Case Report

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A Report of Three Cases Presenting to the Emergency Department due to Near-Drowning

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Abstract

The frequency of drowning increases with the warming of the weather, especially in the summer months. In this paper, the clinical features, radiological imaging and laboratory values of three patients who presented to the emergency department due to near-drowning are discussed comparatively. In Case 1 and 3, advanced life support was applied at the scene and spontaneous circulation was restored. Case 2 presented with the complaint of dyspnea. Cases 1 and 3 died after being admitted to the intensive care unit, while Case 2 was discharged with full recovery. Cardiopulmonary resuscitation performed at the scene is a sign of poor outcome. Diffuse ground-glass opacities were detected in the early thorax computed tomography imaging of all three cases. In addition, there were early increases in laboratory values in all three cases, with the highest increases being observed in aspartate aminotransferase, alanine aminotransferase and creatinine kinase values. This suggests that tissue perfusion disorder develops in the early period.

Keywords: Drowning, emergency department, clinical features, laboratory values

Introduction

The frequency of drowning increases with the warming of the weather, especially in summer months. Near-drowning is defined as immediate survival after being removed from water. In cases of near-drowning, mortality increases as the time in water increases. It is more common in children younger than five years, individuals who drink alcohol and the elderly[1,2]. Hypoxia and acidosis are conditions seen in the early period after near-drowning and therefore treatment should be aimed at ensuring recovery from these conditions3. In this paper, the clinical features, radiological imaging and laboratory values of three patients that presented to the emergency department (ED) due to near-drowning are discussed comparatively.

Case Report

Case 1: A 39-year-old male patient was started on advanced life support at the scene due to the absence of a heartbeat and respiratory failure caused by near-drowning in freshwater, which he had entered to cool off. As a result of the successful advanced life support performed at the scene, in the ambulance and the ED, the heartbeat returned after 30 minutes. The patient was referred to our ED to the requirement of intensive care. It was seen on Electrocardiography (ECG) that the rhythm of the patient, whose first cardiac rhythm was detected as asystole, turned into sinus tachycardia in the emergency room after resuscitation. In the examination of the patient, his Glasgow Coma Scale (GCS) score was 3, pupillary fixation was dilated, there was no spontaneous breathing and endotracheal intubation was present. The patient was examined in the ED and the most increased values according to the reference intervals were determined as aspartate aminotransferase (AST) (630 U/L), alanine aminotransferase (ALT) (409 U/L), lactate (5.6 mmol/L) and creatinine kinase (CK) (1.015 U/L) (Table 1). Diffuse ground-glass opacities were detected in thorax computed tomography (CT) imaging (Figure 1). It was seen that the patient had cerebral edema in the brain CT was taken in the emergency room (Figure 2). The patient was admitted to the intensive care unit and died on the 11th day of hospitalization. It was learned from the patient's history that he did not have any disease and that he did not smoke.

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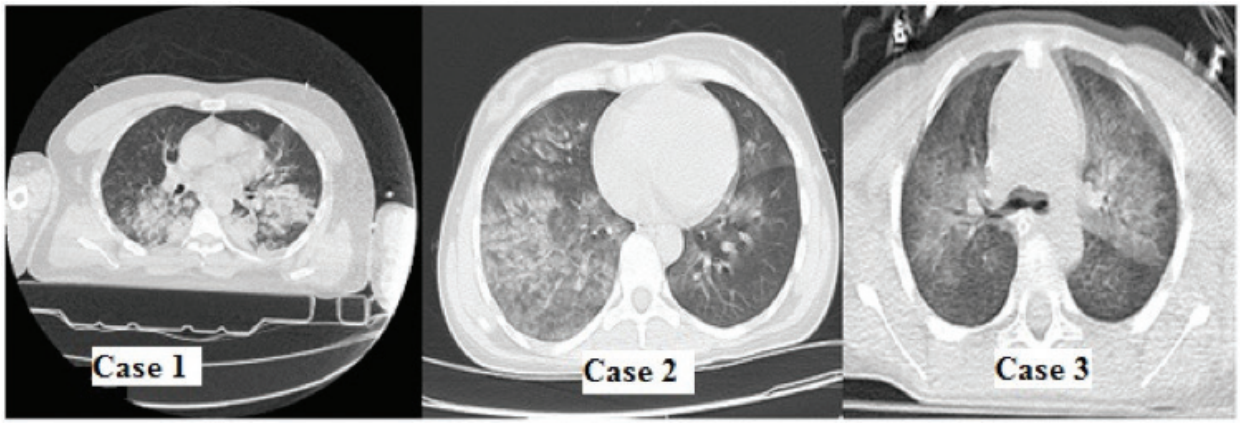

