



A STUDY OF ELECTROCARDIOGRAPHIC CHANGES IN STROKE PATIENTS

Dr. Boppana Tarun Bhaskhar

MBBS Intern, Kims, Amalapuram.

Dr. Rishitha Batchalakuri

MBBS Intern, Kims, Amalapuram.

Dr. Metta Lakshman Rao*

MD General Medicine. *Corresponding Author

KEYWORDS :

INTRODUCTION

Cerebrovascular accident is the most common life threatening disorder. It is the third leading cause of death in the developed countries after cardiovascular disease and cancer. It is responsible for about 80% of all first ever in a lifetime strokes. Primary Intracerebral hemorrhage for 10% and Subarachnoid hemorrhage for 5%.

Many studies have shown CVA associated with ECG changes. Changes occurring in ECG following stroke were T-wave, U-wave, ST-segment, QT-interval and various arrhythmias, these ECG changes may resemble those of myocardial ischemia or sometime myocardial infarction.

Aims And Objectives

1. Study the different changes in ECG in the cases of Cerebrovascular accidents.
2. To assess the different changes have got any prognostic significance in these cases.

The most commonly observed ECG changes following stroke are :

QT interval prolongation

Prominent U waves Ischemic pattern with ST segment depression and Various arrhythmias like –

- Sinus arrhythmia
- SVT,VPB
- Sick sinus syndrome
- Paroxysmal atrial tachycardia
- Wandering pacemaker and rarely other arrhythmias.

There are two primary theories the etiology of ECG changes seen following CNS insult.

The first is that damage occurs to neurologic structures that have direct connections to the autonomic nervous system. Stimulation or destruction of these structures causes augmentation or inhibition of one or both divisions of the autonomic nervous system, resulting in ECG changes without permanent effects on the myocardium.

The second theory is that the neurologic disease creates an imbalance between sympathetic and parasympathetic outputs favouring sympathetic dominance. The relative excess of sympathetic stimuli lead to an increase in plasma catecholamine levels that triggers ECG changes.

These systemic effects develop more slowly but are also longer lasting and cause damage to the myocardium.

MATERIALS AND METHODS

The material of the prospective study comprised of 100 patients admitted in konasema institute of medical science

and research foundation College between February 2024 to February 2025

Inclusion Criteria : Cases of CVA (CT scan proved) admitted within 72 hours after the onset of stroke were selected for the study ,

Exclusion Criteria:

1. Patients admitted beyond 72 hours after onset of stroke were excluded as the incidence of ECG changes beyond this period were infrequent.
2. Traumatic cases producing neurological deficits, infection, neoplastic cases producing CVA. CVA cases with known underlying cardiac diseases, which produce ECG changes
3. After admission a detailed history regarding the temporal profile of the stroke including history of risk factors like hypertension, diabetes mellitus, smoking, history of IHD and rheumatic heart disease were obtained .

ECG criteria:

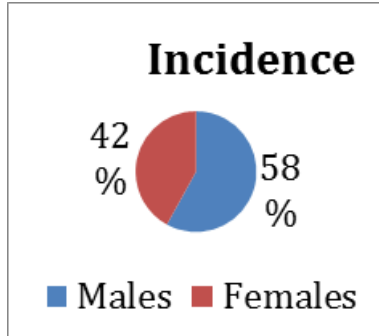
1. Heart rate less than 60/min was regarded as bradycardia and heart rate exceeding 100/ min was regarded as tachycardia.
2. ST segment depression of 0.5 mm or elevation of more than 1 mm were taken abnormal.
3. T-wave was considered abnormal when inversion of T-waves in which it should have been upright i.e., I, II V3–V6 may be variable in III, aVR, V1 and V2.
4. **QTc prolongation:** The QT interval is measured from the beginning of the QRS complex to the end of T-wave, the rate corrected QTc is obtained by dividing the actual QT by the square root of the RR-interval (both measured in seconds). QTc is taken as prolonged if it more than 0.44 m-seconds.
5. U-wave was taken as significant when exaggeration of U-wave voltage was noted when appeared in more than 2-leads in which it was normally seen.
6. **RVH:** R-wave may be taller than the S-wave in lead V1, and persistent S-wave seen in V5-V6. sokolow lyon crieteria for RVH.
 $RV1 + SV5/V6 \geq 1.10 \text{ mV}$
7. **Sokolow lyon crieteria for LVH :** If the sum of the depth of the S-wave in lead V1 and the height of the R- wave in either lead V5 or V6 exceeds 35 mm, $SV1 + RV5 / V6 \geq 3.5 \text{ mV}$ an R-wave of 11 mm or more in lead aVL is another criteria for LVH. $RaVL \geq 1.1 \text{ mV}$

RESULTS

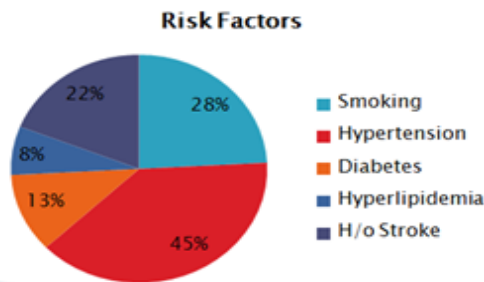
1. During the period of February 2024 to February 2025, 100 stroke patients were selected for the present study who met inclusion and exclusion criterion were analyzed with

regard to ECG changes in stroke patients and following results were noted .

