Antibiotic Sensitivity Pattern in Bacterial Endocarditis

Pages with reference to book, From 129 To 132

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Abstract

Seventyone blood cultures were taken from suspected cases of infective endocarditis. The positive cultures were isolated for study of their antibiotic susceptibility patterns. Gentamycin was found to be the most effective. Cloxacillin, chloramphenicol, Vibramycin, Tetracyclin, Erythromycin were next in order. The incidence of bacteria probably susceptible to high dose schedules and those demonstrating complete resistance was also determined (JPMA 33:129, 1983).

Introduction

The most common mistakes in antibiotics selection are choosing an agent that does not have optimum activity against the pathogen involved and using two or more antibiotics when one would be adequate. Recognizing that indiscriminate use of antibiotics worsens the problem of antibiotic resistance in the community, how is the clinician to choose the antibiotic rationally?. The corner stone of rational antibiotic therapy is recovering the infective agent and then testing that agent in vitro for antibiotic susceptibility. A physician needs to know resistance at the local level to prescribe the least toxic and least expensive antibiotic, likely, to be effective for a patient (DeHaan, 1981).

Material and Methods

Specimens:- Blood samples were obtained from 26 patients undergoing treatment at the National Institute of Cardiovascular Diseases, National. Institute of Child Health, Jinnah Postgraduate Medical Centre, Karachi.

Bacterial Susceptibility to Antimicrobial Agents using Disc Agar Diffusion Method.

Muclier-Hinton medium was used for anti biotic studies. The agar depth was 4mm that is óOml of the medium was poured in 150mm diameter plates. Media prepared was stored at 4°C. If any moisture was observed, the dishes were dried in an incubator at 37°C for 10-30 minutes before use. Paper discs 6mm in diameter impregnated with antibiotics (according to regulation W.H.O. & F.D.A.) were used. Before use the discs were brought to room temperature. Mueller-Hinton agar was inoculated streaking crosswise using a cotton swab, soaked in the suspension. The swab was pressed against the side of the tube, so that the whole surface is covered. This was repeated 2 or 3 times turning the dish 600 each time to ensure uniform inoculation of the agar.

Discs were applied with sterile forceps. Each disc was gently pressed with the surface to ensure complete contact. Discs were less than 3cm from each other and not less than 2cm from the edge of the plate.

Interpretation of the zone was measured including the disc.

Results

All the bacteria isolated in this study (18) were subjected to antibiotic susceptibility (Tables I and II).

Table 1

Percentage of Effectiveness of Antibiotic against the Organisms Isolated.

Antibiotics %	Streptococci %	Staphylococci %	Total %
Lincomycin	50%	25%	44.44%
Penicillin	42.85%	–	33.33%
Amoxycillin	71.42%	75%	72.22%
Ampicillin	57.14%	75%	50%
Cloxacillin	64.28%	100%	72.22%
Vibramycin	71.42%	75%	72.22%
Chloramphenicol	71.42%	75%	72.22%
Tetracycline	78.51%	50%	72.22%
Erythromycin	71.42%	75%	72.22%
Gentamycin	92.85%	75%	88.88%

Table ii

Antimicrobial Sensitivity Pattern of Organisms Isolated from Blood Cultures.

Antibiotics	Streptococcus Viridans Total No. (13)			Streptococcus Faecalis Total No. (1)			Staphylococcus aureus Total No. (3)			Staphylococcus Albus Total No. (1)		
	S	I	R	S	I	R	S	I	R	S	I	R
Lincomycin	7	–	6	–	–	1	1	–	2	–	–	1
Penicillin	4	2	7	–	–	1	–	1	2	–	–	1
Amoxycillin	9	1	3	–	–	1	2	1	–	–	–	1
Ampicillin	7	1	5	–	–	1	3	–	–	–	–	1
Cloxacillin	7	2	4	–	–	1	3	–	–	1	–	–
Vibramycin	9	–	4	1	–	–	1	1	1	1	–	–
Chloramphenicol	9	1	3	1	–	–	1	2	–	–	–	1
Tetracycline	10	1	2	–	–	1	11	–	2	1	–	–
Erythromycin	7	2	4	–	1	–	1	1	1	–	1	–
Gentamycin	11	1	1	1	–	–	3	–	–	–	–	1

S : Sensitive (Probably susceptible to clinical therapy at ordinary dose rates).
i : Intermediate (Likely to respond to high dosage therapy).
R : Resistant (Unlikely to respond to high dosage therapy).

