

The ECG in hypothermia: Osborn waves

T.J. Olgers*, F.L. Ubels

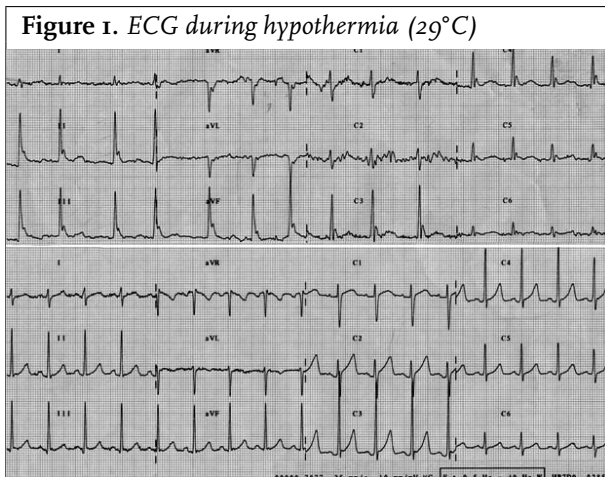
Department of Internal Medicine, Medical Centre Leeuwarden, PO Box 888, 8901 BR Leeuwarden, the Netherlands, *corresponding author: tel.: +31 (0)58-286 66 66, fax: +31 (0)58-286 60 05, e-mail: T.J.Olgers@znb.nl

CASE REPORT

A 26-year-old man was referred to our Emergency Room with mental confusion and accidental hypothermia. After attempting to run away, partly through water, he was found more than one hour later in a field. He was in a comatose, hypothermic state and unresponsive. The Glasgow Coma Scale was 2-4-1, with an irregular pulse of 120 beats/min and a blood pressure of 130/85 mmHg. Rectal temperature measured 27.9°C. Physical examination revealed small but normally reactive pupils, extremities were cold without reflexes. He was shaking heavily. Laboratory investigation was normal.

WHAT IS YOUR DIAGNOSIS?

See page 353 for the answer to this photo quiz.



ANSWER TO PHOTO QUIZ (ON PAGE 350)
THE ECG IN HYPOTHERMIA: OSBORN WAVES

DIAGNOSIS

The ECG (*figure 1*) showed atrial fibrillation with a ventricular rhythm of 110 beats/min and prolonged conduction intervals. The J waves or Osborn waves (arrows) were striking. The patient was actively rewarmed under haemodynamic surveillance without complications. Six hours after presentation his body temperature had risen to 35°C. The ECG showed normal sinus rhythm without the Osborn waves (*figure 2*).

The next day it became clear that the patient had used cocaine, which had probably caused the initial mental disturbance.

Hypothermia (body temperature <35°C) can be divided into three categories (mild between 32 and 35°C, moderate between 28 and 32°C, and severe <28°C). This classification is important for assessing the risk of complications. The most serious complications occur with temperatures below 28°C and consist of hypotension, pulmonary oedema, areflexia, bradycardia, ventricular fibrillation and asystole.¹

Hypothermia instigates typical changes on the ECG as a consequence of artefacts during shaking and because of the retarded conduction through the cardiac tissue. This is responsible for the prolonged conduction times measured. Elevation of the J point is also possible and can be seen as the characteristic Osborn waves, named after J.J. Osborn who initially described them. They are the result of a more prominent transient outward potassium current resulting in a transmural voltage gradient in the epicardium, more pronounced under hypothermic conditions.² Description of the exact mechanism is beyond the scope of this article. Osborn waves are most distinct in the precordial and inferior leads and disappear after normalisation of the body temperature. They are a characteristic finding in hypothermia but also occur in other conditions such as hypercalcaemia.² The presence of Osborn waves is not associated with a higher mortality in contrast to the presence of atrial fibrillation and the absence of shivering artefacts.³

CONCLUSION

J waves or Osborn waves on the ECG in accidental hypothermia.

REFERENCES

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3. Graham CA, McNaughton GW, Wyatt JP. The electrocardiogram in hypothermia. *Wilderness Environ Med* 2001;12(4):232-5.

