



ISSN: 0975-833X

REVIEW ARTICLE

ELECTRICAL INJURY INDUCED ATRIAL FIBRILLATION A RARE PRESENTATION

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ARTICLE INFO

Article History:

Received 10th July, 2014
Received in revised form
25th August, 2014
Accepted 04th September, 2014
Published online 25th October, 2014

Key words:

Cardioversion,
Cardorone,
Amiodarone.

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ABSTRACT

A 35 year old man was admitted to the emergency department with a fast ventricular rate atrial fibrillation after an electrical shock. Successful pharmacological cardioversion was achieved after 16 hours of amiodarone infusion and patient was discharged on oral cardorone. Serum cardiac specific markers were all within normal limits. Acute onset atrial fibrillation after electrical injury is discussed.

INTRODUCTION

A 35 year old man was admitted to the emergency department with alleged history of electric shock when he touched a live wire of 220 volts. He had lost consciousness for a while after the accident, but was conscious on admission. He had no history of cardiac disorder. On physical examination, his blood pressure was 110/70 mm Hg and his heart rate was 120 beats per minute, with irregularly irregular rhythm. There was an entry wound on the right hand but there was no exit wound identified. Cardiac monitoring showed atrial fibrillation with fast ventricular rate on the monitor (120/min). He was given intravenous cardorone 150mg stat and 1gm over the next 24 hours. Successful cardioversion was achieved with ventricular rate of 60 bpm. All hematological and biochemical investigations were normal. Cardiac biomarkers CK-MB, Troponin T were all within normal limits in two successive measurements at 12 hours interval. Chest radiography and ECHO were normal.

DISCUSSION

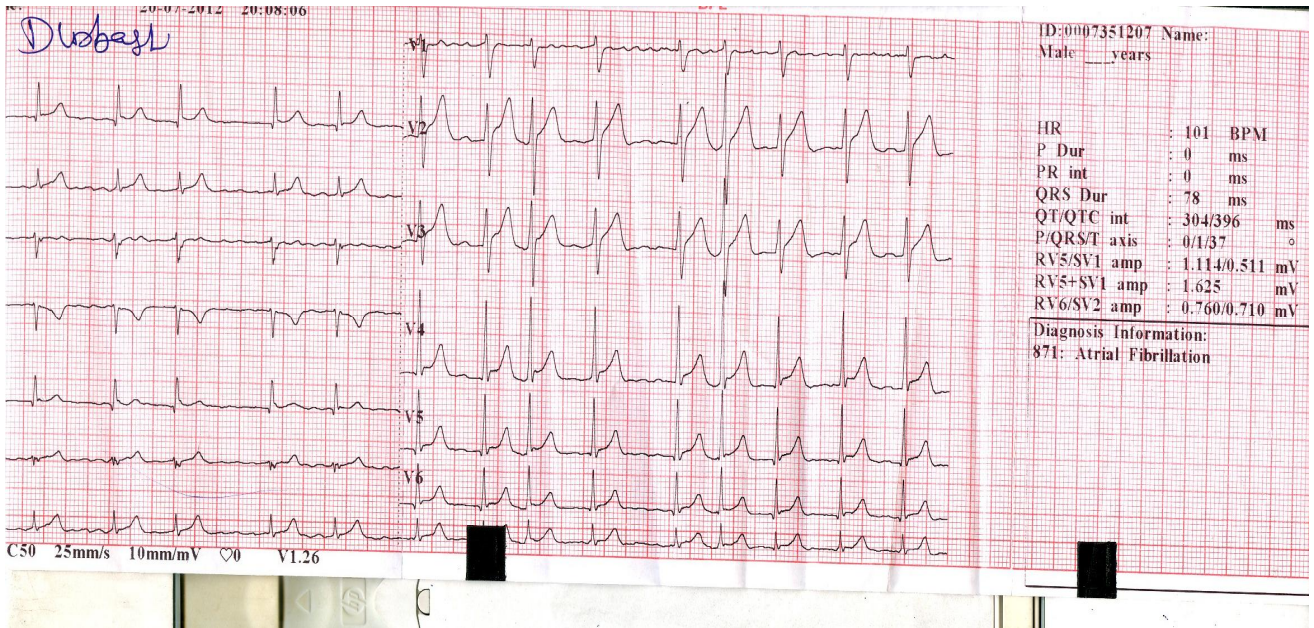
Electrical injuries resulting from domestic or industrial appliances cause myocardial infarction, transient accelerated hypertension, left ventricular dysfunction, cardiac rupture and arrhythmias (Butler and Gant 1977; Solem *et al.*, 1977) Atrial fibrillation, bundle branch block, ventricular tachycardia and ventricular fibrillation have been described after electrical

injury. (Solem *et al.*, 1977; Wander *et al.*, 1992) Evidence of arrhythmias after electrical shock varies from 10%- 36%. Atrial fibrillation after electrical shock is extremely rare. In a study of 182 cases of electrical injury over a 20 year period only 2 were reported to be atrial fibrillation and one of them required cardioversion. ((Butler and Gant 1977; Boggild *et al.*, 1995) Retrospectively in a study of 145 patients (Arrosmith *et al.*, 1997) evaluated post electrical injury for 5 years, 128 (88%) had suffered low voltage injury and 17 (12%) had suffered high voltage injury. Frequency of cardiac complications was only 3% (4 patients), out of which only one case of atrial fibrillation was detected which reverted to normal with Digoxin.

