Successful Treatment of Central Sleep Apnea with an Oral Prosthesis*

Simon J. Farrara, M.D.†

Two cases of polygraphically defined central sleep apnea were successfully treated with the tongue retaining device, an oral prosthesis designed to reduce hypopharyngeal obstruction. The tongue retaining device may be an alternative to CPAP in the treatment of some cases of central sleep apnea.

(Chest 1991; 100:1461-62)

Successful treatment of polygraphically defined “central” sleep apnea by methods conceptually related to the relief of airway obstruction¹ draws attention to the complex etiology of the sleep apnea syndrome and to the dangers of distinguishing between “central” and “obstructive” apneic episodes by conventional recording techniques. It has been suggested that the effect of oral prostheses in the treatment of sleep apnea is obtained by holding the tongue forward to prevent obstruction of the hypopharyngeal space.² In two cases, predominantly “central” apneic episodes were successfully treated using the tongue retaining device. Effective use of the TRD in this situation has not been described elsewhere.

The TRD is a vinyl prosthesis that fits over the teeth and holds the tongue forward by maintaining a potential vacuum between the tongue and the special compartment into which it fits. It prevents mouth breathing and is thought to alter the anatomy of the airway.³ The effectiveness of the TRD has been demonstrated in several series,⁴,⁵ and it may be useful for some patients in whom CPAP or plastic surgery alone have been ineffective.⁶,⁷

CASE REPORTS

CASE 1

A 66-year-old white man complained of excessive daytime sleepiness and disturbed nocturnal sleep. His symptoms also included episodes of dizziness. By history, he had been a mouth breather for many years, had snored heavily before his recent weight loss, and often had a stiff neck. He had undergone coronary artery bypass grafting and was considered by the referring neurologist to suffer intermittent basilar artery insufficiency.

Physical examination demonstrated a thin man of normal facial appearance. Cervical, mandibular, oral, lingual, and pharyngeal dimensions appeared unremarkable. In particular, although the tongue was positioned posteriorly, the oropharyngeal space was generous. Nasal airways were widely patent. Lateral soft tissue x-ray film of the head and neck demonstrated no soft tissue abnormalities.

Nocturnal polysomnography included EEG, EOG, ECG, submental EMG, leg movement accelerometer, O₂ saturation, and end-tidal PCO₂. Breathing was recorded by means of abdominal and thoracic strain gauges on separate channels and oral and nasal thermocouples on a single channel. During a total sleep time of 5 h and 48 min, there were 52 episodes of "central" apnea (duration 10 to 22 s), one episode of "mixed" apnea lasting 24 s, and frequent periods of paradoxic breathing (apnea index 9). Minimum recorded O₂ saturation was 92 percent. Maximum end tidal PCO₂ was 51 mm Hg. Central apnea was characterized as no abdominal and thoracic movement and no airflow through the nose and/or mouth.

The patient was fitted with a TRD. He reported relief of symptoms when he wore it regularly.

At follow-up polysomnography, five months after the fitting, there was a total sleep time of 6 h and 33 min during which there were three episodes of "central" apnea and occasional episodes of paradoxic breathing (AI <1.0). Minimum O₂ saturation was 88 percent and maximum end tidal PCO₂ was 48 mm Hg.

CASE 2

A 59-year-old white man complained of increased irritability. He reported a dry mouth on some mornings but no other specific symptoms. He was unaware of disturbed sleep. His wife reported that his recurrent sleep apnea was much worse when he was supine. Medical history included tonsillectomy and uvulo-palato-pharyngoplasty after demonstration of predominantly obstructive sleep-apnea by means of a commercially available "at-home" recording device.

Physical examination demonstrated no marked obesity, a small neck, a short mandible with crowding of the lower teeth anteriorly, a large tongue, and an oropharynx of normal dimensions after a
well healed uvulo-palato-pharyngoplasty. Nasal airways were widely patent and formal ENT examination was otherwise unremarkable.

Nocturnal polysomnography was performed for two consecutive nights on two occasions following the pharyngeal surgery. Polysomnography included EEG, EOG, ECG, submental and anterior tibial EMG, and O2 saturation. Breathing was recorded by means of nasal and oral transducers on one channel and abdominal and thoracic transducers on another channel. On the first night, six months after surgery, there was a total sleep time of 6 h and 15 min with 60 "central," 32 "obstructive," and 42 "mixed" apneic episodes (A1 21). Maximum duration was 42 s. The minimum O2 saturation was 89 percent. Central apnea was defined by the same characteristics as for case 1. On the second night, total sleep time was 6 h and 52 min, with 82 "central," 7 "obstructive," and 3 "mixed" apneic episodes (A1 13). The minimum O2 saturation was 78 percent. On the third night, 11 months after the surgery, total sleep time was 6 h and 5 min, with 121 "central," 40 "obstructive," and 26 "mixed" apneic episodes and 94 episodes of hypopnea (A1 27). The minimum O2 saturation was 88 percent. On the fourth night, continuous, positive airflow pressure at 4.0 cm H2O reduced the apnea index to three episodes per hour.

