Diagnosing and treating vocal cord dysfunction

In this article...
- An overview of vocal cord dysfunction (VCD), including potential causes
- Signs and symptoms of VCD and how to diagnose it
- How to treat VCD using speech and language therapy
- Staff knowledge and awareness of VCD

Vocal cord dysfunction (VCD) is a respiratory condition characterised by the paradoxical closure of the vocal cords. In normal respiration, the vocal cords remain open during inspiration and close slightly during expiration; with VCD however, they close when breathing in and out, making it harder to get air into the lungs (Fig 1) (American Thoracic Society, 2009). This can result in wheezing and shortness of breath during the respiratory cycle (Newman and Dubester, 1994).

VCD is often associated with acute signs and symptoms of upper airway obstruction, chronic cough, voice disturbance, and laryngeal hypersensitivity. Many patients with VCD are wrongly diagnosed with respiratory disorders – usually asthma – and can suffer morbidity from unnecessary medical treatment.

The condition can also coexist with other diseases affecting the upper airway, including asthma, rhinitis and gastrooesophageal reflux, making accurate management challenging. VCD is an important differential diagnosis in asthma and complex breathlessness management. It is becoming more frequently recognised and diagnosed, but prospective studies into differential diagnosis and optimal treatment are limited (Morris et al, 2006).

This article provides an overview of VCD. It aims to increase awareness and understanding of the condition for respiratory nurses, and help general nurses to feel confident about considering VCD as part of the diagnostic pathway.

5 key points
1 Vocal cord dysfunction (VCD) is the abnormal closure of the vocal cords during breathing, most commonly during inspiration
2 Symptoms are often misdiagnosed as asthma, meaning some patients suffer unnecessary treatment morbidity
3 There is poor awareness and understanding on how to best manage VCD due to a lack of robust prospective research
4 Diagnosis is typically based on case history and laryngoscopy, but pulmonary function tests, such as spirometry, can add further support
5 Patients who have limited, inconsistent or unexpected relief from bronchodilators may have VCD rather than asthma
**What causes VCD?**

Due to poor prospective research, the true aetiology and pathogenesis of VCD remains uncertain, and there is poor understanding of true epidemiological data.

The overall incidence of VCD is not well defined but this could be due to a lack of agreed consensus and poor awareness of consideration of VCD as a diagnosis. Additionally, terminology relating to the condition is not uniform across professional fields. In recent years, VCD has become the most frequently used term, but the condition is also known as paradoxical vocal cord motion syndrome, irritable larynx syndrome and hysterical croup.

A number of causes have been proposed for VCD, including psychological factors, upper airway sensitivity, laryngeal irritants, gastroesophageal reflux disease and rhinitis, but the cause largely remains unknown (Carding, 2000). Historically, there has been a strong emphasis on psychological factors but organic causes have also been reported more recently. Morris et al (2006) suggested four theoretical mechanisms for VCD:

- Laryngeal hyper-responsiveness;
- An altered autonomic balance;
- Direct stimulation of sensory nerve endings in the upper or lower respiratory tract;
- Hyperventilation.

However, none of these have been robustly investigated and no consensus has been agreed.

**Signs and symptoms**

VCD is most commonly mistaken for asthma. Morris and Christopher (2010), who reviewed 288 articles on the condition, identified dyspnoea as the predominant symptom during VCD episodes, with others including wheeze, cough and chest tightness (Box 1).

VCD "attacks" are usually episodic, acute, and have an abrupt onset. Patients are also likely to have increased medical use, with recurrent emergency visits or hospitalisations (Mikita and Parker, 2006).

Patients do not usually respond to increased doses of asthma medication but if they do the effects are short-lived. If they are on asthma medication, dosage levels are typically high and do not usually correspond with pulmonary function test results or respiratory chest investigations. Many people with VCD have, therefore, been unsuccessfully treated for years, with escalating dosages of asthma medication resulting in a "refractory asthma" label.

**Diagnosing VCD**

The symptoms of VCD typically resolve over a few hours and patients are often asymptomatic between episodes. This can make diagnosis challenging; if patients are investigated during an asymptomatic period, test result data will most likely be normal. Morris and Christopher (2010) described three main criteria for diagnosing VCD:

- Clinical symptoms and patient history;
- Laryngoscopic evidence of abnormal vocal cord movement during breathing;
- Spirometry findings of an abnormal flow volume loop (usually the inspiratory loop) or lack of airway hyperactivity.

Clinical symptoms and laryngoscopic findings are essential to diagnosing VCD but spirometry is not an independent confirmation of VCD and normal flow volume loops can be produced. Despite this, spirometry data can be a good indicator to raise suspicion, especially during a routine asthma review.

