Rapid Prototyping Technology used to achieve better results in Oral Appliance Therapy for Obstructive Sleep Apnea/Hypopnea Syndrome: a case report

Ricardo C Barbosa[1], Jorge V L Silva[2], Ailton S Barbara[2], Maria F Gouveia[2], Flavio Aloe[1]
1 - Universidade de São Paulo General Hospital - São Paulo-SP-Brazil;
2 - CenPRA-"Renato Acher" Research Center – Campinas-SP-Brazil

Introduction and Objective: Sleep-disordered breathing ranges from partial airway collapse and increased upper-airway resistance manifested as loud snoring and brief arousals to total or partial recurrent airway collapse. Obstructive sleep apnea/hypopnea syndrome (OSAHS) leads to risks of motor vehicle accidents, increased cardiovascular morbidity and mortality**1**. Therefore, even mild degree OSAHS demands an effective treatment. Hence, oral appliance therapy (OAT) has become a treatment alternative for OSAHS. Results of OAT vary depending upon appliance design and the amount of advancement**2**. Application of Rapid Prototyping Technology (RPT) using SLS (Selective Laser Sintering) in medicine is a new and exciting field created by the convergence of three different technologies: medical imaging acquisition, computer graphics and rapid prototyping. Medical images in digital format are obtained by the use of CT and MRI tomography to materialize an organic structure, in plastic material, in its original size or dimensions, allowing therapeutic planning and 3D technical essays. The objective of this case report is to present the PR exam as an auxiliary to reach better results in OSAHS OA therapy.

Methods: A dynamic OA was applied in a polissonographic (PSG1) confirmed OSAHS patient, male, age=67, BMI=25.5, evident facial deformity. Post-treatment PSG2 indexes were obtained: Respiratory Disturbance Index (RDI), Epworth Sleepiness Scale (ESS) subjective daytime sleepiness scores**3**, SatO2min. With the objective of improving the results, the RPT were performed, and a small surgical procedure was planned and executed – extraction of 48 and occlusal adjustment decreasing facial vertical dimension. A new dynamic OA was made and applied, and new PSG3 indexes were obtained.

Results: The results are: PSG1 (RDI=21; SatO2=80%; ESS=18). PSG2 (RDI=44.5; SatO2=74%; ESS=18). PSG3 (RDI=5.2; SatO2=89%; ESS=7).

Discussion and Conclusion: Mandibular advancement with a dental appliance effectively reduces the sleep-breathing disorder measured as frequency of apneas, and a pronounced mandibular advancement did not show a greater improvement of the medical problem compared to less advancement for patients with mild to moderate OSA4. However, in the presence of some facial deformity, the ideal mandibular advancement is not possible and the surgical procedure must be performed. With the RPT we can plan and make the results more predictable, also promoting less aggression to the patient and increasing the possibilities of better results.

Bibliography:

1. Peppard P, Young T, Palta M, Skaturd J Prospective Study of the Association between Sleep-Disordered Breathing and Hypertension.. New Engl J Med, v.342, p.1378-1384, 2000.
2. Ferguson KA, Cartwright R, Rogers R, Schimidt-Nowara W. Oral appliance for snoring and obstructive sleep apnea: a review. SLEEP, v. 29(2), p. 244-262, Feb. 2006.
3. Barbosa RC, Aloe F, Tavares SM, Silva AB. Evaluation of daytime sleepiness in 115 subjects treated with Mandibular Lingual Repositioning Device – MLRD. Sleep Res 1996; v.25, p. 191.
4. Tegelberg À, Walker –Engström ML, Vestling O, Wilhelmsson B. Two different degrees of mandibular advancement with a dental appliance in treatment of patients with mild to moderate obstructive sleep apnea. Acta Odontol Scand, v.61, p. 356-362, 2003.

www.pro-sono.com.br