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Three-dimensional Evaluation of Upper Airway in Patients with Obstructive Sleep Apnea Syndrome during Oral Appliance Therapy

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Obstructive sleep apnea syndrome (OSAS) represents a frequent and common respiratory disease characterized by repeated episodes of complete and/ or partial obstruction of upper airways during sleep, normally associated with reduction of oxygen saturation in blood. The oral appliances (OAs) are considered to be an effective treatment modality thanks to the upper airway enlargement. Lateral cephalometry has been used for the 2-dimensional evaluation of upper airway form with several limits. The authors obtained an accurate 3-dimensional (3D) volume analyses with cone beam computed tomography (CBCT) scans to confirm the effects of OA on the upper airway in patients with OSAS.

Ten patients with moderate or severe OSA (3 males and 7 females, 53.4 years of age, and BMI 24.5), who could not tolerate continuous positive air pressure therapy and rejected a surgical approach, were treated with non-adjustable customized OAs and evaluated with CBCT and polysomnography. Upper airway form was examined in the presence and absence of OA and the volume was measured and compared in 2 different areas. Specific planes have been considered to match the data and calculate the benefit obtained with therapy.

Nine out of ten patients showed an improvement of total upper airway volume and an improvement in apnea-hypopnea index. Volume increased both in the posterior soft palate region and in the posterior tongue region. In the inferior area, the observed greater differences. 3D image reconstruction accurately confirmed morphological changes in the upper airway during OA therapy. The use of this 3D evaluation is expected to improve the results of OA therapy in the future.