**History**

The potential irregularity and inconsistency of VCD attacks mean a detailed case history is essential to diagnosing the condition. Clinicians should discuss the following with patients:

- Onset of symptoms;
- Attack episodes;
- Regularity;
- Psychological aspects;
- Voice difficulties;
- Laryngeal sensory symptoms, such as aching or a tickling in the throat.

Patients with VCD will typically have had numerous investigations and multiple drug therapy trials, and may have adopted a chronic disease behaviour pattern as a result. When taking a verbal history, health professionals should ask patients to point to where they "feel" the airway obstruction is and whether it is predominantly an inspiratory or expiratory breathing restriction. If the patient points to the upper chest or laryngeal region, this is indicative of VCD – as is a predominantly inspiratory breathing restriction. However, it is still difficult to determine whether patients with VCD also have underlying reactive airways disease or if underlying asthma is a potential trigger for VCD (Morris and Christopher, 2010).

**Laryngoscopy**

Laryngoscopy during a symptomatic attack is considered the gold standard for VCD diagnosis. It facilitates direct visualisation of the vocal cords during respiration and allows the clinician to assess vocal cord movements and laryngeal musculature presentations.

Christopher et al (1982) described the classic finding for VCD as inspiratory vocal cord closure of the anterior two-thirds of the vocal cords, with the formation of a posterior diamond-shaped chink.

**Spirometry**

Spirometry is a useful diagnostic tool in clinical practice to help differentiate between a true asthma diagnosis and a...
possible diagnosis of VCD. If a patient has not responded to numerous asthma medications and a step-up medical management approach is about to be implemented, a detailed review of spirometry can be important.

Spirometry data with a FEV1/FVC ratio does not indicate poor asthma control, meaning VCD may be part of the patient’s presentation. In patients who are symptomatic, flow volume loops can be used to aid diagnosis; these patients with VCD will usually produce a flattened inspiratory flow volume loop, indicating an extrathoracic obstruction, and then a normal loop once the VCD episode has passed (Sterner et al, 2009). However, the limited data available suggests only a quarter of patients with VCD who are asymptomatic produce baseline flattened inspiratory flow volume loops. Baseline normal flow volume loops should therefore not be used to exclude a diagnosis of VCD in patients who are asymptomatic (Perkner et al, 1998).

**Treatment**

It is essential that patients continue to be treated in line with their previous asthma or respiratory condition until a diagnosis of VCD is confirmed. Once diagnosed, speech and language therapy (SALT) has been identified as the cornerstone for its treatment and management (Christopher, 2006). This includes:

» Education, including psychological support if required;
» Reducing tension in the head, neck and vocal tract;
» Increased self-awareness of a relaxed diaphragmatic breathing cycle;
» Laryngeal airway control.

Therapeutic techniques can often prevent VCD episodes, or give patients the confidence to reduce or manage them. Once these techniques are established, medications can be reviewed and unnecessary interventions ceased.

In acute VCD episodes, where a patient has had no SALT or struggles to apply techniques with success, heliox can be administered via a rebreathable mask. Heliox is a helium-oxygen mixture; the low density of the gas mixture allows easy movement of air through the closed vocal cords (Goldman and Meurs, 1991). In addition to SALT intervention, it is important to treat comorbidities, such as rhinitis and gastroesophageal reflux.

**Professional awareness**

One of the main issues for VCD management is poor awareness of the condition. Lancashire Teaching Hospital’s airways service is the UK’s first dedicated multidisciplinary clinic to treat VCD and complex breathlessness management. A survey carried out by the service in 2010, looked at knowledge and understanding of VCD among health professionals. Questionnaires were sent to consultants in otolaryngology and respiratory medicine, SALT therapists, nurses and primary care physicians at all trusts in Lancashire and Greater Manchester. The survey results showed a clear lack of awareness and knowledge of VCD among the majority of health professionals, with 83% saying they either had not heard of VCD, or knew little about it (Box 2).

Although the data is limited due to the small numbers involved, it suggests a trend towards inaccurate identification of patients with VCD, and a lack of awareness for successful management once suspicion is raised by a clinician. However, specialist tertiary centres are now emerging.

**Conclusion**

VCD is an important differential diagnosis in asthma and complex breathlessness management. It can coexist with asthma, which can make diagnosis and treatment challenging. If VCD is suspected, the patient should be referred to a specialist centre to ensure accurate intervention and prevent the escalation of unnecessary medical therapies.

**References**