Gentamycin was found to be the most effective with 86.88% of all the gram positive bacteria tested being inhibited by concentrations easily obtainable in the blood.
Cloxacillin, chloramphenicol, vibramycin, tetracyclin, erythromycin, were next in order giving 72.22% effectiveness against the species isolated in this study.
Less than 50% of the isolates were completely sensitive to lincomycin, at easily attainable blood drug concentrations. The incidence of bacteria probably susceptible to high dose schedules and those demonstrating complete resistance was also determined (Table II).

Discussion

The marked variation in susceptibility of antibiotics shown by individual members of some group strongly emphasize the necessity for performing sensitivity tests in order to select the most effective antimicrobial agent against these microorganisms (Schneierson, 1952).
The clinical microbiologic laboratories in this country use the paper disc method for determining susceptibility of bacteria to antibiotics. No uniform standards are, however, used for the interpretation of results, and susceptibility of any given organisms may be interpreted differently by various laboratories. In this procedure the results were seen against the standard interpretation of zones of inhibition.
The disc method was employed for determining bacterial sensitivity over tube method, because the later involves a lengthy procedure and contamination (Shubin et al., 1958). Disc expose a single antibiotic to a given organism. When the clinician chooses two antibiotics, however logical this

procedure may seem, it has been difficult to assemble conclusive data on the correlations of in vitro tests to in vivo results when dealing with 2 drugs at a time, (Tompsett and Pizette, 1962). Use of combination of antibiotics, in case of bacterial endocarditis, is controversial (Sande and Scheld, 1980). Karchmer et al. (1979) also advocate single antibiotic therapy for streptococcal endocarditis. Therefore, synergistic combination studies of antibiotics were not done for susceptibility pattern.

A standardized method designed by Bauer et al. (1966), recognized the importance of various factors that contributed to the size of inhibition zone around the discs.

Results of antibiotic susceptibility performed by Kirby-Bauer technique are shown in Tables I and II These results could, therefore, serve as a basis for selection of prophylactic and therapeutic antibiotics for patients with bacterial endocarditis.

Gentamycin was found to be the most effective against isolates in this study. In staphylococcal endocarditis none of the organisms were susceptible to penicillin, Cohen (1959) also noted the ability of staphylococci to become resistant to penicillin. The studies done by Kirby et al. (1953) are similar. They found that 70% of the staphylococcal infections are caused by penicillin resistant organisms. The antibiotic to be used in such cases is cioxacillin; which has also been found effective in these series (Weinstein, 1975; Kaye et al., 1961). Kirby et al. (1953) state that erythromycin should be a highly effective agent for staphylococcal infections and in our series 77.22% of cases were sensitive to it. Penicillin is the agent of choice for all organisms moderately or highly sensitive to it (Geiger and Durlacher, 1947). Present results and those of Finland (1955) have not found penicillin to be of any value. Stuart Harris et al. (1949) found relatively few reports of penicillin resistant cases of SBE, but by 1958 Geraci observed that bacterial endocarditis was being caused more and more frequently by antibiotic resistant organisms. The reasons may be that, in our country, indiscriminate use of penicillin on the part of clinician, and neglect on part of the patient in taking the proper dose, may be responsible for development of resistance as seen in this study. There are good reasons for avoiding penicillin in such cases, not only because it is not likely to be of value when used alone but also that it may actually decrease the effectiveness of other antibiotics to which the organisms were originally sensitive (Finland, 1958). History of anaphylaxis to penicillin. should forbid its indiscriminate use (Muhammad, 1970). Adrenal steroids may sometimes be used in desperate situations warranting the use of penicillin (Raper and Kemp, 1965).

The diagnosis of bacterial endocarditis is incomplete, unless the infecting agent has been recovered and its sensitivity to antibiotics determined (Hunter, 1951). The duration of treatment should be dictated by severity of infection, duration of illness and clinical response of the patient. A longer period of treatment is conducive to higher curve rate and minimal relapse rate (Tompsert, 1967).

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