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RESEARCH ARTICLE

CLINICAL PROFILE OF MAJOR EMBOLIC COMPLICATIONS IN INFECTIVE ENDOCARDITIS AT A TERTIARY CARE HOSPITAL IN NORTH INDIA

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ABSTRACT

Background: Embolism is a dreaded complication of Infective Endocarditis (IE). Embolism may cause an acute myocardial infarction (AMI). (Cecchi *et al.*, 2004; Deprele *et al.*, 2004) Neurological complications develop in 20-40% of cases, most of which are stroke or transient ischemic attacks. Central nervous system (CNS) involvement is most common; stroke comprises up to 65% of embolic events and may be the presenting sign of I.E. in up to 14% of cases (Jones and Sickert, 1989), Up to 90% of CNS emboli lodge in the distribution of Middle cerebral artery and carry a high mortality rate (Pruitt *et al.*, 1978).

Objectives: To study the major embolic complications in definite infective Endocarditis patients.

Design: A Prospective hospital based study conducted over a course of three years on fifty consecutive cases of definite infective Endocarditis.

Methods: Fifty patients of Infective Endocarditis (IE) were evaluated and studied for prevalence of major embolic complications during treatment in hospital and six weeks follow up.

Results: Of the patients studied (n=50), 29 (58 %) were males and 21 (42 %) were females. Embolic complications were documented in 8 (16%) of patients: 3 (37.5%) had stroke, 3 (37.5%) had peripheral embolism most commonly to femoral and popliteal vessels and 2 patients developed embolic MI.

Conclusions: Embolism is a common complication in IE, embolism most commonly involves CNS and peripheral vascular system. Coronary emboli may cause AMI.

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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. (Nunley and Perlman, 1993) 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).

(Horstkotte *et al.*, 2004) PVE is classified as early or late, depending on when infection occurs: early PVE occurs within 2 months of surgery; late PVE occurs at least 12 months after surgery and intermediate PVE occurs between 2-12 months after surgery. (Mylonakis and Calderwood, 2001; Devlin *et al.*, 2004; Moreillon and Que, 2004; Mouly *et al.*, 2002) Nosocomial IE is defined as IE that occurs more than 72 hours after admission to a hospital, or within 4-8 weeks of a hospital based invasive procedure, (Devlin *et al.*, 2004; Ben Ami *et al.*, 2004; Haddad *et al.*, 2004) although it has been proposed that this definition should be extended to include episodes occurring within 6 months of discharge. (Ben Ami *et al.*, 2004; Fefer *et al.*, 2002) The epidemiological features of NVE are changing as a result of increased longevity, which has given rise to more

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degenerative valvular disease, increased placement of prosthetic valves, and increased exposure to the possibility of nosocomial bacteraemia and long-term haemodialysis. (Devlin *et al.*, 2004; Cabell *et al.*, 2002; Loupa *et al.*, 2004; Hoen *et al.*, 2002; Cecchi *et al.*, 2004) The mean age in IE series varies between 36 and 69 years, and the incidence increases with age. The male to female ratio is 2:1, with a median incidence of IE in the population of 3.6/100 000/year. (Devlin and Andrews, 2004; Mouly *et al.*, 2002)

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. (Werner *et al.*, 2003; Durack *et al.*, 1994; Hoen *et al.*, 1996; Hoen *et al.*, 1995; Dodds *et al.*, 1996; Andres *et al.*, 2003) The Duke criteria have been shown to be highly specific for ruling out IE in patients with acute fever or fever of unknown origin (Hoen *et al.*, 1996).

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 burnetii* 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°F (38°C).
- 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^{90, 91}

DEFINITE INFECTIVE ENDOCARDITIS

Pathologic Criteria

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

Clinical Criteria

- Two major criteria; or
- 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.

MATERIALS AND METHODS

A Prospective study conducted in the department of cardiology Sher-i-kashmir Institute of medical sciences Srinagar, Kashmir. Fifty consecutive patients of definite infective Endocarditis were enrolled for study admitted in the hospital from July 2008 to January 2011. Diagnosis was validated by modified duke criteria; study population included all age groups. Individuals not fulfilling the criteria were excluded from study. Patients were studied in the hospital with respect to complete clinical history, general physical and systemic examination. Investigations included complete blood count, ESR, kidney function tests, liver function tests, urine examination, chest X-ray, electrocardiogram, arterial blood gases and electrolytes, blood cultures as per guidelines and

echocardiography. Additional investigations like neuroimaging, Doppler study, and peripheral/ coronary angiography was done in selected patients where pre-test probability of embolism was high on clinical suspicion. All these patients enrolled for study were evaluated in hospital during the course of treatment and on minimum six weeks follow up for possible embolic complications.

