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Study of ECG Abnormalities in Acute Cerebro Vascular Accidents in a Tertiary Care Hospital of North Andhra Pradesh

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Abstract

Background: *Cardiac abnormalities were described with various CNS diseases including seizures, trauma, ischemic stroke, ICH and less commonly tumours, electroconvulsive therapy and meningitis.ECG abnormalities are common occurring, in 92 percent of patients with acute stroke.*

Materials and Methods: *This is an observational cross-sectional study done for eight months in the Department of General Medicine, King George Hospital, Visakhapatnam, from January 2020 to August 2020. A total of 100 patients with a diagnosis of acute cerebrovascular accident were included in this study.*

Results: *Out of the 100 patients, 54 were ischemic strokes, and 40 are intracerebral haemorrhage and 6 are subarachnoid hemorrhage. 38 out of 54 ischemic strokes showed ECG abnormalities, 34 out of 40 cases of intracerebral haemorrhage showed ECG abnormalities, all 6 cases of SAH showed ECG abnormalities.*

Conclusion: *ECG changes were more commonly associated with intracerebral haemorrhage compared with cerebral infarction.ST segment changes were the most common abnormality noted in our study. It was most commonly associated with ICH.*

Keywords: *ECG Abnormalities, Acute Cerebrovascular Accidents, Tertiary Care Hospital.*

Introduction

Cushing first described hemodynamic changes after acute intracerebral hemorrhage. 1 Cardiac abnormalities were described with various CNS diseases including seizures, trauma, ischemic stroke, ICH and less commonly tumors, electroconvulsive therapy and meningitis.[2]

The anatomy and physiology of pathways involved in brain-heart interaction have been elucidated in both animal and human studies. The ability to reproduce the arrhythmia by activation of the sympathetic nervous system suggested a neurogenic mechanism.[6,7]

The medulla has been described as the principal site of vagal parasympathetic and sympathetic areas involved in cardiac control. Cardiac abnormalities occur in 60 to 70 percent of patients after stroke. 20 The most common disturbance includes ECG abnormalities, cardiac arrhythmias and myocardial injury and dysfunction

distinguishing cardiac abnormalities directly caused by stroke. It however remains difficult because the prevalence of pre-existing cardiac disease is high particularly among patients with ischemic stroke.[21, 22]

An observational study of stroke patients indicated an increase incidence of sudden death among patients with right insular strokes.[37] Right middle cerebral artery strokes were associated with increased incidence of supraventricular tachyarrhythmias. ECG abnormalities are common occurring, in 92 percent of patients with acute stroke.[44] In 1947, Byer and colleagues first described marked QT prolongation with large T and U waves on the ECG of four patients with stroke.[45] Subsequently Burch and colleagues described an ECG pattern after stroke consisting of large inverted Twaves, prolonged QT intervals and large septal U waves that has become distinctive of cerebral vascular injury.[45]

Aims and Objectives
➤ To study the incidence and pattern of ECG changes in patient with cerebrovascular accidents.
➤ To study the association of ECG changes with electrolytes abnormalities
➤ To assess the relation of ECG changes in acute cerebrovascular accident to the location of cerebral lesion.

Materials and Methods
Study Population: All patients admitted to medical ward with acute cerebrovascular accidents. The study was conducted at king George Hospital during the year january2020 to august 2020 on all patients admitted to medical ward with acute cerebrovascular accidents. Study population consisted of100 patients. This is an observational study

Inclusion Criteria
• All patients with acute cerebrovascular accidents.

Exclusion Criteria
Following patients were excluded from the study:
• Patients with underlying heart diseases.
• Patients on drugs.
• Previously diagnosed patients with electrolyte abnormalities.
• Patient with hepatic or renal diseases.

Methodology
All patients with acute cerebrovascular accidents were studied. They were assessed with serum electrolytes, X ray and blood urea and sugar 12 lead ECG was taken and monitored on the day of admission. CT scan was taken within 24-48 hrs. Screening ECHO was done on all patients with ECG changes. Patients showing cardiomegaly on X ray were excluded from the study. Patients previously diagnosed to have electrolyte abnormalities were also excluded from the study. Patients were categorized based on the CT finding as cerebral infarction, cerebral hemorrhage and sub- arachnoid hemorrhage. ECG was then interpreted with rate, rhythm, ST segment, QRS complex, T wave amplitude and morphology and QT interval was calculated. QTC interval was calculated based on Bazettsformulae.

