Clinical picture

Osborn waves in a patient with hypothermia due to severe hypothyroidism

An 88-year-old female with history of hypothyroidism was brought to our emergency department with acute change in mental status. Her vital signs were significant for a core body temperature of 88°F (31°C). She was found to be severely hypothyroid (serum TSH—7.14 mU/l, Free T4—0.5 ng/dl) on lab work with a normal complete blood count and serum chemistry. The electrocardiogram on admission showed sinus bradycardia with a prolonged PR interval and a positive deflection in the downstroke of QRS complex, consistent with Osborn waves of hypothermia (Figure 1). The patient was admitted to the intensive care unit and immediately started on thyroxine replacement therapy. She responded extremely well to the treatment with remarkable improvement in the mental status and normalization of the body temperature.

Osborn waves, also known as J waves, are positive deflections occurring at the junction between the QRS complex and the ST segment. They represent distortion of the earliest phase of membrane repolarization and are most notable in the precordial leads V2–V5. Hypothermia causes slowed impulse conduction through the potassium channels and as a result sinus bradycardia ensues, accompanied by a progressive PR, RR, QRS and QT interval prolongation with an elevation of the J point. The amplitude and duration of the Osborn waves is directly proportional to the degree of hypothermia and they resolve gradually with rewarming.

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Figure 1. Electrocardiogram showing Osborn waves.