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# Dead sea like giant negative t wave associated with subarachnoid hemorrhage

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## Abstract

Subarachnoid hemorrhage is a catastrophic neurological event. Rupture of an aneurysm results it. In addition to neurological signs and symptoms ECG abnormalities reported. These ECG findings reported are prolonged QTc, ST segment abnormalities, T wave inversion, abnormal U wave, bradycardia, tachycardia, Premature ventricular complex, Premature atrial complex, atrial fibrillation, VT, AV blocks. We described a patient with subarachnoid hemorrhage showed giant inverted T wave.

**Keywords:** Subarachnoid hemorrhage, T wave inversion

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## Introduction

Subarachnoid hemorrhage is a catastrophic neurological event. Rupture of an aneurysm results in it. In addition to neurological signs and symptoms ECG abnormalities are reported. These ECG findings reported are prolonged QTc, ST segment abnormalities, T wave inversion, abnormal U wave, bradycardia tachycardia, Premature ventricular complex, Premature atrial complex, atrial fibrillation, VT, AV blocks. We described a patient with subarachnoid hemorrhage who showed a giant inverted T wave. Generally inverted T waves are related to acute coronary syndromes. Additionally, T wave inversion occurs in patients with left ventricular hypertrophy, acute myocarditis, WPW syndrome, acute pulmonary embolism, pericarditis, electrolyte disturbances, on treatment with digoxin and Yamaguchi syndrome.

## Case Report

A 64-year-old woman admitted to the emergency department with sudden loss of consciousness and left hemiparesis. The blood pressure was 180/120 mmHg with a heart rate of 78 bpm. Her ECG showed global very widely splayed and very deeply inverted T-waves with prolonged QT (QTc: 640 ms) (**Figure 1**). Cranial CT showed subarachnoid hemorrhage.

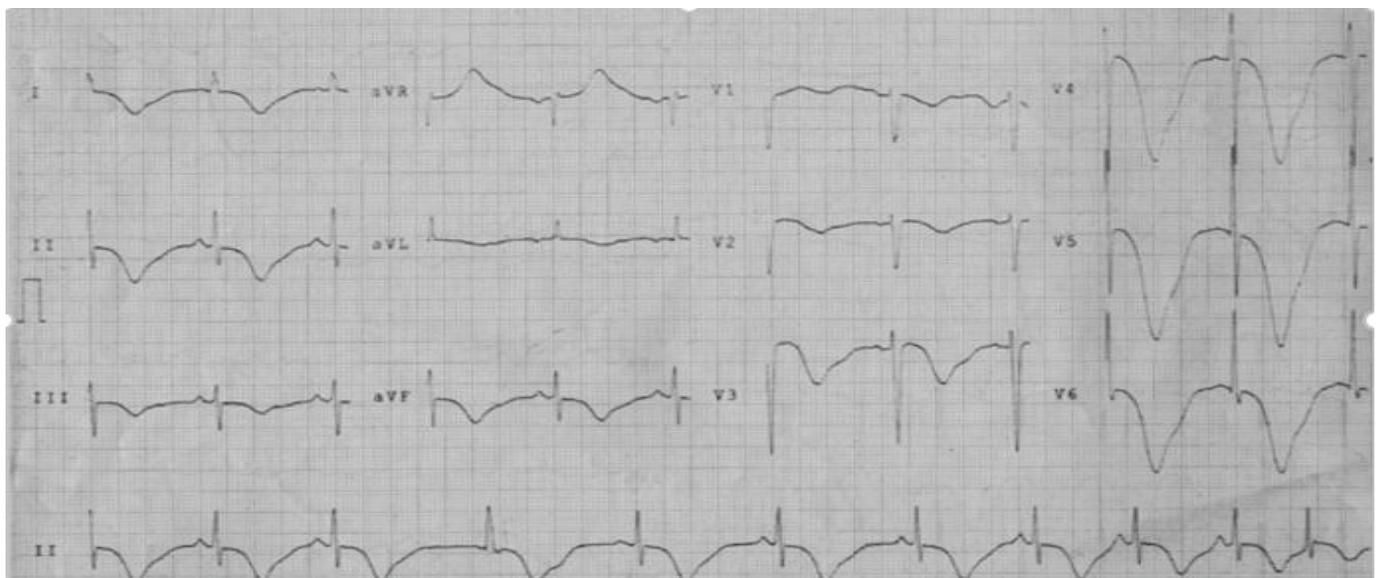
Standard biochemical parameters were in normal

