The Changing Etiology Of Infective Endocarditis

*TARIQ NISHTAR**
*MOHAMMAD ALI***
*SULTAN MEHMUD****
*REHMATULLAH OPAL*****
*SALAR ZAI******

ABSTRACT:

One hundred four patients with Chronic Rheumatic Heart Disease were investigated to find out the prevalence of bacterial endocarditis in this group and to document the causative organisms and their sensitivity pattern.

Of the total 104 patients, 23 (22%) gave a positive blood culture. Staphylococcus aureus was the most common organism isolated. It was isolated from 15 patients (65.2% of the culture positive cases). Streptococcus viridans was isolated from only one patient (4.3%). Most culture positive had clinical features of subacute bacterial endocarditis.

INTRODUCTION:

Since the introduction of antibiotics in the mid forties, endocarditis has been going through an evolution. The changing etiology of endocarditis has been the subject of several reports.[1,2,3,5] According to these reports, in the economically advanced countries the age has shifted from the 2nd and 4th decade to the 5th and 6th decade with a mean at about 55 years. The etiology of the disease has changed with Strep. viridans no longer the predominant organism. Non-hemolytic Streptococci and Staph. aureus now account for a large proportion of cases.[1,2,5] The mortality of endocarditis fell from 100% to 30% soon after antibiotics became available but since then no further improvement has occurred in spite of the introduction of more potent antibiotics.[3,4] Hayward has pointed out that since 1944 the natural history of the disease has changed with a change in clinical picture and that the traditional criteria for diagnosis are no longer adequate and that critical reappraisal of the current methods of treatment is required in view of the persisting high mortality.[3]

In Pakistan rheumatic valvular heart disease continues to be a prevalent problem. However no adequate study on the problem of endocarditis in these patients is available. The study being reported was undertaken to document the prevalence of this disease in cases of rheumtic valvular heart disease admitted to hospital for various reasons and to study the etiology in our patients who are frequently exposed to various potent antibiotics in usually inadequate doses.

MATERIAL AND METHODS:

All patients with chronic valvular rheumatic heart disease admitted consecutively to the Medical C Ward of Khyber Hospital Peshawar were included in the study. After complete clinical assessment, samples of blood were taken from each patient on three consecutive days for blood culture.

Five to 10 ml of venous blood was collected aseptically in glucose broth bottles. The bottles were incubated at 37C^0 for 18-24 hours. After overnight incubation a loopful of the broth was subcultured on a blood agar MaConkey agar and chocolate agar plate. The plates were incubated at 37°C for 18-24 hours. Subcultures were made on the 1st, 4th and 7th day of incubation on the respective media. The broth bottles were discarded if the smear was negative and the

*Professor of Medicine Medical C unit, Khyber Hospital Peshawar
**Associate Professor Medical 'C' unit Khyber Hospital, Peshawar
***Assistant Professor Medical 'C' unit Khyber Hospital, Peshawar
****Registrar. Khyber Hospital, Peshawar
*****Microbilogist PMRC Research Centre, K.M.C. Peshawar.

plates showed no growth. Sensitivity of organisms cultured was studied by the paper disc diffusion method.

RESULTS:

Of the 104 patients studied 60 were males and 44 females. A positivie blood culture was obtained from 23 cases. None yielded a positive result in all three blood culture samples, and only one culture each was positive in all. In 10 (43.4%) a positive culture was obtained from the first culture bottle, in 5 (21.7%) the 2nd blood sample yielded a positive culture and in 8 (34.8%) the 3rd sample was the source of a positive culture.

The age and sex distribution of the whole sample and cases of endocarditis is given in Table I. 95% of the cases of endocarditis are less than 40 years of age. The male female ratio appears to be higher in the endocarditis cases as compared to the whole sample.

Table – I.

