Effectiveness of non-ablative treatment for snoring and obstructive sleep apnea with two high-intensity pulsed lasers: A controlled randomized double-blind clinical trial

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Abstract

Primary snoring and obstructive sleep apnea (OSA) represent different severity degrees of the same disorder, which affects one billion people worldwide. Increased cardiovascular risk, emergence of chronic diseases and use of medications result from disease worsening and represent a major challenge for health systems. A palatopharyngeal muscle tone dysregulation plays a significant role in this disorder. All therapeutic approaches have limitations. Speech therapy exercises show improvement in muscle tone, reducing snoring and OSA, positively signaling laser treatment, which can contribute to improvement of sleep breathing disorder (SBD). This study aims to evaluate the treatment of SDB with high-intensity non-ablative irradiation with 2 pulsed lasers: Nd:YAG laser (1064 nm) and Er:YAG laser (2940 nm), comparing results before and after the intervention. After obtaining the approval of research ethics committee, 30 volunteers from primary snoring to moderate OSA were treated in 3 sessions of laser irradiation, 14 days apart. Upper airway lumen was analyzed, according to modified Mallampati index by 3 independent, blinded and calibrated evaluators. Oxyhemoglobin desaturation index (ODI), severity of snoring and sleep quality were also evaluated. The observation of variability for each outcome allowed for the analysis of difference between the experimental periods in relation to baseline for each variable and the behavior of laser group in relation to control. Then, classification "Reduced" or "Didn't Reduce" was assigned to the variation above, making it possible to apply the χ^2 test corrected by Fisher, with a significance level of $\alpha = 5\%$. The main clinical result obtained is the expansion of upper airways lumen (control and laser group variation: (0.0 ±0.0); (–25.0 ±50.0) with $p = 0.00060$). Therefore, the improvement of ODI (19.6 ±67.6); (–18.1 ±88.2) with $p = 0.018$; snoring time (64.8 ±179.1); (–1.5 ±85.0) with $p = 0.034$; snoring peak amplitude (–8.3 ±12.3); (–12.4 ±15.8) with $p = 0.029$ were observed. Non-ablative laser treatment is effective in rehabilitation of patients with SBD. In the protocol used in this work, the procedure is performed without need of medication or anesthesia. The expansion of upper airways lumen by decreasing tissue compliance leads to improved sleep quality, snoring severity and daytime sleepiness ($p = 0.00026$, $p = 0.02171$ and $p = 0.027$, respectively), contributing to the improvement of observed health parameters.

Key words: primary snoring, obstructive sleep apnea, high-intensity pulsed lasers