The patient sought alternative therapy and was fitted with a TRD two months after the trial of CPAP. He reported regular use of the TRD and relief of his symptoms.

Follow-up polysomnography, one month after the fitting, was performed using the same technique as for case 1. It demonstrated a total sleep time of 7 h and 15 min, with 33 "central" and 5 "mixed" apneic episodes (A1 5). Minimum O2 saturation was 88 percent.

**DISCUSSION**

Airway somatosensory information, rather than airway obstruction as such, may be important in the etiology of some sleep apnea syndromes. Like the report of Guilleminault et al., these studies indicate that changing the mechanics of the airway may be helpful in the treatment of some cases of "central" sleep apnea. They also suggest the TRD as an alternative to CPAP in such cases.

**REFERENCES**


3 Cartwright RD, Samelson CF. The effects of a nonsurgical treatment for obstructive sleep apnea: the tongue retaining device. JAMA 1982;248:705-09

4 Cartwright RD. Predicting response to the tongue retaining device for sleep apnea syndrome. Arch Otolaryngol 1985;111:385-88

5 Samelson CF. A survey of the effectiveness of the tongue retaining device for the control of snoring and/or obstructive sleep apnea. Sleep Res 1989;18:299


---

**Apical Pneumocystis carinii Pneumonia in AIDS Patients Not Receiving Inhaled Pentamidine Prophylaxis**

Myung S. Shin, M. D., F. C. C. P.; Curtis F. Val, M. D.; John G. Jessup, M. D.; and Kang-Jey Ho, M. D., Ph. D.

Isolated apical Pneumocystis carinii pneumonia might develop in AIDS patients receiving aerosolized pentamidine prophylaxis. Demonstrated here are two cases of apical P. carinii pneumonia occurring in patients not receiving inhaled pentamidine prophylaxis. Such isolated apical localization of P. carinii should be differentiated from tuberculosis and fungal infection. (Chest 1991; 100:1462-64)

Conventional treatment of P. carinii pneumonia has been oral or intravenous trimethoprim-sulfamethoxazole and/or parenteral pentamidine. Because of the serious side effects associated with such use of these two drugs, aerosolized pentamidine recently has been tried and shown to be quite effective in prophylaxis and treatment of P. carinii pneumonia with minimal toxicity. However, three patients, reported separately, developed apical P. carinii pneumonia while receiving aerosolized pentamidine prophylaxis. This was most likely the consequence of poor apical delivery of the aerosol as confirmed by the radiotracer aerosol studies. We have recently encountered two acquired immunodeficiency syndrome patients who received no inhaled pentamidine prophylaxis, yet developed apical P. carinii pneumonia. Such atypical presentation of P. carinii pneumonia should be differentiated from pulmonary tuberculosis.

**CASE REPORTS**

**Case 1**

A 26-year-old homosexual man presented to a physician with a ten-day history of fever, chills, night-sweats, malaise, and cough productive of yellow sputum. He failed to improve while receiving antibiotics and was referred to University Hospital. Pertinent laboratory and physical examination findings included serum positive for human immunodeficiency virus antibody, hemorrhagic chorioretinitis of the left eye, oral thrush, and clear auscultation of the chest except for bronchial respirations at both apices. Chest roentgenography revealed bilateral apical thick-walled cavities and nodules highly suggestive of tuberculosis or fungal infection (Fig 1). The patient underwent bronchoscopy with transbronchial biopsy which showed granulomatous inflammation with numerous P. carinii organisms, but absence of acid-fast bacilli or fungal elements. Ophthalmologists believed that the retinal lesions in the left eye were compatible with cytomegalovirus infection. The patient was, therefore, treated with trimethoprim sulfamethoxazole for P. carinii and with gancyclovir for cytomegalovirus with good responses.

**Case 2**

A 27-year-old homosexual man with serum tested positive for HIV antibodies eight months previously was admitted to University Hospital for recent 10 kg weight loss, arthralgia, fatigue, night-sweats, fever, shortness of breath, and cough productive of thick mucus. From the tDepartment of Radiology, tMedicine (Pulmonary), and §Pathology, School of Medicine, University of Alabama at Birmingham and Veterans Affairs Medical Center, Birmingham. Reprint requests: Dr. Shin, Department of Radiology, 619 South 19th Street, Birmingham, AL 35233.

---

**1462 Apical PCP in AIDS Patients (Shin et al)**