



STUDY OF ECG ABNORMALITIES IN PATIENTS WITH ACUTE STROKE

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ABSTRACT In acute stroke Electrocardiogram (ECG) changes are frequently seen, as found in myocardial ischemia/infraction and arrhythmia. The aim of this study was to observe ECG changes in patients with acute stroke.

METHODS: our study was a prospective observational study conducted in the Swaroop Rani hospital from March 2016 to July 2017. A total of 134 patient selected, 100 were in the study group as per the inclusion and exclusion criteria. CT brain, MRI brain (in an inconclusive situation) done for diagnostic confirmation and there ECG changes were observed.

RESULTS: The mean age of the study group was 63.14 ± 9.04 majority of stroke patient were in 51 – 70 years age group, 70 were males and 30 were females. Out of 100 patients, 63 were having ischemic stroke and 37 were having hemorrhagic stroke. ECG changes found in 90 patients. The most common ECG changes was ST depression T wave inversion 16%, followed by QTC prolongation in 12%

CONCLUSION: ECG changes mimicking myocardial ischemia and arrhythmias are commonly seen in stroke patients, even without a history or sign of primary heart disease. During their treatment physicians should aware of these changes.

KEYWORDS : stroke, ECG, electrocardiogram

INTRODUCTION

Stroke or cerebrovascular accident is defined as the abrupt onset of neurological deficit that is due to vascular cause. Ischemic stroke is more common than hemorrhagic stroke, 80% and 20% respectively. In 1947, Byer, Ashman, and Toth¹ described a patient with intracerebral hemorrhage whose electrocardiogram (ECG) showed marked QT prolongation with large T and U waves. In 1954, Burch, Myers, and Abildskov² reported a pattern of QT prolongation, abnormal T waves, and U waves which they considered distinctive of acute stroke. ECG changes are present in 60-90% of patients with intracerebral hemorrhage and 5 to 20% of patients with acute ischemic stroke³. The underlying basis is the disordered repolarization process.⁵ The possible mechanism is through disturbances in autonomic regulation and massive stimulation of the sympathetic nervous system.⁶ Some studies indicate that stroke areas adjacent to the right insular cortex have specially marked cardiac effects⁷. Various studies had shown ECG in stroke patients and their prognostic significance⁸.

ECG of the patients with acute stroke may mimic of cardiac disease especially in elderly⁹. So it is important to know ECG changes in acute stroke.

MATERIAL AND METHODS

It was a prospective hospital-based observational study conducted in the department of medicine SRN Hospital Motilal Nehru medical Allahabad for a period of March 2016 to July 2018. All patients within this duration fulfilling inclusion criteria were included in the study.

Inclusion criteria

Cases of acute stroke with symptoms lasting more than 24 hours and admitted within 72 hours of onset of stroke were included. Clinical Diagnosis of stroke confirmed with CT and/or MRI.

Exclusion criteria

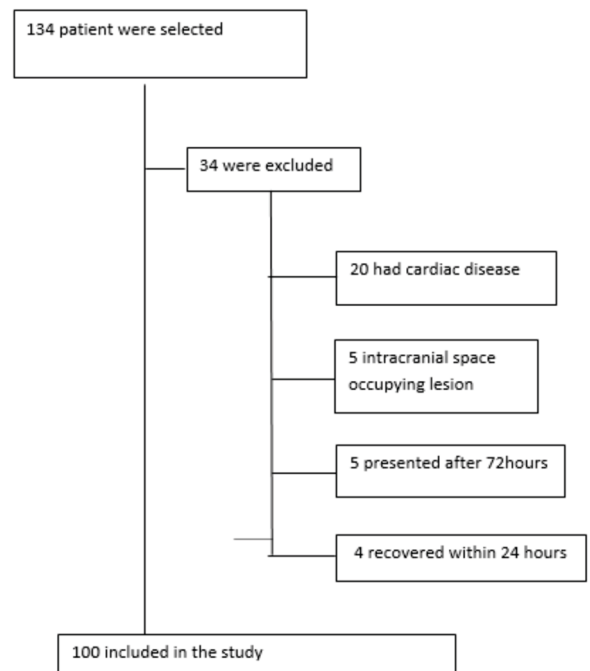
Patient admitted beyond 72 hours of stroke Traumatic cases producing neurological deficit Stroke secondary due to brain infection or neoplastic of brain Stroke with known cardiac disease After admission detailed history regarding temporal profile of stroke, risk factors like hypertension, diabetes mellitus smoking, past of stroke, heart disease and other comorbid condition taken. Detailed general examination and system wise examination especially neurological and cardiac examination done. Laboratory test of all patients CBC, RBS, BUN, creatinine lipid profile of all patients done. CT scan of all patients done to establish a diagnosis of stroke. if it is not clear then MRI brain obtained. ECG has done on the day of admission and these findings were noted.

