# Hypothermia And Changes In An Electrocardiogram In An Elderly Patient

*ZIJAD DURAKOVIC**

**Summary:**

**A 81-year-old man was hospitalized with hypothermia. Signs and symptoms of the disease and its complications have been attributed to the living in cold atmosphere, taking too small amounts of food and to the use of diazepam and promazine. On admission to hospital, his rectal temperature reached 28°C. He was unconscious, hypohydrated and bradicardic: 35/min. After therapy was introduced, diuresis was restored and heart frequency reached 64/min, but he was still unconscious. An ECG showed a prolonged corrected QT interval of 0.571 s and monomorphous ventricular premature beats. The aspects of hypothermia and its complications are discussed.**

**Key words:**

Hypothermia, QT interval, arrhythmia.

**Introduction:**

Hypothermia is a state where the body temperature is below 35°C. It usually occurs in elderly individuals due to reduced awareness of coldness, failure of physiological mechanism of heat conservation, inclination towards orthostatic hypotension and change in tonus of the vegetative nervous system resulting in lowered peripheral blood flow during a rest as well as because of loss of vasoconstrictive skin responses to cold[1-4]. Predispositions for hypothermia to develop are inability to walk, starvation, use of drugs such as neuroleptics (particularly, phenotiazine), sedatives and hypnotics, together with other factors. It has been reported[2] that during the winter months 3.5% of the elderly who are admitted to hospitals have the body temperature lower than 35°C.

Most elderly patients with hypothermia present after a period of several hours or several days of stay in a low environmental temperature of less than 18°C.

**Case Report:**

A 81-year old man (V.J.) was admitted to the Department of Internal Medicine, University Hospital Rebro because of hypothermia and dehydration.

In the afternoon of January 3, 1993, the patient was found unconscious lying down on the floor of his room. The ambient temperature was low.

The patient had been taking diazepam 3x2 mg, prazine 3x2 mg and theolin 3x125 mg per day.

**On Examination (at the admission).** The patient was soporous and hypothermic (rectal temperature: 28°C), tachypnoic (36/min), red in the face and with red extremities. His skin was turgid. Crackles were heard at both lung bases with bronchial murmurs. The heart sounds were diminished: 35/min. The blood pressure was 120/70 mmHg.

MD, PhD., FACP Department of Medicine, University Hospital Rebro, School of Medicine, University of Zagreb.

