Rare disease

Pneumomediastinum in a snorkelling diver

Johanne Perez,¹ Raphael Teatino²¹Caye Caulker Clinic, Belize Medial Associates Ltd, Belize City, Belize;²Cardiology Department, Homerton Hospital, Maldon, Essex, UK

Correspondence to Dr Raphael Teatino, r.teatino@hotmail.co.uk

Summary

Pneumomediastinum is an uncommon disorder seen in shallow water divers. The authors present the case of a 25-year-old who sustained a pneumomediastinum while snorkelling; his presentation, investigation results, treatment and response.

BACKGROUND

This was an uncommon case and one with a clear history of events, which we would like to share with others. The investigations clearly show the pneumomediastinum. This case highlights the importance of recognising such a potentially serious condition in even shallow water sports.

CASE PRESENTATION

A 25-year-old male, otherwise fit and well, presented with central chest pain, dysphonia, partial deafness and severe odynophagia following a snorkelling excursion. He had a medical history of childhood asthma and mild gastro-oesophageal reflux disease.

On a day trip involving snorkelling in Belize, Central America, the patient reports repeated diving to depths of 3–4 metres with breath holding up to 45 s. On one occasion upon surfacing, he suffered ear pressure, partial deafness and otalgia. He experienced progressive development of retrosternal discomfort with increasing pain when belching. Subsequently, he noticed crackles in his neck, with associated severe odynophagia, dysphagia, hoarseness and neck stiffness, but no difficulty in breathing.

He presented to medical services the following morning. Upon examination, he was anxious, afebrile, blood pressure 140/90, heart rate 100 bpm, respiratory rate 20/min and pulse oximeter was 99% on room air. Neck pain was 6/10, slight shortness of breath. Erythema and subcutaneous crepitus felt at right sternocleidomastoid. Auscultation of heart and lungs was unremarkable. There were no neurological deficits and mental status unimpaired.

INVESTIGATIONS

He underwent chest x-ray which revealed pneumomediastinum. Neck CT scan revealed air cephalad along the carotid sheaths in the plane of the buccopharyngeal fascia without intracranial extension of air. There were no evidence of pneumothorax, bronchiectasis, bullae or pleural effusions (figure 1A,B).

The patient was admitted for investigation, observation, analgesia and given 100% oxygen. He was made nil by mouth and given intravenous fluids. The next day a gastrograffin test revealed a normal oesophagus without contrast extravasation. There was a slight decrease in the

amount of pneumomediastinum. A repeat CT scan prior to discharge showed a near resolution of the pneumomediastinum coinciding with resolution of other symptoms.

TREATMENT

He was managed conservatively. Oxygen and analgesia were administered. He was covered with intravenous antibiotics and given intravenous fluids.

OUTCOME AND FOLLOW-UP

He was discharged from hospital receiving omeprazole. He has been advised to undergo endoscopy in his respective country.

DISCUSSION

Pulmonary barotrauma is extremely rare with snorkelling. Increased intrathoracic pressure due to coughing or ascending while breath holding can result in pulmonary barotraumas due to transient increases in intraalveolar and intrabronchiolar pressure.¹

Exposure to supranormal pressures of gases results in proportionately supranormal quantities of gas being dissolved in body tissues (Henry's law). On returning to the surface, the reduction in ambient pressure results in supersaturation of tissues with gases, which is associated with bubble formation.²

Diving from the surface to a depth of 10 m doubles the ambient pressure, and halves the volume of gas-containing spaces (and vice versa on ascent). Descent from 20 to 30 m, results in a decrease of 1/4 of the volume. Therefore, barotrauma is greater in a shallow water dive.³

This can give pulmonary overpressure syndrome. Because of Boyle's law, maximal changes in volume occur in the 4 feet closest to the surface and the diver sustains a tear in the pulmonary parenchyma with the escape of air into the pulmonary venous outflow resulting in pneumomediastinum.²

Pneumomediastinum is free air or gas contained within the mediastinum. The most common symptoms and signs are subcutaneous emphysema (76%), and neck or chest pain (38%); low-grade fever, dysphonia, odynophagia, jaw pain. Hamman's sign (diminution of heart sounds and precordial systolic crepitations) may be present.¹

Figure 1 (A, B) Free air cephalad along the carotid sheaths in the plane of buccopharyngeal fascia.

Treatment consists of oxygen and observation.³ The patient's history of asthma may have indicated residual lung disease. A medical history of asthma classifies the patient as a relative risk (moderate increase in risk) for barotrauma.⁴

Patients should be advised to avoid further pulmonary barotrauma by avoiding diving, playing wood instruments, smoking and inhalation of drugs until resolution of their symptoms.¹

Learning points

- Free diving at minimal depths while breath holding can have a significant impact on the behaviour of gases, causing pulmonary barotrauma.
- Investigation and management of pneumomediastinum.

Competing interests None.

Patient consent Obtained.

REFERENCES

1. **Shah S**, Thomas S, Gibb E. Pneumomediastinum after shallow water diving. *J Emerg Med* 2009;**36**:76–7.
2. **Levett DZ**, Millar IL. Bubble trouble: a review of diving physiology and disease. *Postgrad Med J* 2008;**84**:571–8.
3. **Yanir Y**, Abramovich A, Beck-Razi N, *et al*. Telephone diagnosis of a strange voice. *Chest* 2003;**123**:2112–4.
4. PADI Medical Statement and Guidelines for Recreational Scuba Divers' Physical Examination. Retrieved from <http://www.blueplanetdivers.net/Padi-Medical-Form.html> (accessed 14 October 2011).

This pdf has been created automatically from the final edited text and images.

Copyright 2012 BMJ Publishing Group. All rights reserved. For permission to reuse any of this content visit <http://group.bmj.com/group/rights-licensing/permissions>.

BMJ Case Report Fellows may re-use this article for personal use and teaching without any further permission.

Please cite this article as follows (you will need to access the article online to obtain the date of publication).

Perez J, Teatino R. Pneumomediastinum in a snorkelling diver. *BMJ Case Reports* 2012;10.1136/bcr.09.2011.4776, Published XXX

Become a Fellow of BMJ Case Reports today and you can:

- ▶ Submit as many cases as you like
- ▶ Enjoy fast sympathetic peer review and rapid publication of accepted articles
- ▶ Access all the published articles
- ▶ Re-use any of the published material for personal use and teaching without further permission

For information on Institutional Fellowships contact consortiasales@bmjgroup.com

Visit casereports.bmj.com for more articles like this and to become a Fellow

Keep up to date with all published cases by signing up for an alert (all we need is your email address) <http://casereports.bmj.com/cgi/alerts/etoc>