Figure 1. Electrocardiogram of the patient was consistent with atrial fibrillation with rapid ventricular response.

Case 2: A 34-year-old female patient was admitted to the ED due to near-drowning. The patient had complaints of chills, shivering and shortness of breath. Her vital signs were normal. The first ECG of the patient was evaluated as compatible with sinus tachycardia. The patient was started on oxygen support. In her laboratory tests, the highest increases were observed in AST (127 U/L), ALT (120 U/L), lactate (3 mmol/L) and CK (501 U/L) (Table 1). Since the patient was conscious, only thorax CT was got. Diffuse ground-glass opacities were detected in thorax CT imaging (Figure 1). The patient was admitted to the intensive care unit and discharged with full recovery following antibiotic and supportive treatments. The patient was not pregnant and has not no chronic health problem.

Case 3: A five-year-old male patient was given 10-minute advanced life support due to no heartbeat and no pulse at the initial evaluation after near-drowning. The patient's heart rate was recovered and he was transferred to our ED by ambulance. It was seen on ECG that the rhythm of the patient, whose first cardiac rhythm was detected as pulseless electrical activity, turned into sinus tachycardia in the emergency room after resuscitation. At the time of presentation, his GCS score was 3 and he was intubated. His laboratory tests revealed the highest increases in glucose (433 mg/dl), AST (484 U/L), ALT (325 U/L), lactate (16 mmol/L), CK (469 U/L) and amylase (501 U/L) (Table1). Diffuse ground-glass opacities were detected in thorax CT imaging (Figure 1). It was seen that the patient had cerebral edema in the brain CT was taken in the emergency room (Figure 2). The patient was admitted to the intensive care unit and died 30 hours after hospitalization. It was also learned that the patient did not have any health problems before.

Discussion

The main basis of damage caused by drowning in the body is hypoxia4. When hypoxia occurs, oxygen in the blood is directed to vital organs (brain, heart) through physiopathological mechanisms in the body. When hypoxia persists, irreversible damage occurs in cells of the heart and brain. With early intervention, damage to vital organs is minimized[5]. All three of our cases were in danger of drowning in freshwater and early intervention was undertaken because there were witnesses. Spontaneous circulation was restored in two of our cases with effective advanced life support.

Table 1: Laboratory values of the cases at the time of admission to the emergency department

Variables	Case 1	Case 2	Case 3
WBC(×10⁹/L)	6.7	16.6	15.1
Hemoglobin (g/dL)	16.7	10.9	12.4
pH	7.21	7.39	6.83
Lactate (mmol/L)	5,6	3	16
PCO2 (mmHg)	22	36	29
HCO3 (mmol/L)	11.3	21.9	4.6
AST (U/L)	630	127	484
ALT (U/L)	409	120	325
Na (mmol/L)	139	134	137
K (mmol/L)	5.2	3.5	3.2
Cl (mmol/L)	106	104	105
CK (U/L)	1015	501	469
Urea %	46	27	33
Creatinine (mg/dl)	1.55	0.69	0.80
CRP	20.8	8	30
Glucose (mg/dl)	240	97	433
Amylase (U/L)	631	120	501

