Cervical osteophytes and respiratory failure
An unusual case of upper airway obstruction

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Summary

An unusual case is presented in which large cervical osteophytes caused upper airway obstruction. The presenting features of acute-on-chronic respiratory failure and cor pulmonale were alleviated by permanent tracheostomy.

Narrowing of the upper airway, which may occur at any level between the nose and the carina, may lead to respiratory distress, obstructive sleep-induced apnoea and cardiovascular complications.

Case report

A 63-year-old man presented to the emergency unit of Groote Schuur Hospital with a 3-month history of increasing inspiratory difficulty, orthopnoea and peripheral oedema. He had been a heavy smoker in the past and had been hoarse for the past 17 years.

He was unable to speak, was distressed, stridulous, and cyanosed, with a respiratory rate of 30/min. His pulse rate was 100/min; blood pressure 90/40 mmHg; jugular venous pressure elevated 6 cm above the clavicle. He had oedema of the sacrum and pedal oedema extending up to his knees. Chest movement was poor and a tracheal tug was noted. Auscultation revealed inspiratory and expiratory wheezing, and bilaterally reduced air entry. A loud P2 sound and evidence of tricuspid incompetence were also noted. Abdominal examination revealed a tender pulsatile hepatomegaly. An ECG showed sinus tachycardia, right axis deviation and inferior ischaemia. Examination of arterial blood gases revealed:

- pH 7.29;
- partial pressure of CO2, 9.9 kPa;
- partial pressure of O2, 6.4 kPa;
- base excess (BE) +6.2;
- and standard bicarbonate 29 mmol/l.

The serum sodium level was 114 mmol/l and the serum potassium level 6.0 mmol/l.

A chest radiograph revealed cardiomegaly with right atrial enlargement, prominence of the pulmonary vasculature, some hyperinflation of the lung fields and no evidence of pulmonary consolidation. Endotracheal intubation relieved his respiratory distress and he was transferred to the respiratory intensive care unit for further management. Therapy included oxygen-enriched humidified air via the endotracheal tube and a T-piece, intravenous and nebulised bronchodilators, physiotherapy to clear secretions, and diuretics. He improved clinically on this therapy with resolution of the clinical signs of right ventricular failure and clearing of secretions.

Indirect laryngoscopy revealed an oedematous supraglottis; the posterior pharyngeal wall was prominent and impinging on the arytenoids. An elective tracheostomy was performed before further evaluation. Subsequent fibre-optic bronchoscopy showed that the vocal cords were also oedematous but otherwise normal and mobile, but the subglottic airway was markedly narrowed and did not allow passage of the 5 mm bronchoscope. Lateral radiographs of the cervical spine (Fig. 1) showed the presence of large osteophytes extending from C1 to C6 and compressing the upper airway.

Lung function testing and flow volume loops performed via the tracheostomy tube and subsequently with the tracheostomy tube.
out and the stoma temporarily occluded, showed evidence of inspiratory airflow limitation due to upper airway obstruction as well as a moderate degree of chronic lower airway obstruction which was not reversible on bronchodilator therapy (forced expiratory volume in 1 second (FEV₁) 1450 ml, predicted 2750 ml; forced vital capacity (FVC) 2570 ml, predicted 3570 ml; FEV₁/FVC ratio 58%, predicted 76%; peak expiratory flow 175 l/min, predicted 350 l/min; peak inspiratory flow 125 l/min, predicted 255 l/min).

The patient was subsequently discharged with a permanent ‘speaking’ tracheostomy tube, and after regular follow-up visits over a period of 9 months, requires no medication and is no longer in right ventricular failure. Examination of arterial blood gases taken prior to discharge from the intensive care unit, with the patient breathing room air, revealed: pH 7.44; Pco₂ 4.8 kPa; Po₂ 8.2 kPa; BE ± 0.8 mmol/l; standard bicarbonate 25.1 mmol/l; and saturation 92.3%.

Nine months after discharge the patient underwent uneventful surgical repair of an inguinal hernia and recovered well without respiratory support.

Discussion

Cervical osteophytes occur as part of the degenerative process of osteoarthritis of the cervical spine. Although such changes in the cervical spine are common, it is unusual for osteophytes to reach such a large size. Cervical osteophytes have been recognised for some time as a cause of dysphagia, but we have not been able to find a reported case of cervical osteophytes causing upper airway obstruction. It is also pertinent that our patient has never experienced dysphagia.

Anatomical upper airway obstruction may lead to sleep-induced obstructive apnoea. The causes of obstruction include hypertrophied tonsils and adenoids in children; mandibular malformation and deviation of the nasal septum; glottic obstruction including vocal cord paralysis; and subglottic obstruction. To this list can now be added cervical osteophytes.

Upper airway obstruction may lead to important cardiovascular complications. Hypoxia leads to an elevation in pulmonary arterial pressure. This in turn may lead to right ventricular hypertrophy and right ventricular failure. Life-threatening arrhythmias may occur during sleep in these patients when hypoxia is at its worst. These include sinus bradycardia, asystole, atrioventricular dissociation and ventricular tachycardia.

Cor pulmonale and the complications listed above may be reversed on relief of the obstruction. This is achieved by surgical correction of anatomical abnormalities or tracheostomy. Our patient was assessed for surgical resection, but the length of cervical spine involved was too extensive for it to be performed safely.

In patients with severe chronic obstructive airway disease, a newly developed upper airway obstruction may be very difficult to diagnose clinically. Even the use of a flow volume loop is sometimes misleading as severe lower airway obstruction may mask the upper airway obstruction. Diagnosis is even more difficult when the upper airway obstruction is functional and can be missed on endoscopy unless careful dynamic evaluation of the spontaneously breathing patient is performed using fibre-optic laryngoscopy.

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REFERENCES