Asthma Diagnosis in Otolaryngology Practice

Pulmonary Function Testing

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KEYWORDS

• Spirometry • Asthma • Flow-volume loop • Pulmonary function testing
• Allergic rhinitis

KEY POINTS

- Current evidence-based guidelines strongly recommend the use of objective testing in the diagnosis and treatment of patients with asthma.
- Spirometry provides an easy, readily available, and inexpensive methodology that can be used in the otolaryngology office.
- Peak flow measurement can be used by patients at home to monitor their symptoms and disease status.

As previously discussed in this issue, the diagnosis of asthma is based on a comprehensive assessment of patient symptoms and signs from physical examination. In addition, there are several standardized instruments that can assist in clarifying the diagnosis and assessing the severity of the disease. Current National Heart, Lung and Blood Institute guidelines[1] recommend the use of these elements to confirm an initial diagnosis and evaluate response to therapy.

Although assessing clinical symptoms and signs can be useful in patient management, these factors can be less reliable and objective than desired, especially in their ability to quantify the physiologic expression of the disease. Because asthma represents a disease of airflow obstruction in the small bronchioles, an objective assessment of the degree of obstruction is useful in determining the degree of direct impact on pulmonary function and following both the progression of the disease and the response to medical intervention. To assist with physiologic measurement of lung function, several specific methods have been developed that can reliably and accurately assessment the impact of asthma on respiratory physiology.

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PEAK FLOW MEASUREMENT

Peak flow meters are small, inexpensive devices that are simple to use and ideal for home assessment of pulmonary function. They primarily measure airflow through the larger portions of the airway, and are therefore less sensitive to small changes in the distal bronchioles. Their major value is for following lung function at home on a daily or twice daily basis to detect sequential changes over time. Although peak flow testing can be useful as a gross assessment of function, results are dependent on patient effort so education on proper technique is essential to obtain accurate results. In addition, beneficial use requires consistent measurement and recording on a regular basis, with poor patient or parent adherence compromising maximal benefit.

PULMONARY FUNCTION TESTING

The primary method used to assess respiratory physiology and status in patients diagnosed with or suspected of having asthma is pulmonary function testing (PFT). PFTs represent an integral portion of the diagnosis and therapeutic management of patients with asthma, and serve 3 core functions in practice: (1) to assess the presence and severity of asthma; (2) to establish reversibility of airway obstruction; and (3) to measure response to therapy. PFTs play an essential role in the management of patients suspected of having respiratory dysfunction, and can be considered an objective assessment of lung function much as audiometry represents an objective assessment of auditory function.

PFTs are important in differentiating specific pulmonary pathophysiology based on whether the disease is obstructive or restrictive, and whether obstruction is reversible or irreversible. PFTs also establish a reliable and valid baseline for establishing an initial diagnosis and for monitoring changes over time, with or without specific treatment. Because of advancements in measurement and computing technology, small, portable, inexpensive, and automated devices are now widely available for in-office use.

Physiologic testing of lung function involves several specific testing methodologies to assess components of normal pulmonary physiology, including mechanics of the lungs and ventilatory function, the ventilation-perfusion relationship, diffusion and gas exchange, and muscular strength. Full battery PFTs can include a variety of these procedures, although in the diagnosis of asthma not all components of the testing battery are necessary. The 4 primary procedures in common use include: (1) measurement of lung volume; (2) measurement of diffusing capacity; (3) spirometry; and (4) bronchoprovocation. The first of these 2 procedures is briefly reviewed here; spirometry and bronchoprovocation are discussed in greater detail.

Spirometry

Spirometry is the most commonly performed lung function study, and is often sufficient to confirm a diagnosis of asthma without more specialized testing. It can be easily and quickly performed in the office setting under the guidance and supervision of a trained technician or health care provider. Spirometry measures air flow in the lungs, which involves assessing how much air can move in and out of the lungs as well as how fast the air in the lungs can be exhaled. The indications for spirometry include the diagnosis and monitoring of suspected diseases of lung function, including asthma, chronic obstructive pulmonary disease, and other common and uncommon pulmonary conditions.

Spirometry involves a maneuver in which the patient voluntarily inhales maximally and then rapidly and forcefully exhales to the fullest extent possible. At full