Statistical analysis was done as appropriate, mean in continuous data, nominal data as numbers and percentage. Chi-square was used to look statistical significance

RESULTS

Total of 134 patient included, 34 patients were excluded on the basis of exclusion criteria. Out of 34 patients who were excluded 20 patients had cardiac disease, 5 patients had intracranial space occupying lesion, 5 presented in hospital after 72 hours, 4 patient neurological deficit recovered within 24 hours (figure 1).

Fig 1 flow chart of subjects



Out of 100 stroke patients, 70 (70%) were male and 30 (30%) were female and the mean age of the male patient was 63.51 ± 9.72 and the female patient was 62.27 ± 7.32 . majority of patient were 51 to 70 age group 71% (n = 71)

In a total of 100 patients, 63 were ischemic stroke and 37 were hemorrhagic stroke mean age of ischemic stroke was 62.46 ±9.33 and hemorrhagic stroke were 64.30±8.53 respectively (p=0.33).

Overall 90% (n=90) had abnormal ECG while only 10 (10%) had normal ECG. the most common ECG changes in stroke patients were ST depression and T wave inversion 16% (n=16) followed by QTc prolongation 12%(n=12). Ten patient (10%) have normal ECG (Table 1).

Table.1 ECG finding in acute stroke

ECG Changes	Number of patients (n =100)	Percentage
ST depression and T inversion	16	16%
QTc prolongation	12	12%
Atrial fibrillation	10	10%
LVH	10	10%
LBBS	9	9%
Q wave	9	9%
T inversion	8	8%
ST elevation	6	6%
RBBB	4	4%
U wave	4	4%
Sinus bradycardia	2	2%
Normal ECG	10	10%

Comparison of ECG changes in ischemic and hemorrhagic stroke (Table 2). Ischemic stroke had 87.30% (n=55) ECG changes, hemorrhagic stroke 94.60% (n=35) had ECG changes, the difference was not found statically significant chi square 1.37 p value 0.24. Most common ECG abnormality in ischemic stroke was atrial fibrillation 15.9%(n=10) in hemorrhagic stroke it was ST depression, T wave inversion 21.6%(n=8). Sinus bradycardia was present in 5.4% (n=2) of hemorrhagic stroke none of the ischemic stroke showed bradycardia.

Comparison of ECG changes in ischemic and hemorrhagic stroke (Table 2)

ECG changes	Ischemic stroke (n=73)	Hemorrhagic stroke (n=37)
ST depression and T inversion	12.7%(8)	21.6%(8)
QTc prolongation	7.9%(5)	18.9%(7)
Atrial fibrillation	15.9%(10)	0
LVH	6.4%(4)	16.2%(6)
LBBS	7.9%(5)	10.8%(4)
Q-wave	14.3%(9)	0
T inversion	1.6%(1)	18.9%(7)
ST elevation	9.5%(6)	0
RBBB	6.4%(4)	0
U wave	4.8%(3)	2.7%(1)
Sinus bradycardia	0	5.4%(2)
Normal	12.7%(8)	5.4%(2)

DISCUSSION

This study was done with the aim of grossly exploring ECG finding in acute stroke. The study was completed in a sample of n=100. Regarding the distribution of ECG findings, ECG changes were found in 90%. Only 10% of patients have normal ECG which was comparable with the study of Goldstein¹⁰ where the frequency of ECG abnormalities in 150 patients was 92% (n=138) and 8% had normal ECG. Whereas in other studies Bozluoclay et al⁸ in their study they found ECG changes in 62.5% of patients with cerebral infarct. Ebrahim et al¹¹ found similar value in his study of electrocardiographic in acute ischemic stroke they found ECG changes in 60% of the subject.

Arruda WO¹² observed 34.5% patient with hemorrhagic stroke has ischemic ST-T changes. Goldstein DS study showed ST depression and T wave inversion are more common abnormality in ischemic stroke than ST elevation (44.6% vs 15.5% respectively). In our study, we also found ST depression T inversion common finding 12.7% than ST elevation but both has lesser percentage as compared to Goldstein study.

According to Goldstein stroke patient had an increased frequency of pathological Q wave 20% and LVH 26% but these were not new finding at the time of stroke. Ebrahim et al¹¹ observation pathological Q wave in only 12.7%(33/262). In present study we got pathological q wave in 9% (9/100).

In our study, we got QTc prolongation in 12% (12/100). Goldstein DS found corrected interval was prolonged in 45% of the stroke patient. Arruda WO in 1992 observed 67.2% of patients with acute intracerebral hemorrhage had prolonged QTc. Kumar S et al found QTc prolongation in 23% of patients.

CONCLUSION:

Ischemic like changes and arrhythmias are frequently seen in stroke patients even in those patients with a negative history of cardiac disease without signs and symptoms of cardiac disease. This supports a central nervous system origin of EEG abnormalities. ST depression and T wave inversion is common abnormalities found in acute stroke, QTc prolongation, LBB, LVH is also found in ECG. We feel that long term cardiac monitoring is required in these patients till ECG changes normalizes or stabilizes. Such studies are likely to throw light on the possible pathogenesis of acute onset changes and also their effect on patient outcome

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