeons and included for comparison study was 86, while the remaining 40 cases were either not given antibiotics (15 cases), or the antibiotics treatment were missed by our study (25 cases). The number of patients treated with single type of antibiotics were 22 (26%), while 64 patients (74%) were given more than one type of antibiotics. The most commonly given antibiotics were Ampiclox (Ampicillin+Cloxacillin), They were given to 60% of patients. We found that, in 48% of cases, the organisms were totally resistant to the antibiotics that were given by their surgeons. Only 29% of cases the organisms were sensitive to the antibiotics that has been used. In the remaining cases 23% which yielded mixed growth, only 10 isolates were sensitive to the given antibiotics, while 12 isolates were resistant. There fore, in 71% of cases partially or completely inefficient antimicrobial regimen was given to

the patients with osteomyelitis.

Discussion

We conclude from this study that the antimicrobial agents used in the treatment of 86 patients with osteomyelitis were ineffective in 71% of cases. The misuse of antimicrobial agents was related to two factors, firstly: improper appreciation of antimicrobial susceptibility test by the hospital laboratory workers, especially that concerned the measurement of the zone of inhibition around the antimicrobial disks. Secondly: most of the patients were given antimicrobial agents without doing antimicrobial susceptibility tests. Although culture and sensitivity test is important factor in the choice of the suitable antibiotics, but this is not the only parameter that determine the choice of antibiotics, i.e. other factors should be considered, which include, the availability of antibiotic, allergic manifestation, systemic problems and the cost of the antibiotic. In the present work, all of Staphylococcus aureus (29 isolates) were susceptible to fusidic acid 100%, followed by co-trimoxazole 72%. The Staph. aureus isolates were resistant to ampicillin and penicillin G in 88% and 94% of isolates respectively. This percentage was in agreement with that of Blocky and McAllister¹¹, they declared that 93% of Staph. aureus isolates were resistant to penicillin in 1972, while the resistance was only in 14.1% of isolates in 1946. A lower penicillin resistance was found by Dich et al. in 1975⁶, Morrey and Peterson in 1975¹², and Mollan and Piggot in 1977¹³, they found that the resistance of Staph.

Percentage of susceptible and intermediately susceptible organisms to antimicrobial agents.

Micro-organ.	No. of isolate	AM		C		CL		CT		CX		DO		E		FD		SM		P		SXT	
		S	I	S	I	S	I	S	I	S	I	S	I	S	I	S	I	S	I	S	I	S	I
Staph. aureus	29	6	6	66	8	66	0	66	8	64	0			0	0	93	7	50	18	6	0	72	0
Coag-ve Staph.	20	30	10	63	6	60	0	74	0	55	0					90	0	30	15	10	0	50	0
Strept. pyogen.	4	100	0	100	0			100	0					100	0			100	0	100	0	0	0
Strept. virid.	3	100	0									100	0							100	0	66	0
Strep. faeca.	1	0	0					0	0			0	100	0	100					0	0	0	0
Lacto-bacilli	1	0	0					0	100			0	100							0	0	0	0
Diphtheroids	2	50	0	0	50			100	0			0	0	0	0					0	50	0	0
Neisseria sps	2	100	0	0	0							0	0	0	0					100	0	0	0
Haemophilus	2			0	0			100	0					0	0					0	0	0	0

Table I: Susceptibility of bacterial isolates to antimicrobial agents.
* For abbreviations of antimicrobial agents and microorganisms see materials and methods.
** S=Sensitive organisms, I=Intermediately susceptible organisms.

Percentage of susceptible and intermediately susceptible organisms to antimicrobial agents.

Microorganism	No. of ISOLATE	AM		C		CT		DO		PB		ST		SM		SXT	
		S	I	S	I	S	I	S	I	S	I	S	I	S	I	S	I
pseudomon. sps	37	6	0	7	4	34	13	13	3	26	11	10	0	0	0	17	3
Klebsiella sps	33	3	0	33	0	64	3	38	7			24	0	0	0	34	0
Proteus sps	23	21	0	32	5	43	5	6	0			55	0	0	0	39	0
Escheri. coli	8	33	0	60	0	71	0	29	14			67	0	0	0	17	0
Salmonella sps	2	50	0	50	0	100	0								50	0	
Other Enteroba.	10	10	10	20	10	70	20	10	0			30	0	30	0	40	0

Table II. Susceptibility of bacterial isolates to antimicrobial agents.
* For abbreviations of antimicrobial agents see materials and methods.
** S=Sensitive organisms, I=Intermediately susceptible organisms.

aureus to penicillin was 39%, 80%, and 74% respectively. The place of surgical intervention and the optimal duration of antimicrobial treatment can not be answered from the present work, but can only be determined by a prospective clinical trials. However, most of the patients in our country were presented at a relatively late

stage. Therefore surgical intervention was suggested to be done for all patients with acute haematogenous osteomyelitis, especially if the causative agent was Staph. aureus which has the highest incidence of complications. Anyhow surgical operation should not lead to reducing the dosage and duration of parenteral antibiotic treat-

ment. As we noticed in the present study, there was no emphasis on dosage and long term parenteral antibiotics therapy for the patients with osteomyelitis and this could be related to the high failure rate in the treatment of bone infection. Also we believe that oral antibiotics, that were given for some patients, are not effective in the treatment of osteomyelitis. Furthermore, other factors may affect the success of antibiotic treatment in this country, which include, the lack of education of the patient or his parents, and high percentage of patients 70% were of poor socioeconomic status. Kelly² declared that, since they began a regimen of four weeks of parenteral antibiotic therapy, the rate of success has been nearly 90% for chronic osteomyelitis in the categories of haematogenous infection. Concerning surgical intervention, Buchman¹⁴ felt that surgeons should operate on "the patient who fail to respond". Harris¹⁵, on the other hand, recommended a routine early operation.

Conclusion

From this study, it is obvious that fusidic acid is the best antibiotic for treatment of Staph. aureus infection (the commonest causative agent of haematogenous osteomyelitis), and this antibiotic should be used in full parenteral dosage and for at least four weeks duration. In addition, the antibiotic should be used as early as possible to abolish the need for surgical interference of acute haematogenous osteomyelitis.

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