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Clinical, Bacteriological and Echocardiographic Profile of Infective Endocarditis in a Tertiary Care Hospital in Northern India

JAN MOHAMMAD SHEIKH
Senior Resident
Postgraduate Department of Medicine
Government Medical College Srinagar
Jammu and Kashmir, India
SAMIERA HASSAN
Medical Officer
Postgraduate Department of Social and Preventive Medicine
Government Medical College Srinagar
Jammu and Kashmir, India
IRSHAD AHMAD LONE
Senior Resident
Postgraduate Department of Surgery
Government Medical College Srinagar
Jammu and Kashmir, India
HILAL AHMAD DAR
Senior Resident
Postgraduate Department of Medicine
Government Medical College Srinagar
Jammu and Kashmir, India
BASHIR AHMED FOMDA
Additional Professor
Department of Microbiology
Sher-I-Kashmir Institute of Medical Sciences, Soura Srinagar
Jammu and Kashmir, India
KHURSHID IQBAL
Ex-Professor and Head
Department of Cardiology
Sher-I-Kashmir Institute of Medical Sciences, Soura Srinagar
Jammu and Kashmir, India

Abstract:

Background: *Infective endocarditis today is a different disease from that was seen in the pre-antibiotic era, by identifying these trends; Increased median age of patients, Increased ratio of*

males to females, Increased proportion of acute cases, Reduced incidence of some of the classical physical signs of advanced SABE, Decreased proportion of cases due to streptococci, with an increased incidence of staphylococci, Lengthened list of etiological organisms, with more report of cases by gram-negative bacilli, fungi or unusual microbes, Increased number of cases in intravenous drug users, Increased number of prosthetic valve infection, Increased incidence of concomitant HIV infection and endocarditis. ***Objectives:*** *To study the clinical, bacteriological and echocardiographic profile of infective Endocarditis.* ***Design:*** *A Prospective, hospital based study. Methods: Fifty patients of Infective Endocarditis (IE) were studied with respect to: 1) Past and present history. 2) General physical and systemic examination. 3) Routine laboratory work up.4) Blood cultures and serology. 5) Echocardiographic details 6) Complication profile.* ***Results****: Of the patients studied; 58 % were males and 42 % were females. Twenty six percent of the patients were above age of 40 years with 10% above age of 50 years (mean age of 36.4 years). Eighty two percent of patients had Native valve and 18% had Prosthetic valve IE. Rheumatic heart disease was observed in 54%, congenital heart diseases in 20%, 4% were intravenous drug abusers, 2% had pacemaker and 2 % had hemodialysis associated IE. Fever was recorded in 92%, 64% had palpitations ,anorexia and malaise in 40%, murmur in 90% , splenomegaly in 48 %, clubbing in 28 %, petechiae in 8%. Anemia was documented in 56%, leucocytosis in 36 % and raised ESR in 70%.Blood cultures were positive in 46% of cases. Staphylococcus aureus was isolated in 65.2% of culture positive cases. Of the culture negative cases; 70% had received antimicrobials prior to blood culture study and 11.11% were positive for brucella serology. Heart failure complicated 18% of cases and 16 % had embolism. Mitral valve was involved in 40% and aortic valve in 32%.* ***Conclusions:*** *Rheumatic heart disease is the commonest predisposing lesion followed by congenital heart disease and prosthetic valves. Fever is the commonest symptom and murmurs commonest sign. Staphylococcus aureus is the commonest organism isolated; brucella spp. is an important cause for culture negative Endocarditis. Heart failure and embolism are common complications. Transthoraxic Echocardiography documents vegetation in most of the cases.*