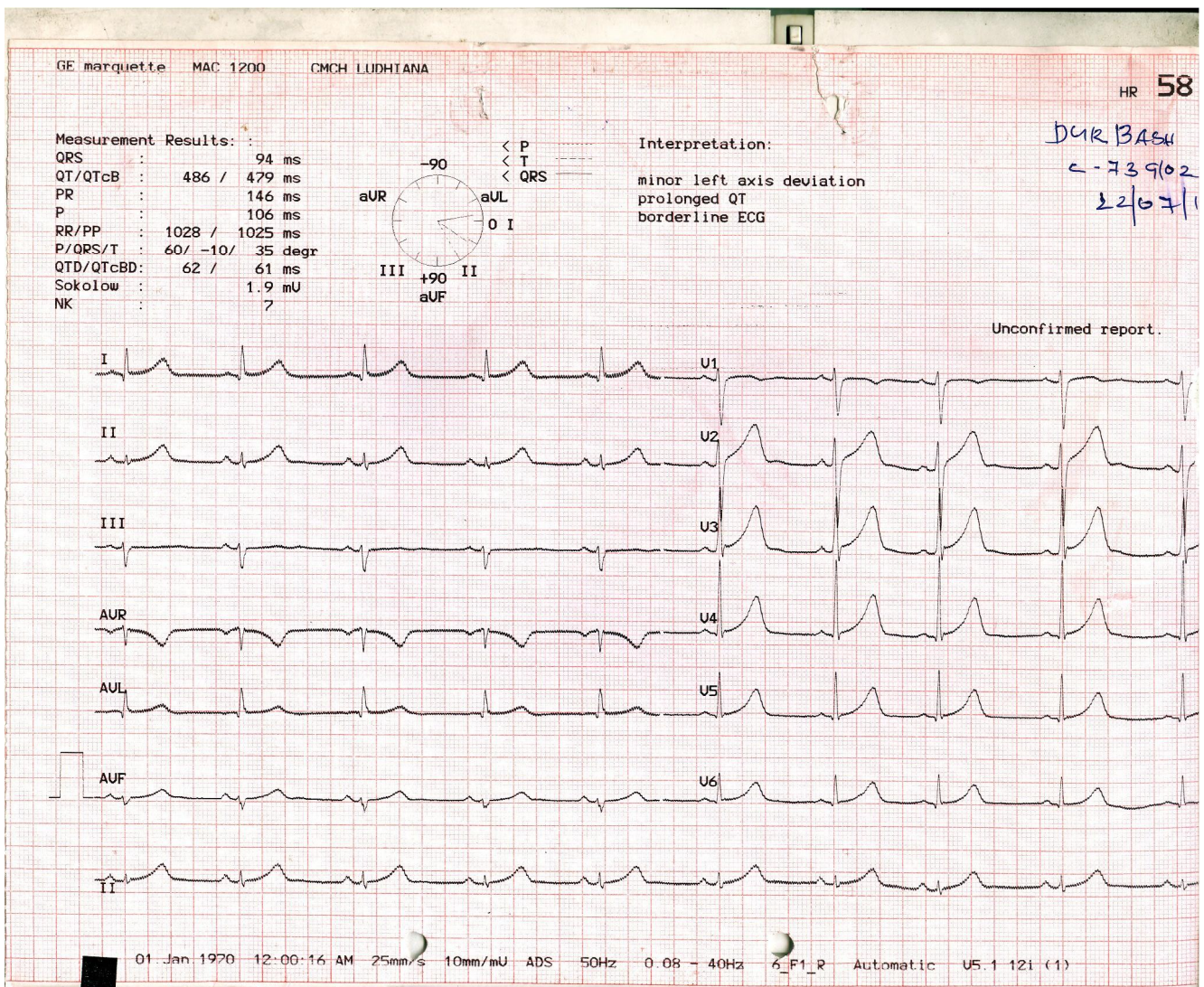
The mechanism postulated for the arrhythmias seen after electric shock is that there is the difference of electrical resistance in various tissues, whereby the current travels preferentially along blood vessels and nerves (Boggild *et al.*, 1995). This makes the heart most vulnerable to injury. This is borne out by the demonstration of patchy necrosis of the heart muscles on biopsy. The fibrotic tissue so formed may become a potential arrhythmogenic focus (Boggild *et al.*, 1995). Increase in sodium potassium pump activity and increase in potassium concentration have also been implicated. Most of the arrhythmias occurs within 24 hours of electrical injury (Jensen *et al.*, 1987; Arrosmith *et al.*, 1997).

There was an entry wound on the right hand but no exit wound was identifiable in our patient. He had lost consciousness for a while after the accident. However, he was conscious and his blood pressure was normal on admission. Atrial fibrillation with a fast ventricular rate was detected by ECG in the

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This is the first ECG on presentation to the emergency department showing atrial fibrillation. (Figure A)



This is the second ECG showing pharmacological cardioversion after giving intravenous cardarone. (Figure B)

emergency room. Because it had been an acute onset atrial fibrillation, we attempted pharmacological cardioversion with Amiodarone and sinus rhythm restored.

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