A Study on the ECG changes in Cerebrovascular Accidents in a Tertiary Care Hospital

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ABSTRACT: Introduction: Numerous studies have demonstrated that cerebrovascular accidents may produce ECG Changes without any myocardial lesions. ECG Changes affecting T wave, U wave, ST segment, QT interval and arrhythmias have been reported. These changes may simulate myocardial ischemia and leading to delay in the management of patients of acute cerebrovascular accidents.

Materials and methods: Fifty patients with acute ischemic stroke were included in the study. For all patients CT brain was done to confirm the diagnosis. A 12 lead ECG was taken for all patients at the time of admission.

Results: 70% of all stroke patients had some form of ECG abnormalities. 77% of patients with cerebral infarct and 62.5% of patients with hemorrhages had changes in ECG. ST segment changes were most commonly noted after cerebral infarction.

Conclusion: Understanding the ECG changes which are occurring in patients with stroke is important because it may lead to erroneous judgement of assigning these patients as CAD.

Keywords: Cerebrovascular Accidents, Electrocardiogram, Stroke, Cerebral Hemorrhage

INTRODUCTION:
A Stroke is defined as the abrupt onset of neurological deficit due to a focal vascular cause the diagnosis of which is further augmented by various laboratory investigations particularly brain imaging.¹

The anatomy and physiology of pathways involved in brain-heart interaction have been elucidated in both human and animal studies². The ability to reproduce the arrhythmia by activation of the sympathetic nervous system suggested a neurogenic mechanism.³,⁴

In this study, we researched ECG findings in patients with cerebrovascular accidents.

AIMS AND OBJECTIVES:
To Study the pattern of changes in the ECG of acute stroke patients on presentation.

MATERIALS AND METHODS:
The study was conducted in all newly diagnosed cases of acute stroke admitted in medicine ward of JNIMS hospital, Imphal for a period of 3 years. This is a hospital based prospective study. A total of fifty patients admitted with acute ischemic stroke were included in the study. For all patients CT scan was done to confirm the diagnosis. Detailed history was taken along with complete neurological and systemic examination. A 12 lead ECG was taken for all patients at the time of admission.

INCLUSION CRITERIA:
All patients aged 18 years and above admitted within 72 hours after the onset of stroke

EXCLUSION CRITERIA:
1. Any pre-existing neurological disability from previous stroke or other diseases
2. Cases that present with stroke like syndromes
3. Stroke cases admitted after more than 72 hours from the onset of symptoms
4. Patient with underlying heart disease

RESULTS AND OBSERVATION:
A detailed analysis of the ECG of all the patients was done.
This table shows that 70% of all stroke patients had some form of ECG changes. 77% of patients with infarction and 62.5% of patients with hemorrhage had abnormal ECG changes.

Fig. 1: Incidence of abnormal ECG in the study group.

Table 1: Incidence of abnormal ECG in the study group.

<table>
<thead>
<tr>
<th>Study Group</th>
<th>No of Cases</th>
<th>Abnormal Cases</th>
<th>Percentage</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cerebral Infarction</td>
<td>26</td>
<td>20</td>
<td>77%</td>
<td></td>
</tr>
<tr>
<td>Cerebral Hemorrhage</td>
<td>24</td>
<td>15</td>
<td>62.5%</td>
<td>0.266</td>
</tr>
<tr>
<td>Total</td>
<td>50</td>
<td>35</td>
<td>70%</td>
<td></td>
</tr>
</tbody>
</table>

This table shows that 70% of all stroke patients had some form of ECG changes. 77% of patients with infarction and 62.5% of patients with hemorrhage had abnormal ECG changes.

Fig. 2: The incidence of ST segment changes in the study group.
ST segment changes were most commonly noted after cerebral infarction. 26.92% of patients with infarction had ST depression while ST elevation was found in 20.83% of patients with ICH.

Fig 3: Location and type of cerebrovascular lesion with number of patients

Table 4: Percent and number of patients with specific ECG changes
25% of patients with intracerebral hemorrhage and 30.7% of patients with infarct had QTc prolongation. T wave changes were present in 25% of patients with intracerebral hemorrhage and 50% of patients with infarct. Rhythm disturbances were present in 23% of patients with infarct. 12.5% of patients with intracerebral hemorrhage had rhythm disturbances of which 4.1% had sinus tachycardia and 7.6% had sinus bradycardia.

**DISCUSSION:**
The study was carried out in medicine ward. Study population consist of 50 cases of which 26 cases were cerebral infarction and 24 cases were cerebral hemorrhage.

12 lead ECG taken for all the patients admitted and were monitored. CT scan was taken within 72 hours and analysed. In our study considerable number of patients had ECG changes.

In our study the most common abnormality noted was ST segment changes in patients with cerebral infarction. 42% of patients had above changes of which 15.3% had ST segment elevation and 26.9% had ST segment depression. The study of Frentz and Gorsmen who reported an incidence of 71% with cerebral infarction and 15% with ICH with statistically significant p=0.048 and also study of Lindgren et al who showed ST segment depression in lateral leads.

Regarding the relationship between the location of CVA lesion and ECG abnormalities, our study had association which was statistically significant (p=0.017). This is consistent with study of Frentz and Gorsmen, and Kreus et Al who briefly noted that ECG changes appeared to bear relationship to arteriographic findings.

These findings suggest that the structures related to cardiovascular functions are widely distributed within the central nervous system. Therefore it is likely that CVA lesions not only in the frontal lobe but also in the temporoparietal lobe and basal ganglia can destroy or irritate such widely spread neurons or pathways regulating the cardiovascular system, resulting in ECG changes.

**CONCLUSION:**
Thus we concluded that ST segment changes, T wave inversion and QTc prolongation were the common ECG findings in patients with cerebrovascular accidents.

**REFERENCES:**