

## COMMON PATHOGENS ASSOCIATED WITH ENDOCARDITIS IN HAZARA DIVISION

*Mehr Dil Khan Wazir, Malik Mahmood Alam & Niaz Ali Khan*

*Fifty-one cases of suspected infective endocarditis were studied in detail in Paediatrics Department of Women and Children Hospital, Abbottabad. Underlying heart disease was congenital in six patients and possible rheumatic in forty-five patients. Cultures were negative in thirty-nine patients and positive in twelve patients with Streptococcus viridans in five patients and Staphylococcus aureus in seven patients. Most of the patients responded to Penicillin and Streptomycin except a few with Staphylococcal aetiology who responded well to a combination of either Ampiclox and Gentamicin or Cephadrin (Velosef) and Gentamicin.*

### INTRODUCTION

Infective Endocarditis a term now used instead of subacute bacterial endocarditis & encompasses all forms of infections of endocardium. Incidence in developed countries is 3000-4000/year in United Kingdom, and about 13000/year in United States of America. Incidence in developing countries is not known.

Infective endocarditis is an illness caused by infection of cardiac valves and endocardium by micro-organisms (bacteria, fungi, viruses etc.). Factors which predispose to endocarditis are dental manipulation, genito-urinary surgery, intravenous cannula, haemodialysis shunt, intravenous drug abuse, insertion of intra-uterine contraceptive device, endoscopy and immunodeficiency<sup>1</sup>.

Abnormal valves are most commonly infected and accordingly different heart lesions are divided into high risk, moderate risk and low risk of getting infected. High risk category includes Rheumatic Valve Disease (like mitral regurgitation and aortic regurgitation), Prosthetic Heart Valve, and Congenital Heart Disease (like Patent Ductus Arteriosus, Coarctation of Aorta, Fallot's Tetralogy and Ventricular Septal Defect).

Moderate risk includes patients with Prolapsed Mitral Valve and Bicuspid Aortic Valve. Low risk heart diseases associated with endocarditis are patients having Atrial Septal Defect and pure Mitral Stenosis. Blood culture is the confirmatory test - all the other tests are supportive. Echocardiography helps both in confirmation of the clinical diagnosis and in detection of vegetations. Recently transoesophageal echocardiography has been developed which is considered better than precordial two-dimensional echocardiography in detection of vegetations.

### MATERIALS AND METHODS

After a thorough history and examination including past history of any dental or urinary tract disease or procedure, clinical diagnosis of the lesion was made. Blood smear examination, erythrocyte sedimentation rate & urine examination was done. Blood samples for culture after necessary preparation of the venipuncture site were taken. Two samples were taken with one-hour interval and the third sample was taken on the next day. Chest radiography and electrocardiography was done in all the cases with echocardiography in a few of them.

### RESULTS

Fifty-one cases of infective endocarditis were studied in the period from 1985-1988. Out of these, five cases were between 2-6 years and forty-six were between 7-12 years. There were twenty-one male patients and 30 females with male to female ratio of 2:3. Three male and 2 female children were under 6 years of age while

---

From: Women & Children Hospital & Ayub Medical College, Abbottabad.

DR MEHR DIL KHAN WAZIR, Professor & Chairman, Department of Paediatrics.

DR MALIK MAHMOOD ALAM, Medical Officer.

DR NIAZ ALI KHAN, Registrar. Corresponding

Author: DR MEHR DIL KHAN WAZIR

18 males and 28 females were between 7-12 years of age.

Past history of rheumatic fever was present in twenty-five patients. History of ingestion of drugs, specially antibiotics, was present in thirty-seven patients. There was no history of any dental manipulation or genito-urinary tract procedure in any patient.

Patients usually presented with fever, dyspnea, palpitations with moderate to severe anaemia. Signs and symptoms are given in Table-1.

**Table 1: SIGNS AND SYMPTOMS**

Signs & Symptoms	Present	% age	Absent	% age
<b>Fever</b>				
Low grade	34	66.0	-	-
High grade	17	34.0	-	-
Total	51			
Dyspnoea	35	68.0	16	32.0
Palpitations	32	62.0	19	38.0
Anaemia	48	94.0	03	6.0
Clubbing	12	22.0	39	78.0
Cyanosis	0	-	50	100
Palmar erythema & Osler nodes	0	-	50	100

Pulse was normal in rate in seven patients, between 80-100/min in thirty-two patients and more than 100/min in 12 patients. Pulse was of collapsing character in five patients and blood pressure was normal in all except in five patients who had increased pulse pressure.

