A rare cause of non-cardiogenic pulmonary oedema

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INTRODUCTION

Venous air embolism (VAE) is a well-known complication of trauma and many surgical, diagnostic, and therapeutic procedures. We present an unusual case of a male health-care worker who attempted suicide by venous injection of air (in the knowledge that a small amount of air embolus could be fatal), resulting in severe pulmonary oedema.

COMMENT

Pulmonary air embolism is usually iatrogenic and occurs most often in a surgical setting that involves an incision above the level of the heart, e.g. a craniotomy with the patient in the sitting position (Lawrence et al, 1971). Other common causes are direct aspiration into centrally placed venous catheters and following gunshot wounds or accidental trauma (Yee et al, 1983). Attempted suicide by VAE seems extremely rare, a search of the literature identifying no similar cases. Patients with pulmonary air embolism experience sudden onset of cough, dyspnoea and chest pain. On examination they may have tachypnoea, tachycardia, hypotension, expiratory wheeze and a characteristic drum-like or 'mill wheel' murmur. Echocardiography, demonstrating intracardiac air bubbles, is a rapid diagnostic test. Transoesophageal echocardiography is more sensitive than transthoracic echocardiography, but is less readily available.

Chest X-ray manifestations of VAE are listed in *Table 1* (Kizer and Goodman, 1982). Hartveit et al (1968) suggested that the pulmonary oedema was due to damaged vessel walls, resulting in increased permeability of the alveolar–capillary membrane, secondary to transient vascular occlusion. In untreated cases of VAE, the mortality can be as high as 90% (Thomas et al, 1979). Death is believed to occur from accumulation of air in the main pulmonary artery and its branches, preventing forward flow of blood.

Treatment involves giving 100% oxygen to correct hypoxia and enhancing the absorption of nitrogen in the air bubbles. Patients should be placed in the left lateral decubitus position to accumulate air in the upper right ventricle, away from its outflow tract into the main pulmonary artery. Large collections of air can be aspirated via a central venous catheter or pulmonary arterial catheter. In trauma or cardiothoracic surgery patients, air can be aspirated from the right ventricle transthoracically. Hyperbaric oxygen therapy is indicated in severe cases, and can be utilized for paradoxical emboli (in patients with atria or ventricular septal defects) causing neurological symptoms (Grim et al, 1990).

CASE REPORT

A 41-year-old male health-care worker was admitted to hospital with chest pains and dyspnoea. Before his admission, he had felt depressed and contemplated suicide by hanging or drowning, but then read in a medical textbook that an air embolus could be fatal, even with the injection of a relatively small amount of air. He attempted suicide by connecting a car foot pump to an adapter and a needle by means of 'superglue'. After pumping air into his antecubital veins, he developed severe chest pain and became unconscious. He later regained consciousness, and attempted again by injecting into the other arm. Later, he was admitted to hospital with chest pain.

He felt depressed because of family and financial pressures. There was no significant past psychiatric or medical history. He drank alcohol in moderation, but denied taking any drugs.

On clinical examination he was conscious, alert and orientated. He was dyspnoeic at rest and was centrally cyanosed. His pulse was 110 beats/minute with blood pressure 150/85 mmHg. The heart sounds were normal, and there were no audible murmurs. Chest examination revealed expiratory wheeze and bilateral crepitations. Central nervous system examination was normal.

Arterial blood gases showed type 1 respiratory failure (pH 7.48, PaO_2 7.21 kPa and $PaCO_2$ 3.96 kPa) on breathing room air. Full blood count, plasma electrolytes and creatinine were normal. An electrocardiogram showed sinus tachycardia. Chest X-ray (*Figure 1*) showed pulmonary oedema. He was turned on his left side and treated with high flow oxygen therapy and salbutamol nebulizers. Echocardiography showed normal right-sided pressures, good left ventricular function and no evidence of intracardiac bubbles, atrial or ventricular septal defects. Gradually he improved clinically. A repeat chest X-ray showed a small residual right-sided pleural effusion. Once stable, he was transferred to a psychiatric unit.

TABLE 1.
Chest X-ray manifestations of venous air embolism

Normal
Atelectasis
Enlarged central pulmonary arteries
Focal oligaemia
Intracardiac air
Pulmonary oedema
Air in the hepatic venous circulation
Air in the main pulmonary arteries
Adult respiratory distress syndrome

From Kizer and Goodman (1982)

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CONCLUSIONS

Potentially, this condition can be fatal, yet with recognition and prompt appropriate treatment, recovery may ensue. In addition to the usual iatrogenic and traumatic cases, it can be caused by a patient's attempt at suicide or self harm, in which case the aetiology may be concealed, and the diagnosis made correspondingly more difficult. HM

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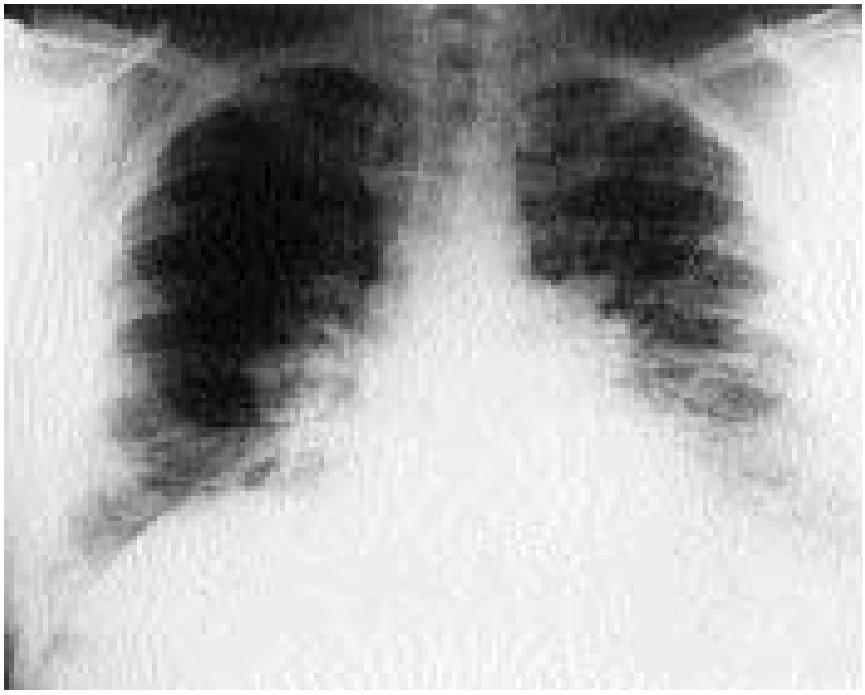

Figure 1. Chest X-ray showing pulmonary oedema.