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Severe hypothermia showing Osborn waves associated with transient atrial fibrillation and ST segment depression

An 80-year-old woman with no known cardiovascular risk factors was found unconscious at home with a body temperature $< 30^{\circ}\text{C}$ ($< 86^{\circ}\text{F}$). On arriving at the emergency department, her ECG (panel A) showed an atrial fibrillation (AF) with ST segment depression from V3 to V6. In leads V5 and V6 there was a terminal extra QRS deflection formed by the junction between the J point and the ST segment, consistent with the so-called Osborn waves (panel C). Serum electrolytes and cranial computed tomography (CT) were normal. After re-warming to a body temperature of 36.7°C (98°F), the patient recovered sinus rhythm (panel B) and the ST segment depression and the Osborn waves disappeared.

Hypothermia (body temperature $< 35^{\circ}\text{C}$ ($< 95^{\circ}\text{F}$)) is initially associated with sinus tachycardia, but with temperatures $< 32.2^{\circ}\text{C}$ ($< 90^{\circ}\text{F}$) sinus bradycardia supervenes, associated with a progressive prolongation of the PR interval, QRS complex, and QT interval. At temperatures $\leq 30^{\circ}\text{C}$ ($\leq 86^{\circ}\text{F}$), atrial ectopic activity can be triggered, eventually progressing into atrial fibrillation (AF). At this level of hypothermia, 80% of the patients have Osborn waves consisting of an extra deflection at the end of the QRS complex best depicted on the inferior and lateral leads. Osborn waves become more prominent as the temperature drops, and they disappear gradually with re-warming. The combination of transient Osborn waves and AF in the hypothermia setting, with the recovery of sinus rhythm after re-warming, has been rarely described. Although several ECG alterations have been described in accidental hypothermia, this is the first report of asymptomatic transient ST segment depression with recovery after re-warming.

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(A) Emergency department 12 lead ECG obtained at core body temperature $< 30^{\circ}\text{C}$ ($< 86^{\circ}\text{F}$) showing atrial fibrillation (AF) with ST segment depression from V3 to V6. In leads V5 and V6 there was a terminal extra QRS deflection formed by the junction between the J point and the ST segment, consistent with the so-called Osborn waves. (B) 12 lead ECG obtained after patient had been re-warmed to 36.7°C (98°F); the patient recovered sinus rhythm and the ST segment depression and the Osborn waves had disappeared. (C) Detail of the Osborn wave, also known as J waves, camel-hump waves or hypothermic waves.