Abnormal Movement of the Arytenoid Region During Exercise Presenting as Exercise-induced Asthma in an Adolescent Athlete*

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A 16-year-old female basketball player presented with a 2 1/2-year history of exercise-induced severe dyspnea, stridor, and mild wheezing that did not respond to prophylactic treatment with β-agonists and cromolyn. Spirometric data at rest were normal, but flow-volume loops during exercise suggested a variable extrathoracic obstruction. Laryngoscopic evaluation while the patient was riding an exercise bicycle demonstrated an abnormal motion of the arytenoid region causing obstruction of the airway during inspiration. The vocal cords moved normally. This patient demonstrates the capacity of supraglottic tissue to obstruct the airway during exercise as a cause for exercise-induced dyspnea and stridor. Patients with this disorder may be misdiagnosed as having exercise-induced asthma.

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Functional disorders of the vocal cords may mimic attacks of bronchial asthma,¹-³ and variable vocal cord dysfunction may present as exercise-induced asthma.⁴ A recent report describes stridor at rest in a 75-year-old woman with inspiratory airflow obstruction due to an abnormal motion of the arytenoid region.⁵ We now report similar findings masquerading as exercise-induced asthma in an adolescent female athlete.

**CASE REPORT**

A 16-year-old female high school athlete presented to the clinic with a 2 1/2-year history of worsening episodic dyspnea occurring during participation in competitive athletics. She first experienced exercise-associated dyspnea at the age of 7 years when she attempted to run a mile. This exertional dyspnea progressively increased over the next few years, leading her family physician to make a diagnosis of exercise-induced asthma 2 years before our evaluation. He prescribed therapy with albuterol via a metered-dose inhaler for use prior to exercise and when symptoms developed during exercise. Initially, the patient reported that the medication was effective, but over the ensuing 2 years, she found that it neither prevented nor relieved symptoms.

The patient complained that vigorous exercise caused symptoms of throat tightness, dyspnea, and wheezing that were worse when the air was hot and humid. In contrast, cold air did not exacerbate symptoms. She denied nasal symptoms, ocular symptoms, and cough. She had no psychiatric history or history of emotional distress.

The patient was given a Wright peak flow mini-meter (Keller Medical Specialties, Inc) that she used both at rest and with exercise for 26 consecutive days. Average resting values in the morning and evening were 410 L/min and 390 L/min, respect-

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testing, which was performed twice, and the patient was referred to the speech therapy department for evaluation.

One month after the discovery of the abnormal motion of the arytenoid region, the patient underwent a methacholine bronchial provocation challenge to evaluate bronchial hyperresponsiveness. The test was positive at 10 mg/ml (92 cumulative breath units), with a fall in FEV1 of 38 percent. At that time, the patient reported improvement in exercise-related dyspnea and stridor after the initiation of speech therapy.

DISCUSSION

This adolescent female athlete had symptomatic exercise-associated stridor that was initially diagnosed as exercise-induced asthma but was caused by an abnormal motion of the arytenoid folds. There are many reports of upper airway obstruction without evidence of organic abnormalities being attributed to a paradoxical motion of the vocal cords.1-5 There have been two recent reports of functional upper airway obstruction not related to abnormal vocal cord motion. Bronchoscopy in a 15-year-old boy revealed pharyngeal constriction associated with a deformed epiglottis.6 The second patient was a 75-year-old woman who had evidence of abnormal motion of the arytenoid region as the cause of her upper airway obstruction at rest.5 To our knowledge, our case demonstrates the first report of the same abnormal arytenoid motion occurring only during exercise (Fig 1 and 2).

Unlike patients with typical exercise-induced asthma, this athlete’s condition did not respond to inhaled β-agonists, she experienced throat tightness with exercise, and she felt more symptomatic in a high-humidity, warm environment. Consequently, we performed spirometry to obtain flow-volume loops and visualized the supraglottic region, both at rest and with exercise. Unexpectedly, we found abnormal motion of the arytenoid associated temporally with the development of stridor and the appearance of a cutoff of the inspiratory region of the flow-volume loops. The decline in mini-Wright peak flow values with exercise may have been an effort-related phenomenon because we were unable to confirm the drop in flow rates during two formal exercise tests on a stationary bicycle. Alternatively, in the sport-specific setting, the patient may have developed some reversible obstruction of the airways that caused a decrease in the FEV1. The methacholine bronchial provocation challenge neither confirmed nor excluded the diagnosis of asthma because it was positive at 92 cumulative breath units.7 The most useful methacholine challenges are those that are entirely negative and those that are positive when less than 1.25 mg of methacholine is inhaled.7

The 75-year-old woman described by Nagai et al6 was treated with 6 mg of diazepam per day, with amelioration of symptoms. Our patient did not appear to have a psychological component to her problem and has not received benzodiazepines or psychotherapy. Instead, she has received speech therapy in an attempt to prevent abnormal glottic closure and reports fewer symptoms with exercise.1,4

REFERENCES


Abnormal Movement of the Arytenoid Region (Bittleman, Smith, Weiler)

FIGURE 2. Flow-volume loops before (top) and during (bottom) exercise. Loop at top was obtained just prior to beginning exercise; loop at bottom was obtained at time that patient was symptomatic, at same time that photograph (Fig 1, bottom) was taken.