


## Case Report

# Electrical alternans in a case of electrical shock

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## Abstract

Electrical alternans is a broad term that describes alternate-beat variation in the direction, amplitude and duration of any component of the ECG waveform. The presence of electrical alternans has no clinical manifestation outside those present from underlying cause of association. Thus searching for underlying cause is necessary. Here we have reported a case of 8 years old male child who presented with cough and increase respiratory rate following electrical shock and ECG showed electrical alternans in QRS complex.

## Key words

Electrical alternans, Electrical shock, ECG, Respiratory rate, Cough, Tachycardia.

## Introduction

Electric shock or Electrocutation is the physiological reaction or injury caused by electric current passing through the human body. Typically, the expression is used to describe an injurious exposure to electricity. Several type of electric injury that include-lightning injury [1], high voltage injury and low voltage injury or joule burns [2, 3, 4]. Electrical injury can lead to various clinical manifestations range from transient unpleasant sensations

without apparent injury to massive tissue damage [5]. When current passes through the heart it causes cardiovascular effects which include myocardial infarction, transient accelerated hypertension, left ventricular dysfunction, cardiac rupture, and arrhythmias [6, 7, 8]. Premature ventricular contractions, ventricular tachycardia, ventricular fibrillation, atrial tachycardia, atrial fibrillation, bundle branch, and complete heart block may occur after electrical shock [8, 9]. Electrical alternans is extremely

rare after electrical injury. So, here we have presented a case of electrical injury complicated with electrical alternans.

### **Case Report**

8 years old male child was admitted to our PICU with complain of electric shock 3 days back and increased respiratory rate with cough since 2 days. He had touched a live cable carrying volts during micturition. He had lost his consciousness for half an hour after accident, but was regain consciousness. He was relatively asymptomatic for around 24 hours and then he had gradually developed shortness of breath associated with dry cough. He had no history of any cardiac disorder. On physical examination, heart rate was around 110/min, blood pressure was 102/54 mmHg, with tachypnea (44/min) with nasal flaring, intercostal retraction, sub costal retraction, supra-sternal retraction. Lung examination revealed air entry decreased on right side of lung with crepitation. Other systemic examination was normal. The entry wound was contact abrasions on between ring finger and little finger of left hand. (**Figure – 1**) There was no any exit wound on body.

**Figure – 1:** Entry wound.



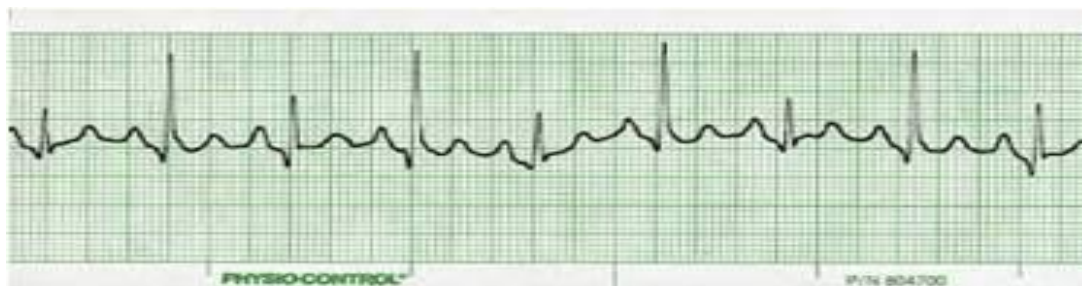
On investigation there was leukocytosis (18800) with high CRP (248.7). CPK-MB (845) and LDH (578) were high with normal serum calcium and magnesium level. ECG was abnormal and showed electric alternance in QRS complex amplitude in chest lead II. (**Figure – 2**) 2D Echo was normal. ABG was done which was normal. X-ray AP view and lateral view were done which didn't show any abnormality. Patient condition deteriorated over next day so we had intubated the child and put on ventilator on SIMV mode and kept patient under sedation for 3 days and gradually wean of from sedation. On 4<sup>th</sup> day of ventilation, we had done tracheostomy and insert tracheostomy tube and again put on ventilator. He was on ventilator for total 8 days, and he was under continuous ECG monitoring. (**Figure – 3**)

### **Discussion**

Domestic electrical supplies operate at 220–240 volts, alternating current (A.C.) which is more dangerous than direct current (D.C.). Electric shock generally results from contact with live wires or lightning.

Electrical alternans is an electrocardiographic phenomenon of alternation of QRS complex amplitude or axis between beats and a possible wandering base-line. It is seen in cardiac tamponade and severe pericardial effusion and is thought to be related to changes in the ventricular electrical axis [10]. The mechanism of electrical current induced arrhythmias is not clear yet. Because of differences in electrical resistance, current travels preferentially along the blood vessels and nerves, making the heart most susceptible to injury [11]. Patchy necrosis can be seen in heart muscle biopsy specimens after electrical injuries, the fibrotic tissue being a potential chronic arrhythmogenic focus [12]. Increased cardiac sodium/potassium pump activities and an increase in potassium concentration have also been described in electrical injury cases [13]. Cardiac arrhythmias may occur at the time of electrical shock or later, but mostly within first day after injury [12, 13].

**Figure – 2:** ECG Showed electric alternance in QRS complex amplitude in chest lead II.



**Figure – 3:** Patient's condition after treatment.



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