CASE REPORT

A NIGHT IN THE SEA: A HYPOTHERMIA CASE

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Abstract

Hypothermia occurs as a result of increase in heat loss or decrease in heat production and it is defined as falling of body temperature below 35°C for any reason. Hypothermia which seen in all age groups is a severe condition that can be resulted with death if it is not treated. In this case report, epidemiology, pathophysiology, clinical features and treatment of hypothermia were discussed over a case report.

Presentation of Case

A forty-nine years old male was brought to our peripheral emergency room (ER) by emergency medical services' ambulance, accompanied by the police. The patient had a poor general appearance, his conscious was open but he was unorientated and uncooperated. According to the information obtained from the police, he was found at sea. When vital signs were assessed at the first examination, the body temperature was 33.1˚C, and the blood pressure was 90 mmHg systolic and 60 mmHg diastolic. Respiratory rate was 19 per minute and the oxygen saturation was 99% in the room air. The cardiovascular system findings were normal. The peripheral pulses were normally palpable. No mass or murmur were detected in the abdomen; rebound tenderness and rigidity or involuntary guarding were not assessed because of lack of consciousness. The bowel sounds were normoactive in all quadrants. Extremities were cold and pale. Glaskow Coma Score was assessed as 13. The laboratory findings of the patient are summarized on Table 1.
Airway of the patient was open and his respiration was spontaneous. The patient was immediately monitored in the ER. Electrocardiographic examination revealed no pathological sign except sinus tachycardia. A solution of 1000 cc 5% dextrose was intravenously started to the patient. At the same time, the patient was heated by electrical blanket. When his vital signs and physical findings were getting beter, he was referred to our hospital's central ER for follow-up.

Discussion

The body temperature required for optimal function of the human body ranges between 36.4-37.5°C. Preservation of optimal body temperature depends on the formation of heat in the body and the balance of heat loss. Hypothermia occurs as a result of increase in heat loss or decrease in heat production. Heat loss in the human body especially occurs in dry environments with radiation (55%), evaporation (30%) and transmission (15%). Skin is responsible for 90% of heat loss and if body is wet, heat lost by transmission increases up to 25 fold (1,2). Body temperature is primarily controlled by the preoptic nucleus of anterior hypothalamus. This center organizes behavioral responses of individual for coolness. With peripheral and cutaneous vasoconstriction, this center tries to reduce heat loss and with shivering, increaseheat production. On the other hand, when an individual is alerted to "cold", he or she develops behavioral responses such as exercising, sheltering or dressing.
Hypothermia is defined as falling of body temperature below 35°C for any reason (3). The causes of hypothermia are usually multifactorial and may develop under any environmental condition. Heat production is markedly reduced, especially in cases of elderly, hypoglycemia, severe malnutrition, hypopituitarism, hypothyroidism and trauma. Exposure to cold, toxins, burns, and iatrogenic causes can increase heat loss. It is well known that senility, dementia, alcohol or sedative drug use, encephalopathies and some metabolic disorders play an important role in the development of hypothermia (2,4).

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Prevalance of hypothermia in Turkey is not quite known. It was estimated that 1500 hypothermia induced deaths per year reported in United States (1). Hypothermia exposure is more frequent in men than in women and especially seen in very young and very old ages. Hypothermia seen in elderly patients is mostly related to chronic or secondary causes, whereas hypothermia that develops after accidents are frequent in young people. More than half of deaths due to hypothermia occurs in individuals older than 65 years (5). There are different classifications in hypothermia. It was functionally classified as; controlled hypothermia (actively cooling a patient for intervention); endogenous hypothermia (due to increased heat loss or loss of thermoregulation) and accidental hypothermia (2). Another commonly used classification is the Swiss Hypothermic Classification according to body temperature and vital signs (6). With this classification hypothermia is divided into 4 classes. Stage 1 hypothermia, the lightest stage of hypothermia and body temperature ranges 35-32°C, only chills were seen. Stage 4 hypothermia, the heaviest form, has no sign of life and the body temperature of the person is below 20°C. Our case can be considered as stage 1 hypothermia according to this classification. Measurement of body temperature in hypothermic cases is important in terms of transplantation and management. Body temperature should be assessed with a thermometer that is properly well calibrated and be able to show notably low body temperatures. However, there are limited thermometers that allow the evaluation of notably low body temperature outside the hospital. Because of perfusion status of a case measurement results may vary according to the body part on which the measurement is made and highly depended on environmental factors. Most accurate measurement location of body temperature of hypothermic patients is the bottom 1/3 part of the esophagus. However, evaluation of the temperature of tympanic membrane is worthwhile in incoherent cases. On the other hand, it is misleading to make oral or aural measurements over the skin (6). Systemic effects of hypothermia vary according to the severity of hypothermia. Hypothermia at a mild level causes skin burning and shivering. The physiological responses develope during this period and as a result, blood pressure increases with the increase of peripheral vasoconstruction, tachycardia and myocardial oxygen consumption. If the hypothermia persists, tachycardia converts to bradycardia and it can be very severe if the body temperature is below 32°C (2,5). J (Osborn) waves begin to appear on ECG when the body temperature falls below 33°C and the waves become distinctly apparent as the body temperature keeps going down (7). Symptoms such as amnesia, confusion, impaired apathic speech, hyporeflexia and loss of fine motor movements may occur in moderate hypothermic cases. Ventricular fibrillation and asystole may occur at body temperatures below twenty-eight degrees. In a case out-of-hospital hypothermia, the main goal of treatment is to provide basic life support and to reheat the patient. Patient should be carefully examined and kept under control since peripheral pulse cannot be easily obtained. In the absence of any finding, cardiopulmonary resuscitation (CPR) should be initiated. Passive heating should be done. Blankets, hot air pads, electrical heaters can be used for this purpose (6). In mild cases, passively warming the patient with heat blankets increases the body temperature by 1-2°C per hour. If heating pads, hot water mats and heated intravenous fluid are used, the heat increase can be up to 3°C/hour. We were trying to increase the body heat by passive heating in our case. Since hypothermia is not a sudden process, passive heating is the best choice as a treatment option. By that way, no sudden cardiovascular changes would occur. Inserting the patient into the warming water can provide rapid heating, but it is not practical in the emergency department, because it makes resuscitation and monitoring impossible. Hypothermia in heated air is another successful method (8).

Table 1. Laboratory parameters of the patient

Laboratory Parameters	Value (Reference)
Venous pH	7.37 (7.35-7.45)
WBC (10^3/uL)	9.900 (4.80-10.80)
Hgb (g/dl)	14.2 (12.0-16.0)
Creatine (mg/dl)	0.63 (0.51-0.95)
Potasium (mmol/L)	4.00 (3.50-5.10)
CPK (IU/L)	546.00 (0-195)
Troponine (ng/ml)	0.00 (0-0,3)
Glucose (mg/dl)	50.00 (74.00-106.00)
Calsiyum (mg/dl)	10.10 (8.40-10.60)
Sodium (mmol/L)	131.00 (136.00-146.00)

In our case, the patient was transfered to our central ER via 112 EMS later on. The body temperature was measured at 35°C; the physical examination was fine and any pathological finding was not detected in the ECG; and passive heating and supportive treatment were continued.

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