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Hidden Threat in the Black Sea; Rip Currents and Drowning Risk: Case Report

Karadeniz'deki Gizli Tehdit; RİP Akıntıları ve Suda Boğulma Tehlikesi: Olgu Sunumu

Acil Tıp

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Özet

Suda boğulmalar, daha çok kaza olmak üzere intihar ya da cinayet nedenli de karşımıza çıkabilen, sıvılara maruz kalma sonucu solunum işlevinin yerine getirilememesi durumudur. Daha çok yüzme bilmemekten kaynaklansa da rip adı verilen çeken akıntılar da diğer önemli nedenlerdendir. Böyle bir durumla karşılaşıldığında hastanın ilk değerlendirilmesi yapıldıktan sonra hava yolu güvence altına alınmalı, hemen oksijen başlanmalı ve devamlılığı sağlanmalıdır. Bu yazıda da akıntıya kapılıp suda boğulma tehlikesi geçiren, acile ilk getirildiğinde bilinci kapalı ve derin asidozu olmasına rağmen sekelsiz iyileşip taburcu edilen hasta üzerinden suda boğulma ile karşılaşıldığında yapılması gerekenlere ve Karadeniz kıyılarında daha sık görülen rip akıntılarına dikkat çekmek amacıyla 61 yaşında erkek olguyu sunuyoruz.

Anahtar kelimeler: *Acil*, *Boğulma*, *Asidoz*, *Prognoz*, *Müdahale*

Abstract

Drowning in water is a condition experienced mainly by accident and caused by suicide or murder, where respiratory failure happens because of being exposed to fluids. While drowning mostly occurs due to the inability to swim, rip currents are among the significant reasons. Effective interventions, including early rescue, respiratory tract safety, and oxygen support, increase survival chances. In this case report, it was aimed to emphasize that mortality and morbidity can be reduced by the correct and effective management of drowning patient at the scene and in the emergency service, based on the case of drowning, which was a 61-year-old male who was brought to the emergency service with the unconscious and a deep acidosis clinic.

Keywords: *Emergency*, *Drowning*, *Acidosis*, *Prognosis*, *Prevention*

Introduction

Drowning, defined as an inability to perform the respiratory function due to sinking in a liquid environment, is the third leading cause of death due to accidental injury and constitutes 7% of all injury-related deaths[1]. According to World Health Organization data, approximately 320,000 people worldwide die from drowning, although it is mostly seen in underdeveloped and developing countries[2]. The etiology of drowning is multifactorial and varies with age and geographic location[3]. The most important cause of death due to drowning grows out of an inability to swim. On the other hand, rip currents are also among significant reasons[4]. The drowning results were defined as death, morbidity, and non-morbidity at the First World Congress on Drowning (WCOD) in Amsterdam in 2002. It was recommended not to use the previously used terms such as "drowning," "near-drowning, " "dry and wet drowning"[5].

Low Glasgow Coma Scale (GCS) and acidosis in drowning cases are among the parameters that show a poor prognosis[4,6]. Most of these cases are lost before reaching the hospital. Early rescue, airway support, providing, and continuing oxygen support increase the survival[4,5].

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This case; was presented to draw attention to the importance of early intervention in drowning cases, and especially the rip currents encountered on the coasts of the Black Sea, through the example of a patient who was brought to the emergency room unconscious and with deep acidosis, and discharged in healthy.

Case Report

A 61-year old male, wheezing and unconscious, was brought to the emergency department(ED). According to the information received from the healthcare team that brought the patient, as a result of being caught in the current, who remained underwater for about 3-4 minutes, he was unconscious and wheezing; the people made the first intervention, and the patient was taken to the nearest health institution by the emergency team. In the ED, where he was first taken, the patient with 10 GCS was taken to the resuscitation room, monitored, and started oxygen and bronchodilator treatment. Blood gas results were pH: 6.88, bicarbonate (HCO3): 10.8 mmol/L, the partial pressure of carbon dioxide (PaCO2): 67 mmHg, the partial pressure of oxygen (PaO2): 140 mmHg, oxygen saturation (SpO2): 95%. Sodium bicarbonate was given because of HCO3: 10.8 mmol/L. Ten minutes later, the control blood gas was taken, pH: 6.99, HCO3: 17 mmol/L, PaCO2: 73 mmHg, PaO2: 100 mmHg, SpO2: 93%. The patient has transferred to our hospital for follow-up in an advanced center and reached in about ninety minutes; the general condition was evaluated as a medium, conscious (the patient became conscious during the transport), GCS: 15. Blood pressure was 117/72 mmHg, pulse 108/min, respiratory rate 20/min, and SpO2 measured at room air was 89%. In physical examination, rales were detected in the middle and lower zones in the lungs. Other systemic examination findings were recorded as normal. Sinus tachycardia was observed on electrocardiography (ECG). Arterial blood gas values included pH: 7.33, HCO3: 23.3 mmol/L, PaCO2: 52.9 mmHg, PaO2: 90 mmHg, SpO2: 94%, lactate: 3.6 mmol/L. The blood gas values of the patient are summarized in Table 1.

