You respond to a call at a local high school for a 16-year-old female cross country runner who collapsed 20 yards from the finish line at a national championship meet. Upon arrival, she presents with symptoms of acute respiratory distress suggesting an asthma attack, including wheezing, shrugged shoulders, dyspnea, anxiety, tightness in her throat and chest, and altering levels of consciousness.

Her blood pressure is 120/70, heart rate is 120 bpm, respiratory rate is 48, and oxygen saturation on room air is 100%. Her coach reports the episode came on suddenly, and he isn’t aware of any recent respiratory illness and confirms the athlete has no history of asthma. The patient denies smoking or using drugs or alcohol.

You administer supplemental oxygen and nebulized albuterol during transport and coach the patient to breathe deeply through the mouth to ensure the medicine and oxygen reach as deeply into the lungs as possible. It doesn’t provide the relief you’d expect from a patient suffering an asthma attack, and she seems increasingly anxious. Her lack of response to the bronchodilator is curious.
The next day, when dropping off a patient at the same ED, you’re puzzled to find out the girl was diagnosed with exercise-induced asthma. She was prescribed albuterol and told to use a vaporizer with eucalyptus ointment to promote bronchodilation before training. Having not responded to the albuterol during transport, you wonder if you’ll be seeing the patient again.

**Asthma Mimic**

Acute respiratory distress is an unnerving incident for both patients and emergency care providers, especially when the cause isn’t known and the care provided fails to relieve symptoms. Vocal cord dysfunction (VCD), also called paradoxical vocal fold motion, is one of those unsettling conditions.

VCD is a rare and confounding malady that mimics an asthma attack. It oftentimes results in unnecessary care, providing little to no relief of symptoms, which may exacerbate anxiety (one of the causative factors of VCD), causing a vicious cycle.

VCD is an idiopathic phenomenon characterized by dyspnea, chest and/or throat tightness, chronic cough, frequent throat clearing, intermittent hoarseness, wheezing/stridor and greater difficulty inhaling than exhaling. Because of these symptoms, VCD is often mistaken to be asthma, and sometimes occurs simultaneously with an asthmatic episode.1

The cause of a VCD episode is multifactorial and triggers can include, but not be limited to, the following:2

- Anxiety/stress;
- Cold temperatures;
- Upper respiratory infections;
- Airborne irritants;
- Gastroesophageal reflux;
- Laryngopharyngeal reflux;
- Strong odors/fumes;
- Smoke;
- Physical exertion; and
- Singing/laughing.

In one study, 75% of asthmatics were found to also have VCD.2 Female athletes have been found to be especially prone to episodes.3 Stress and anxiety are both strong contributing factors in triggering episodes. A study comparing teens with VCD and asthma found higher levels of stress and anxiety in the VCD group.4 Expanding on the stress model, patients presenting with a history of depression, personality disorders, post-traumatic stress disorder or incidents of childhood sexual abuse are all strong candidates for VCD.5–7 Anecdotal observations have also revealed that athletes who suffer undiagnosed VCD will, over time, have a decrease in exercise tolerance precipitating an episode.8

**Anatomy**

Vocal cords aren’t actually cords; they’re bilateral epithelial folds, white in color, located in the larynx superior to the trachea. These folds are further distinguished by their location and anatomic construct into the false vocal cords (vestibular folds) and true vocal cords (vocal folds), both of which are innervated by branches of the vagus nerve.

The vestibular folds are thick mucous membranes that protect and sit superiorly to the vocal folds and beneath the epiglottis. Folds are typically 1.75–2.5 cm in length in males and 1.25–1.75 cm in length in females.9
During the course of respiration and making vocal sounds, the folds should perform two distinct actions: During inspiration the folds will abduct, or open, to allow the flow of air into the trachea and into the respiratory system. The folds will adduct, or come together, during expiration to make vocal sounds. The vocal folds have been found to be especially sensitive to hormonal influences, particularly androgen, estrogen and progesterone where specific receptors can be found in the epithelial and granular cells and fibroblasts.10

**Etiology**
Pathophysiology of VCD remains a mystery. J. Tod Olin, MD, the director of the Pediatric Exercise Tolerance Center at National Jewish Health in Denver, the foremost VCD research and treatment center in the United States, says practitioners are leery of what occurs on the cellular level before and during an attack.

“We don’t know about the mechanism partly because [researchers and other experts] still don’t completely agree on what constitutes a spell,” Olin said.11 “It is hard to arrange a clinical trial, for ethical reasons, in which you are trying to worsen someone.”

Research on the etiology of VCD is ongoing, but it doesn’t appear there’ll be a definitive answer anytime soon.

“Without a gold standard test that’s easily administered to a large population, we have no prevalence estimates, which totally depends on denominator populations anyway,” Olin said. “If you think about it, you’d have to catch people in a spell, which would be hard.”

As with any newly recognized condition, there’s been a spike in diagnosis of VCD as the general medical community becomes more aware of it, creating a perceived increase in recognized cases of VCD.