RESULTS

Our study consisted of 50 patients of definite infective Endocarditis (IE), there were 29(58%) males and 21(42%) females. The distribution of cases in various age groups :

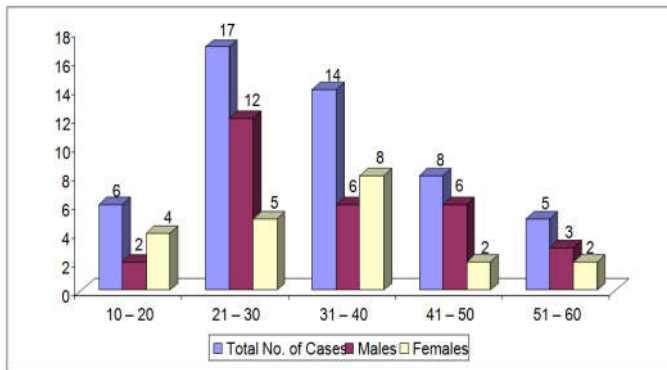
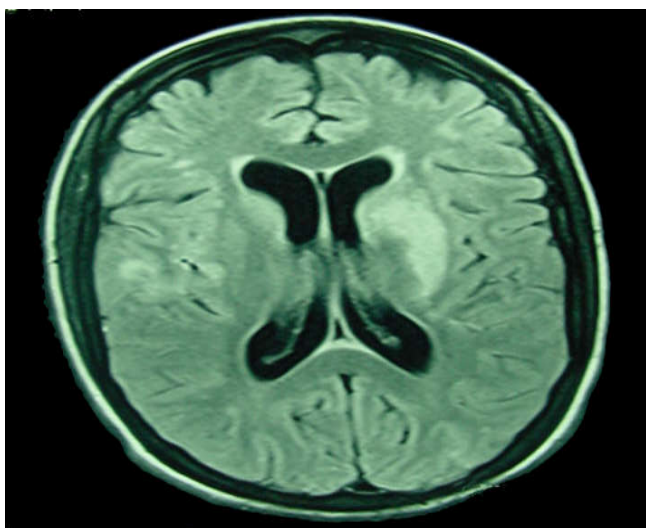
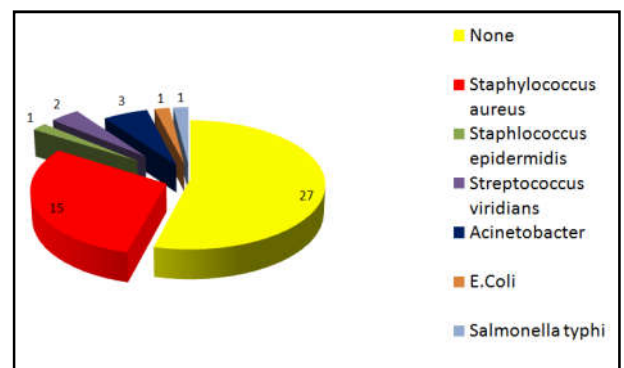
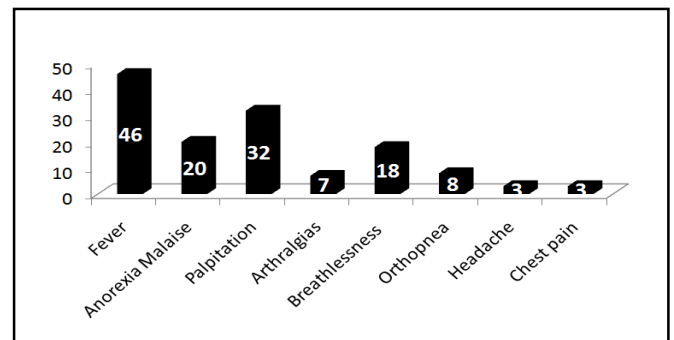
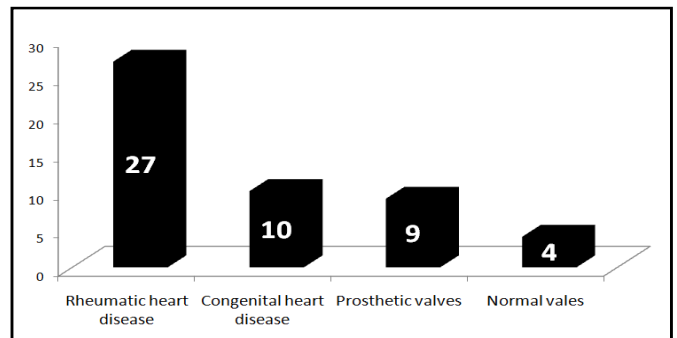
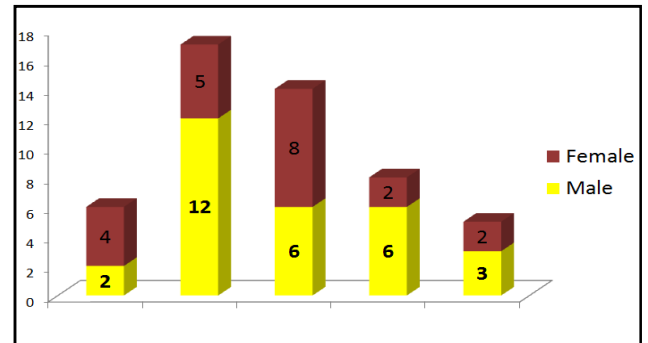
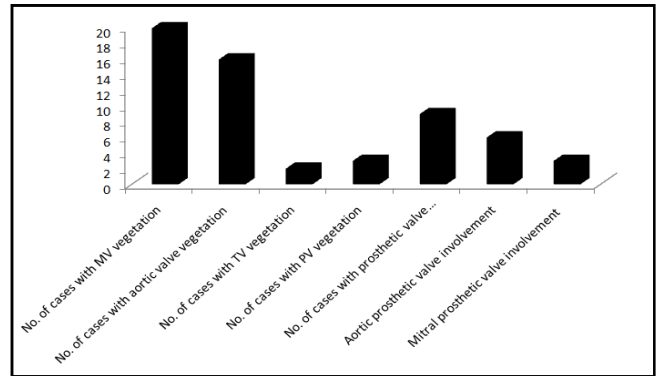
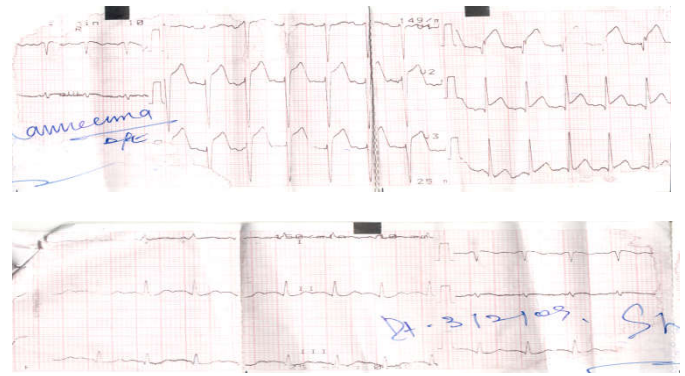
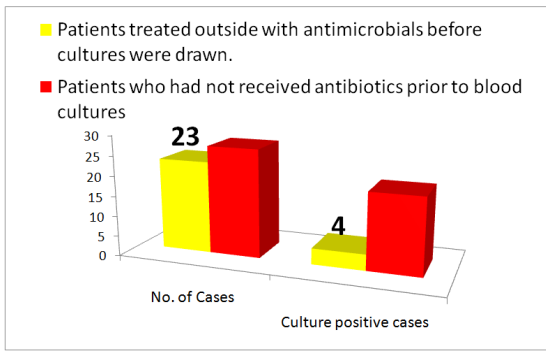