Table 1: Arterial blood gas results of the patient

Arterial blood gas values	On admission	10th minute	90th minute	4th day
pH	6,88	6,99	7,33	7,42
Lactate mmol/L	-	-	3,6	1,6
PaCO2 mmHg	67	73	52,9	45,1
PaO2 mmHg	140	100	90	87
SpO2 %	95	93	94	95
HCO3 mmol/L	10,8	17	23,3	25,2

Table 1
Arterial blood gas results of the patient

Other laboratory parameters were found to be within normal limits. The pulmonary computed tomography (CT) findings are shown in *Figure 1*. Normally detected brain CT imaging is shown in *Figure 2*.

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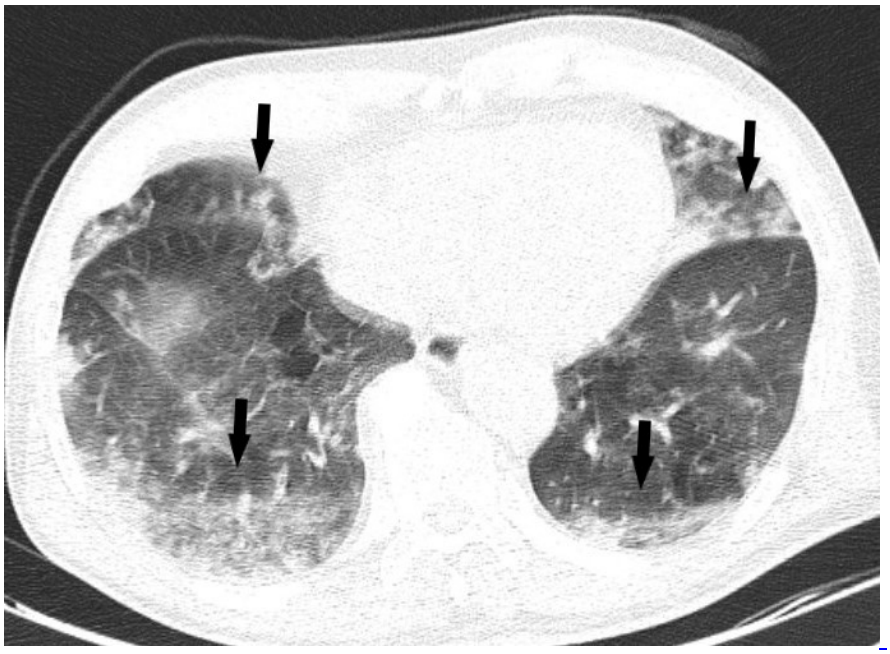

Figure 1
Pulmonary CT; Density changes following ground-glass sights-congestion are observed at the basal side of both lungs, which are prominent posterior and reach large dimensions posterior. In the patient with a history of drowning, the findings were thought to be areas of low-density consolidation secondary to aspiration.

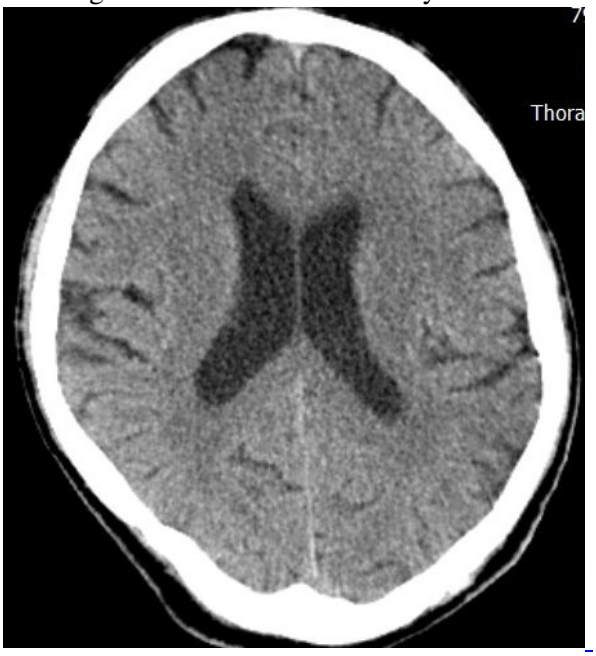

Figure 2
Brain CT; Brain tomography examination within normal limits.

