

# Pediatric Clips

*When asthma is not the case*

By Patrick Sobande, MD

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Pediatric Clips from The Children's Medical Center of Dayton are quick reviews of common pediatric conditions.

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## CASE PRESENTATION

An 11-year-old boy has had asthma and allergic rhinitis since the age of 4 years. His asthma has been well controlled until recently, when he experienced hard-to-control episodes of respiratory distress. He presents to the emergency department (ED) for the fourth time in 10 days because of chest tightness and odd noises in his throat following

exposure to dusty conditions. The episodes are characterized by the rapid onset of dyspnea, nonproductive cough and suprasternal retractions. The episodes have continued despite a brief course of oral steroids and the response to bronchodilators has been inconsistent. The episodes resolve without other therapy, usually within minutes.

In the ED, vital signs were stable and he had no stridor or wheezing. The rest of his exam was unremarkable. His oxygen saturation is 99 percent on room air. He is subsequently assessed with pulmonary function testing, speech evaluation and a diagnostic procedure that reveals the diagnosis.

## CASE DISCUSSION

### CASE DISCUSSION

The patient was believed to have paradoxical vocal cord motion (PVCMM). Pulmonary function testing showed variable flattening of the inspiratory limb of the flow volume curve, suggestive of extrathoracic airflow limitation. He underwent flexible fiberoptic laryngoscopy, which showed inspiratory adduction of the anterior portion of the cords and a characteristic diamond-shaped margination between the posterior aspect of the vocal cord and the corniculate tubercle, confirming the diagnosis. This finding has been described as a posterior sink. He was referred to a speech pathologist for relaxation techniques and breathing exercises.

### DIFFERENTIAL DIAGNOSIS

Acute respiratory distress has several causes, the most common being acute asthma. In patients who present with dyspnea, upper airway obstruction (UAO) must be suspected. Specific conditions associated with extrathoracic UAO in pediatric patients include tonsillar enlargement, epiglottitis, laryngomalacia, croup, bilateral vocal cord paralysis, anaphylaxis, foreign body aspiration and laryngeal cyst.

### THE CONDITION

PVCMM is called vocal cord dysfunction, or laryngeal dyskinesia. This condition is characterized by paradoxical vocal cord adduction during inspiration, resulting in signs and symptoms such as dyspnea, cough, chest tightness and shortness of breath. The glottis consists of the true vocal cords and the aperture between them known as the rima glottides. During normal respiration, the posterior cricoarytenoid muscle abducts the vocal cord, widening the rima glottides, while adduction occurs by contraction of the lateral cricoarytenoid muscle.

PVCMM is usually seen in females ages 20 to 40 years, but the diagnosis is being made with increased frequency in the pediatric age group. In one study, evaluation of patients who had refractory asthma revealed PVCMM in 10 percent of patients.<sup>1</sup> Another study evaluating patients having PVCMM found 56 percent of the patients to have coexisting asthma.<sup>2</sup> Distinguishing between the two entities is essential.

Different causes of PVCMM can result in the same presentation. Risk factors and associated conditions other than asthma include gastroesophageal reflux, cystic fibrosis, post-nasal drip, cold air, cigarette smoke, brainstem abnormalities (eg, aqueductal stenosis,

Arnold Chiari malformation), stroke and myasthenia gravis. Athletes may develop vocal cord dysfunction (VCD) during training and competition. Psychological risk factors include anxiety over school performance, parent-child conflict, divorce, emotional upset, abuse and psychiatric disturbances such as somatization disorder.

### MAKING THE DIAGNOSIS

As many as 50 percent of patients who have PVCMM also have asthma. The distinction must be made to prevent unnecessary use of bronchodilators and steroids, due to its episodic presentation. The dyspnea in PVCMM is predominantly inspiratory, unlike the expiratory dyspnea of asthma. The noise occurs on inspiration in PVCMM as opposed to true wheezing which occurs during expiration in asthma. The rapid onset of dyspnea and resolution of symptoms with little or no response to bronchodilators are evidence against asthma.

If cases associated with significant and prolonged hypoxemia an arterial blood gas will show normal arterial-alveolar gradient because there is no ventilation-perfusion defect, as would be present in asthma patients having the same degree of hypoxemia. The chest radiograph in PVCMM will not show hyperinflation. Pulmonary func-

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tion testing shows variable flattening of the inspiratory limb of the flow-volume curve, whereas the expiratory limb is scooped out in asthma.

Direct visualization of the vocal cords is required to make a definite diagnosis. The current criteria for diagnosis are laryngoscopic evidence of adduction of the vocal cords during inspiration and the presence of a posterior *shink* in the vocal cords. A referral to a pediatric pulmonologist or pediatric ENT specialist for flexible laryngoscopy is appropriate for children suspected of having this entity.

### MANAGEMENT

Management of PVCMM requires a multidisciplinary approach, including both acute and long-term components. The primary cause of the dysfunction must be elicited and treated. In the absence of such primary disorders, acute management is symptomatic. Panting with the tongue out

increases the glottic aperture and brings about acute relief. Short-acting benzodiazepines (eg, midazolam) have been shown to be effective.

Measures that increase the glottic apertures should be in place for long-term control. Long-term management requires speech therapy, relaxation techniques and psychological intervention. Special exercises increase the patient's awareness of abdominal breathing and relax the throat muscles. Psychotherapy usually is recommended if there is no improvement with speech therapy alone or if there is a psychiatric disorder such as conversion disorder, or pathologic family dynamics that generate anxiety. Educating the patient about the condition will reduce stress.

### LESSONS FOR THE CLINICIAN

PVCMM is more common than appreciated and is often overlooked in the differential diagnosis of recurrent dyspnea. Patients

who have asthma may also have PVCMM. The patients present with recurrent dyspnea in the face of appropriate treatment for asthma. It is important to characterize the type of dyspnea in order to institute proper treatment and to avoid doing further harm by administering unnecessary medications.

## REFERENCES

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## FEATURED SPECIALIST



### PATRICK SOBANDE, MD,

is a pediatric pulmonologist at The Children's Medical Center of Dayton. Dr. Sobande received his medical degree from Ogun State University in Nigeria and completed his pediatric residency at Harlem Hospital Center/Columbia University in New York. He completed a

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### PULMONARY MEDICINE AT DAYTON CHILDREN'S

The department of pulmonary medicine at Dayton Children's is staffed by pediatric specialists experienced in handling the inpatient and outpatient care of

infants, children and teens including acute and chronic pulmonary conditions. The pulmonary department developed the successful Asthma Care Program, which ensures children with asthma receive consistent, high-quality care as well as patient/family education. Expert care from our pulmonary medicine specialists is available at Dayton Children's main campus and at our Specialty Care Center - Warren County. For more information, call 937-641-3376.



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