The cardiac lesions found are given in Table-II.

**Table-II: CARDIAC LESIONS**

S.No	Clinical diagnosis	No of patients	%age
1.	Mitral Regurgitation	36	70.0
2.	Mitral Stenosis & Mitral Regurgitation	07	14.0
3.	Aortic Regurgitation & Mitral Regurgitation	03	6.0
4.	Ventricular Septal Defect	03	6.0
5.	Patent Ductus Arteriosus	02	4.0

Haemoglobin was less than 6 gm/dl in 7 patients, 6-8 gm/dl in 34 patients and more than 9 gm/dl in 10 patients. Total leucocyte count was between 4 - 11000/cmm in 21 patients (42%) and between 11 - 15000/cmm in 30 patients (58%).

ESR was in the range of 20-50 mm in 1st hour in 13 patients, 51-100 mm in 27 patients (54%) and 101-150 mm in 11 patients (22%).

Polymorphs were raised in twenty-five patients and in normal range in twenty-six patients. Microscopic haematuria was present in thirteen patients with thirty-four patients having normal urinary findings. Blood cultures were negative in thirty-nine patients and positive in 12 patients. *Streptococcus viridans* and *Staphylococcus aureus* were the most common organisms isolated. Sensitivity report is given in Table-III.

**Table-III: SENSITIVITY REPORT**

Antibiotic	Staphylococcus aureus	Streptococcus viridans
Neomycin	7	5
Velosef	7	5
Gentamicin	7	5
Penicillin	2	4
Lincomycin	4	5
Tobramycin	5	3
Streptomycin	0	3
Dalacin	3	4

In our study Streptomycin and Benzyl Penicillin was used in most of the patients, with a few cases in whom Cephadrin and Gentamicin or Ampiclox and Gentamicin were used.

Response to antibiotics and result of successes or failure of therapy is given in Table-IV.

**Table-IV: RESPONSE TO ANTIBIOTICS**

Antibiotic	No of patients	Good	Response Fair	Nil
Benzyl Penicillin & Streptomycin	51	41	01	08
Ampiclox & Gentamicin	04	04	-	-
Cephadrin & Gentamicin	06	06	-	-

All the patients were initially put on Benzyl Penicillin and Streptomycin and later switched over to Cephadrin and Gentamicin (or Ampiclox and Gentamicin) depending either on the results of culture/sensitivity or because of failure of initial therapy (later was true in most of the cases). Failure of therapy was considered when the response could not be elicited after two weeks of antibiotic therapy.

Most of the patients improved in about one week but some took two weeks to settle. Patients were afebrile with improvement in fever, malaise and lethargy, anaemia improved over a period of time and there was gradual improvement in palpitations, dyspnoea, heart rate and microscopic haematuria.

Most of the patients in whom cultures were negative improved with a combination of Benzyl Penicillin and Streptomycin.

Out of 12 cases, in which cultures were positive, the relevant cardiac lesion and the causative organisms are given in Table-V:

**Table-V: CARDIAC LESIONS & MICROORGANISMS**

Cardiac Lesions	Strep. viridans	Staph. aureus	Total (/12)	%age
Mitral Regurgitation	02	06	08	66.6
Aortic Regurgitation & Mitral Regurgitation	03	-	03	25.0
Patent Ductus Arteriosus	--	01	01	08.4

Out of 50 cases one patient died but the cause could not be ascertained as he died at home when the patient left against medical advice. All the other patients responded well to therapy.

## DISCUSSION

Most of our culture positive patients showed *Staphylococci* and *Streptococci* as the predominant organisms causing infective endocarditis.

In a report<sup>2</sup> the incidence is mentioned as follows: *Streptococcus viridans* - 50%, *Staphylococcus* - 33%, less frequent organisms - 7% and negative cultures - 10%. In the same report it is also mentioned that there is an increase

in the incidence of Staphylococcal infections in the past many years.

In our study though there was high incidence of *Staphylococcus* in the culture positive patients, we presume that the incidence of *Streptococcus* in comparison to *Staphylococcus* may be high when total number of 51 patients is considered; because all of our staphylococcal infections were resistant to Streptomycin and partially sensitive to Benzyl Penicillin while majority of our culture negative patients responded to Penicillin and Streptomycin.