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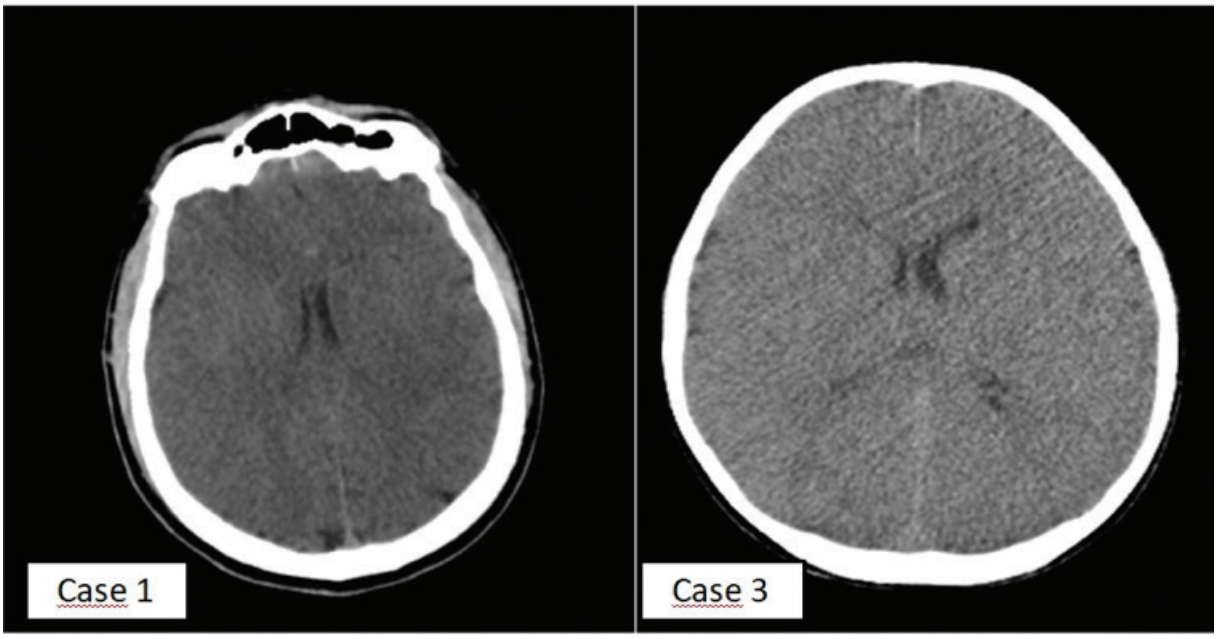

Figure 2. Brain computed tomography images of the two cases presented to the emergency department due to near-drowning.

In the study of Mosaybi et al.[6] on child drowning cases, it was observed that the mortality rate was higher in cases with a pH <7.2 and who underwent cardiopulmonary resuscitation at the scene. Similarly, in our study, cases 1 and 3 who underwent CPR at the scene died, while case 1 without CPR survived. Differently, although the pH was higher than 7.2, Case 1 died. Performing CPR at the scene was considered a more important mortality parameter

Oehmichen et al.[7] stated that electrolyte disturbances were not observed in the majority of patients presenting with near-drowning. Early changes were due to hypoxia and multi-organ damage was detected in four patients. Similarly, in our study, elevated liver enzymes, amylase and creatinine may indicate multi-organ damage.

Blood lactate level is a parameter indicating tissue hypoxia[8]. In the study of Şık et al.[9] the blood lactate level was found to be higher in the group with a high mortality rate. Although it is not correct to make inferences with our 3-case study, it was observed that the blood lactate levels of two patients (cases 1 and 3) who died in our study were higher than those of the surviving patient (case 2).

In the study performed by Nucci-da-Silva et al.[10] it was found that 78.2% of the patients admitted after drowning had cerebral edema in brain MRI scans. In our study, brain edema was observed in cases 1 and 3 on tomography.

Conclusion

The patients who underwent CPR at the scene are more likely to die. It was determined that the values that increased the most in the early period after near-drowning were AST, ALT, lactate and CK in all three cases. This shows that tissue perfusion disorder develops in the early period. High values of these variables may be associated with mortality. In all three of our cases, diffuse ground-glass opacities were present in the early period. There are usually no professional paramedics during the first minutes of intervention in near-drowning cases. Therefore, it would be beneficial for everyone to receive basic life support and first aid training.

Patient consent form - Ethics:

The case report has written in an anonymous characteristic, thus secret and detailed data about the patient has been removed. Editor and reviewers can know and see these detailed data. These data are backed up by an editor and by reviewers.

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