Key words: Infective Endocarditis, Prosthetic valve, Native valve

Introduction

Infective Endocarditis (IE) is defined as a microbial infection of the endocardial surface. Previously, IE was classified, according to its presentation, as acute, sub-acute or chronic.[1] The present classification refers to the activity of the disease and its recurrence rate, the diagnostic status (definite/possible), the anatomical site (left/right side), whether it is native valve IE (NVE) or prosthetic valve IE (PVE), and the microbiology of the disease (i.e., microorganism implicated and culture/serology/PCR/histology results). There is a decreasing proportion of NVE, probably because of a lower incidence of rheumatic valvular disease. Nowadays, NVE occurs mainly in patients with no previously known heart disease. Degenerative changes are thought to be the predisposing condition.[1,4,6,12] The valve affected most frequently is the mitral valve (45-50% of cases), followed by the aortic valve (35-39%) and the tricuspid valve (19%). Rarely, IE is found on the pulmonic valve (1.5-2%), or on extravalvular localisations such as a pacemaker lead, the atrial septum, ventricular wall, chordae tendineae or mural endocardium.[6,13-15]In cases of PVE, the aortic valve is involved more frequently.[11,16] Both the aortic and mitral valve are affected in 15% of cases, and at least 21% of cases have two sites infected simultaneously.[6,14]

The microbiology of IE depends on whether IE occurs on an native valve or prosthetic valve, and whether the disease is hospital or community acquired.[4,11,12] *Staphylococcus aureus*, *Streptococcus* spp. and *Enterococcus* spp. are responsible for >80% of all cases of IE. An important evolving trend is that *Staph. aureus* has emerged as the most common cause of IE, while rates of infection caused by *viridans* group streptococci

are decreasing.[6,10-13,16-19] Coagulase-negative staphylococci (CoNS) are the most frequent cause of early PVE, followed by *Staph. aureus* and *Enterococcus* spp. The microbiological aetiology of late PVE does not differ significantly from that of NVE, regardless of whether the cut-off is placed at 2 months or 1 year.In cases of intravenous drug abuse, the most frequent pathogens are *Staph. aureus*, *Pseudomonas aeruginosa* and fungi.[1,13] Polymicrobial IE is generally uncommon and occurs mostly in association with intravenous drug abuse.[1,3] In intravenous drug users infected with human immunodeficiency virus (HIV), the risk and mortality from IE rise inversely with the CD4 count (if <500 cells/μL) and the responsible pathogens are sometimes unusual, e.g., *Bartonella*, *Salmonella* or *Listeria*.[5]

Fever is an important criterion when following the evolution of IE. Fever often resolves within 2–5 days following the start of appropriate antibiotics for patients with less virulent pathogens, and defervescence occurs in 90% of patients by the end of the second week of treatment. Persistent fever beyond the first week often indicates the development of complications.[6,9,12,13] Congestive heart failure is the most common life-threatening complication and the principal cause of death in IE patients. In cases of congestive heart failure, the usual cause is infection-induced valvular damage; aortic valve infection is associated more frequently with heart failure than is mitral valve infection.[1,3] Other cardiac complications are cardiac rupture and tamponade, tunnels and fistulas, pseudo-aneurysms, ring abscesses, sinus of Valsalva aneurysms, pericarditis and myocarditis. Involvement of the conduction system, resulting in dysrhythmia, atrioventricular, fascicular or bundle-branch block, is more frequent in PVE and native aortic valve IE than in native mitral valve IE.[1,3]Embolism or fragments of vegetations may cause an acute myocardial infarction (coronary emboli).[13,22] Neurological complications

develop in 20-40% of cases, most of which are stroke or transient ischemic attacks. Other neurological manifestations include brain abscess, brain hemorrhages caused by aneurysm rupture or bleeding in the ischemic stroke, aseptic meningitis, toxic encephalopathy and seizures.[1,6,9,12,13] Possibility of embolic events is at a maximum during the first two weeks of IE, and becomes less with the longer duration of therapy.[17,22] Left sided IE may be complicated by systemic embolism and the central nervous system is involved most frequently. Other sites include spleen, kidney, liver, skin, iliac and mesenteric arteries. Mycotic aneurysms may involve any artery, i.e., aorta, cerebral arteries, visceral arteries and arteries of the extremities. [1,6,9,12,13]

