Aeroallergens/irritants effects on the respiratory system -

Vocal Cord Dysfunction (VCD) – Loss of voice with shortness of breath

By Dr Sharyn Martin PhD

The previous article dealt with the effects of aeroallergens/irritants on the upper respiratory system (nasal cavity, sinuses and eyes), we now move down the respiratory tract to the (throat) larynx where the vocal cords are situated. The three functions of the larynx/vocal cords are 1. Protection of the lower respiratory tract from inhaling noxious irritants or foreign objects, 2. Respiration by controlling airflow and 3. Phonation – producing sound. All three of these functions can be adversely affected in individuals sensitive to aeroallergens/irritants in the environment.

Vocal Cord Disorder (VCD) is a laryngeal disorder that affects respiratory function. It is also known as Paradoxical Vocal Fold Motion (PVFM). In VCD there is air flow obstruction at the level of the larynx (see figure), due to abnormal adduction (closing) of the vocal cords during the respiratory cycle especially during inspiration phase.

The three functions of the Larynx are

1. Protection : The glottis reflex, an automatic reflex action to close the
The cough reflex is also a part of the protection mechanism and triggered in response to stimulation of the upper respiratory tract. It helps to remove irritants and allergens from the airway, preventing their entry into the lungs. 

2. **Respiration**: The larynx can be considered the upper airway valve that helps to keep the lungs expanded. Vocal cord motion allows for control of airflow into the lower respiratory tract.

3. **Phonation**: Producing sound via the vocal cords.

The clinical presentation of VCD ranges from mild dyspnea (breathing difficulty) to acute, severe respiratory distress and is often mistaken for an asthma attack. VCD can occur alone or concurrently with other upper respiratory tract diseases of inflammation such as rhinitis.

**Symptoms:**

- Sudden episodes of shortness of breath, usually difficult breathing on inhalation
- Air hunger
- Tightness localized to the throat or neck,
- Cough,
- Stridor (high pitched upper airway noise) or laryngeal wheezing
- Hoarseness, loss of voice and voice change
• Dyspnea on exertion

• Pallor (without cyanosis)

• Light headedness

• Dizziness

• Heaviness of extremities

• Tingling/numbness of the hands and feet, and around the mouth

• Near or total loss of consciousness

• Difficulty swallowing

• Fatigue

• Chest pain

• Throat clearing.

A characteristic presentation of abrupt, transitory airway compromise without hypoxemia (low blood oxygen levels) is typical of VCD. Episodes of VCD frequently begin and end abruptly and
may or may not be attributed to identifiable triggers. The main symptoms of VCD that mimics persistent asthma are wheezing, cough, dyspnea (breathing difficulty).

**Characteristics that distinguish VCD from asthma:**

- In VCD there is an absence of hypoxemia (low blood oxygen) compared with compromised person with asthma

- Unlike asthma VCD is unresponsiveness to bronchodilators and corticosteroids

**Triggers**

Sensory receptors, particularly irritant receptors, densely populate the upper airway and provoke glottis closure and cough when stimulated. Patients with VCD may report a single initiating trigger but then find that their VCD is elicited by a number of previously benign irritants (priming effect).

Some of the reported triggers of VCD are listed in the table below.

<table>
<thead>
<tr>
<th><strong>Environmental allergens and/or pollutants</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Self reported, accidental and occupational</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Physical triggers</strong></th>
</tr>
</thead>
</table>
occupational exposures

perfumes and strong scents

fumes

solvents

smoke

air pollution

cleaning chemicals

soldering fumes

dust

organic solvents

machining fluid

gluteraldehyde,
chlorine gas fumes

smoke and particulates from fires

sodium metabisulphite in the fishing industry. Also used as preservative, antioxidant and bleaching agent

Upper airway inflammation due to allergies (rhinitis), sinusitis, or recurrent viral infections

potnasal drip

eating

talking

laughing

singing

coughing

acid reflux
physical exertion

intense exercise

weather changes

emotional stressors

In occupational cases cough is a frequent symptom of VCD and is commonly associated with exposure to chemicals.

Incidence

Studies have found the incidence of VCD diagnosed in adults and adolescents varies between 8% to 27%. VCD is frequently comorbid with asthma and appears to be influenced from concurrent upper respiratory tract disease such as – Post Nasal Drip (PNP) 55%, pharyngitis 55%, laryngitis 40% and sinusitis 32%. VCD is also associated with MCS.

Etiology

There is some evidence to suggest that an upper airway hyperresponsive to aeroallergens/irritants develops following viral infections, allergic and non allergic inflammation, GERD (gastroesophageal reflux disease), prior episodic coup, or toxic inhalation exposure.

Psychological considerations have not been supported in the literature. Although specific psychological conditions such as anxiety and depression is linked with VCD, it is likely that these symptoms are a result of the illness rather than the cause.
Diagnosis

The diagnosis of VCD relies on four areas: (1) clinical history and physical examination, (2) pulmonary function testing, (3) measures of oxygenation, and (4) laryngoscopy (direct view of the larynx).

Treatment

Patients with VCD generally do not respond to pharmacologic treatment for asthma and frequently have severe side effects from unnecessary medications. Avoidance of triggering substances maybe the only method of treatment.

If you suspect you have an allergy, visit your GP or Allergy specialist.

The next and final article of this series will deal with the effects of aeroallergens/irritants on the lower respiratory system, in particular allergic and non-allergic asthma.

Further Reading

ASEHA leaflets on Indoor and Outdoor Air pollution; Chemical Sensitivity; Pesticides; Skin Allergy

For more information on the allergic diseases and the prevention of allergic reactions to aeroallergens please visit the following sites.

about the Allergenic Pollen plants, and what times of the year the plants usually flower all over Australia.

ASCIA www.allergy.org.au or www.ascia.org.au

Asthma Foundation www.asthmaaustralia.org.au

National Institute of Allergy and Infectious diseases http://www.niaid.nih.gov/

World Allergy Association www.worldallergy.org


Safe Cleaning Tips for Your Home http://www.ewg.org/schoolcleaningsupplies/safecleaningtips

References


Bisaccioni Carla, Aun Marcelo Vivolo, Cajuela Edcarlos, Kalil Jorge, Agondi Rosana Câmara, Giavina-Bianchi Pedro. 2009. Comorbidities In Severe Asthma: Frequency Of Rhinitis, Nasal Polyposis, Gastroesophageal Reflux Disease, Vocal Cord Dysfunction And Bronchiectasis CLINICS;64(8):769-73

King Christopher S and Moores Lisa K. 2008. Clinical Asthma Syndromes and Important Asthma Mimics RESPIRATORY CARE; 53(5)
