Two cases of lightning strikes resulting in Lichtenberg figures

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A B S T R A C T

Lightning strikes may cause serious injury such as burns and cardiac rhythm disorders or death through the powerful electric current. Lichtenberg figures, also known as the “picture of the lightning” are the important clues for lightning strikes. They look like the fern image on the skin and they are pathognomonic for the lightning strikes. In this report, two cases of lightning strikes and Lichtenberg figures were presented.

Introduction

Lightning is a natural event and is particularly common in spring and autumn. Deaths have been reported in 20–30% of cases of lightning strikes. Moreover, serious complications may develop among the survivors of lightning strikes. In addition to serious systemic effects, lightning strikes may also cause special figures on the skin resembling ferns, known as Lichtenberg figures. These figures are considered to be pathognomonic for lightning strikes. In this report, two cases of lightning strikes with Lichtenberg figures in which the victims were found unconscious are presented.

Case reports

Case 1

A 16-year-old male patient was found unconscious under a tree and was brought to the emergency department. The patient was conscious in the emergency clinic. He said that he had escaped from the rain under trees with a friend. He also said that he had remembered nothing after the sound of the lightning. His arterial blood pressure was 130/75 mmHg, his pulse was 85 per minute, and his fingertip oxygen saturation was 98%. The results of a neurologic examination were normal and his Glasgow Coma Scale (GCS) score was 15. There was a 15% second-degree burn on the patient’s back and right ear. In addition, there was a 2-cm cut on his right ear. His hearing and the tympanic membrane were found to be normal. There were no neurologic signs and symptoms and the patient’s GCS score was 15. She had a first-degree burn in the shape of a metal necklace on her neck region and Lichtenberg figures extending over her entire chest. Electrocardiography revealed sinus tachycardia of 120 per minute. Direct posteroanterior chest radiography and cranial computed tomography were normal. The patient’s complete blood count was normal, but cardiac biomarker levels were found to be high: troponin I 9.1 ng/mL, creatine kinase 316 U/L, and creatine kinase-MB 49.8 U/L. Cranial computed tomography was normal and electrocardiography was in normal sinus rhythm. The patient was discharged from the emergency intensive care unit on the 5th day of hospitalization.

Case 2

A 15-year-old female patient who was found unconscious was brought to the emergency department together with a friend. She did not know why she had been brought to the hospital. Her consciousness and the results of general physical examinations, except for cutaneous lesions, were normal. There were no neurologic signs and symptoms and the patient’s GCS score was 15. She had a first-degree burn in the shape of a metal necklace on her neck region and Lichtenberg figures extending over her entire chest. Electrocardiography revealed sinus tachycardia of 120 per minute. Direct posteroanterior chest radiography and cranial computed tomography were normal. The patient’s complete blood count was normal, but cardiac biomarker levels were found to be high: troponin I 9.1 ng/mL, creatine kinase 316 U/L, and creatine kinase-MB 54.9 U/L. Transthoracic echocardiography, including ventricular figures are pathognomonic for the lightning strikes. In this report, two cases of lightning strikes and Lichtenberg figures were presented.

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wall motion, was normal. On the 5th day of hospitalization, cardiac biomarker levels and control echocardiography were found to be normal and the patient was discharged from the pediatric intensive care unit.

Discussion

Energy levels of lightning have been calculated to be as high as 30 million volts/50,000 amps, and lightning may cause exposure to temperatures as high as 3000°C. In the United States, deaths of 374 people as a result of lightning strikes were reported between 1995 and 2000. By contrast, there are insufficient data about deaths due to lightning strikes in Turkey. The victims are mostly people doing various jobs outdoors during the summer. In our cases, the patients said that they had taken shelter under trees to escape from the rain. Lightning strikes cause disorders in many systems, but the most important effects occur in the cardiovascular and central nervous systems. The most common cause of death in lightning strike victims is cardiopulmonary arrest. Heart tissue damage and even wall motion abnormalities may occur due to the electrical current, and cardiac biomarker levels may be increased, as was the situation with our female patient. In addition, many neurologic problems may be seen in lightning strike cases. Generally, the victim loses consciousness immediately. In both of our patients, loss of consciousness occurred and the victims did not remember what had happened. In LS when struck by lightning, the electrical current usually passes outside the body and causes characteristic superficial linear burns resembling a tree, known as Lichtenberg figures. Deep internal burns are relatively rare and are characterized by rhabdomyolysis and myoglobinuria. Lichtenberg figures were described in 1777 by Georg Christoph Lichtenberg. The exact mechanism of Lichtenberg figure formation remains unclear. It is estimated that it may involve dielectric degradation of the skin and red blood cell leakage to superficial skin layers from capillaries caused by intensive electron flow. Lichtenberg figures appear approximately 1 hour after exposure to lightning and decreases over time, tending to disappear within 24–48 hours. Both of our patients were admitted early and both had Lichtenberg figures on admission. Lichtenberg figures were seen very clearly on our first patient, even on the 5th day, but the Lichtenberg figures on our second patient disappeared within 72 hours.

Lightning strikes should be kept in mind when persons are found lying unconscious outdoors, especially during the rainy season. Lichtenberg figures have pathognomonic importance in suspected cases of lightning strikes.

References