THE ROLE OF THE NASAL AIRWAY IN THE USE OF CPAP TO TREAT OSA

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After several years of finding it increasingly difficult to get out of bed, stifling yawns in office meetings and fighting sleep on his drive home, Michael gave in to his wife's request that he "PLEASE GO TO THE DOCTOR" about his snoring. His visit to the sleep clinic was followed by a night in the sleep lab. In his follow-up appointment, the doctor explained that his polysomnogram showed obstructive breathing, oxygen desaturations and sleep fragmentation. Michael reluctantly agreed to a second night in the sleep lab for a CPAP titration to determine the amount of pressure required to keep his airway open, stop his snoring and restore a normal sleep pattern. He was encouraged by the possibility of feeling better, driving without fighting sleep and an end to his wife's complaints about his snoring.

When he woke in the sleep lab after his CPAP titration he did feel more refreshed and soon he was given a CPAP unit and mask to use at home. However, he had difficulty getting used to the device, often waking during the night with the mask at his side rather than his wife. Discouraged, he decided to return the CPAP device.

A number of factors are known to affect CPAP compliance, or, more accurately, acceptance and usage. Studies have shown that nasal congestion is a factor in a significant number of patients. Since the nasal airway is the route of choice for delivering air pressure to prevent upper airway collapse during sleep, it is important to consider the possible structural and physiologic impediments to the passage of increased airflow through the nose.

The anatomy of the nose serves several important purposes in normal ventilation. As air passes through the nares, it passes through the nasal valve area. This is the narrowest part of the upper airway and provides most of the resistance. This resistance serves to increase inspiratory time and provide PEEP on expiration. Poiseuille's Law states that flow through a tube is proportional to the radius to the 4th power and resistance is inversely proportional to the 4th power of the radius. In other words, a small decrease in the cross-section results in a significant increase in resistance. As many as 13% of patients with chronic nasal obstruction have nasal valve collapse. A Cottle test may be used to evaluate nasal valve stenosis. In this test, the cheek is gently pulled laterally with 1-2 fingers, which opens the nasal valve. The test is positive if the patient feels less airflow resistance. A nasal valve defect may be treated surgically, or with the adhesive nasal strips, favored by athletes.

The nasal cavity is divided into two halves by the nasal septum, comprised of cartilage and bone. It is estimated that 80% of people have an asymmetrical nasal cavity, without symptoms. If the septal deviation is significant, it can cause difficulty with airflow, sometimes on the side away from the deviation. Septoplasty is the surgical procedure to correct a septal deviation.

After passing the narrow nasal valve area, air passes into the larger nasal cavity where the flow becomes turbulent. This turbulence increases the passage of air around the nasal turbinates.

The turbinates are three shelf-like mucous-covered structures that serve to cleanse, humidify the air and moderate it's temperature. The turbinates are highly reactive to allergens, irritants, medications, airflow and temperature. Some feel that the turbinates also serve to promote changes in body position during sleep by periodic side to side engorgement called nasal cycling.

continued on page 68

Increasing Awareness... *Continued from page 20*

age of forty five, persistent coughs, wheezing, shortness of breath or any regular occupational exposure to smoke or lung irritants.

The NLHEP program goal would include increasing the public's recognition of chronic lung disease. The at risk patient with proper knowledge would have the awareness to discuss the need for routine pulmonary function testing if the subject is not raised by their primary care physician.

Raising the awareness of regular pulmonary function testing for at risk patients requires the aid of all respiratory care practitioners. Regardless of where the respiratory care professional engages in the profession they can make a difference in providing information about COPD to the public. Information can be distributed to patient diagnosed or at risk for COPD in acute care settings, outpatient settings and home care. Information on obtaining brochures and posters for distribution to patients and other health care professionals can be found at the NLHEP website. (www.NLHEP.org) The role of the respiratory therapist has also been identified as a health care provider who has the ability to provide information and training on proper pulmonary function testing administration to other health care professionals involved in the care and treatment of the COPD patient.