limits except serum potassium level of 3.1 mg/dL and leukocytosis on complete blood count. Bilateral basal crackling rales in the lungs were detected but the echocardiography, cardiac markers and the renal parameters were all in normal limits. The patient was intubated after a short period after admission and she died after a short time of deterioration.

## Discussion

T wave is the electrocardiographic manifestation of ventricular repolarization. Any reason disrupting ventricular repolarization just like acute coronary syndromes, left ventricular hypertrophy, pulmonary embolism, electrolyte disturbances and cerebrovascular events eventuate T wave abnormalities. Subarachnoid hemorrhage is usually accompanied by electrocardiographic abnormalities including the T-wave abnormalities and it is thought that these changes are caused by increased sympathetic and vagal tone leading to aberrant repolarization, probably secondary to myocyte injury and contraction band necrosis.<sup>1</sup>

Neurogenic ECG alterations are often transient. It causes diagnostic problems, ECG findings in neurogenic problems can mimic acute myocardial infarction. It is important to avoid inappropriate therapies. An imbalance of autonomic cardiovascular control and increased



**Figure 1:** Her ECG showed global very widely splayed and very deeply inverted T-waves with prolonged QT

circulating local myocardial tissue catecholamines. Several experience investigation reported that a sudden increase in intracranial pressure occurs that a massive sympathetic discharge.<sup>2,3</sup> Experimental studies suggest that a large amount of norepinephrin is released during sudden neurologic problems. Alterations in cardiac depolarisation and repolarisation reported 74% of patient with cerebrovascular events.<sup>4</sup> Experimental studies implicates that insular cortex is responsible in cardiovascular control and heart chronotropik organisation.

Studies suggest that its involvement occurs neurogenic ECG alterations.<sup>5</sup> Porter et al.<sup>6</sup> found that stimulation of the posterolateral hypothalamus not only induced rhythm abnormalities but also caused repolarisation changes. Attar and colleagues found that stimulation of the anterior hypothalamus produced ST elevation and deepening of T waves.<sup>7</sup> Thus, hypothalamic stimulation is capable of causing both arrhythmias and a variety of ECG changes which mimic acute myocardial injury or ischemia. In a study by Estanol et al.<sup>8</sup> rhythm and repolarisation changes were created in dogs by introducing

blood into the subarachnoid space.

Rudehill et al.<sup>9</sup> ECG s were prospectively studied on 406 patients with subarachnoid hemorragiae. Three hundred thirty one patients (82%) had an abnormal ECG. The predominant findings were U wave changes (47%). T wave abnormalities (32%), prolonged QTc interval (24%), and ST segment depression.( 15%). Stober et al.<sup>10</sup> showed that ECG abnormalities in patients with subarachnoid hemorragiae were interested in arterial spasm on the brain. Several studies revealed electrocardiographic abnormalities related with subarachnoid hemorragiae.<sup>11-13</sup>

In conclusion; acute ischemic cardiac events show electrcardiographic abnormalities. T wave abnormalities also can often seems as a result of acute cardiac problems. On the other hand acute cerebrovascular events can mimic electrocardiographic abnormalities in patients with acute cardiac problems. As a result phsician must be aware about these ECG similarities. Otherwise, these ECG abnormalities can cause inappropriate therapies.

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Conflicts of interest were not reported.

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