Results

Study Group	No of Cases	Abnormal Cases	Percentage
Cerebral Infarction	54	38	70
Cerebral Hemorrhage	40	34	89
Subarachnoid Hemorrhage	6	6	100
Total	100	78	78

ABNORMAL ECG

■ Cerebral Infarction   ■ Cerebral Hemorrhage   ■ Subarachnoid
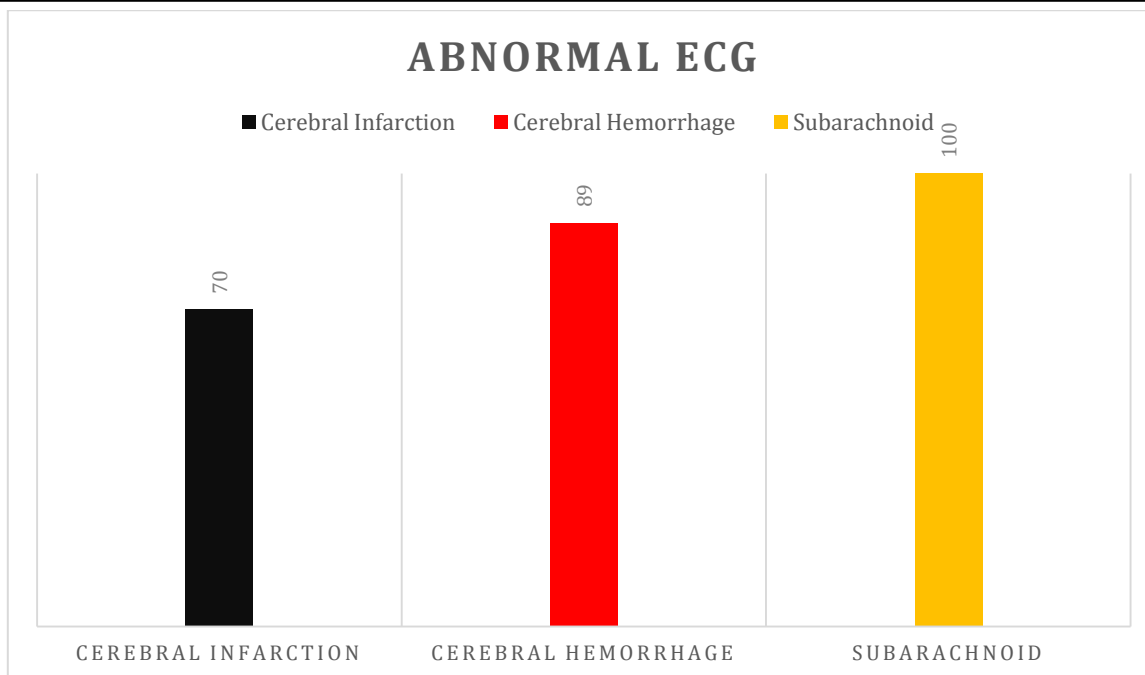
Study group	Total No Cases	ST Segment Elevation	ST Depression Segment	Percentage With ST Segment Changes
Cerebral Infarction	54	2(3%)	18(33. 3%)	20(37%)
Cerebral Hemorrhage	40	20(50%)	4(10%)	24(60%)
Subarachnoid Hemorrhage	6	2(33. 3%)	0	2(33. 3%)

Study Group	Total No of Cases	Prolonged QTC	Percentage
Cerebral Infarction	54	16	29. 6%
Cerebral Hemorrhage	40	20	50%
Subarachnoid Hemorrhage	6	2	33%

Study Group	Total No of Cases	Tall T Waves	T Wave Inversion	Percentage with T Waves Changes
Cerebral Infarction	54	4 (7%)	12(22. 2%)	16(30%)
Cerebral Hemorrhage	40	14(35%)	4(10%)	18(45%)
Subarachnoid Hemorrhage	6	2(33. 3%)	0	2(33. 3%)

Discussion

The study was carried out in medicine ward. Study population consisted of 100 cases of which 54 cases were cerebral infarction and 40 cases were cerebral hemorrhage6 cases were SAH. For all these patients admitted to the medical ward base line RFT AND ELECTROLYTES were taken and analysed.

Patients with previous abnormalities were excluded from the study. 12 lead ECG taken for all the patients admitted and were monitored. ct scan was taken within 24-48 hrs and analysed and patients were categorized as cerebral infarct and intracerebral hemorrhage and SAH. In our study considerable no of patients had ECG changes.

The most common abnormality noted was ST segment changes in patient with cerebral hemorrhage. 60 percent of patients had the above changes. Of which 50% had st segment elevation and 10% had ST segment depression. This findings consistent with study of Frentz and Gorsmen who reported an incidence of 71 % with

ICH and 15% with infarction and also study of Lindgren Et Al who showed ST segment depression in lateral leads.

Conclusion

Of all the CVA patients assessed in this study, ECG changes of all forms were noted in as high as 78% of the patients. ECG changes were more commonly associated with intracerebral hemorrhage compared with cerebral infarction. ST segment changes were the most common abnormality noted in our study. It was most commonly associated with ICH. Next common abnormality noted was QTc prolongation which was noted in 50% of patient. Most common in patients with ICH. T wave changes were noted in 45% of patients. Most commonly observed in patients with ICH. Tall T wave was noted mostly in ICH. Rhythm disturbance were noted in 40% percent of patients with ICH. Sinus bradycardia was the common abnormality associated with ICH. 7% percent of the patients with cerebral infarction had pathological Q waves.

Limitations

The study is done in a limited number of patients. Results may vary when done in a large number of subjects.

Source of Support: None
Conflict of Interest: None

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