But still our positive cultures show more of staphylococcal infection and this requires giving due attention to the problem. The staphylococcal infections are resistant to Benzyl Penicillin and Streptomycin. If proper attention is not given to these patients and proper antibiotics are not selected, these patients of infective endocarditis with high incidence of staphylococcal infection will carry high mortality. The majority of negative cultures in 39 patients were probably due to the fact that these patients were already on antibiotics. The patients could not have been kept without antibiotics because the patients were sufficiently ill and were in cardio-respiratory distress. It was found, that though this is a serious disease, but if it is well diagnosed and proper treatment is started, the prognosis is good. In fact, a few of our Staphylococcal Endocarditis patients got further deteriorated (developed pancarditis) while not responding to Penicillin and Streptomycin, yet responded to Ampiclox and Gentamicin. Even some of the culture negative patients, who did not respond to Penicillin and Streptomycin, got deteriorated but responded to Ampiclox, Gentamicin, Cephadrin (alone or in combination).

None of our patients had any predisposing factors but dental hygiene of more than half of our patients was poor with caries of more than one tooth which may be a predisposing factor.

Most of our patients had either Mitral Regurgitation and Aortic Regurgitation alone or in combination as well as Congenital Heart Lesions like Ventricular Septal Defect, and Patent Ductus Arteriosus.

There is a marked difference in the cure rate between right and left sided infective

endocarditis. There is a better cure rate with infection on right side of the heart, e.g. tricuspid valve, as compared to aortic and mitral valve disease which are comparatively resistant to antibiotics with higher morbidity and mortality.

The pathogenesis of difference between the right and left sided endocarditis seems to be multifactorial which may include selected organism factors, antimicrobial factors and host defense factors. Anticoagulants have no role in endocarditis with or without systemic embolism

Some suggestions will be: -

1. Any patient having a known cardiac disease should be suspected of infective endocarditis if there is unexplained fever or congestive cardiac failure, septicemia, embolic episodes, unexplained neurological illness, anaemia and increased ESR, or surgical or diagnostic procedure performed recently.

2. Any suspected infective endocarditis patient should be immediately started on Benzyl Penicillin and Streptomycin after taking blood samples for culture and sensitivity:

(a) Because majority of our patients responded well to the two antibiotics.

(b) If the antibiotics are not started some of the patients may quickly progress to severe deterioration and fatal outcome.

3. Close watch should be made on the satisfactory progress of the patient. If the response is not good or there is further deterioration, the antibiotics should be changed (Ampiclox, Gentamicin, Cephadrin).

4. Antibiotic prophylaxis according to the guidelines of working party of British Society of Antimicrobial Chemotherapy (1982, amended in 1986) should be used <sup>5</sup>.

Another amendment is the single dose of Clindamycin in a dose of 600 mg as prophylaxis for patients allergic to Penicillin as an alternative to Erythromycin. But the indications of its use in children are not clear <sup>6</sup>.

## REFERENCES

1. Geddes AM & Littler WA. Infective endocarditis. *Medicine International*, Sep 21, 1982; 19: 878-883.
2. Oakley C. Infective Endocarditis. *Medicine International*, 1989; pp 2928-34.
3. *Quarterly Journal of Medicine*, 1977; 46: 449 - 512.
4. Taams MA, Gussenhoven EJ, Bos E, et al. Enhanced morphological diagnosis in infective endocarditis by trans-oesophageal echocardiography. *British Heart Journal*, 1990; 63: 109-13.
5. Nelson. *Textbook of Pediatrics*, 1987; pp 1011-1013.
6. Simmons NA. Antibiotics prophylaxis of infective endocarditis. *Lancet*, Jan 13, 1990; 88-89.
7. Bayer AS & Norman DC. Valve site specific pathogenic differences between right sided and left sided bacterial endocarditis. *Chest*, July 1990; 98(1): 200.

## FURTHER READING

1. Valvular Heart Disease infected valves and prosthetic heart valve. *American Journal of Cardiology*, Feb 2, 1990; 65(6): 29C-31C.
2. Immunopathological effects of S.B.E. *Chest*, Jan 1990; 97(1): 204.
3. Repeat Echocardiography for staphylococcal S.B.E. *Post Grad Medicine*, Mar 1990; 66 (773): 227.
4. Valve site and specific pathology in S.B.E. *Chest*, July 1990; 98(1): 200.
5. Group A p-Haemolytic Streptococcal S.B.E. *American Heart Journal*, May 1988; 115 (5): 1132.