

CARDIAC EVALUATION OF PATIENTS WITH ISCHEMIC STROKE

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ABSTRACT

Objective: To identify the commonest potential cardiac sources of embolism in patients with ischemic stroke.

Methodology: This hospital based descriptive case study was conducted at Khyber Teaching Hospital, Peshawar from November 2009 to December 2010 on 150 patients with first ever ischemic stroke. Patients were selected on convenient sampling technique. All patients with the clinical diagnosis of acute stroke and confirmed by non-contrast Computerized Tomography (CT) scan of brain as ischemic stroke were recruited in the study. Trans-thoracic and Trans-esophageal echocardiography were performed in selected patients in the Cardiology Department. A questionnaire was designed comprising detailed history, general physical examination, neurological, cardiovascular examinations and relevant investigations. Data was analyzed by SPSS windows version 17.

Results: Study included 150 patients (88 male and 62 female) ranging in age from 18-85 years with mean age of 60 years \pm 11.20 years. Potential cardiac sources of embolism were present in 45 (30%) patients. Twenty (13.33%) patients had atrial fibrillation due to rheumatic heart disease, 13(8.67%) patients non-valvular atrial fibrillation, 04(2.66%) patients myocardial infarction at the time of stroke, 03(2%) patients had dilated cardiomyopathy, 02(1.33%) patients infective endocarditis and one patient each had mitral valve prolapse (0.67%), prosthetic heart valves (0.67%) and left ventricular aneurysm (0.67%).

Conclusion: Potential cardiac sources of cerebral embolism were detected in about one third of patients with ischemic stroke. Atrial fibrillation was the commonest cardiac source of embolism reflecting a high prevalence of rheumatic fever and rheumatic heart disease in our country.

Key Words: Ischemic Stroke, Cardiac Embolism, Atrial Fibrillation.

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INTRODUCTION

Stroke is a clinical syndrome characterized by rapidly developing symptoms and or signs of focal and at times global loss of cerebral functions, with symptoms lasting more than 24 hours or leading to death, with no apparent cause other than that of vascular origin¹. Stroke is a major cause of mortality, morbidity with disability and social dependence worldwide². In the developed countries, stroke is the 3rd common cause of death after ischemic heart disease and all cancers. According to WHO estimates for year 2020, stroke will remain the 2nd leading cause of death along with Ischemic Heart Dis-

ease (IHD) both in developing countries and developed world³.

From 2000-08, the overall stroke incidence rates in low to middle income countries have exceeded the incidence rate in high income countries by 20%⁴. Stroke may be due to cerebral ischemia causing infarction or intracerebral hemorrhage. In developed countries, about 85-90% of strokes are due to cerebral infarction⁵. The hospital based studies conducted in Pakistan revealed 21% to 39% cases of stroke due to cerebral hemorrhage and 61-79% due to ischemia in centers where facilities for Computerized Tomography (CT) scan or Magnetic Resonance Imaging (MRI) are available⁶⁻⁸.

Cerebral infarction may be due to thrombotic occlusion of cerebral circulation or embolic occlusion. Embolization is either from artery to artery or from a cardiac source. About 20% of all ischemic strokes are due to cardio embolic events⁹. The Trial of Org 10172 in Acute Stroke Treatment (TOAST) study¹⁰ defined the cardiac abnormalities as high risk or medium risk for embolization. The high risk cardiac abnormalities are atrial fibrillation, prosthetic heart valves, rheumatic heart disease, bacterial endocarditis, atrial myxomas and dilated cardiomyopathy. Medium risk abnormalities included myocardial infarction and left ventricular thrombus. Other car-

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diac risk factors for stroke, the significance of whom is not very clear are patent foramen ovale, atrial septal defect, mitral valve prolapse and mitral annular calcification¹¹. The purpose of this study was to identify the commonest potential cardiac sources of embolism (if any) in patients with ischemic stroke.

METHODOLOGY

This hospital based descriptive case series study was conducted in the Department of Medicine, Khyber Teaching Hospital, Peshawar from November 2009 to December 2010. Patients were selected on convenient sampling technique.

Inclusion criteria for the study were

- Patients with first ever stroke according to WHO definition¹ “A clinical syndrome consisting of rapidly developing clinical signs of focal (or global in case of coma) disturbance of cerebral function lasting more than 24 hours or leading to death with no apparent cause other than a vascular origin”.
- Ischemic stroke, confirmed on CT scan brain.
- patients of either gender.
- age > 18 years and
- admitted in the Department of Medicine, Khyber Teaching Hospital, Peshawar.

