The electrocardiographic characteristics, presence of J-waves, and torsade de pointes with hypothermia.

Minoru Tarawa  
Masaomi Chinushi  
Yukie Ochiai  
Makoto Tomita  
Takumi Akiyama  
Yoshifusa Aizawa

Introduction: The occurrence of a J wave (Osborn wave) with hypothermia is well known, but the relationship of J waves and torsade de pointes (TdP) with hypothermia has not yet been clarified.

Methods: In this study, 66 consecutive patients (31 men; mean age, 74 ± 16 years) were admitted to our hospital with accidental hypothermia, and were classified into 3 groups according to rectal temperature upon arrival in the emergency room (group A: 33–35°C, group B: 30–33°C, and group C: under 30°C). ECG was recorded on admission, and the ECG parameters, including J-waves, were compared with the patient’s clinical data and courses. Special attention was paid to the ECG characteristics of the patients who had TdP.

Result: Consciousness disorders were observed in 8 of 13 patients in group A, in 7 of 16 patients in group B, and in 36 of 37 patients in group C (P <0.0001). Heart rate was slower in group C than in groups A and B (group A: 81.2 ± 26.3bpm, group B: 75.6 ± 26.7bpm, and group C: 51.7 ± 21.0/bpm [P=0.0002]). Although ECGs showed sinus rhythm in 12 of the 13 patients in group A and in 12 of 16 patients in group B, bradycardiac atrial fibrillation or junctional rhythm was observed in 24 of the 37 patients in group C (P=0.0002). J waves (slurs or notches ≥ 0.1mV in amplitude) were observed in 31 of 37 patients in group C and in 5 of 16 patients in group B, but in only 1 of 13 patients in group A (P <0.0001). QRS duration was longer in group C than in group B and A, and QT interval were longer in group C than in groups B (QRS duration; group A: 103.2 ± 11.3 ms, group B: 105.5 ± 13.7 ms, and group C: 142.3 ± 34.3 ms [P < 0.0001]; QT interval: group A: 426.2 ± 59.7 ms, group B: 447.1 ± 75.3 ms, and group C: 564.7 ± 93.7 ms [P < 0.0001]). No significant differences in laboratory blood results were found among the three groups. Rate-dependent changes in the J wave amplitude were observed in 19 patients, and all 19 patients were belonged to group C. TdP was observed in 3 patients in group C. The ECGs of these 3 patients showed atrial fibrillation with bradycardia, and rate-dependent changes in the J-wave amplitude.

Conclusion: ECG characteristics, including J waves, were affected by rectal temperature in the patients with accidental hypothermia. TdP developed in 3 of 66 patients (4.5%), who also had J waves demonstrating heart rate-dependent variations and atrial fibrillation with slow ventricular rates.