Electrocardiogram in a man who drove off the road

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Figure 1. Electrocardiogram recorded in the emergency department. See text for explication.

A passing motorist found a 28-year-old man on a cold January day outside of his wrecked automobile in a water-filled ditch. The state police noted that the victim was confused but able to answer simple questions, and his Glasgow Coma Score was 5 when he arrived at our emergency department.

The electrocardiogram recorded in the emergency department showed atrial fibrillation with a controlled ventricular response, a huge J wave, nonspecific ST-T wave changes, and a long Q-T interval (*Figure 1*). These are typical changes of hypothermia (1, 2)—the patient's rectal temperature was 28.3°C or 82.9°F—and disappear as core temperature returns to normal (*Figure 2*).

J waves, so called because of their location at the junction of the QRS complex and the ST segment, are common (3, 4), may be large in early repolarization, and reach their greatest size in hypothermia, when they are called Osborn waves. Atrial

fibrillation is common in patients with core temperatures of 32° to 22°C, and the lower the temperature, the higher the incidence of atrial fibrillation (5, 6). The patient is fortunate that he did not drown and that the motorist spotted him next to the secluded road. More time in the water would have resulted in an even lower core temperature, and ventricular fibrillation occurs between 30° and 15°C, and the lower the temperature, the higher the incidence of ventricular fibrillation (5).

Hypothermia is caused by exposure to cold and the inability to protect against it for any number of reasons, which is often an altered mental state produced by psychosis, stroke,

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Figure 2. Five days after the electrocardiogram shown in Figure 1 was recorded, the electrocardiogram was normal except for sinus tachycardia and minor T-wave change, i.e., TV_1 taller than TV_6 .

severe hypothyroidism or, most commonly, alcoholic stupor. This young man apparently had consumed a large amount of beer on the night he drove off the road, and his social history, low serum albumin (2.2 g/dL; reference, 3.4–5.0), and elevated aspartate aminotransferase and alanine aminotransferase levels (160 U/L and 80 U/L, respectively; references, <45 and <46) suggest long-standing excess alcohol consumption with alcoholic liver disease.

Motor vehicle accidents often result in orthopedic injuries, and our patient had a left transverse posterior wall acetabulum fracture, left second and third metatarsal base fractures, right subtalar dislocation, and bilateral knee collateral ligament disruption. He also had an open wound of his left leg and a small right pneumothorax. His mental state returned to normal with time and rewarming. After reduction of the subtalar dislocation

and open reduction and internal fixation of the left transverse posterior wall acetabulum fracture, he was transferred on the 17th hospital day to a rehabilitation unit.

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