Case Report
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The Osborn Wave and Ethanol?

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Abstract

The Osborn wave which is also known as the J wave in electrocardiogram (ECG) is most commonly detected in the cases with hypothermia. Furthermore, this wave may develop as secondary to many conditions such as hypercalcemia, hypoglycemia, brain damage, ischemic heart disease. The Osborn wave disappears when the underlying cause is recovered. As is known, alcohol is a substance made of ethyl alcohol which may cause severe cardiac problems such as cardiomyopathy, cardiac arrhythmia and cardiac arrest In the present case report, we wanted to address the association of a typical Osborn wave with high blood level of alcohol by presenting two cases whom Osborn wave was detected after cardiac arrest and hypothermia developed secondary to high alcohol level in the blood; and discuss the association between Osborn wave and high blood levels of alcohol.

Keywords: Osborn Wave, Ethanol, Cardiac Arrest, Emergency Room

Introduction

The Osborn wave is a dome- or hump-shaped deflexion appeared on RST junction (J point) in ECG[1]. The J waves (Osborn waves) were first identified by Dr. Osborn[(2)]. The Osborn wave was identified with many different denominations such as camel-hump sign, late delta wave, hathook junction, hypothermic wave, J point wave, K wave, H wave and current of injury. Although there is not any definite impression about terminology of the aforesaid wave, the most common denomination recently is the Osborn wave or J wave[1]. The Osborn waves are commonly observed in case of hypothermia. Progressive decreases in the pulse and cardiac output occur in extended moderate hypothermia (28-32°C) whereas increases in atrial and ventricular arrhythmias as well as the Osborn waves are detected in ECG[3]. However, Osborn waves were also reported in case of hypercalcemia, sepsis, neuroleptic drug use, hypoglycemia, diabetic ketoacidosis, brain damage, cardiac arrest, Chagas disease, ischemic heart disease, cardiopulmonary arrest developed secondary to over-sedation and Brugada syndrome[4].

Alcohol is widely used in chemistry, industry and medicine. This compound consists of carbon, hydrogen and oxygen. The most well known alcohol is the ethyl alcohol as it is the essential ingredient of alcohol beverages[5]. The risk for ischemic heart disease and myocardial infarction increases in the individuals who intake alcohol. Alcohol may increase the blood pressure and cause cardiac failure. Severe cardiac problems such as cardiomyopathy, cardiac arrhythmias and sudden death may develop due to alcohol use[6].

The aim of the present case report was to focus onto the association between appearance of typical Osborn wave detected in ECG and high blood levels of alcohol via a patient who referred to our ER twice due to cardiac arrest and hypothermia developed as secondary to high alcohol levels detected in the blood and developed Osborn waves and disappearance of the waves by treatment through typical ECG images.

The Case

A 51-year old male individual who was severely drunk was taken to ER by 112 team. It was learned that the patient was chronically alcoholic based on the information obtained from the relatives and 112 team. The first assessment of the patient was as follows; overall status was good; GCS: 15; the patient was conscious but disoriented due to alcohol. Vital signs; blood pressure: 110/60 mmHg, pulse: 82/min; respiration count: 22/min; body temperature: 36.3°C and SpO2: 95%. Blood glucose measured from the finger tip blood was 110 mg/dl. Physical examination was normal. Since the patient was disoriented, neurological examination could not be performed. The patient had not any significant motor deficit as much as assessed. Laboratory tests were ordered. Cardiopulmonary arrest developed during monitoring under med-

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ical observation; therefore, resuscitation was started. The patient was intubated; and the cardiac pulse returned after a 5-minute of CPR performance. Vital signs after the CPR; BP: 70/50 mmHg, Pulse: 55/min, RC: intubated; body temperature: 36.4°C; SpO2: 98%. The Osborn waves were observed in the ECG (Figure 1). Cerebral tomography was ordered for further tests and diagnosis. Laboratory tests were normal except the blood alcohol level of 211 mg/dl (normal range: <10 mg/dl). There was not any intracranial pathology in the cerebral tomography of the patient. Cardiology department was consulted for any cardiac pathology. Any cardiac pathology was not considered primarily. No pathology was detected in laboratory analyses during monitoring period. Final blood alcohol level was detected as 118 mg/dl. In line with this finding, there were gradually decreasing Osborn waves in ECG series of the patient (Figure 2). After a monitoring period for 12 hours in the ER, the patient was referred to intensive care unit. The patient was extubated at 36th hour in the ICU, laboratory tests were normal and ECG was at normal sinus rhythm without any Osborn waves; discharge was planned after a monitoring period of 48 hours without any symptoms.

The 51-year old male patient whom emergency service team told he was severely drunk and his clothes were wet was taken to our ER approximately 5 days later. First assessment revealed a well overall status as well as somnolence; GCS was detected 14. All clothes of the patient was wet and cold. Vital signs; blood pressure: 130/90 mmHg, pulse: 78/min; respiration count: 20/min; body temperature: immeasurably low and SpO2: 96%. Blood glucose measured from the finger tip blood was 106 mg/dl. All clothes of the patient were taken off and he was observed. There was not any abnormal finding in the physical examination of the patient except cold skin. Neurological examination could not be performed since the patient has somnolence. The patient had not any significant motor deficit as much as evaluated. There was not any additional pathology detected in the ECG except the Osborn waves (Figure 3). Depending on the aforesaid findings, heating protocol was started since hypothermia was considered. Intravenous infusion of 0.9% physiological saline which was heated up to 40°C was started. All clothes of the cases were taken off and he was covered with blankets. Electric heaters were placed around the case. A foley catheter was inserted and irrigation was performed with heated water. Heated moist O2 was administrated. Samples were collected and referred for laboratory tests. The body temperature was measured as 35°C through a digital thermometer approximately 2 hours later. The body temperature was detected as 35.7°C at 4th hour of monitoring. The control ECG revealed that the Osborn waves disappeared and the rhythm returned to normal sinus rhythm. There was not any significant pathology except alcohol level of 411 mg/dl (Normal range: <10 mg/dl). Since the tests and treatment process revealed no pathology during a monitoring period of 24 hours, the patient was discharged.