Exclusion criteria were

- patients with recurrent stroke,
- patients with hemorrhagic stroke
- patients with stroke mimicking condition like brain tumor, cerebral abscess, tuberculomas and trauma.
- Patients with stroke lasting more than seven days.

A detailed history of patients was taken and general physical, neurological and cardiovascular examinations were carried out at the time of admission. History of previous medical problems and cardiac diseases was noted. History was taken from patient himself or from a valid surrogate respondent (in case of aphasia or altered conscious state). A valid surrogate respondent was a spouse or first degree relative of patient who was living in the same home or was aware of the patient's past medical history and current treatment.

CT brain of each patient was performed by Radiology Department, KTH, Peshawar. Contrast was not given routinely. CT examination of the patients was performed within 24 hours of hospital admission. Trans-thoracic and Trans-esophageal echocardiography were performed in selected patients in the Cardiology Department KTH, Peshawar. Statistical analysis of the results was performed by utilizing SPSS version 17.

RESULTS

Out of 150 patients, 88 (58.66%) were male and 62 (41.34%) were female. Male to female ratio was 1.42:1. Mean age of presentation was 60 ± 11.20 years and ranged from 18-85 years. The patients were divided in four different age groups (Figure 1). Age group I comprised of patients between 18-30 years of age and consisted of 15 patients. Majority (68/150) were in age group III comprised of patients between 51-70 years of age. Potential cardiac sources of embolism were present in 45 (30%) patients (Table I). Out of these 45 patients, 20(13.33%) had atrial fibrillation due to rheumatic heart disease and 13 (8.67%) patients had non-valvular atrial fibrillation. Four (2.66%) patients had myocardial infarction at the time of stroke.

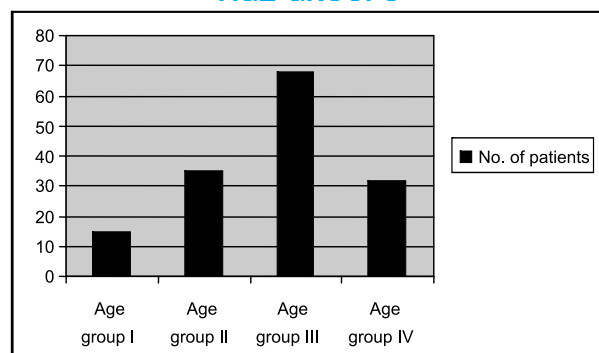
Atrial fibrillation due to rheumatic heart disease was the dominant potential cardiac source of embolism found

POTENTIAL CARDIAC SOURCES OF CEREBRAL EMBOLISM

Sources of cardiac emboli	Frequency (n = 150)	%age
Atrial fibrillation due to rheumatic heart diseases	20	13.3
Nonvalvular Atrial fibrillation	13	8.67
Myocardial Infarction	4	2.67
Dilated cardiomyopathy.	3	2
Infective endocarditis	2	1.3
Mitral valve prolapse,	1	0.67
Prostatic heart valves	1	0.67
Left ventricular aneurysm	1	0.67

Table I

DISTRIBUTION OF PATIENTS IN DIFFERENT AGE GROUPS



Group 1: 18-30 years; Group II: 31-50 years; Group III: 51-70 years; Group IV: >70 years