The role of echocardiography and the morphological features of the vegetation in predicting embolisation remain controversial, but most studies conclude that vegetation size is correlated with the risk of embolisation and, in particular, large vegetations on the mitral valve, especially the anterior leaflet, are associated with a higher risk of embolisation than are vegetations of similar size elsewhere.[3,5,6,13,17,19,22-25]

The diagnosis of IE involves an integration of clinical, laboratory and echocardiographic data. The Duke criteria have replaced the Beth Israel or Von Reyn criteria because of a substantially higher sensitivity and negative predictive value, which is mainly attributed to the use of echocardiographic findings.[26-31] The Duke criteria have been shown to be highly specific for ruling out IE in patients with acute fever or fever of unknown origin [28.]Blood cultures are the most important laboratory diagnostic test, and also provide susceptibility test results for bacteria.[4,21] The current recommendation calls for at least three blood culture sets to be drawn from different peripheral venipuncture sites, irrespective of body temperature, within the first 24 h of admission, spaced at least 1 h apart, in order to differentiate IE from contamination. This procedure

can be repeated on the second day.[4,9,33] Blood cultures remain sterile in only 5–7% of cases.[8,20] Negative blood cultures are caused most frequently by antibiotic consumption within the previous 2 weeks.[1,26] Other reasons for culture-negative endocarditis are fastidious and difficult-to-cultivate microorganisms, such as the HACEK group, *Bartonella* spp., *Coxiella burnetti, Brucella* spp., *Legionella* spp., *Mycoplasma* spp. or intracellular pathogens.[1,33-36] PCR can be used to identify unculturable organisms in excised vegetations or systemic emboli, and is of particular value when no serological test is available, e.g., in the case of *Tropheryma whipplei.*[26,33,34,36] Serum should always be analysed for antibodies that can not be cultured.[20,32,33]In the case of severe sepsis, severe valvular dysfunction, conduction disturbances or embolic events, immediate empirical therapy is indicated after taking three blood cultures; this empirical therapy should later be adjusted according to the microbiological test results.[40 4]

Methodology

Our study was a prospective study, conducted in the Department of Cardiology and Microbiology Sher-i-Kashmir Institute of Medical Sciences, Soura Srinagar from May 2008 to October 2010. Fifty consecutive patients of Duke definite infective Endocarditis (IE) were selected in the study. Patients were evaluated in hospital and were followed for six weeks. The diagnosis was validated by Modified Duke Criteria [90,91] which is described as:

Definition of Terms in the Modified Duke Criteria

MAJOR CRITERIA

Blood culture positive for IE:

- Typical microorganisms consistent with IE from two separate blood cultures:
    - Viridians streptococci, *Streptococcus* bovis, HACEK group, *Staphylococcus* aureus; or Community-acquired enterococci ; in the absence of a primary focus; or
- Microorganisms consistent with IE from persistently positive blood cultures; defined as follows:
    - At least two positive cultures of blood sample drawn more than 12 hours apart; or all of three or a majority of greater than four separate cultures of blood (with first and last sample drawn at least 1 hour apart).
- Single positive blood culture for Coxiella burnetti or antiphase IgG antibody titer greater than 1:800.

Evidence of Endocardial Involvement

- Echocardiogram positive for IE (TEE recommended in patients with prosthetic valves, rated at least "possible IE" by clinical criteria, or complicated IE [para-valvular abscess]. TTE as first test in other patients), defined as follows:
    - Oscillating intracardiac mass on valve or supporting structures, in the path of regurgitant jets, or on implanted material in the absence of an alternative anatomic explanation; or abscess; or new partial dehiscence of prosthetic valve.
- New valvular regurgitation (worsening or changing of pre-existing murmur not sufficient).

MINOR CRITERIA

- Predisposition, predisposing heart condition, or injection drug use.
- Fever, temperature greater than 100.4^0F (38^0C).
- Vascular phenomena, major arterial emboli, septic pulmonary infarcts, mycotic aneurysms, intracranial hemorrhage, conjunctival hemorrhages, and janeway's lesions.
- Immunologic phenomena; glomerulonephritis, Osler nodes, Roth spots, and rheumatoid factor.
- Microbiologic evidence, positive blood culture but does not meet a major criterion, or serologic evidence of active infection with organism consistent with IE.
- Echocardiographic minor criteria eliminated.

