



An unusual presentation of congenital central hypoventilation syndrome (Ondine's Curse)

B L Lovell, R E Bullock and K N Anderson

Emerg Med J 2010 27: 237-238
doi: 10.1136/emj.2009.072215

Updated information and services can be found at:
<http://emj.bmj.com/content/27/3/237.full.html>

These include:

References

This article cites 4 articles, 4 of which can be accessed free at:
<http://emj.bmj.com/content/27/3/237.full.html#ref-list-1>

Email alerting service

Receive free email alerts when new articles cite this article. Sign up in the box at the top right corner of the online article.

Notes

To order reprints of this article go to:
<http://emj.bmj.com/cgi/reprintform>

To subscribe to *Emergency Medicine Journal* go to:
<http://emj.bmj.com/subscriptions>

An unusual presentation of congenital central hypoventilation syndrome (Ondine's Curse)

B L Lovell, R E Bullock, K N Anderson

Congenital central hypoventilation syndrome is a rare illness, which classically presents in the neonatal period; newborns present with shallow breathing and cyanosis, without a physiological rise in breathing rate. Incidence has been estimated from 1 in 10 000 to 1 in 200 000 live births. This case report describes the case of a young man who was asymptomatic until his presentation in acute respiratory failure at the age of 36 years. This case is reported to highlight the importance of considering this treatable illness as a potential cause of collapse and respiratory failure in adults presenting to emergency departments.

A 36-year-old man was admitted to the emergency department following a collapse at a restaurant. He had consumed 6 units of alcohol over the course of the evening. On initial assessment his Glasgow coma score was 3/15 and he was afebrile. Bloods tests were normal (haemoglobin 13.5 g/dl, platelets 165, white cell count 7.0, sodium 138, potassium 4.6, urea 5.6, creatine 60, C-reactive protein <1). Arterial blood gases on room air showed a marked respiratory acidosis, with a raised bicarbonate (pH 7.24, partial pressure carbon dioxide (P_{CO}₂) 10.0, partial pressure oxygen (P_O₂) 9.5, bicarbonate 32.1). When the patient was placed on 15 litres oxygen, the acidosis worsened (pH 7.11, P_{CO}₂ 14.8, P_O₂ 41.6). The patient was subsequently intubated.

Full cardiovascular, respiratory and neurological examination was normal. Chest x-ray was normal. His only past medical history of note was of a constitutional growth delay during adolescence; this was fully investigated at the time, and no endocrine pathology was found.

Subsequent oximetry showed episodes of profound desaturations and carbon dioxide retention. The patient had an apnoea/hypopnoea index of 21.4/h (the number of desaturations was >4% below baseline per hour). At worst, his oxygen saturation fell to 59% and carbon dioxide rose to 10.5 kPa. Repeat oximetry, when the patient was ventilated with bilevel positive airways pressure, demonstrated satisfactory oxygen saturation and carbon dioxide levels throughout sleep. A magnetic resonance brain imaging scan was undertaken and was normal, showing no brainstem abnormalities.

Investigations were undertaken to look for a primary neuromuscular, lung, cardiac or brainstem pathology that may account

for his clinical findings. More detailed magnetic resonance brain imaging with fine cuts through the brainstem was normal. Detailed nerve conduction studies and electromyography, including examination of the phrenic nerve and diaphragm, were normal. Echocardiography showed normal heart structure and function.

Further questioning of the patient revealed a lifelong normal sleep pattern. He denied daytime somnolence or headache, to suggest any previously undiagnosed nocturnal hypoventilation. The only thing of note was a very poor tolerance to alcohol, and he had been monitored overnight in a police cell on two previous occasions after becoming unresponsive after relatively small amounts.

Genetic testing was performed, as 50–98.5% of congenital central hypoventilation syndrome (CCHS) patients have mutations of the paired-like homeobox 2b (*PHOX2B*) gene.¹ It was revealed that he is heterozygous for a polymorphism (about 870C→A) known to be associated with CCHS.¹

DISCUSSION

Ondine's Curse is a reference to the myth of Ondine, a water nymph who had an unfaithful mortal lover. He swore to her that his 'every waking breath would be a testimony of his love', and upon witnessing his adultery, she cursed that if he should fall asleep, he would forget to breathe. Eventually, he fell asleep from sheer exhaustion and his breathing stopped.

Failure of automatic control of breathing is rare; in adults mass lesions within the brainstem may cause symptoms, but in infants and children it is

usually congenital (CCHS) and is often but not always associated with mutations in the *PHOX2B* gene. These patients develop marked oxygen desaturation and carbon dioxide retention during sleep.² In our patient, a brainstem mass lesion was carefully excluded and despite his age a diagnosis of CCHS was made.

