

Irritative Vocal Cord Dysfunction

It is a well known medical adage that “all that wheezes is not asthma”. Vocal cord dysfunction (VCD) is one of the entities that needs to be considered in the differential diagnosis when evaluating a patient with possible work-related asthma after irritant exposure.

Two review articles in 2010 summarize the multiple causes, diagnosis and treatment of vocal cord dysfunction^{1,2}. See Table 1.

Case reports and a case control study of work-related irritative VCD have reported that VCD and work-related asthma, particularly Reactive Airways Dysfunction Syndrome (RADS) may have similar presentations³⁻⁵.

For example, a 44 year old railroad worker was exposed to anhydrous ammonia after a rail car leaked³. He immediately developed a cough, hoarseness, burning eyes, tearing, rhinitis and felt “his lungs and stomach to be on fire”. He was treated with inhaled bronchodilators and corticosteroids. His hoarseness persisted. Five months later he was found to have an abnormal inspiratory loop on spirometry, a negative methacholine challenge test and paradoxical adduction of his vocal cord on laryngoscopy. A second example, with a less immediate onset of symptoms was a 45 year old nurse who developed dyspnea and cough one week after transferring to a gastroenterology unit⁴. She was in charge of cleaning endoscopy instruments, with 40-50 washes per day using various disinfectants. Pre/post bronchodilator testing was negative. She had a 22% decrease in FEV₁ to saline and no methacholine was administered. No eosinophilia was found in induced sputum. On laryngoscopy she had adduction of her vocal cords during inspiration with posterior chinking.

Table 1. Differential Diagnosis of Laryngeal Movement Disorders

Airway Disorder	Associated Conditions
VCD	
Psychogenic VCD	Somatoform disorder
	Conversion disorder
	Psychiatric illness
	Abuse
	Other components (anxiety disorder, stress, depression)
Exercise VCD	Exercise
Irritant VCD	Extrinsic
	Chemical irritants
	Olfactory stimuli
	Intrinsic
	GERD
	Rhinitis/postnasal drip
	Sinusitis
Supraglottic disorders	Laryngomalacia
	Exercise-induced supraglottic closure
Laryngospasm	Intubation
	Airway manipulation
	IgE mediated
	Nocturnal aspiration
Vocal cord paresis	Prolonged intubation
Vocal cord paralysis	Head and neck malignancy
	Chest surgery
	Thyroid surgery
	Idiopathic
Neurogenic	Brainstem compression
	Upper motor neuron injury
	Lower motor neuron injury
	Movement disorders
	Adductor laryngeal breathing dystonia

(From reference 1)

The case-control study from Denver compared 11 patients with irritant-exposed vocal cord dysfunction to 33 patients with vocal cord dysfunction caused by non irritative etiologies³. They found no difference in gender, cigarette smoking, symptoms or pulmonary function results but did report that a higher percentage of the individuals with irritative vocal cord dysfunction were Hispanic (27% vs. 3%, $p = 0.02$) and had chest pain or chest tightness (100% vs. 57%, $p = 0.04$). Among the 11 patients with irritative vocal cord dysfunction: two had the sudden onset of dyspnea and upper airway irritation after spills of ammonia; two were electronic assemblers who had throat tightness, dry cough and dry heaves after the inappropriate mixing of flux and solder; one was a registered nurse in an emergency department who had wheezing and dyspnea after scrubbing a bed; one was a bus driver who developed cough and dyspnea 24 hours after being exposed to an aerosolized carburetor cleaning solution; one was a machine operator who developed dyspnea and chest tightness two hours after exposure to metal working fluid; one was a restaurant worker who developed dyspnea and sore throat 24 hours after an offensive odor while cooking “Cajun salmon”; one was an office worker with immediate cough and hoarseness after exposure to construction dust; and two were individuals who developed symptoms including chest burning and nausea after exposure to smoke from fires³. The diagnostic criteria for irritative vocal cord dysfunction used in the case-control study are shown in Table 2.

Other authors have also described foods, perfume and chlorine as causes of irritative vocal cord dysfunction⁶⁻⁹. All authors have emphasized the contribution of psychosocial issues.

Differentiating whether the etiology of symptoms is due to asthma or VCD may be difficult. First, patients with vocal cord dysfunction may also have asthma. Second, a methacholine challenge may precipitate vocal cord dysfunction^{10, 11}. Normal spirometry with an inspiratory flow volume loop may be useful in the diagnosis by showing changes of extra thoracic obstruction. However, in different case series this positive finding has varied from as low as 20% to 79% of patients with VCD¹.

Table 2. Clinical Criteria for Vocal Cord Dysfunction (VCD)
Irritant VCD
1. Documented absence of preceding vocal cord dysfunction or laryngeal disease
2. Onset of symptoms after a single specific exposure or accident
3. Exposure to an irritating gas, smoke, fume, vapor, mist, or dust
4. Onset of symptoms within 24 hours after exposure
5. Symptoms of wheezing, stridor, dyspnea, cough, or throat tightness
6. Abnormal direct laryngoscopy for vocal cord dysfunction either in the asymptomatic state, during symptoms, or with a provocative study
7. Exclusion of other types of significant vocal cord disease

(From reference 3)

Flexible laryngoscopy is the gold standard for diagnosis. Findings diagnostic of vocal cord dysfunction are 1) inspiratory vocal cord adduction of the anterior two-thirds of the vocal cords with a posterior diamond shaped chunk; or 2) adduction on both inspiration and expiration; or 3) adduction of the false vocal cords. Greater than 50% inspiratory closure of the vocal cords is sufficient for diagnosis but since vocal cord motion may only be abnormal during an acute episode, a negative vocal cord study may not rule out the condition where the diagnosis is highly suspected. In exercise induced vocal cord dysfunction, laryngoscopy is recommended before and after exercise.

Since the typical asthma medications are ineffective in treating vocal cord dysfunction, differentiating VCD from asthma is important. Many times individuals with vocal cord dysfunction have been treated for long periods as difficult-to-treat asthmatics with significantly greater use of health care resources than the average asthmatic.

Recommendations to remove the patient from the irritative exposure have been included in treatment modalities although the most effective recommended treatment options have been speech therapy with psychotherapy or psychological counseling (Table 3)^{1, 2, 10}. There are no controlled studies to show additional improvement in outcome if the patient is removed from the irritative exposure.

Table 3. Short- and Long-term Management of Vocal Cord Dysfunction
Short-term
Reassure patient. Instruct patient in breathing behaviors, including panting, diaphragmatic breathing, breathing through the nose or a straw, pursed-lip breathing, and exhaling with a hissing sound. Consider a trial of helium and oxygen (heliox) in patients with persistent or severe vocal cord dysfunction.
Long-term
Avoid known triggers, such as smoke, airborne irritants, or certain medications. Treat underlying conditions, including anxiety, depression, gastroesophageal reflux disease, and rhinosinusitis. Consider a trial of inhaled ipratropium (Atrovent) in patients with exercise induced symptoms. Referral for speech therapy is indicated in patients with unresolved symptoms. Long-term tracheostomy may be appropriate in severe, resistant cases.

(From reference 2)

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 * **asthma or irritative vocal cord dysfunction, please call 1-800-446-7805.** *
 * *****

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