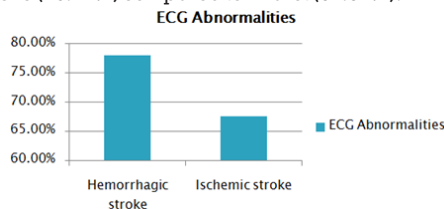
- The incidence of stroke in the present study were more common in 5th and 6th decade and there was slight male (58%)predominance compared to females (42%) making male-female ratio of 1.4:1.



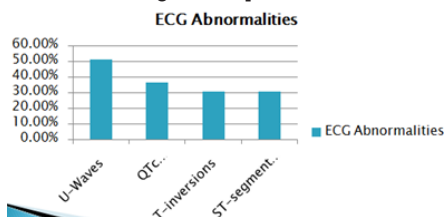
- Hypertension was the most common risk factor and was present in 45% cases, followed by smoking in 28%, history of stroke in 22%, diabetes mellitus in 13% patients and hyperlipidemia in 8% patients.



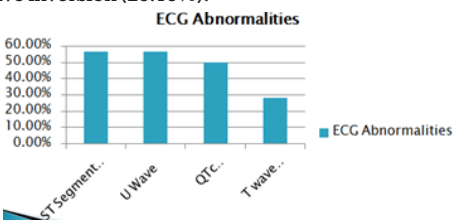
- Ecg abnormalities (71%) more common in stroke patients and was statistically significant.
- Ecg abnormalities were more common in hemorrhagic stroke (78.12%) compared to infarct (67.64%).



- It is evident that ECG abnormalities among infarct group, U-wave (51.47%), QTc prolongation (36.76%) were the most common abnormalities followed by T-wave inversion (30.88%) and ST-segment depression (30.88%).



- In cases of hemorrhage group St segment depression (56.26%) and U wave (56.26%) were the most common abnormalities followed by prolonged QTc (50%) and T wave inversion (28.13%).



DISCUSSION

A hospital based prospective study was done to know the ECG changes had any prognostic significance in stroke patients.

In this study, CT scan was mandatory in the inclusion criteria to prove the stroke and the type of stroke. Among the 100 patients 58 were males and 42 were females (sex ratio was M:F - 1.4:1), age ranged from 24-92 years and the mean age of patients of alive and dead were 58.73 and 54 years respectively. The cases of stroke were more common in the 5th and 6th decade.

CONCLUSION

ST segment depression, QTc prolongation and U are the common ECG abnormalities in hemorrhagic strokes QTc prolongation and U-waves are the common ECG abnormality in ischemic stroke.

ECG abnormalities in stroke patients do not any any prognostic significance. ST segment depression, QTc prolongation and U are the common ECG abnormalities in hemorrhagic strokes prolongation and U-waves are the common ECG abnormality in ischemic stroke abnormalities in stroke patients don't have any prognostic significance.

Summary

This is a hospital based prospective study done in KIMS amalapuram during the period of February 2024 to February 2025 which comprised of 100 patients.

Stroke was most common in 5th and 6th decade Males had higher predominance among all the stroke patients. In Infarct group, 51.45% were males, whereas female were 48.33%. In hemorrhage group 59.37% were males whereas females were 40.63% with male-female ratio of 1.4:1.

Hypertension was the most common risk factor comprising 45% followed by smoking 28%, past history of stroke 22%, diabetes mellitus 13% and the least was hyperlipidemia with 8%.

Headache was presenting complaint in 25% of patients in infarct group and 65.62% of patients in hemorrhage group. Vomiting was present in 19.11% among infarct patients whereas in hemorrhage group 78.12%. Convulsions were present in 8.82% in infarct group, whereas it was 12.50% in hemorrhage group.

Right sided hemiplegia was present in 51.47% in the infarct group, whereas in hemorrhagic group it was 18.75%. Left sided hemiplegia was present in 22% in infarct group, whereas it was 6.25% among hemorrhage group.

It is evident that ECG abnormalities among infarct group, U-wave (51.47%), QTc prolongation (36.76%) were the most common abnormalities followed by T-wave inversion (30.88%) and ST-segment depression (30.88%). In cases of hemorrhage group ST segment depression (56.26%) and U wave (56.26%) were the most common abnormalities followed by prolonged QTc (50%) and T wave inversion (28.13%).

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