**Assessment**
Individuals with VCD have been reported to be frequent ED visitors largely due to the idiopathic nature of an attack and misdiagnosis, which continues through recurring episodes.12 It’s typically a diagnosis of exclusion made after ruling out other potential pathologies, such as asthma, gastroesophageal reflux, laryngopharangeal reflux, post-extubation, anaphylaxis, vocal cord palsy, vocal cord cancer or polyps. Therefore, EMS should be suspicious of regular calls for a patient who presents with acute respiratory distress, but says they haven’t received any benefit from an emergency inhaler. One study concluded dyspnea may be the actual trigger and the emotional response is secondary, causing an uncontrollable cyclical episode.13

The most common signs/symptoms of a VCD episode mimic what you might see in an asthma patient: normal O2 saturation, elevated heart rate, increased respirations, normal blood pressure, dyspnea, tightening of the throat and chest, a choking sensation, cough and dysphonia-impaired speech.

There are, however, two signs not usually found in a patient suffering an asthma attack. An asthmatic patient typically presents with greater difficulty on stridor on expiration, but a VCD patient will present with greater difficulty on stridor on inspiration.

Another symptom different from asthma is that a patient suffering from VCD will present with clear lung sounds with stridor being heard in the throat and not in the chest, as in an asthmatic patient. Should the patient be intubated, it’ll become evident that the wheezing and stridor ceases, lending credence that airflow was restricted in the upper airway and not the chest.
Episodes of VCD can last from hours to days. It must be emphasized that VCD can occur concurrently with an asthma attack and should be treated appropriately with supplemental oxygen and albuterol.

Should a physician suspect VCD, multiple post-admission tests will be carried out for a more definitive diagnosis. These include pulmonary function tests, CT scan, laryngoscopy, controlled exercise stress test to provoke an episode and arterial blood gases. If a patient is presumed to have VCD, they’ll have normal arterial blood gases and normal expiratory spirometry results.

**Prehospital Care**

If the patient presents with symptoms more indicative of VCD and not asthma, ask if a diagnosis has been made. This will be ascertained while obtaining the patient’s medical history. Be prepared, however, to treat both. Don’t compromise the administration of an emergency bronchodilator if there’s a suspicion of asthma present.

It’s important to provide a calm and supportive environment for the patient while attempting to mitigate the commotion typically surrounding an individual in respiratory distress. This is important for patients with asthma, but even more important for a patient suffering a VCD episode because medication may do nothing to relieve the patient’s symptoms, resulting in increased anxiety. If possible, avoid using the sirens, which can abate anxiety.

“At a basic level, VCD is a ‘behavioral’ problem in that the larynx is doing the wrong thing at the wrong time. Meds and inhaled gases don’t correct that issue,” Olin said. “At a physiologic level, most of these spells are characterized by hyperventilation, even with nearly closed cords. Slowing breathing should be a goal.”

Panting through pursed lips increases the glottic aperture, or having the patient repeatedly whisper “shhhhh” can help relax the vocal cords if VCD is suspected.

Supplemental oxygen may provide comfort but have little effect since the O2 saturation is typically normal. Heliox can be helpful because it’s thinner than air, causing less vocal cord vibration, but is rarely the curative treatment.14

Although a 0.5–1 mg dose of lorazepam often results in relief for the anxiety caused by VCD within 5–10 minutes, it shouldn’t be administered in lieu of treating other organic pathology and likely wouldn’t be allowed by protocol.

Administering an anticholinergic agent, such as inhaled ipratropium combined with the albuterol, has also proven helpful in treating episodes of VCD.15

Behavioral support can’t be overstated. Reassurance and a calm demeanor can sometimes stop an episode in only five or 10 minutes.

**Case Conclusion**

Despite the treatment recommended by the doctor, the patient continues to suffer frequent episodes, particularly in cold temperatures, with no relief from the albuterol. Corticosteroids are prescribed to reduce suspected bronchial inflammation, but these also provide no relief.

A pulmonary specialist recommends she go to National Jewish Health in Denver for further testing. There she’s diagnosed with VCD and told to emphasize diaphragm breathing by laying on her back with a book on her stomach, making the book on her abdomen rise during each inspiration.
Episodes of VCD are abated, but there are occasional recurrences. Despite this, she goes on to excel in cross country and track and field at a major NCAA Division I university. She sees a sports psychologist twice a week and is taught visualization and stress reduction techniques. Now a third-year medical student, the athlete reflects and says she definitely believes her VCD episodes were all stress-related.

**Conclusion**

VCD is a nebulous, often idiopathic event that causes asthma-like symptoms. As a result, it isn’t uncommon for EMS providers to treat undiagnosed VCD as an asthma attack. When you treat an assumed asthmatic patient with oxygen and bronchodilators, and you find these modalities have very little to no effect and may even exacerbate anxiety and symptoms, a focus on anxiety reduction is paramount.

**References**


**Source URL:** http://www.jems.com/article/patient-care/vocal-cord-dysfunction-puzzling-asthma-mimic