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Original Research Article

ASSESSMENT OF ELECTROCARDIOGRAPHIC AND ECHOCARDIOGRAPHIC CHANGES IN PATIENTS WITH CEREBROVASCULAR ACCIDENTS

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ABSTRACT

Background and Aim: Cerebrovascular accident also called as stroke is defined as the sudden onset of neurological deficit that can be attributable to a focal vascular cause. ECG changes can develop in stroke patients even in the absence of underlying cardiac problems, according to numerous investigations conducted in the past. In order to analyze various electrocardiographic patterns and echocardiographic changes in patients with cerebrovascular accident, the current study was conducted.

Material and Methods: The current analysis is a descriptive, clinical, observational study. The study comprised 200 patients in total who were admitted to the general medicine department of the institute of the medical sciences and the affiliated hospital. In each patient, a thorough medical history, clinical examination, including a fundoscopy, was performed after admission. Patients were subjected to CT scan of brain, Electrocardiogram and 2D echocardiography within 24 hours of admission.

Results: Out of 200 patients in the analysis, 138 were men and 62 were women. Patients with abnormal ECGs had a 28.12% overall death rate compared to 11.11% for patients with normal ECGs. When compared to patients with normal 2D echocardiogram, those with aberrant 2D echocardiography had a higher overall death rate.

Conclusion: Typical ECG abnormalities in ischemic stroke include QTc prolongation and U-waves. In stroke patients, LV dysfunction is the most prevalent 2D echocardiographic abnormality. In comparison to the ischemia group, hemorrhagic cases often had higher fatality rates.

Key Words: Cerebrovascular accident, Echocardiography, Electrocardiogram, Stroke

1. INTRODUCTION

In developed nations, vascular illnesses continue to be the leading cause of mortality and disability. Clinical and experimental findings indicate that joint ischemic heart disease does

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not appear as some type of neurologically induced myocardial harm, notably in subarachnoid haemorrhage. Both ischemic and hemorrhagic strokes frequently exhibit electro-cardiac abnormalities after an acute stroke. The electrocardiogram (ECG) modifications included anomalies of repolarization, including ST elevation, ST depression, negative T waves, and QT prolongation.[1,2] In the medical field, cerebrovascular accidents are a major cause of mortality and morbidity. They significantly weaken the patients and their family in both physical and emotional aspects. Numerous studies have emphasised the value of early diagnosis, treatment, and rehabilitation for patients with acute cerebrovascular accidents. A variety of cardiovascular problems, including arrhythmias, severe hypotension, cardiac arrest, etc., can affect stroke victims. Some of these folks who suffer these cardiac episodes don't have any previous cardiac conditions.[3,4] About 6.2 million people died from cerebrovascular accidents in 2011, making them the second greatest cause of mortality worldwide. By 2030, it is predicted that stroke mortality in the United States will have doubled under current patterns. ECG changes can develop in stroke patients even in the absence of underlying cardiac problems, according to numerous investigations conducted in the past.[1,5] These modifications include aberrant U waves, QTc prolongation, ST-T modifications, and more. A small number of studies have also shown that stroke patients have 2D echocardiographic alterations in the form of LV dysfunction, aortic valvular disease, and mitral valve prolapse.[6,7] In order to analyze various electrocardiographic patterns and echocardiographic changes in patients with cerebrovascular accident, the current study was conducted.

2. MATERIALS AND METHODS

The current analysis is a descriptive, clinical, observational study. The study comprised 200 patients in total who were admitted to the general medicine department of the institute of the medical sciences and the affiliated hospital. The study included patients who had previously experienced a stroke within the previous 72 hours of the stroke's commencement. Following were the inclusion and exclusion criteria used in the study:

All patients over the age of 18 who presented with a stroke within 72 hours of its onset and who had no prior history of any heart illnesses were included in the trial.

Strokes that result from trauma, neuro-infections, cancer, patients with underlying heart diseases, electrolyte disturbances, and patients who appear more than 72 hours after the commencement of the stroke were excluded from the study.

In each patient, a thorough medical history, clinical examination, including a fundoscopy, was performed after admission. On the basis of the patients' clinical examination, CT scans of their brains, and the temporal profile of their clinical syndrome, the diagnosis of CVA was made.

Within 24 hours of hospitalization, a 2D echocardiogram and a 12-lead ECG were performed. Investigations such as complete blood count, erythrocyte sedimentation rate, blood urea and serum creatinine, serum electrolytes, and lipid profile were performed on all patients.

Age, sex, risk factors, and mortality were taken into consideration when analysing the results. Before the study began, the ethical clearance certificate was received, and the institute's ethical committee had accepted the study's objective.

Statistical analysis

SPSS version 20 was used to analyze every piece of data. In order to determine the significance level between groups, the chi-square test was utilised. Statistics were judged to be significant at a P value of 0.05.