Fig. 1

PATIENTS WITH AND WITHOUT POTENTIAL CARDIAC SOURCES OF EMBOLISM

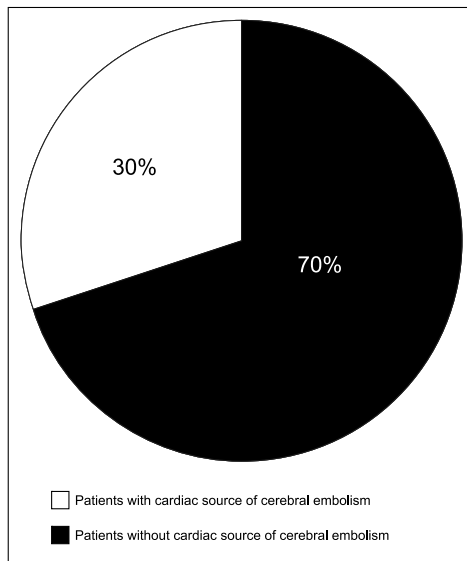


Fig. 2

in age group I and was present in 12(8%) patients. One patient each had infective endocarditis (0.67%) and non-valvular atrial fibrillation (0.67%). In age group II, again atrial fibrillation due to rheumatic heart disease was predominant and present in 8 (5.33%) patients. Four (2.67%) patients had non-valvular atrial fibrillation. One patient each had myocardial infarction (0.67%), mitral valve prolapse (0.67%), infective endocarditis (0.67%) and prosthetic heart valves (0.67%). Non-valvular atrial fibrillation was the main cardiac source found in age group III and was present in 05(3.33%) patients. Dilated cardiomyopathy (1.33%) and myocardial infarction (1.33%) was documented in 02 patients each and one patient had left ventricular aneurysm (0.67%). In age group IV, non-valvular atrial fibrillation was found in 3(2%) patients and one patient each had dilated cardiomyopathy (0.67%) and myocardial infarction (0.67%). Only one patient out of 33 with atrial fibrillation (AF) was anticoagulated but ineffectively as target INR (2.5-3.0) was not achieved.

DISCUSSION

Stroke is currently the third leading cause of death in the developed world surpassing heart diseases and malignancies respectively¹². As there is no definite treatment and only supportive therapy is available, so the prevention of stroke becomes an important aspect. Many of the cardiac diseases causing cerebral embolism can be treated and managed medically to prevent the catastrophic events of stroke. This study was conducted with a view to ascertain the frequency of any potential cardiac source of embolism in patients presenting with ischemic stroke.

This study included 150 patients of ischemic stroke and the potential cardiac sources of embolism were present in 45 (30%) patients. It is comparatively a higher

percentage to that of developed countries where it is reported to be 20%.

There may be several possible reasons for this high percentage of patients. The incidence of rheumatic heart disease is quite high in our country as compared to developed ones^{13,14}. In our study quite a large number of patients had atrial fibrillation due to rheumatic heart disease as the predominant cardiac source of embolism. Rheumatic fever and rheumatic heart disease are very uncommon in the developed countries nowadays¹⁵.

Due to better health care system, various cardiac diseases causing cerebral embolism are detected early and are better managed in the developed countries^{16,17}. Patients with AF and other cardiac conditions which could lead to thrombus formation and cerebral embolism are properly anticoagulated in the developed world^{18,19}. On the contrary, our study showed that none of the patients with AF was properly anticoagulated.

Most studies from the developed world documented potential cardiac sources of embolism in 20% of all stroke patients including cerebral and subarachnoid hemorrhages²⁰⁻²². A local study also reported 22% frequency of cardiac risk factors in patients with ischemic and hemorrhagic stroke²³.

In our study, potential cardiac sources of embolism were found in 30% of ischemic stroke patients excluding cerebral and subarachnoid hemorrhages. This finding is comparable with national studies²⁴.

Atrial fibrillation due to rheumatic heart diseases stood out as the major cardiac source of embolism leading to stroke in our study. This finding is higher than that of Kaul S¹⁶ (6%), Alam I²⁵ (12%), Janet L²⁶ (3%) and Flemming KD²⁷ (2%) but lower than Amin R²⁸ (23%). Interestingly, out of 33 patients with atrial fibrillation either due to rheumatic heart disease or non valvular causes, only one patient was anticoagulated. Target INR (2.5 – 3) was not achieved and that patient ended up in cerebral embolism and stroke. Small number of patients and patients without follow up are the limitations of our study. Large studies are needed to evaluate the problem in detail.

CONCLUSION

High prevalence of rheumatic fever and rheumatic heart disease in our country and lack of their early detection and management results in cerebral embolism and ischemic stroke. Rheumatic fever should be properly treated to eradicate the streptococcal infection and proper antibiotic prophylaxis for prevention of rheumatic heart disease should be instituted. Furthermore, patients with atrial fibrillation should be properly anticoagulated to minimize the risk of cerebral embolism.

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AUTHOR'S CONTRIBUTION

Following authors have made substantial contributions to the manuscript as under

- IH:** Conception and design, Drafting the manuscript
- AK:** Critical revision and final approval of the version to be published
- NI:** Analysis and interpretation of data, Drafting the manuscript
- FS:** Acquisition of data
- IM:** Acquisition of data
- FA:** Acquisition of data

CONFLICT OF INTEREST

Authors declare no conflict of interest
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