Spontaneous pneumomediastinum in an 11-year-old boy after a shallow breath-hold dive

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Abstract

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Spontaneous pneumomediastinum is caused by pulmonary barotrauma due to transiently increased intra-alveolar and intra-bronchial pressure. The most frequent triggers of spontaneous pneumomediastinum in children are asthma and manoeuvres creating forced expiration. It has been rarely associated with breath-hold diving. Chest pain and dyspnoea are the main symptoms, and the diagnosis can be confirmed by chest X-ray. The treatment of choice is oxygen, analgesics and monitoring the patient. The recurrence rate is low. The main differential diagnoses of spontaneous pneumomediastinum are oesophageal perforation and pericarditis. We report a case of an 11-year-old boy with no substantial medical history, who tried to breath-hold in shallow water for as long as possible. After diving, he felt dyspnoea and chest pain. Chest X-ray revealed pneumomediastinum and subcutaneous emphysema. The patient was admitted to the PICU for observation and was discharged after two days' follow up. Spontaneous pneumomediastinum in children may be more common than thus far acknowledged. It requires a high index of suspicion and should be considered in all children with acute chest pain.

Key words

Breath-hold diving, pulmonary barotrauma, children, radiological imaging, case reports

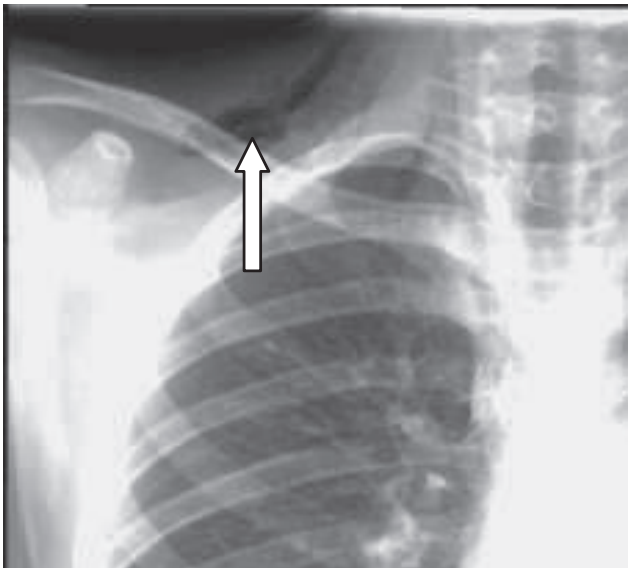
Introduction

Spontaneous pneumomediastinum is caused by pulmonary barotrauma (PBT) due to transiently increased intra-alveolar and intrabronchial pressure. The most frequent triggers of spontaneous pneumomediastinum in children are asthma and manoeuvres creating forced expiration.[1,2] It has been very rarely associated with breath-hold diving. We report the case of a child with evidence of PBT after a breath-hold dive.

Case report

An 11-year-old boy, with no substantial medical history, tried to breath-hold in shallow water (0.5–1 metre depth) for as long as possible. Immediately after diving he felt dyspnoea and right-sided chest pain. The pain settled but

Figure 1
Chest radiograph with arrows demonstrating air outlining the left heart border and subcutaneous emphysema in the neck



did not disappear completely. The pulse was elevated and irregular, and there was a sense of constriction around the neck. Deep breathing increased the symptoms. On admission, his general condition was stable and all vital signs within normal limits. Physical examination was normal, except for pain on palpation in the right fourth intercostal space. ECG, blood count, C-reactive protein, troponin T and blood gas analysis were within normal limits. The patient was admitted to the PICU for observation. Chest X-ray showed pneumomediastinum and subcutaneous emphysema on the right side of the neck (Figure 1). Next day, he was asymptomatic and pneumomediastinum had resolved. He was discharged after two days, and chest X-ray 10 days later was normal. Parental permission was given to report his case.

Discussion

The detection of spontaneous pneumomediastinum requires a high index of suspicion and should be considered in all children with acute chest pain. Air leaking from an alveolar rupture may dissect along the tracheobronchial tree, leading to cervical and mediastinal emphysema. The most frequent triggers of spontaneous pneumomediastinum in children are asthma, vomiting, shouting, coughing, foreign body aspiration, breath-holding and intense sport activities, but it is rarely associated with free diving.[1-4] The incidence of spontaneous pneumomediastinum has ranged from 1:800 to 1:42,000 children treated in hospital emergency units.[1,2] The occurrence is bimodal with peak incidences in children younger than seven and older than 15 years.[2]

The combination of chest pain, dyspnoea and subcutaneous emphysema in the neck and/or supraclavicular fossae is found in 40% cases, though pain is present in 50–90 %.[1] Other possible symptoms are weakness, back and shoulder pain, swollen neck, sore throat, dysphagia, torticollis and abdominal pain.[1–3] The diagnosis can be confirmed by chest X-ray, which may show radiolucent streaks of air outlining various structures, tracking vertically, and subcutaneous emphysema.[5] A double image along the left heart border, where the two layers of the pericardium are separated by air, is a classic and sometimes the only positive radiological sign of pneumomediastinum. Follow-up X-rays are indicated only if the patient's condition alters.[2]

The main differential diagnoses of spontaneous pneumomediastinum are oesophageal perforation and pericarditis. A concomitant pneumothorax, or underlying asthma, pulmonary embolism or pneumonia should be considered. Rare complications include pneumopericardium, tension pneumothorax and diffusion of air elsewhere.[1,2]

The treatment of choice is oxygen, analgesics and monitoring of the patient, and the recurrence rate is low. It resolves within three days to two weeks. Patients should avoid diving and manoeuvres creating forced expiration to lessen the risk of barotrauma.[1–5] The presence of asthma, wheeze or airway hyperresponsiveness should prevent children and adolescents from diving, but this boy with spontaneous pneumomediastinum with no substantial medical history has no absolute contra-indications to scuba diving in the future.[6]

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