There are case reports of CCHS presenting in adulthood. However, many of these reports note that patients have histories of being extraordinary breath-holders as toddlers, of becoming cyanosed but not distressed by hypoventilation, or being able to swim underwater longer and further than their peers.³ Also, presentation to a doctor usually follows years of poor sleeping and evidence of decreased rapid eye movement and non-rapid eye movement sleep. This classically includes daytime somnolence, morning headaches and frequent napping, none of which had been experienced by our patient.

In order to make a clinical diagnosis of CCHS, it is essential first to rule out a primary neuromuscular, lung, or cardiac pathology, or brain stem lesion. In addition, the patient must have evidence of alveolar hypoventilation, particularly during sleep, poor sensitivity to hypercapnia and hypoxia without a concomitant rise in respiratory rate and lack of psychological or behavioural awareness of developing hypoxia.

A variety of treatments have been used including ventilation and diaphragmatic pacing. There are long-term survivors who have used bilevel positive airways pressure for many years, showing that nocturnal ventilation has good long-term outcomes and may even permit a normal lifespan.³

With reference to the patient's history of growth hormone deficiency as an adolescent, it remains uncertain whether this is a relevant connection to his ultimate neurological diagnosis. A search of published medical literature reveals only two previous cases of adult-onset CCHS in patients with growth hormone deficiency.⁴ There is no current evidence that these two illnesses share a common pathogenic process, but hypothalamic dysfunction has been suggested to play a role.

The episodes of collapse in association with excess alcohol are likely to be relevant in our patient, and it is worth highlighting the need for considering arterial blood gases in patients with decreased consciousness level secondary to alcohol.

Our patient has responded extremely well to home nocturnal ventilation and is able to live a full and active lifestyle.

Emergency casebook

CONCLUSION

This case report highlights a late onset presentation of CCHS in a previously well adult. Although this is a rare cause of respiratory failure in an emergency department, it is crucial to consider and exclude CCHS as a cause for this presentation given the treatable nature of the condition.

Newcastle General Hospital, Newcastle upon Tyne, Nebraska, USA

Correspondence to Dr RE Bullock, Regional Centre for Neurosciences, Newcastle General Hospital, Westgate

Road, Newcastle upon Tyne, UK; Robert.Bullock@nuth.nhs.uk

Competing interests None.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

Accepted 23 March 2009

Emerg Med J 2010;**27**:237–238.
doi:10.1136/emj.2009.072215

REFERENCES

1. **Berry-Kravis EM**, Zhou L, Rand CM, *et al.* Congenital central hypoventilation syndrome: *PHOX2B* mutations

and phenotype. *Am J Respir Crit Care Med* 2006;**174**:1139–44.

2. **Shea S**, Andres L, Shannon DC, *et al.* Ventilatory responses to exercise in humans lacking ventilatory chemosensitivity. *J Physiol* 1993;**468**:623–40.
3. **Antic N**, Malow B, Lange N, *et al.* *PHOX2B* mutation-confirmed congenital central hypoventilation syndrome: presentation in adulthood. *Am J Respir Crit Care Med* 2006;**174**:923–7.
4. **Trang H**, Dehan M, Beaufils F, *et al.* The French congenital central hypoventilation syndrome registry: general data, phenotype, and genotype. *Chest* 2005;**127**:72–9.

Images in emergency medicine

Asymptomatic left-sided pericardial cyst

A 25-year-old man attended the emergency department with a 2-day history of right-sided pleuritic chest pain. He was otherwise well and had no significant medical history. His examination was unremarkable.



Figure 1 Chest x-ray showing a left sided pericardial cyst. (The patient has granted permission for publication of this radiograph.)

A chest x ray revealed an unusual contour to his lower left heart border (figure 1). An echocardiography suggested a pericardial cyst in the left cardiophrenic border. This was confirmed on CT (7.8×5.3 cm).

Pericardial cysts occur in 1:100 000 of the population. They are thought to result from the failure of fusion of the mesenchymal lacunae, which form the pericardial sac, during embryonic development. The majority are at the right cardiophrenic angle. Only 20% are left-sided.¹

Most cysts are treated conservatively. However, some may require aspiration to relieve cough, chest pain or shortness of breath. Occasionally, surgical resection is required if the cyst is very large or if there is a potential for malignancy.¹

C O'Connell, A Byrne, L Swales

Emergency Department, Royal Group of Hospitals, Belfast, UK

Correspondence to Dr Aoife Byrne, Emergency Department, Royal Group of Hospitals, Grosvenor Road, Belfast, UK; aoifebyrne@yahoo.com

Acknowledgements The authors would like to thank the patient for agreeing to this article being published.

Competing interests None.

Patient consent Obtained.

Accepted 26 November 2008

Emerg Med J 2010;**27**:238. doi:10.1136/emj.2008.069542

REFERENCE

1. **Patel J**, Park C, Michaels J, *et al.* Pericardial cyst: case reports and a literature review. *Echocardiography* 2004;**21**:269–72.