Discussion

The Osborn waves are commonly observed in case of hypothermia. However, Osborn waves were also reported in case of hypercalcemia, sepsis, neuroleptic drug use, hypoglycemia, diabetic ketoacidosis, brain damage, cardiac arrest, Chagas disease, ischemic heart disease, cardiopulmonary arrest developed secondary to over-sedation and Brugada syndrome[3]. In the present case, the cause of Osborn waves which were reported in the literature was cardiac arrest for the first referral; and the second cause was hypothermia; the blood level of alcohol was detected at very high levels than normal limits.

The effects of alcohol use on cardiovascular system include high blood pressure and cardiac failure. Cardiomiyopathy, cardiac arrhythmias and sudden death may appear due to alcohol intake[5]. In the present case, cardiopulmonary arrest developed because of possible increase in the blood alcohol level and a considerably short cardiopulmonary resuscitation was performed (approximately 5 minutes). There was not any cardiac pathology detected in cardiac evaluation of the patient. However, the Osborn waves in the ECG of the patient may be assumed as secondary to the cardiac arrest. Second referral was because of development of hypothermia due to possible exposure to a cold environment for a long period in an unconscious state because of high levels of alcohol and the Osborn waves might have developed due to this.

The Osborn waves are temporary findings; therefore, the osborn pattern in ECG disappears when the underlying cause is treated such as return of body temperature to normal level in hypothermic patients[(7)]. The present case had not any pathology and a condition that may cause osborn wave (i.e. hypothermia, cerebral cardiac pathology) in the first referral except high alcohol levels in the blood (211 mg/dl); and the osborn wave pattern gradually decreased and disappeared in line with the decrease in blood level of alcohol during monitoring. Hypothermia and elevation of the blood alcohol level (411 mg/dl) were detected in the second referral; the osborn waves again disappeared in the ECG by rapid heating and decrease of the alcohol level in the blood. The two conditions mentioned above were considered to be related with high alcohol level in the blood.

Consequently, detection of the osborn wave would be an important indicator for emergency medicine physicians to investigate the possible causes as well as plan the treatment earlier. We believe that the high blood levels of alcohol that we detected during each referral of the present case is a predictor for possible pathological conditions that may cause the osborn wave in ECG and this would serves as a warning for emergency medicine physicians for close monitoring and treatment of the patients.

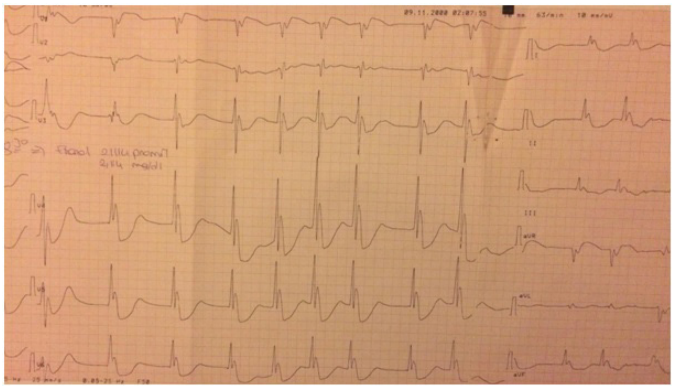

Figure 1: The Osborn waves were observed in the admitted ECG.

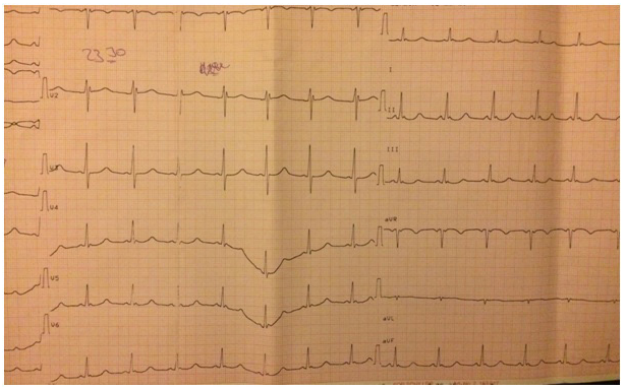

Figure 2: ECG demonstrating progressive Osborn wave resolution.

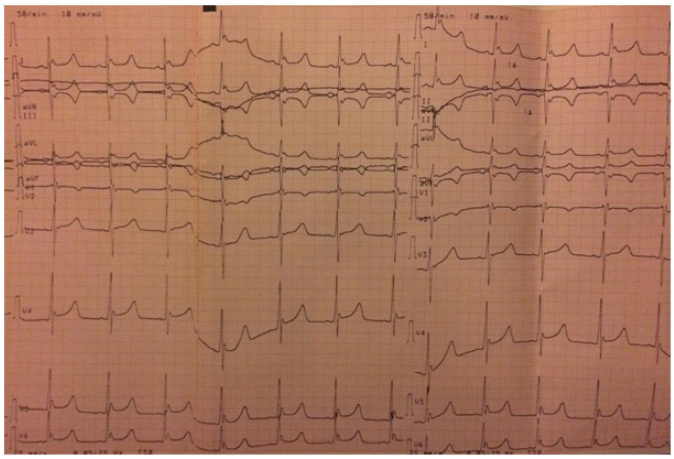

Figure 2: ECG demonstrating progressive Osborn wave resolution.

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