Oxygen and bronchodilator treatment was initiated in the intensive care unit after chest diseases consultation with a diagnosis of aspiration pneumonia. Meropenem was added because of fever and high C-reactive protein (CRP) in the follow-up. On the fourth day; the patient, who without fever and whose laboratory values improved (pH: 7.42, HCO3: 25.2 mmol/L, PaCO2: 45.1 mmHg, PaO2: 87 mmHg, lactate: 1.6 mmol/L, SpO2 measured at room air was 95%), was discharged in a healthy.

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Case Discussion

Deaths due to drowning are more common in males in the age group of thirty and under and are the third leading cause of death in children aged 5-14[2,6]. The higher rate of deaths due to drowning in males is explained by sportive activity and risky behavior profile (alcohol or drug use)[7]. Although drowning due to accidents is the most common, deaths due to suicide and attempted murder have also been reported[6,8].

In Turkey, about 1,000 people die from drowning every year[8]. However, this data does not mention the role of rip currents. The rip currents, which occur on the coasts where the wave regime is irregular and seen mainly on the Black Sea shores in our country, and are defined as the pulling current, are the most common cause of drowning events in the world[4].

Hypoxia, hypothermia, and associated metabolic acidosis are mainly responsible for the morbidity in drowning. Continuing hypoxia for over four minutes causes permanent changes in neurons. In hypothermia, this period is prolonged due to the slowdown of cell metabolism and decreased oxygen use. For this reason, how long patients stay underwater and the temperature of the water gain importance. Early initiation of basic life support, especially by removing from underwater in a short time, prolonged cardiopulmonary resuscitation (CPR) in the presence of hypothermia; reduces mortality by contributing to drowning victims' survival minimal or no neurological sequela[6,9]. In our case, the person who was caught in the current was noticed in a short time. We believe that the low duration of our patient's stay underwater, who was unconscious but breathing when removed from the water, and the correct, effective, and early intervention at the scene, spontaneous breathing, and the preservation of circulation contributed to survival.

There are three different periods in treating patients in drowning: pre-hospital, emergency room, and inpatient treatment. Respiratory functions and pulse should be checked first, and the possibility of trauma should be evaluated. Routine stabilization of the cervical spine is not required unless factors leading to strangulation indicate that trauma is likely (IIa). Cervical spine stabilization is necessary if there is a history of diving, water slide use, signs of injury, or alcohol poisoning signs. If the patient taken out of water is unconscious despite breathing, he should be placed on his side. If breathing and pulse are not taken, CPR should be started immediately. CPR applied in drowning cases is no different from CPR performed in other cardiac arrest cases. The Heimlich maneuver is not recommended as there may be a delay in the intervention. When the patient is brought to the emergency room, the airway should be re-evaluated during the first examination, and its safety should be ensured. Oxygen should be started immediately to prevent neurological damage secondary to hypoxia. The cases of drowning in water respond rapidly to oxygen therapy in the first 24 hours. Despite oxygen support, if PaO2 <60 (mmHg) in adults and PaO2 <80 (mmHg) in children, patients should be intubated. Prophylactic antibiotics and steroids should not be given. Patients who are decided to be hospitalized should be followed up in intensive care unit[4-5].

Although many parameters are used to determine the prognosis in drowning, none of them are entirely reliable. Being under three years of age, having GCS less than five, being underwater longer than five minutes, resuscitation time longer than ten minutes, and acidosis(pH <7.1) have been associated with poor prognosis[6,10].

Our case is a drowning that occurred on the Black Sea coast, and there was no witness or suspicious situation indicating trauma. Therefore, standard recommendations (early recovery, effective basic life support practices, oxygen and airway support, and symptomatic systemic treatment) were applied in its management. On admission GCS: 10, although he had deep metabolic and respiratory acidosis, the prognosis was not bad, and the patient recovered without sequela with an early rescue, early emergency intervention, successful emergency service, and intensive care management [4,6,10].

In drowning cases, most lives can be saved with early taking out of the water and effective basic life support. We

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believe that increasing the first-aid training for volunteers and lifeguards, ensuring their continuing by updating, preparing educational and informative posters and brochures to get rid of rip currents, and placing warning signs on the shores will reduce drowning cases a protective and preventive public health service.

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