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3. RESULTS

Out of 200 patients in the analysis, 138 were men and 62 were women. A 2:1 male to female ratio was discovered. The age range of 61 to 70 years was discovered to be the most common for stroke. The current study identifies hypertension as the most prevalent risk factor, which was present in almost half of the patients, or 50%, and was followed by smoking in 60% of the study population, diabetes mellitus in 60% of the population, a history of stroke in 40% of the population, and hyperlipidemia in 20% of the population.

Many individuals, particularly men, had multiple risk factors. The bulk of the 200 patients, 160 patients, had ischemic strokes, and the remaining 40 individuals suffered hemorrhagic strokes. 138 individuals had abnormal electrocardiographic alterations, while 116 patients had abnormal echocardiograms.

When compared to individuals who had ischaemic stroke, people with hemorrhagic stroke most frequently displayed electrocardiographic abnormalities. The changes were observed in 126 patients who had an ischemic stroke and 140 patients who had hemorrhagic stroke. Additionally, it was discovered that patients with hemorrhagic stroke experienced echo cardio abnormalities more frequently than those with ischaemic stroke. It was discovered in 146 individuals who had ischaemic stroke and 160 people who had hemorrhagic stroke.

The following ECG alterations were examined in the current study: bradycardia, tachycardia, QTc prolongation, T wave inversion, ST depression, and U waves. In 150 patients with hemorrhagic stroke, LV dysfunction was the most prevalent 2D echocardiogram abnormality. However, only 50 individuals with ischemic stroke showed signs of LV dysfunction. The second echo anomaly was aortic valve abnormality, which was discovered in 18 individuals, and mitral valve abnormality, which was identified in 40 patients. However, 87 individuals and 50 patients with hemorrhagic stroke had normal echo results.

Table 1 shows that mortality was increased in stroke patients with QTc extended and ST segment depression, however neither of these factors was statistically significant. Patients with abnormal ECGs had a 28.12% overall death rate compared to 11.11% for patients with normal ECGs.

Table 2 shows that mortality was higher in patients with LV dysfunction and that mitral valve abnormalities was statistically significant second. When compared to patients with normal 2D echocardiogram, those with aberrant 2D echocardiography had a higher overall death rate.

Table 1: Mortality in stroke patients and its correlation with ECG changes

Type of ECG changes	Alive	Dead	P value
QTc prolongation	74	26	0.07
T wave inversion	52	12	0.09
ST segment	56	16	0.10
U waves	52	10	0.09

Table 2: Mortality in stroke patients and its correlation with Echo changes

Type of ECG changes	Alive	Dead	P value
LV dysfunction	38	32	0.07
Mitral valve abnormality	26	6	0.09
Aortic valve abnormality	10	2	0.10
Normal	84	4	0.09

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4. DISCUSSION

Conventionally speaking, a stroke is defined as a neurological deficit brought on by an acute focal injury to the central nervous system (CNS) caused by a vascular cause, such as cerebral infarction, intracerebral haemorrhage (ICH), or subarachnoid haemorrhage (SAH), which is a leading cause of disability and death worldwide.[8] Humans with insular cortex strokes had their nocturnal blood pressure fall stopped, their corrected QT intervals lengthened, their ventricular tachyarrhythmias increased, and their plasma norepinephrine levels elevated. Clinical observational studies among stroke patients also suggest a loss of parasympathetic tone, loss of nocturnal vagal dominance, and increased sympathetic tone.[9]

All of the evidence points to the possibility that a stroke can change cardiovascular tone by directly harming the insular cortex or other connected regions and tipping the scales in favour of sympathetic activity. ECG abnormalities are present in 92 percent.[10]

When the risk factors for stroke in the current study were analysed, it was shown that hypertension, which was observed in 100 patients, was the most frequently, followed by diabetes mellitus, and dyslipidemia was least frequently, occurring in only 20 patients. In the study conducted by Santalucia et al[11]., diabetes mellitus (21.5%) and hypertension (71.6% of participants) were the two main risk factors for stroke.

The current study revealed that haemorrhagic strokes were more likely to experience ECG changes than ischemic strokes. Common ECG abnormalities include QTc prolongation, tachycardia, ST depression, and T-wave inversions followed by U-wave. The QT prolongation, tachycardia, and arrhythmia rates in the Goldstein study (27%) were comparable to those in our investigation.

In the current study, 25% of patients with ischemic stroke and 75% of those who had hemorrhagic stroke displayed 2D Echo abnormalities in the form of LV dysfunction. However, 20% and 8.75% of patients with ischemic stroke, respectively, also had defective mitral and aortic valves. In ischemic stroke patients, studies by Gagliardi et al. and Uma et al[12]. revealed comparable LV dysfunction of 22.22% and 26%, respectively.

5. CONCLUSION

Typical ECG abnormalities in ischemic stroke include QTc prolongation and U-waves. In stroke patients, LV dysfunction is the most prevalent 2D echocardiographic abnormality. In comparison to the ischemia group, hemorrhagic cases often had higher fatality rates. Therefore, as part of the initial examination, all patients who present with stroke should have ECG and 2D Echocardiography.

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