Table 1. Percentage prevalence of various complications in our study group

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



MRI brain showing embolic infarct in a patient of mitral valve Endocarditis



Embolic myocardial infarction in a young female with mitral valve Endocarditis

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

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. 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%.

Conclusion

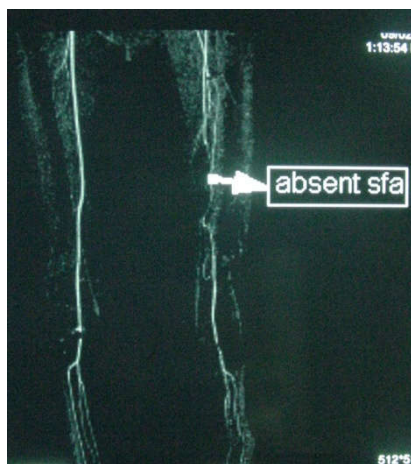
1. I. E is common among males, with a male female ratio of 1.38: 1.
2. Heart failure is the commonest complication followed by embolism.
3. Complications are most commonly found in S. aureus aortic valve disease.
4. Most commonly affected valve is mitral valve and then aortic valve.
5. Embolism to coronary artery can cause Acute myocardial infarction.

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CT Angio showing embolism to femoral artery in aortic valve Endocarditis



Peripheral embolism in aortic valve vegetation

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