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Oral Appliances and Sleep-Disordered Breathing

Oral appliances are indicated for the treatment of mild to moderate obstructive sleep apnea (OSA), yet insurance infrequently covers the costs associated with this therapy. Physicians remain hesitant to prescribe oral appliances for long-term use, particularly in younger patients with mild sleep-disordered breathing. These behaviors are the result, in part, of the paucity of long-term follow-up data on oral appliances. Research on the determination of long-term efficacy and compliance has relied too heavily on subjective measures (eg, patient/bed-partner satisfaction and self-report questionnaires) rather than more objective parameters such as treatment apnea-hypopnea index (AHI) and a continuous positive airway pressure (CPAP) data card equivalent. There is a need to evaluate systematically the efficacy of oral appliances using follow-up polysomnograms and to develop more objective measures of real-time compliance and efficacy.

In this issue of *CHEST* (see page 1184), Vezina et al[1] evaluate the long-term risks and efficacy (>2 years) of two different bibloc devices (ie, traction and compression) based on regular medical visits, questionnaires, cephalometrics, and level 1 and 3 polysomnograms in >150 subjects who were moderately overweight but nonobese. Unfortunately, only 40% of the subjects fitted with an oral device were seen in follow-up visits, and only 26.5% (43 of 162) of the subjects had follow-up polysomnograms. Although Vezina et al[1] did not design the study to compare the efficacy of the devices, they did report that 52% and 61% of the subjects outfitted with a compression appliance and a traction appliance, respectively, demonstrated partial efficacy, with a mean improvement in the AHI from around 30 events per hour at baseline to around 14 events per hour with treatment. They reported pain, especially at the beginning of treatment, as the primary side effect, which the authors deemed clinically irrelevant. The study closed with a rather small sample size, with a large number of nonparticipating subjects. Vezina et al[1] did not randomize the type of devices, but instead preferentially prescribed traction-based devices to lean female subjects and compression-based appliances, which have more robust attachments, to male subjects and to subjects with symptoms of bruxism. Therefore, it is difficult to draw conclusions with regard to long-term changes in dental occlusion based on appliance type. There has been a shift over the years from monobloc to bibloc appliances to minimize complications and improve efficacy. However, the type of bibloc device selected is likely as important as selecting good candidates for appliance therapy. Our general lack of understanding of the long-term risks and physiologic actions of each device makes it difficult to select the most appropriate device. This work suggests that proper appliance selection might minimize pain and ultimately improve compliance. There is a need for a standard algorithm for appliance selection.

Gauthier et al[2] followed 14 subjects prospectively for 40.9 ± 2.1 months; the subjects were treated using

oral appliance therapy and had follow-up polysomnograms. The subjects selected an oral appliance after being allowed to try two different appliances for a short period of time. The mean AHI was 10.4 ± 1.3 at entry and 4.5 ± 0.7 at final follow-up with the oral appliance. The subjects were satisfied with the therapy and reported a decrease in snoring in spite of an overall, significant increase in BMI ($n = 11$) from 0.38 kg/m^2 to 3.56 kg/m^2. The study proposes that the patient choose his or her own appliance after a physician's investigation of the mouth, dentition, and upper airway, as well as a short-term trial using several appliances. Orthodontists typically outfit patients with a select model, which tends to be their own design or preferred appliance. Cost hinders appliance selection, as it is not routine to allow patients to try multiple appliances. This option will likely require more long-term studies like those of Vezina et al[1] and Gauthier et al[2] to convince insurance companies and national health systems that oral appliance therapy is a cost-effective, long-term option for OSA therapy.

These data suggest that oral appliances are as effective as several surgical options, but with significantly fewer risks. Maxilla-mandibular advancement surgery addresses a different type of patient, but when performed on individuals < 45 years of age, it may give long-term results similar to those of nasal CPAP.[3] On the other hand, patients undergoing soft-tissue upper-airway surgery with or without genio-tubercle advancement may be better served with oral appliance therapy alone. The benefit of the genio-tubercle advancement surgery in the treatment of OSA is still unresolved, and the overall gain with this surgery has not been confirmed.[4] The addition of a bibloc device with soft-tissue surgery may be as effective as genio-tubercle advancement with soft-tissue surgery, but with fewer complications. If enlarged tonsils are present, then tonsillectomy with pharyngoplasty without manipulation of the uvula likely represents the best surgical approach in patients with mild to moderate OSA. However, if a patient has mild to moderate OSA without enlarged tonsils or status posttonsillectomy, the question has to be raised whether to perform uvulo-palato-pharyngo-plasty (UPPP) or prescribe oral appliance/CPAP therapy. The data of Vezina et al[1] suggest that oral appliances produce similar results to those of UPPP. UPPP removes the uvula for little gain, but risks further detriment to the neurologic incoordination of upper airway contraction[5,6] and scarring with secondary upper airway retraction, leading to the reemergence of abnormal breathing several years after the uvulectomy. The more complicated question is when should we recommend dental devices as the first step in OSA treatment? Vezina et al[1] present data that raise several questions, including the utility of genio-tubercle advancement and UPPP, particularly in the absence of enlarged tonsils with significantly redundant lateral soft tissues. To respond to these questions, we are in need of further long-term, randomized, prospective studies with scientific evaluation of the effects of different oral devices to standardize appliance selection based on gender, joints, dentition, and severity of OSA.

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From Telemedicine to a Critical Care Database

A New Resource for National Benchmarking

Critical care medicine (CCM) plays a very large role in the US health-care system.[1] Broad-based national-level CCM data on ICU beds, use, and costs