EMERGENCY CASEBOOK

A rare complication of chlorine gas inhalation: pneumomediastinum

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Chlorine gas is a potent pulmonary irritant that causes acute damage in both the upper and lower respiratory tract.

Chlorine gas is frequently produced from a homemade mixture of diluted hypochlorite with hydrochloric acid. Low-concentration household bleach alone is regarded as a chemical irritating the mucous membranes, but when it is mixed with hydrochloric acid to clean the floor of bathrooms and toilets, chlorine is produced.¹ Chlorine gas is a potent pulmonary irritant that causes acute damage in both the upper and lower respiratory tract.² Such cleaning mixtures are commonly used in Turkey. This article describes pneumomediastinum, a rare complication of chlorine gas inhalation.

CASE REPORT

A 26-year-old woman with dyspnoea was admitted to the Department of Emergency Medicine, Erciyes University Faculty of Medicine, Kayseri, Turkey, after inhalation of gas produced by a mixture of household cleaning products. Two days before admission, she had mixed 5% sodium hypochlorite with the same amount of 18% hydrochloric acid. Just after mixing these chemicals, she had started coughing violently and had difficulty in breathing. She had tolerated these symptoms for two days and when it became intolerable, she was brought to our emergency department.

On admission, the patient had severe dyspnoea and wheezing. Blood pressure was 110/80 mm Hg, pulse rate was 120 beats/min and respiration rate was 24/min. On indirect laryngoscopic examination, her vocal cords and laryngeal structures were hyperaemic and edematous. A diffuse rhonchus was heard on auscultation of both lungs. When the neck was palpated, it was noticed that she had soft-tissue emphysema. Arterial blood gas analysis showed no abnormality.

After posteroanterior radiographic examination of the lung, the patient was suspected of having pneumomediastinum. Computed tomography of the neck and thorax of the patient showed that she had emphysema on the neck and pneumomediastinum.

The patient was treated with 50% humidified oxygen via a non-rebreathing facemask, followed by mixed ipratropium bromide and salbutamol (Combivent, Boehringer Ingelheim Ltd, Berks, UK) nebulisation, and intravenous methylprednisolone and aminophylline infusions for the bronchospasm. On the second day of treatment, she still had rhonchus on auscultation and mild coughing. On the third day, she was almost asymptomatic. She was followed up by daily lung roentgenograms. On the sixth day of treatment, a computed tomography scan of the thorax showed a complete resolution of the pneumomediastinum. She was discharged on the sixth day having recovered completely.

Six months later, the pulmonary function test was carried out and a good response was observed after β mimetics.

DISCUSSION

Chlorine gas inhalation cases are usually mild to moderate; death is rare.² Patients who need medical care after a minor exposure to chlorine gas may experience burning of the eyes or throat, consistent with irritation of their mucous membranes. Patients with major exposure to chlorine gas may also have cough, shortness of breath, chest tightness or other symptoms referable to the lungs.³ This patient also described violent coughing and shortness of breath just after the inhalation. So, it may be accepted as a moderate to severe case of chlorine gas inhalation.

Vital sign changes generally include tachypnoea and tachycardia.³ Our patient also had these findings until the third day of inhalation. All these prolonged symptoms and vital sign changes made us think of complications, which are pulmonary embolism, denudation of alveolar and bronchial epithelium, pulmonary oedema, chemical pneumonitis, alveolar disruption and, as a rare complication, pneumomediastinum.¹ Subcutaneous emphysema on the neck region was also suggestive of pneumomediastinum in our patient and this was confirmed on radiographs, which showed the presence of air in the mediastinal space.

In 1944, Macklin and Laenec⁴ described the pathophysiological mechanism of the spontaneous pneumomediastinum, and their description is still valid today. Trigger factors have been described as all those non-iatrogenic factors contributing to an increase in the pressure gradient between the alveoli and the interstitium. So, rupture of marginal alveoli as a result of increased intra-alveolar pressure and dissection of the air along the pulmonic vascular sheaths into the mediastinum is seen.⁵ It may follow severe strain or cough,

Figure 1 Air in mediastinal space, seen on chest radiograph.

and has been described with various conditions such as parturition, bronchial asthma, certain respiratory tract infections, foreign body aspiration and pulmonary embolism.¹ This is also the probable mechanism of pneumomediastinum in our patient, which was precipitated after violent coughing.

Spontaneous pneumomediastinum has a good prognosis, subsiding in a week without any treatment.¹ Our patient also recovered rapidly, without intervention other than oxygen, and her chest radiograph returned to normal after 5 days.

Cases of exposure to chlorine gas because of household mixing products are usually mild. But clinicians must be aware of complications such as pneumomediastinum. This case presentation draws attention to this easy-to-treat, but potentially dangerous complication.

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