

The effect of the tongue retaining device on awake genioglossus muscle activity in patients with obstructive sleep apnea.

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Knowledge of how dental appliances alter upper airway muscle activity when they are used for the treatment of snoring and/or obstructive sleep apnea (OSA) is very limited. The purpose of this study was to define the effect of a tongue retaining device (TRD) on awake genioglossus (GG) muscle activity in 10 adult subjects with OSA and in 6 age and body mass index (BMI) matched symptom-free control subjects. The TRD is a custom-made appliance designed to allow the tongue to remain in a forward position between the anterior teeth by holding the tongue in an anterior bulb with negative pressure, during sleep. This pulls the tongue forward to enlarge the volume of the upper airway and to reduce upper airway resistance. In this study, two customized TRDs were used for each subject. The TRD-A did not have an anterior bulb but incorporated lingual surface electrodes to record the GG electromyographic (EMG) activity. The TRD-B contained an anterior bulb and two similar electrodes. The GG EMG activity was also recorded while patients used the TRD-B but were instructed to keep their tongue at rest outside the anterior bulb; this condition is hereafter referred to as TRD-X. The GG EMG activity and nasal airflow were simultaneously recorded while subjects used these customized TRDs during spontaneous awake breathing in both the upright and supine position. The following results were obtained and were consistent whether subjects were in the upright or the supine position. The GG EMG activity was greater with the TRD-B than with the TRD-A in control subjects ($p < 0.05$), whereas the GG EMG activity was less with the TRD-B than with the TRD-A in subjects with OSA ($p < 0.01$). Furthermore, there was no significant difference between the GG EMG activity of the TRD-A and the TRD-X in control subjects, whereas there was less activity with the TRD-X than with the TRD-A in subjects with OSA ($p < 0.05$). On the basis of these findings, it was concluded that the TRD has different effects on the awake GG muscle activity in control subjects and patients with OSA. The resultant change in the anatomic configuration of the upper airway caused by the TRD may be important in the treatment of OSA because such a change may alleviate the impaired upper airway function.

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