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INVERTED T WAVES AND PROLONGED QT INTERVAL IN ASSOCIATION WITH HEMORRHAGIC STROKE: A RARE CASE REPORT.

General Medicine

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ABSTRACT

A stroke is a medical condition caused by poor blood flow to brain tissue causing cell death. There are two main types of stroke hemorrhagic and ischemic. In hemorrhagic stroke bleeding occurs directly into the brain. Subarachnoid haemorrhage is caused by bleeding into the space surrounding the brain. Stroke symptoms typically start suddenly over second to minutes and depend upon the area affected.

In acute stroke patients, ECG changes can be seen in the absence of predisposing cardiac illness. These patients can have myocardial ischemia due to increased levels of circulating catecholamine or due to autonomic stimulation of the brain. ECG changes associated with stroke primarily affect repolarization, and can cause abnormalities of ST segment, T wave, U wave, and QTc interval prolongation. Even troponin levels may be elevated in these patients.

Herein ,we report a case of 70 years old female who presented in the emergency department and started treatment of acute coronary syndrome based upon ECG findings and positive troponins. But later on non contrast CT head was done which showed Subarachnoid hemorrhage with intraventricular extention. Treatment of coronary artery disease was stopped and patient was referred to higher centre for CT angiography and further management.

KEYWORDS

ECG, QTc interval. stroke,

INTRODUCTION:

A stroke is a medical condition in which poor blood supply to the brain causes cell death. Depending upon the aetiology, two main types of stroke are ischemic and hemorrhagic. Both cause parts of the brain to stop functioning properly, depending upon the site of blood loss. Hemorrhagic strokes are further classified into intracerebaral and intraventricular hemorrhagic strokes. In intracerebaral hemorrhage which is basically bleeding into the brain itself, intraventricular hemorrhage is bleeding into the ventricular system of brain. Subarachnoid hemorrhage is the bleeding below the arachnoid matter into the space surrounding the brain.

Various risk factors for the stroke are high blood pressure, smoking, obesity, diabetes mellitus and atrial fibrillation. Hemorrhagic stroke can occur due to cerebral amyloid angiopathy, cerebral arteriovenous malformations, and intracranial aneurysms.Signs and symptoms of a stroke depends upon the area of the brain involved and severity of hemorrhage. Patient can have inability to move a part of body, difficulty in speaking and understanding and loss of vision and even patient can go into a state of coma. Hemorrhagic stroke can have severe headache. Diagnosis is typically based on physical examination, CT Scan or MRI brain, other tests done are ECG and blood tests to determine the risk factors and to rule out probable causes.

ECG changes can occur in a patient of stroke due to the pre-existing illness or changes can be produced due to stroke. There are two mechanisms that might mediate ECG changes in patients with stroke, i.e. autonomic neural stimulation from the hypothalamus or elevated levels of circulating catecholamines. Hypothalamic stimulation may cause ECG changes without associated myocardial damage whereas elevated catecholamine levels have been correlated with QT-interval prolongation and myocardial damage. The most common abnormalities are QT prolongation, ischemic changes, U waves ,tachycardia , and arrhythmias . Patients with cerebral embolus had a significantly increased frequency of atrial fibrillation and with sub-arachnoid hemorrhage an increased frequency of QT prolongation and sinus arrhythmia .The frequencies of QT prolongation and ischemic changes related strongly to admission systolic pressure. Stroke patients had an increased frequency of pathologic Q waves and left ventricular hypertrophy. The results are consistent with an interaction of underlying hypertensive or atherosclerotic cardiovascular disease, sympathetic hyperactivity, and possibly myocardial necrosis, in producing ECG changes.

Physicians have known for centuries that primary cardiac disorders can lead to stroke, but the realization that strokes may produce ECG abnormalities is not much more studied. Therapeutic thrombolytic therapy and anticoagulation as well as withholding of life-saving neurosurgery in such cases may well endanger the life of the patient concerned.

