



CASE STUDY

Aqua jogging-induced pulmonary oedema

M. Wenger and E.W. Russi

ABSTRACT: The present study reports the case of a 43-yr-old very sporty male, who developed shortness of breath and expectorated bloody froth during aqua jogging. Pulmonary oedema was diagnosed clinically and by computed tomography of the chest. The patient made a full recovery and his echocardiography was entirely normal.

Pulmonary oedema occurring in healthy scuba-divers and swimmers has been reported previously. However, this is the first case where pulmonary oedema was observed during aqua jogging.

KEYWORDS: Aqua jogging, pulmonary oedema

In 1981, the occurrence of pulmonary oedema during scuba-diving or swimming was reported for the first time by WILSMHURST *et al.* [1]. These observations were confirmed in a series of previously healthy individuals, who developed lung oedema during diving or swimming [2]. Since the studies of WILSMHURST *et al.* [1] and PONS *et al.* [2], 36 healthy individuals have been reported in medical literature to have developed pulmonary oedema while scuba-diving and 121 persons have developed it during swimming [3–8]. In view of the fact that such events occur sporadically and are not reproducible under experimental conditions, the underlying pathophysiology remains elusive.

CASE REPORT

A 43-yr-old male was aqua jogging in lake Zurich (Switzerland) wearing a buoyancy control belt. He was a nonsmoker with no history of arterial hypertension. The patient was very sporty and exercised several times per week in preparation for triathlon races. While mountain climbing to the Capanna Regina Margherita (near the summit of Monte Rosa on the Swiss–Italian border), located at an altitude of 4,554 m above sea level, he did not develop high-altitude pulmonary oedema. The patient had chosen aqua jogging due to an irritation of the Achilles tendons that meant he could not run on land. On the day of the event the water temperature of the lake was 20°C and the air temperature was 26°C. He felt entirely healthy and had been aqua jogging many times before. After ~20 min he experienced a slight pressure in his chest, developed shortness of breath and expectorated bloody froth. He did not lose consciousness and no water was inhaled.

On admission to the hospital, a diagnosis of pulmonary oedema was made based on a chest

radiograph (fig. 1) and a computed tomography scan of the chest (fig. 2). Myocardial infarction was excluded by blood and ECG examinations. Flexible bronchoscopy was performed and did not show residual blood in the bronchial tree. The patient received supplemental oxygen by nasal cannula and recovered completely without further treatment within 24 h. Echocardiography was performed 1 week later and was entirely normal.

DISCUSSION

Since the first studies of pulmonary oedema in healthy swimmers and divers [1, 2], such observations have been made by other groups worldwide [3–8]. However, considering the popularity of both scuba-diving and swimming, such episodes remain a remarkably rare event.

To the current authors' knowledge, this is the first case of pulmonary oedema occurring during aqua jogging in a healthy person. Aqua jogging is a popular, joint-preserving and highly effective training method. A buoyancy control belt is used to allow a vertical head-out immersion position. In a similar manner to diving or swimming, the following mechanisms which facilitate the development of pulmonary oedema can be discussed. 1) Immersion increases pre-load due to intrathoracic blood pooling, and it has been shown that central blood volume may increase by up to 700 mL [4, 6]. 2) Temperature differences between the water and ambient air may raise the afterload by an increase in peripheral vascular resistance due to stimulation of the sympathetic nervous system. 3) Breathing in a head-out immersion position increases the pressure difference between the pulmonary capillaries and the alveoli leading to a fluid shift, which overstrains the draining capacity of the pulmonary interstitial and alveolar compartments. In contrast to

AFFILIATIONS

Pulmonary Division, Dept of Internal Medicine, University Hospital, Zurich, Switzerland.

CORRESPONDENCE

E.W. Russi
Pulmonary Division
University Hospital
Raemistrasse 100
CH-8091 Zurich
Switzerland
Fax: 41 442554451
E-mail: erich.russi@usz.ch

Received:

September 04 2007

Accepted:

October 02 2007

STATEMENT OF INTEREST

None declared.



FIGURE 1. A chest radiograph showing bilateral infiltrates and Kerley-B lines.

the even rarer events of pulmonary oedema in ultramarathon runners [9], rugby players [10] and during high-intensity cycling [11], where an extremely high cardiac output is speculated to lead



FIGURE 2. Computed tomography of the chest with bilateral infiltrates, which is consistent with pulmonary oedema.

to stress failure of the pulmonary capillaries analogous to racehorses [12], this factor can probably be neglected in aqua jogging.

The patient remained completely healthy and active and continued to exercise strenuously on a regular basis (e.g. he participated in several triathlon races). To date, the patient has not experienced any further health troubles. The current observation supplements the literature on pulmonary oedema occurring during water sport activities but does not enhance insight into the underlying pathophysiological mechanisms.

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