AGE AND SEX DISTRIBUTION IN WHOLE SAMPLE VERSUS ENDOCARDITIS GROUP

Age group	Whole sample N – 104			SBE group N – 23		
	Male	Female	%	Male	Female	%
12-25	32	12	42	8	1	39 (20.4%) 12 25 yrs
26-40	30	24	52	8	5	56-5 (24% of) 26 40 yrs
41-60	03	03	5.7	0	1	4.3 (16.6% of) 41-60 yrs

In table II the distribution of the type of valvular lesions is shown. Of the 62 mitral valve disease cases 15 (24%) had endocarditis, while of the 6 aortic valve disease cases 4 (66.6%) had valve infection and of the 8 combined lesion patients, 50% had endocarditis.

The type of organisms grown and their antibiotic sensitivity is given in table III. Staph. aureus is the dominant organism grown. Only one growth of Strep. viridans was obtained and it was resistant to penicillin G.

Table – II.

DISTRIBUTION OF TYPE OF VALVULAR LESIONS

Type of lesion	N – 104		with Endocarditis N – 23	
	No.	%	No.	%
Mitral valve	62	59.6	15	24
Aortic valve	6	5.7	4	66.6
Combined	8	7.6	4	50

Table - III.

ORGANISMS ISOLATED AND THEIR ANTIBIOTIC SENSITIVITY

Type of organism	No of Isolates	Antibiotic Sensitivity			
	Gentamicin	Chloramphenicol	Penicillin	Tobramycin	Ampicillin
Staph. aureus	16	70%	55%	15%	78% 40%
Strep. viridans	01	0	50%	0	50% 50%
E. coli	05	80%	20%	0	80% 10%
Enterobactor	01	0%	0%	0%	0% 0%

DISCUSSION:

The results of the study show that the age distribution of our cases is the same as that of the preantibiotic-era in the developed countries.[1,5] Thirtynine per cent of our endocarditis cases were in the 2nd and 3rd decade and 56.5% in the 3rd and 4th decade. The sex ratio in our cases is similar to that reported by Lerner and Wienstein (1966) and Garvey and Neu (1973). Although in our hospital admitted cases the number of females is generally lower than that of males, however, we have taken into account the sex ratio in all cases of rheumatic heart disease and have found that in the endocarditis cases the ratio is higher.

Garvey and Neu in their report of 107 cases of natural valve infection found aortic valve infection in 39 (36.4%), Mitral valve infection in 35 (32.7%) and combined infection in 13 (12.1%). In this study, of the 62 mitral valvular disease patients 15 (24%) were found to have endocarditis while of the 6 aortic valve disease cases 4 (66.6%) had infection. Therefore as in Garvey and Neu report, aortic valves appear to be more prone to get infected when compared to other valvular sites.

The most worrisome finding of the study is the type of organisms isolated from infected cases. As pointed out earlier, the etiology of endocarditis has been changing since the introduction of antibiotics with Strep. viridans accounting for about half the cases and non-hemolytic streptococci and staphylococci for the rest. However except for one partially resistant strain, all the streptococci are reported to be sensitive to penicillin G. In our cases Staphylococcus aureus was the predominant organism with E. coli the next common. The one strain of Streptococcus viridans isolated was found resistant to penicillin and gentamicin and partially resistant to chloramphenicol, tobramycin and amoxicillin. Our results indicate that resistant organism like the Staphylococci and E. coli have taken over as the common etiologic agents of the disease. This is expected in an environment in which antibiotics are being used frequently, irregularly and haphazardly. Finland et al in their report of the changing etiology of endocarditis, have stated that Staph. aureus, gram negative bacilli, Enterococcus and Staph. epidermidis appear to be related to extensive usage of antibiotics.

In addition to its low sensitivity to antibiotics staphylococcal endocarditis is reported by Lerner and Wienstein to be asymtomatic in a fair proportion of cases. We therefore feel that as it is there is a low index of suspicion for endocarditis among our medical practitioners. With the added high prevalence of staphylococcal endocarditis in our patients, it is feared that quite a large proportion of cases must be going undetected.

ACKNOWLEDGEMENT:

The authors are grateful to Dr. Tasleem Akhtar, Research Director, PMRC Research Centre, Khyber Medical College, for help in the preparation of this report and to Miss Mubarik Begum for typing the manuscript. The study was approved and financed by the Pakistan Medical Research Council.

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