Pneumomediastinum and bilateral pneumothorax following near drowning in shallow water
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Abstract

We report pneumomediastinum, bilateral pneumothorax and acute respiratory distress syndrome in a 24-year-old college student who drowned in a fresh water pond. He was waist-deep in the water. He was immediately rescued when his absence was noted and taken to a nearby hospital within thirty minutes. On admission, he had tachycardia 130/min, tachypnea 28/min and systolic blood pressure of 60 mm Hg. Bilateral air entry was reduced albeit with crackles basally, and he was awake, obeying commands with no focal neurological deficits. His investigations were: hemoglobin 21.4 g/dL, haematocrit 60, urea 10.7 mmol/L, creatinine 176.6 µmol/L, potassium 2.6 mEq/L, metabolic acidosis, sinus tachycardia on electrocardiogram, and bilateral lung infiltrates, bilateral pneumothorax and pneumomediastinum on chest radiography (Figure 1A). His central venous pressure was 6cm of saline following which fluids and inotropes (dopamine and dobutamine) were administered. The patient also had upper gastrointestinal (GI) bleeding following which he was transfused two units of red blood cells (RBCs). On the second day subcutaneous emphysema over neck was noticed and a computed tomography of the chest was performed to rule out chest trauma. Echocardiography was normal; a left sided intercostal chest tube was placed and removed on day 4 of admission. Inotropes were tapered and stopped on the third day. His renal function improved with fluid management and he was discharged on day 10 with the presence of a small pneumothorax on the right side. On a follow up visit two weeks later his chest x-ray (CXR) was normal and he remained symptom free.

Introduction

Unintentional drowning accounts for about 8% of injuries related deaths. A majority of these drowning related deaths occur in developing and underdeveloped countries. About 86000 deaths related to drowning had been reported in India (in 2000), with a mortality rate of 8.5%. The lack of sufficient education in drowning prevention and resuscitation has resulted in thousands of unnecessary deaths. Here we report a case of pneumomediastinum, bilateral pneumothorax and acute respiratory distress syndrome (ARDS) in a male with near drowning that recovered with conservative therapy.

Case Report

This 24-year-old college student was brought to the emergency with history of drowning in a fresh water pond. He had been waist-deep in the pond drinking alcohol, while his friends who were swimming had been unaware when he had slipped into the water. He was immediately rescued when his absence was noted and taken to a nearby hospital within thirty minutes. En route, they had noticed that he was barely conscious, able to follow a few commands and had shallow breathing. He was nasally intubated and brought to our institution about three hours later. On examination he had tachycardia 130/min, tachypnea 28/min and systolic blood pressure of 60 mm Hg. Bilateral air entry was reduced albeit with crackles basally, and he was awake, obeying commands with no focal neurological deficits.

His investigations were: hemoglobin 21.4 g/dL, haematocrit 60, urea 10.7 mmol/L, creatinine 176.6 µmol/L, potassium 2.6 mEq/L, metabolic acidosis, sinus tachycardia on electrocardiogram, and bilateral lung infiltrates, bilateral pneumothorax and pneumomediastinum on chest radiography (Figure 1A). His central venous pressure was 6cm of saline following which fluids and inotropes (dopamine and dobutamine) were administered. The patient also had upper gastrointestinal (GI) bleeding following which he was transfused two units of red blood cells (RBCs). On the second day subcutaneous emphysema over neck was noticed and a computed tomography of the chest was performed to rule out chest trauma. Echocardiography was normal; a left sided intercostal chest tube was placed and removed on day 4 of admission. Inotropes were tapered and stopped on the third day. His renal function improved with fluid management and he was discharged on day 10 with the presence of a small pneumothorax on the right side. On a follow up visit two weeks later his chest x-ray (CXR) was normal and he remained symptom free.

Discussion

Drowning is suffocation arising from submersion in a liquid medium, generally water and near drowning is at least temporary survival following drowning that enables a patient to obtain health care. Near drowning is much more common than drowning. Most such incidents are under-reported, although up to half a million deaths occur worldwide due to drowning. Ninety percent of near drowning incidents are wet drowning wherein small to large amounts of fluid are aspirated into the lungs along with temporary laryngospasm. Wet drowning with fresh or sea water generally disrupts surfactant lining and hence alveolar collapse, adult respiratory distress syndrome, hypoxemia and cerebral hypoxia occur. Drug intoxications, arrhythmias, depression, epilepsy, head injuries and accidental falls are common causes of near drowning. About 20-25% of young adult (especially males) deaths associated with water recreation activities are seen with alcohol use as in our patient. Serum sodium may be altered depending on whether fresh or seawater was aspirated, but our patient’s sodium was normal. Hypokalemia is seen in 50% of fatal drowning incidents. Hemoconcentration is generally seen in sea water drowning, but our patient who drowned in a pond presented with elevated hematocrit and low central venous pressure (CVP). His upper GI bleeding probably contributed to the patient’s hematocrit and decreased oxygen delivery to tissues.
towards his contracted intravascular volume and shock. Computed tomography (CT) findings of near drowning including pneumomediastinum, crazy pavement appearance, ground-glassing as reported in a study were also seen in our patient. CT chest revealed no trauma, while hypokalemia, renal failure and pulmonary edema were seen in our patient. Good prognostic indicators in the emergency include GCS>5/15, short submersion time and spontaneous respiration and cardiac activity all of which were observed in our patient.

In conclusion, we report a case of pneumomediastinum in near drowning that followed slipping into the water in an intoxicated state which has not been previously reported. Presence of shock, upper GI bleeding, pneumomediastinum, pneumothorax were not poor prognostic indicators when the sensorium was normal and could be treated conservatively.

References

1. Drowning. In: World Health Organization Injuries & Violence Prevention- Non-Communicable Diseases and Mental Health World Health Organization:1-8. http://www.who.int/violence_injury_prevention/ Accessed: 14 June 2011.
2. Meacher S. Managing near drowning of adults within the emergency department. Austral Emerg Nurs J 2006;9:3-9.
3. Papa I, Hoelle R, Idris A. Systematic review of definitions for drowning incidents. Resuscitation 2005;65:255-64.
4. Moon RE, Long RJ. Drowning and near-drowning. Emerg Med (Fremantle) 2002;14:377-86.
5. Oehmichen M, Hennig R, Meissner C. Near-drowning and clinical laboratory changes. Leg Med (Tokyo) 2008;10:1-5.
6. Kim KI, Lee KN, Tomiyama N, et al. Near drowning: thin-section CT findings in six patients. J Comput Assist Tomogr 2000;24:562-6.
7. Shah S, Thomas S, Gibb E. Pneumomediastinum after shallow water diving. J Emerg Med 2009;36:76-7.
8. Koullias GJ, Korkolis DP, Wang XJ, Hammond GL. Current assessment and management of spontaneous pneumomediastinum: experience in 24 adult patients. Eur J Cardiothorac Surg 2004;25:852-5.
9. Marioni G, De Filippis C, Tregnaghi A, et al. Cervical emphysema and pneumomediastinum after tonsillectomy: it can happen. Otolaryngol Head Neck Surg 2003;128:298-300.
10. Harries M. Near drowning. BMJ 2003;327:1336-8.