Definition of Infective Endocarditis According to the Modified Duke Criteria

DEFINITE INFECTIVE ENDOCARDITIS

Pathologic Criteria

- Microorganisms demonstrated by culture or histologic examination of a vegetation, a vegetation that has embolized, or an intracardiac abscess specimen; or
- Pathologic lesions: vegetation, or intracardiac abscess confirmed by histologic examination showing active endocarditis.

Clinical Criteria

- Two major criteria; or
- One major criterion and three minor criteria; or
- Five minor criteria

POSSIBLE INFECTIVE ENDOCARDITIS

- One major criterion and one minor criteria; or
- Three minor criteria

REJECTED

- Firm alternate diagnosis explaining evidence of infective Endocarditis; or
- Resolution of infective Endocarditis syndrome with antibiotic therapy for less than 4 days; or
- No pathologic evidence of infective Endocarditis at surgery or autopsy, with antibiotic therapy for less than 4 days; or
- Does not meet criteria for possible infective Endocarditis, as noted above.

The detailed history of patients was taken, regarding presenting complaints, any surgical intervention including dental procedures, valve replacements, I/V drug abuse, prior history of Endocarditis, long term haemodialysis, PPM for pocket or generator infections, or cardiac catheterization. Past history was evaluated for RHD or non-rheumatic valvular heart disease. Patients were subjected to detailed general physical examination and systemic examination which included examination of cardiovascular system, respiratory system, abdominal examination, musculoskeletal system, nervous system and fundus examination. Patients were evaluated and investigated extensively and following investigations were done;

1. Complete blood count including differential cell count, platelet count, and erythrocyte sedimentation rate. Peripheral blood films were examined for anemic patients.
2. Chest x-ray P/A view.
3. 12-lead Electrocardiogram.
4. Serum chemistry particularly liver function tests and serum creatinine.
5. Tests like, complement levels, antinuclear antibody, rheumatoid factor were done for selected patients.

6. Serology/PCR was done for those patients who had culture negative Endocarditis, for fastidious organisms like Brucella.
7. HIV serology for all patients.
8. Ultrasound examination for abdomen.
9. Complete urine examination for casts, hematuria or pyuria.
10. CT scan, coronary or peripheral arterial angiography was done in selected patients who had high clinical suspicion of complications.
11. Blood cultures: for growth of microorganisms and sensitivity to drugs were drawn from all patients.

Method (Blood culture) : Samples were drawn from different vein puncture sites preferably from antecubital veins, after the puncture site was cleaned with 70% alcohol and then allowed to dry before samples were taken. A total of 3 sets (2 bottles each set) of blood cultures were drawn from each patient separated from each other by 1 hour over first 24 hours of admission. Sample size for each culture bottle was 10ml for adults and 5ml for children. Sterile gloves were worn before aspiration. The blood was poured in the culture broth bottles by piercing the lid. The bottles were shaken gently. If cultures remained sterile after 72 hours of admission, two additional blood culture sets were obtained by same technique. The samples were incubated at a constant temperature of 37^0C for 24 hours and subculture on blood and Mckonkey's agar after 48 and 72 hours. The cultures were examined by the microbiologist at 24 then 48 and 72 hours for any growth. The cultures were closely watched for growth of organisms for a week before being finally discarded as culture negative.

12. Echocardiography:

All patients were subjected to 2D transthoraxic echocardiography. All echocardiographs were taken in left decubitus position. Multiple transducer angulations were used

to examine the heart from all available echocardiographic windows including subxiphoid and apical positions. Positive echocardiographic findings were documented and results were summarized as defined in Duke criteria.

Results

Table – 1 Shows age and sex distribution of cases studied; there were 29 (58%) males and 21 (42%) females.