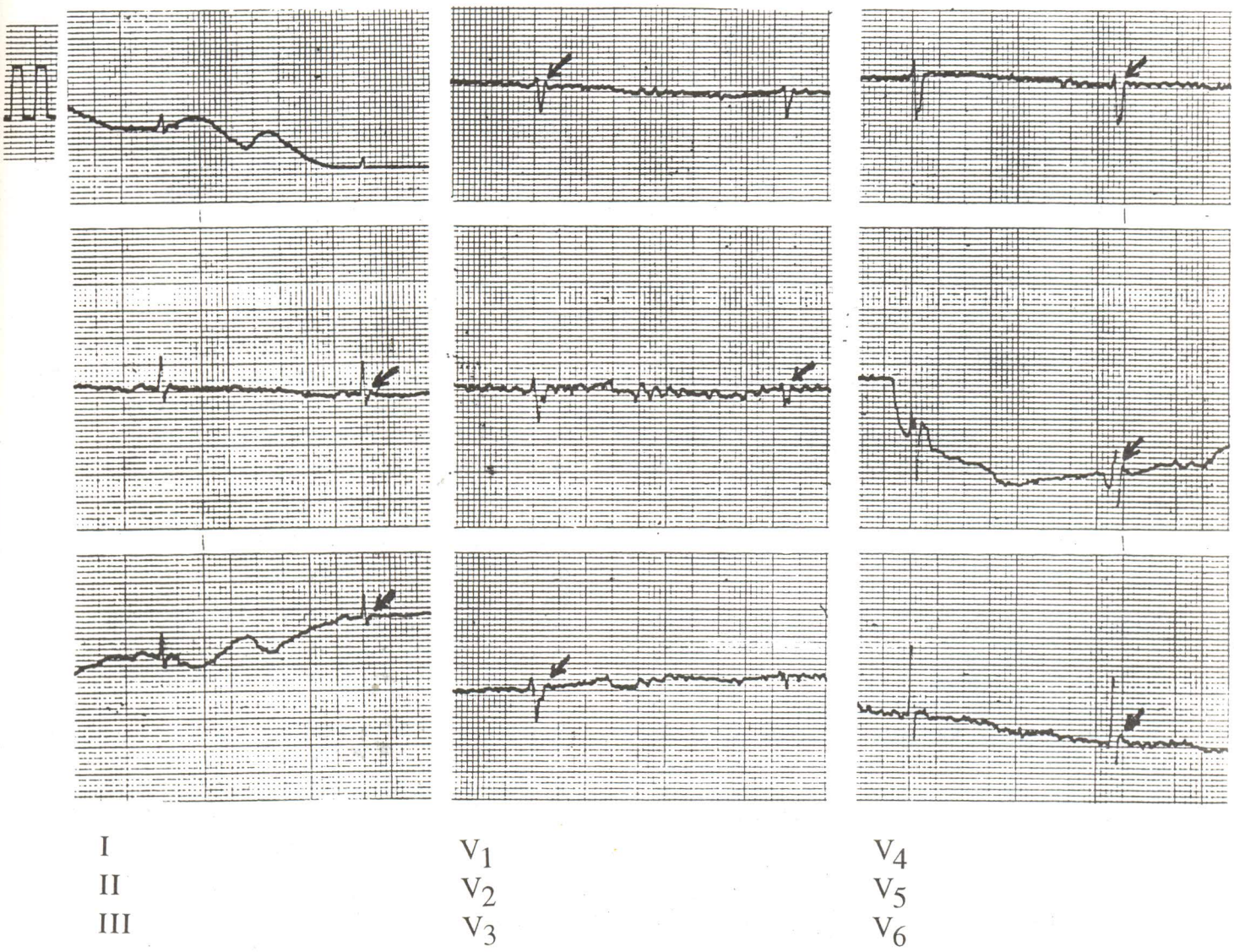


Figure 1.
Electrocardiogram on admission: intermediary electrical axis, sinus bradycardia at a rate of 34 per minute, flat T waves in all leads, extremely prolonged Q-T interval: 0.571 s (normal value for men: ≤0.422 s) analysed in lead II.
Prominent J-poin in all leads (Osborn's wave) characteristic for hypothermia.
The serum potassium concentration: 3.5 mmol/L (normal: 3.8-5.5.)
calcium 2.3 mmol/L (normal: 2.2.-2.7).

The lower legs were red with pronounced superficial veins and feet of livid color. The arterial pulsations were sustained.

**Laboratory evaluation** revealed glycosuria of ++, with glucose of 17.9 mmol/1, and respiratory acidosis. The creatinine kinase was elevated (159 J/L), with myocardial binding of 30 J/L determined on admission, and with the similar values on the following day. The value of triodothyromine was below 0.75/umol/L (normal value: 1.2-2.8), and serum myoglobine was 129/ug/L (normal value: below 90/ug/L).

**Electrocardiogram** on admission showed sinus bradycardia with a rate of 34 per minute, and pronouncedly prolonged corrected Q-T interval and a prominent J-point (Osborn's wave) typical for hypothermia. The electrocardiogram is presented in Figure 1.

On the 2nd hospital day sinus rhythm at a rate of 64/min was found and there were frequent monomorphic ventricular extra-systoles, and a less prominent J-point. The corrected Q-T interval was still prolonged: 0.447 s.

**Course of the disease** with the institution of therapy, a deep body temperature measured rectally rose for 0.5°C each hour and heart rate increased to 60 per minute. The blood pressure was 125/80 mmHg and diuresis 900 ml/24 h on the first hospital day and 1000 ml/24 h on the following day. The blood pressure was up to 120/80 mmHg, and heart rate 92/min. Two days after admission, the rectal temperature of 36°C was recorded, blood pressure amounted to 135/60 mmHg and his heart rate was 96 per minute. The patient continued to do poorly. He was unconscious, respiratory insufficient and died 2 days after admission because of ventricular fibrillation with the serum potassium level of 4.6 mmol/L.

## Discussion:

The patient was under the treatment with benzodiazepine and promazine, what might have been, together with a relatively low ambient temperature, undernourishment and dehydration, the factors leading to hypothermia. The measurement of rectal temperature made on admission 4 h after a stay in another outpatient department was 28°C (!), so the body temperature on arrival into the hospital was probably even lower.

The clinical picture on admission resembling that of cerebrovascular insult developed due to hypothermia. The electrocardiogram therefore showed a J wave (Osborn's wave) which is characteristic of hypothermia in 50% of the patients. Probably, because of the mentioned cerebrovascular changes (brain edema on autopsy), the corrected Q-T interval was extremely prolonged amounting to 0.571 s.

It is well known from the literature that a mortality rate especially among the elderly is in the region of 35% where the body temperature is between 35°C and 32°C, 65-80% when about 28°C and 100% where less than 28°C (28-23°C)[2,3] and the causes of death are ventricular asystolia and ventricular fibrillation. Namely, when the body temperature of a patient falls below 35°C following a prolonged exposure to cold external environment, the temperature continues to fall further until complications occur; sinus bradycardia and different heart arrythmias. After that, depression of the control mechanism of heat regulation of the central nervous system develops and the final outcome depends upon its cause in the individual case, also to its severity and its complications[5, 6].

## References:

1. Fox RH, MacGibbon R, Davies L, Woodward PM: Problems of the old and the cold, Br Med J 1973; 1:21-24.

2. Wagner JA, Robinson S, Marino RP. Age and temperature regulation of humans in neutral and cold environments, J Appl Physiol 1974; 37:563-565.

3. Durakovic Z, Durakovic A. Myxoedema hyperthyreosis, hypothermia, obesity and ionising radiation, In: Durakovic Z ed: Electrocardiogram, Naprijed, Zagreb 1983, pp. 284-285.

4. Durakovic Z. The characteristics of acute renal failure in older persons, Z Alternsforsch, 1986; 41: 85-89.

5. Durakovic Z, Gjurasin M, Ivanovic D, Gasparovic V, Bosnic D, Ljubojevic B. Smalcelj A, Banic M, Badric S. Intensive care for the elderly. Radovi Med fak u Zagrebu, 1988; 29: 229-233.