

Internal Medicine Flashcard

Heart of ice

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A 41-year-old man was found unresponsive at home. On arrival, the air Ambulance team reported Glasgow Coma Scale 5 (E1V1M3), myosis, afinalistic movements and cold skin (28 °C). Blood glucose levels were normal. A history of recent drug and alcohol abuse was reported by friends around. Naloxone and Flumazenil administration was ineffective; intravenous fluids were administered and orotracheal intubation was performed. On admission to the hospital the vital signs were stable and the patient was quickly extubated. Blood tests revealed rhabdomyolysis and acute kidney injury. Electrolytes levels were normal except for mild hyperkalemia. Blood ethanol levels were elevated and a urine drug test resulted positive for cocaine. Arterial blood gas showed pH 6,8, pCO₂ 70 mmHg (9,3 KPa), BE – 22, lactates 10 mg/dL. ECG revealed sinus rhythm with prominent J-waves and prolonged

QT interval in nearly every lead (Fig. 1A).

What is the Diagnosis?

Answer: ECG changes associated with hypothermia.

Hypothermia is defined as a core body temperature less than 35 °C. Urban hypothermia is usually associated with alcohol abuse, confusion, and immobility. Several ECG changes are associated with hypothermia: sinus bradycardia, junctional rhythm, atrial fibrillation, prolonged PR and QT intervals, prominent J-waves, T-wave changes and ventricular fibrillation, all due to prolongation of depolarization and action potential lengthening.

Hypothermia causes an increase of the cardiac transient outward potassium current, which is more prominent in the epicardium than in the endocardium. This transmural gradient results in J waves with

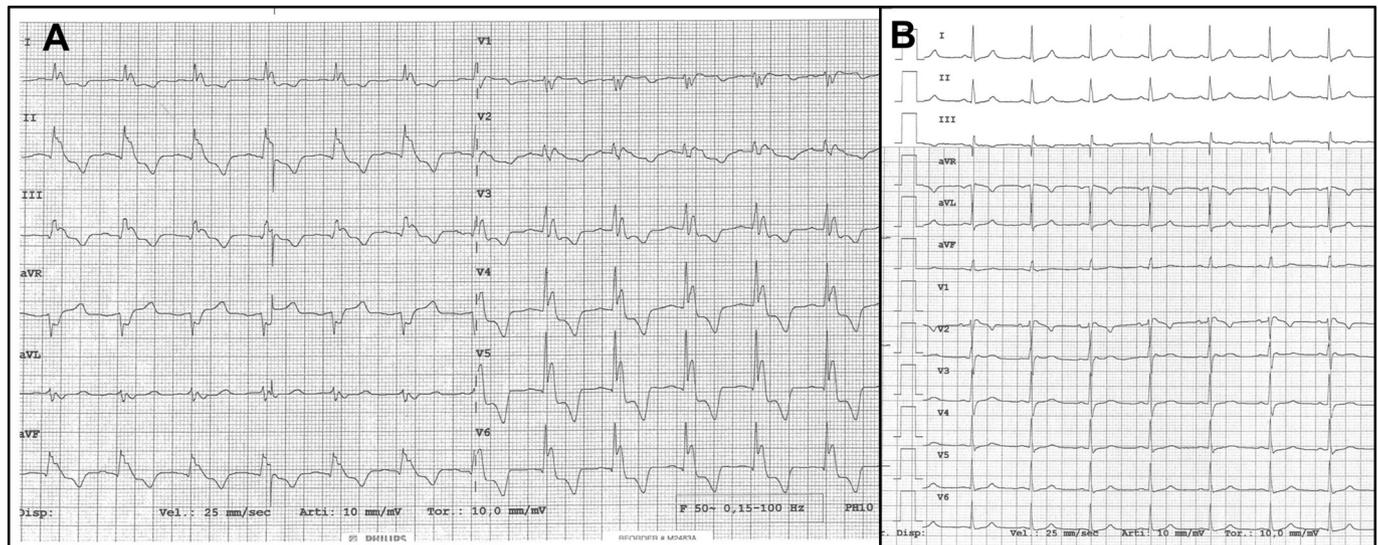


Fig. 1. A) ECG obtained on hospital admission. B) ECG obtained 8 h later.

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a dome morphology in the same direction as R wave, that are typically observed on the precordial leads at the R-ST junction. J-wave was named “Osborn wave” after the first clinician to describe it in 1952 [1]. This pattern occurs in approximately 30% of hypothermic patients [2]. J-waves are not pathognomonic of hypothermia, as they can be found in other conditions such as Brugada syndrome, early repolarization syndrome, subarachnoid hemorrhage, hypercalcemia, and myocardial ischemia.

The patient underwent fluid therapy and rewarming. After rewarming the J waves disappeared, and the QT interval and QRS

duration normalized (Fig. 1B). After five days the patient requested to get discharged. He went home in good conditions, with a normal renal function and a normal echocardiogram.

References

- [1] Osborn JJ. Experimental hypothermia; respiratory and blood pH changes in relation to cardiac function. *Am J Physiol* 1953;175:389–98.
- [2] Colin A, Graham FRCS, Gordon W, et al. The electrocardiogram in hypothermia. *Wilderness Environ Med* 2001;12:232–5.