Age in Years	Total No. of Cases	Percentage	Male	Female
10 – 20	6	12	2	4
21 – 30	17	34	12	5
31 – 40	14	28	6	8
41 – 50	8	16	6	2
51 – 60	5	10	3	2

Table – 2 Shows underlying predisposing factors in our study. Of the fifty patients, 27 (54%) had underlying rheumatic heart disease, 10 (20%) had congenital heart disease, 9 (18%) had prosthetic valves and 4 (8%) had normal.

Underlying heart disease	Total No. of cases	%age	Male	Female
Rheumatic heart disease	27	54	16	11
Congenital heart disease	10	20	5	5
Prosthetic valves	9	18	5	4
Normal vales	4	8	3	1

Table – 3 Shows Patients with underlying RHD with various valve lesions: 12 (44.44%) had mitral stenosis with mitral regurgitation, 4 (14.81%) had purely mitral stenosis, 2 (7.4%) had purely mitral regurgitation, 2 (7.4%) had aortic stenosis with mitral regurgitation, 3 (11.11%) had mitral regurgitation with aortic regurgitation, 2 (7.4%) had aortic stenosis with aortic regurgitation.

Type of lesions	No. of Cases	%age (n =27)	Male	Female
Mitral stenosis with mitral regurgitation	12	44.44	8	4
Mitral stenosis	4	14.81	1	3
Mitral regurgitation	2	7.40	1	1
Aortic stenosis/Mitral	2	7.40	2	0

regurgitation				
Mitral regurgitation/ Aortic regurgitation	3	11.11	21	2
Aortic regurgitation / Aortic stenosis	2	7.40	1	1
Aortic regurgitation / Mitral stenosis	2	7.40	2	0

Table – 4 Shows incidence of various lesions of Congenital heart disease (CHD) 4 (40%) had Bicuspid aortic valve disease, 1 (10%) had VSD and 5 (50%) had pulmonic stenosis as the predominant cardiac lesions.

Type of Heart Lesion	**No. of Cases**	**%age (n = 10)**	**Male**	**Female**
Bisuspid aortic valve disease	4	40	3	2
VSD	1	10	1	0
Pulmonic stenosis	5	50	2	3

Table – 5 Shows Valve involvement in prosthetic valve IE: 6 patients had aortic valve involvement and 3 had mitral valve involvement.

Valve Involved	**No. of Cases**	**%age**	**Male**	**Female**
Aortic valve	6	66.66	4	2
Mitral valve	3	33.33	1	2

Table – 6 Shows incidence of various risk factors for normal valve endocarditis in our study 2 were IV drug abusers, 1 was CKD on long term hemodialysis and 1 had permanent pacemaker related endocarditis (PME).

Valve Involved	**No. of Cases**	**%age**	**Male**	**Female**
I/V drug abusers	2	50	2	0
CKD on HD	1	25	0	1
PME	1	25	1	0

Table – 7 Incidence of various symptoms of I. E in our series46 (92%) of patients had fever, 20 (40%) had anorexia and malaise, 32 (64%) had palpitations, 7 (14%) had arthralgias, 18 (36%) had breathlessness, 8 (16%) had orthopnea, 3 (6%) had headache and 3 (6%) had chest pain at the time of presentation.

Symptoms	**No. of Cases**	**Percentage**
Fever	46	92
Anorexia Malaise	20	40
Palpitation	32	64
Arthralgias	7	14
Breathlessness	18	36

Orthopnea	8	16
Headache	3	6
Chest pain	3	6

Table – 8 Shows Incidence of various Signs of I/E in our series of 50 cases45 (90%) had murmur on auscultation, 24 (48%) had spleenomegaly, 14 (28%) had clubbing in digits, 9 (18%) had raised JVP, 7 (14%) had pedal edema, 4 (8%) had petechiae, 4 (8%) had hepatomegaly, 3 (6%) had rash, 3 (6%) had splinter hemorrhage, 2 (4%) had Roth's spots documented on fundus examination, 2 (4%) had Osler's nodes and 1 (2%) had Janeway's lesions and 1 (2%) had cyanosis.

