

The electrocardiogram of a man found in the forest

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CASE REPORT

A 65-year-old man left his home drunk and fell asleep somewhere in the forest nearby. He survived the cold and rainy night and was found by villagers the next morning. On arrival at the emergency department a blood pressure of 178/89 mmHg, regular heart rate of 58 beats/min and body temperature of 28.1°C were measured. Despite a somnolent impression, the patient scored a maximum Glasgow Coma Score.

Abnormal laboratory analyses were troponin-T 0.15 Ig/l (normal <0.1 Ig/l), glucose 2.4 mmol/l (normal 5 mmol/l) and ethanol 1.6 g/l (normal 0 g/l). Sodium, potassium and calcium were within normal ranges. Arterial blood

gas showed respiratory acidosis: pH 7.25, P_{CO_2} 6.78 kPa, P_{O_2} 14.76 kPa, HCO_3^- 22 mmol/l, and saturation 97%. *Figure 1* shows the electrocardiogram (ECG) during severe hypothermia. Patient was rewarmed using external and internal rewarming techniques on the intensive care unit and gained a temperature of 36.9 °C after approximately eight hours. A new ECG was taken (*figure 2*).

WHAT IS YOUR DIAGNOSIS?

See page 376 for the answer to this photo quiz.

Figure 1.

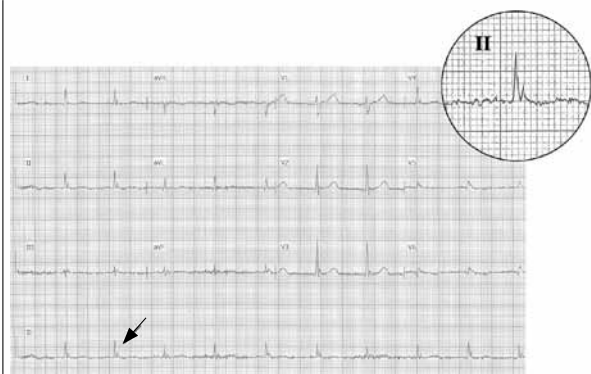


Figure 2.



DIAGNOSIS

The ECG shows Osborn waves due to severe hypothermia. The term Osborn waves refers to a deflection immediately following the QRS complex and in the same direction as the R wave. Osborn waves are mainly observed in hypothermic conditions.¹ Other conditions such as hypercalcaemia and brain injuries, including haemorrhage, have also been reported to cause Osborn waves. Osborn waves are attributed to a disturbance in 4-aminopyridine sensitive transient outward current between epicardium and endocardium. This imbalance produces a transmural voltage gradient during ventricular action that manifests as a Osborn wave on the ECG.²

The clinical significance of Osborn waves is unclear. Osborn waves observed in patients who have suffered from hypercalcaemia and neurological disorders are usually

not accompanied by arrhythmias. Due to the lack of evidence, it is unclear whether Osborn waves can be regarded as a predictive sign for ventricular arrhythmias during hypothermic conditions. Still, in most cases the appearance of Osborn waves on the ECG is accompanied with a serious underlying disorder and therefore requires further diagnostic investigation and treatment.

REFERENCES

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2. van Noord T, Ligtenberg JJ, Zijlstra JG. Diagnostic image (209). A man after submersion in water. *Ned Tijdschr Geneeskd.* 2004;148(40):1966