Case Report:

A 70 year old woman presented to emergency department with complaints of bilateral shoulder pain, giddiness, vomiting and loose stools for three days. She was not having dyspnea, chest pain, palpitation and fatigue. She was not having past history of diabetes mellitus, hypertension and coronary artery disease. On examination she was conscious and well oriented to time, place and person. Her pulse rate was 80 beats/min, blood pressure was 140/90 mmHg, respiratory rate was 16/min, and oxygen saturation was 97% on room air. She was in good general condition, lungs were clear, heart sounds were normal and had no cardiac murmurs. ECG was done in emergency department showing left axis deviation and inverted “T waves” in lead 3 and aVF (Figure 1). Her chest X ray was normal and troponin T (card test) was positive. Diagnosis of acute coronary syndrome with non ST elevation inferior wall myocardial infarction was made. She was admitted in ICCU and started treatment including anticoagulants. On day 2 of her admission ECG was repeated, (Figure 2) showing giant inverted “T waves”in precordial and standard leads with prolonged QT interval (QTc 529msec). 2D ECHO was done showing no regional wall motion abnormality or ventricular hypertrophy. Non contrast CT head was done which showed subarachnoid hemorrhage with intraventricular extention (Figure 3). Treatment of acute coronary syndrome was stopped and patient was referred to higher centre for CT angiography and further management. After one month follow up patient was doing well.

Figure 1.

Figure 2.

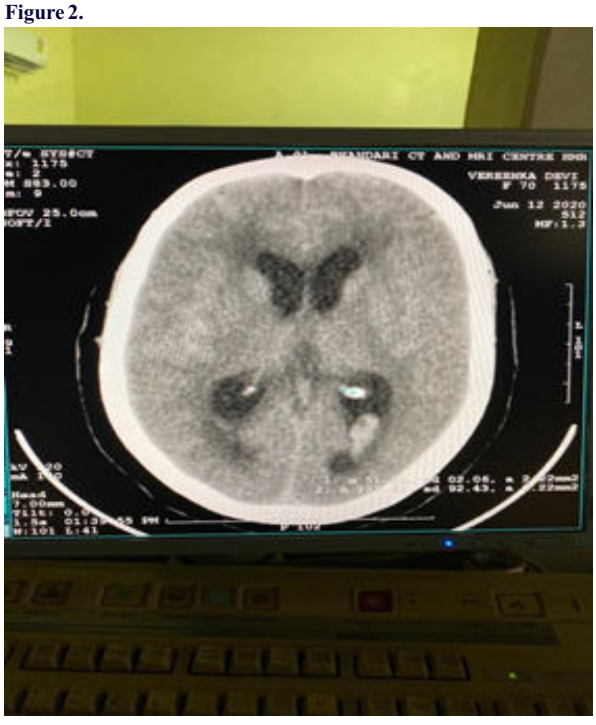

Figure 3.

DISCUSSION:

The patient of stroke with an abnormal ECG is a common diagnostic challenge to the clinicians. Patient with coronary and cerebral atherosclerosis may lead to ECG changes and stroke independently. Various cardiac diseases may produce both ECG changes as well as cerebral ischemia. To this complexity can be added the results of the numerous reports, demonstrating that primary neurologic abnormalities may produce ECG changes, with or without myocardial lesions.

On review of literature it was found that confusion among physicians on the subject is not new, very long ago in 1954 an electrocardiographic pattern was encountered in patients with cerebrovascular accidents by Burch GE[1] , primarily consisting of T waves of large amplitude and duration along with large U waves. It was also found that U waves may fuse with T waves. Fusion of U waves with T waves resulted in prolonged QT interval. In 1959 Beard et al[2] diagnosed myocardial ischemia in a 37-year-old female and started anticoagulants. There was only short-term history of syncope and stupor and later on ruptured aneurysm was found on autopsy.

In one study which involved 100 patients done by Purushothaman S et al[3], found that ECG changes were present in 78 patients. The abnormalities were more common in ischemic group (79.31%) compared to hemorrhagic group (76.19%). T wave inversion, ST segment depression, QTc prolongation and presence of U waves were common in ischemic group, where as T wave inversion ,arrhythmias, U waves and ST segment depression were more common in hemorrhagic group. They also studied that mortality was higher in patients with ST-T changes in ischemic group and in patients with positive U waves in hemorrhagic group. A similar study was done by Familoni et al[4] ,where QTc prolongation was seen in 28% of patients, T wave inversion in 215,ST segment depression in 29%,U wave in 9.3 and arrhythmias in 34.4% of patients. Prolonged QT interval on ECG was independently associated within-hospital all cause mortality in patients with spontaneous subarachnoid hemorrhage[5].

These ECG changes are not consistent, they changes over a period of time. These patients can be diagnosed as unstable angina and started anticoagulants. Similar case report was done by S Chand et al.[5]

There are so many studies as well as case reports about ECG changes in stroke patients but none of them is helping to differentiate ECG changes due to stroke or CAD .we are still confused, which is more in cases of stroke with mild and vague symptoms and signs, weather to start treatment of CAD or go for CT head to rule out stroke because early treatment can affect prognosis of both. More elaborated studies are needed to differentiate ECG changes primarily due to stroke.

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