Clinical signs	**No. of Cases**	**Percentage**
Clubbing	14	28
Splinter haemourages	3	6
Janeway's Lesions	1	2
Roth's spots	2	4
Osler's nodes	2	4
Petechiae	4	8
Rash	3	6
Murmur	45	90
Spleenomegaly	24	48
Hepatomegaly	4	8
Raised JVP	9	18
Pedal edema	7	14
Cyanosis	1	2

Table – 9 Incidence of various microorganisms as causative agents in cases studied, 23 (46%) had culture positive IE and 27 (54%) of patients had cultures negative for causative organism. Of the cultures positive cases, 15 (65.2%) cases had staphylococcus aureus, 1 (4.34%) had staph. epidermidis, 1 (4.34%) had E-coli, 1 (4.34%) had salmonella typhi, 3 (13.04%) had acinetobacter spp. 2 (8.69%) had streptococcus viridians .

Organism Isolated	**Positive Cases (23)**	**Percentage 46%**
Staphylococcus aureus	15	65.21
Staphlococcus epidermidis	1	4.34
Streptococcus viridians	2	8.69
Acinetobacter	3	13.04
E.Coli	1	4.34
Salmonella typhi	1	4.34

Table – 10 Showing effect of prior antibiotic therapy on culture results. Prior antibiotic use was found in 70% of patients with culture negative results.

Case Description	No. of Cases	Culture positive cases	Percentage
Patients treated outside with antimicrobials before cultures were drawn.	23	4	17.39
Patients who had not received antibiotics prior to blood cultures	27	19	70.37

Table – 11 Showing percentage prevalence of various laboratory parameters anaemia was present in 28 (56%) of cases. Of these 28 cases, 21 (71.4%) had mild anaemia, 7 (25%) had moderate to severe anaemia and 1 (3.57%) had severe anaemia and required blood transfusion. Of the 50 cases studied 18 (36%) had leucocytosis and 35 (70%) had raised erythrocyte sedimentation rate.18 (36%) out of 50 had microscopic hematuria on routine urine examination thereby suggesting glomerulonephritis as shown in table.

Laboratory Parameters		Cases Studied	No. of Cases	Percentage
Anaemia		50	28	56
Haemoglobin (g/dl)	< 5	28	1	3.57
	5 – 7	28	7	25.0
	8 – 11	28	20	71.4
Leucocytosis		50	18	36.0
TLC in 1000/□l	11 – 15	18	15	83.33
	> 15	18	3	16.33
Raised ESR		50	35	70.0
ESR in mm/hr	21 – 40	35	27	77.14
	> 41	35	8	22.28
Hematuria		50	18	36.0

Table – 12 Showing percentage prevalence of various complications in our study group Of the 50 patients studied, 8 (16%) had embolic complications, 4 (8%) had pericardial effusion on 2D Transthoracic echocardiography {TTE}, 4 (8%) patients had renal failure and 9 (18%) had heart failure as shown in table.

Complications		Cases Studied	No. of Cases	Percentage
Heart failure		50	9	18
Embolism		50	8	16
	Stroke	8	3	37.5
	AMI	8	2	25

	Peripheral embolism	8	3	37.5
Pericardial effusion		50	4	8
Renal failure		50	4	8

Table – 13 Shows echocardiographic results of our study studied 2D TTE was done over all patients vegetations were seen in 46 (92%) of patients. 4 patients required TEE for diagnosis of definite I.E.

Results	**No. of Cases**	**Percentage**
Vegetation seen on TTE	46	92
TEE	4	8
No. of cases with MV vegetation	20	40
No. of cases with aortic valve vegetation	16	32
No. of cases with TV vegetation	2	4
No. of cases with PV vegetation	3	6
No. of cases with prosthetic valve vegetation	9	18
Aortic prosthetic valve involvement	6	66.33
Mitral prosthetic valve involvement	3	33.33

Discussion

Of the 50 cases studied 29 (58%) were males and 21 (42%) were females. Male to female ratio was 1.3:1. Majority (34%) of the patients were in the age group of 21-30 years, followed by 28% in the age group of 31-40 years, 16% in the age group of 41-50 years, 12% from 10-20 years and 10% in 51-60 years. Mean age of the patients was 36.4 years. Lerner and Weinstein studied 100 patients of I.E. found 69 males, and 31 females. Naveed Ullah Khan et al, studied changing trends in IE on 75 patients of definite I.E. He noticed 55 (70%) males and 20 (30%) females. Chang Han Lee et al noticed 70% men. K. J. Suleiman et al, studied pattern of infective endocarditis, noticed male to female ratio of 1.2:1. Jaffar A.