Smoking cessation programs go hand in hand with spirometry monitoring. Since smoking produces the majority of COPD patients, once an at risk patient is identified the respiratory care professional must have the necessary information available to offer assistance in quitting smoking. Research studies have shown that eight out of ten smokers have attempted to quit smoking at least once and many will require multiple attempts to ultimately be smoke free. The patient needs to be provided with the motivation and support necessary to be successful. More intensive smoking cessation programs have been shown to provide better opportunities to remain smoke free in the future. Patients should be urged to discuss the usage of medications to improve there chances of success if the patient smokes more than ten cigarettes per day or if they have been unsuccessful in quitting smoking on prior occasions with their physician.

With the morbidity and mortality rates for COPD rising, it is the responsibility of all respiratory care professionals to get involved in improves earlier detection of the lung disease and lifestyle modifications necessary to halt the decline of their lung function. By all respiratory care professionals working together the public's awareness of COPD can be raised and we can begin to reverse the trends and begin to lower the morbidity and mortality rates for COPD in the near future.

JOB TIP: BE DECISIVE

There's still time to register on site at the 6th annual FOCUS Conference April 20-22, 2006 Opryland Hotel - Nashville.

The Role of Nasal Airway... *Continued from page 18*

In some patients with septal deviation, the turbinates may have compensatory hypertrophy, or enlargement, on the side away from the deviation. In these cases, the patient may experience significant airflow resistance that is chronic or when nasal cycling results in turbinate engorgement on that side.

Rhinitis, or enlargement of the turbinates, is a reaction to the release of Histamine. Rhinitis may be acute or chronic. Another way to describe it may be as either seasonal or perennial. Seasonal rhinitis is commonly caused by pollen. Perennial or chronic rhinitis may be caused by one or several factors, including dust mites, mold and animal dander. Chronic rhinitis may also be a reaction to fumes, smoke, and temperature. Considering the prevalence of dust mites in mattresses, pillows and bedcovering and the relatively common practice of allowing pets to sleep on the bed, it is not surprising that the bedroom is a common location for rhinitis to occur. Supine sleeping posture may also cause turbinate engorgement. Turbinates are reactive to airflow, so that the increased flow associated with CPAP may be the trigger to enlargement. Rhinitis treatment should address the causes. If there is an allergic component, removal or minimizing the offending agent will help. Medications, including steroids may be indicated. Heated humidification has been shown to be effective in treating a turbinate reaction to increased flow of dry air and has become a common addition to a CPAP prescription.

Enlarged turbinates may be managed medically with antihistamies, decongestants or corticosteroids. Surgical treatment is either by excision, or more recently, radiofrequency (RF) ablation, or with a microdebridder. RF ablation, used in prostate enlargement, has been used in sleep-disordered breathing to reduce the size and stiffen the palate or reduce the size of the tongue. A microdebridder is a small tool that can be used to reduce the turbinates. Treatment by either RF or microdebridder is typically an office procedure with minimal patient discomfort.

Nasal polyps may also cause difficulty with the acceptance and tolerance of nasal CPAP. These are soft, jelly-like overgrowths of the lining of the sinuses. They are the end result of varying disease processes. Most are benign, but some may cause chronic inflammation of the nasal cavity or protrude into the nasal cavity. Conditions associated with multiple polyps include: Bronchial asthma, Cystic Fibrosis (CF), Allergic rhinitis, Chronic rhinosinusitis and Allergic reaction to aspirin.

The prevalence in children is 0.1% (6% in CF). The prevalence in adults is 1-4% overall. Polyp management includes surgical removal, steroids and elimination of a source of allergy.

In attempting to treat Obstructive Sleep Disordered Breathing with Nasal CPAP, it is important to consider that nasal airway anatomy and physiology may impede titration and may impair acceptance and usage. Effective treatment of nasal defects or the physiologic response to CPAP may increase acceptance and usage and may decrease the pressure requirement.

When Michael came to the Sleep Center to return his CPAP machine, his doctor convinced him to undergo a more complete upper airway evaluation. After the evaluation and subsequent treatment, Michael found that the use of CPAP was much easier and he no longer removed his mask in his sleep. Happily, he awoke in the morning to find his wife, not his mask at his side.