Our study demonstrated 27 (54%) had underlying rheumatic heart disease (RHD), 10 (20%) had congenital heart disease (CHD), 9 (18%) had prothetic valves and 4 (8%) had normal valves. The incidence of rheumatic fever has fallen over past two decades in industrialized nations. This decline was largely attributed to improved living conditions. The high

prevalence of RHD in our part of world is probably the reason as the most common predisposing factor of I.E. in our series of 50 patients. RHD continues to be the most common predisposing condition in many studies particularly from Indian sub-continent. H. Hricak et al studied etiology and outcome in 53 cases of I.E. found RHD in 56% of patients studied. Naveen Garg et al , found RHD in 46.9% in 192 patients of Duke definite endocarditis in India. Rajab Chowdhary et al, studied active I.E. from 186 with 190 episodes of I.E. over a period of 10 years at a large referral hospital in northern India found RHD, as the most frequent underlying heart lesion in 42% of patients, followed by CHD in 33% of patients, NVE in 9% and PVE in 2 patients. Allyn Tugcu noticed RHD in 39.3% and PME in 2.9%

Of the 50 patients of definite I.E. commonest symptoms and signs noticed were; Fever in 46 (92%) of patients, anorexia and malaise in 20 (40%) of patients, palpitation in 32 (64%) of patients, arthralgias in 7 (14%) of patients and breathlessness in 18 (36%).Forty five (90%) had murmur, spleenomegaly in 14 (28%), clubbing in 9 (18%) and splinter hemorrhage in 2 (4%) of patients. Naveed Ullah et al noticed, fever, shortness of breath, weight loss, murmur and splenomegaly as the commonest symptoms and signs in his study over 75 definite I.E. patients. Naveen Garg et al, found fever in 90%,clubbing in 58%,spleenomegaly in 60.6% and neurological symptoms in 16.6%. K. J. Suleiman et al, noticed murmur in 98% and fever in 96% of patients. Pankey analyzed 221 patients of bacterial endocarditis found murmurs in 99.5%, fever in 95% and petechiae in 70%. Robinvich analyzed 141 patients of I.E., found murmur in 96%, petechiae in 48%, splenomegaly in 43%, arthralgias in 25%, Osler's nodes in 16% and clubbing of digits in 15%.Jones studied 365 patients of I.E., found neurological symptoms in 65% of patients. Johnson studied 149 episodes of endocarditis, found fever in 87% of patients, splenomegaly in

65%, petechiae in 42%, splinter haemorrhages, Roths spots, janeways lesions and Oslers nodes were present in 7%, 4%, 4% and 5% respectively. Robinovich noticed fever in all (100%) murmur in 96%, arthralgias in 25% and clubbing in 15%.

Fanky analyzed 221 patients found anaemia in 64% of patients raised ESR in 94% of patients. Of the 50 patients studied complication were seen in 25 (50%) of patients. This included heart failure in 9 (18%), embolism in 8 (16%), pericardial effusion in 4 (8%) and renal failure with serum creatinine of >2mg/dl in 4 (8%) of patients. Naveen Garg et al found anaemia in 81% Jaffar A Al-Tawfiq noticed embolic stroke in 5.5%, C Loupa noticed embolic complication in 27%, Mohammad Fariq in 10%, Franky Thuny in 34%, David R, reported embolic stroke in 16.9% heart failure in 32.3% and embolisation in 22.6%. Aylin Tugcu reported CHF in 55.9% patients of I.E. Naveen Garg et al found CHF in 41.9%, Renal failure in in 13.1% and embolism in 23.1%.

Of the 50 case studied 23 (46%) had blood cultures positive for the organisms while 27 (54%) of patients had negative cultures. Of the 27 culture positive cases, 3 (11.11%) had high titres (1:320) for Brucella. Of the 50 patients studied 23 (46%) had received antibiotics before reaching our hospital. Only 4 (17.39%) cases of this group yielded positive blood cultures. Twenty seven (54%) of patients had no antibiotic intake, and 19 (70.37%) yielded positive blood culture.One reason for less number of positive blood cultures in our series of patients could be prior antibiotic therapy before cultures were drawn for study. Of the 23 culture positive cases, 15 (65.12%) had staph aureus, acinetobacter in 3 (13.04%), streptococcus viridans in 2 (8.69%), staph epidermidis,streptococcus viridians and E. coli in 1 (4.34%) case each. Streptococcus and staphylococci are the cause of more than 80% of I.E. Staphylococcus aureus causes 80 to 90 percent of staphylococcal endocarditis and is most common cause for acute endocarditis.

Emerging data from International Consortium on Endocarditis (ICE) suggest that S.aureus has become the leading cause of IE worldwide.Of the 15 cases of staph aureus endocarditis, 9 (60%) cases were methicillin resistant and 6 (40%) cases were methicillin sensitive.Christain Spies et al found staphylococcus aureus as the predominant organism in 20 (50%) of 40 cases. Naveed Ullah Khan et al found staphylococcus in 52.5% and streptococcus in 27.5%. Emannele Durant-e-Mangoni et al found staphylococcus aureus as the leading cause of I.E. in elderly patients.S. Ciclan et al studied 169 episodes of I.E, Staphylococcus and streptococcus were most commonly isolated organisms.

TTE revealed vegetation in 46 (92%) of cases and 4 patients were subjected to TEE for diagnosis of definite I.E. Twenty (40%) of patients had mitral valve vegetation, M.V. was the commonest valve diseased. Sixteen (32%) of patients had aortic valve vegetation.Tricuspid valve was involved in 2 (4%) of patients and pulmonic in 3 (6%) of patients. Naveen Garg studied infective endocarditis in developing country over 192 episodes found vegetations in 89.9%. TTE has limited sensitivity for the detection of vegetation (65%) and intracardial abscess (30%).[115,116] TTE has high specificity for detection of vegetation (98%).[116] Christain Spies et al found MV diseased in 73% and AV in 20%. F. Delahage et al while studying 415 cases of I.E. noticed vegetations on MV in 39% and AV in 36% and on tricuspid valve in 8%. K. J. Suleiman et al noticed vegetations in 80% of his study group.

Summary and conclusion

- I. E is common among males, with a male female ratio of 1.38:1.

- Most common age group affected is less than 40 years (76%) with significant shift towards older group with 10% of patients more than 50 years of age.
- Most common predisposing factor continues to be rheumatic heart disease followed by congenital heart disease and then prosthetic valves.
- Most common symptom is fever and most common sign observed is murmur. Other common findings are; clubbing and spleenomegaly.
- Anaemia, raised ESR, lecocytosis and microscopic hematuria are the common laboratory findings in these patients.
- Cultures are negative for maximum (54%) of patients.Cause for culture negative results is prior antibiotic use and fastidious organisms like brucella spp.
- Most common cause in culture positive cases is staphylococcus aureus found in 65% of patients.
- Sixty percent of staph aureus isolates are methicillin resistant.
- There are significant number of cases (6%) due to acinetobacter.
- Heart failure is the commonest complication followed by embolism.
- Complications are most commonly found in S. aureus aortic valve disease.
- Most commonly affected valve is mitral valve and then aortic valve.
- Tricuspid valve endocarditis is a less common entity with intra venous drug abuse as commonest risk factor.
- Two dimensional Transthoracic echocardiography is a good initial tool and detects vegetation in most of the cases.

- Response to treatment (empirical/sensitivity guided) is good with least number of cases requiring modified/ altered regimens.

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