

# Comparison of Minimally Invasive Techniques in Tongue Base Surgery in Patients with Obstructive Sleep Apnea

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## Abstract

**Objective.** To compare the effectiveness and morbidity of 3 microinvasive tongue base surgical procedures combined with uvulopalatopharyngoplasty (UPPP) in supine-dependent obstructive sleep apnea (OSA) patients.

**Study Design.** A prospective, randomized clinical study.

**Setting.** A tertiary referral center.

**Methods.** Fifty OSA patients were randomly advised to undergo UPPP combined with low-temperature bipolar radiofrequency (group 1), submucosal minimally invasive lingual excision with radiofrequency (SMILE-R; group 2), or submucosal minimally invasive lingual excision with a harmonic scalpel (SMILE-H; group 3). The Epworth Sleepiness Scale, the visual analog scale (VAS) for snoring, the pre- and postoperative 3-month polysomnography (PSG) findings, and the decrease in tongue volume using magnetic resonance imaging (MRI) were compared. The operation times, the postoperative pain VAS score, the analgesic requirement, and the time in commencing a normal diet were compared in the 3 groups.

**Results.** The decrease in apnea-hypopnea index (AHI) and supine AHI values at the postoperative 3-month time point was significant in group 2 ( $P < .05$ ). The decrease in tongue volume at the 3-month postoperative time point according to the MRI evaluations was higher in groups 1 and 2 ( $P < .05$ ). In the subjective comparison of effectiveness, there was no significant difference. The operation time was significantly lower in group 3. In the assessment of postoperative pain, no significant difference was found between the groups.

**Conclusion.** When the PSG findings and MRI were evaluated, UPPP + SMILE-R were found to be more effective. No significant difference was found between the 3 techniques when morbidity and complications were compared.

## Keywords

tongue base reduction, supine-dependent obstructive sleep apnea, submucosal intralingual excision, low-temperature radiofrequency

Obstructive sleep apnea (OSA) may arise from narrowing at more than one site in the upper airway. Surgical treatment modalities such as multilevel surgery have been developed to prevent upper airway collapse.<sup>1</sup> The surgical approaches for OSA patients functionally target the retro-palatal and the hypopharyngeal regions.<sup>2–4</sup> Many studies have reported the results of the procedures in multilevel surgery for OSA patients.<sup>5–13</sup>

Many studies claim that sleep disorders become more serious in the supine posture.<sup>14–17</sup> Furthermore, more than half of OSA patients are posture dependent. The major cause of anteroposterior narrowings at the hypopharyngeal level is tongue base hypertrophy, and narrowings at this level are correlated with the apnea-hypopnea index (AHI) in the supine position.<sup>18</sup>

The described conventional surgical procedures for the hypopharyngeal region in severe OSA patients are invasive techniques with high morbidity. Thus, minimally invasive methods have been developed for patients who have obstruction at the hypopharyngeal level. Compared with other open surgical methods, low-temperature bipolar radiofrequency ablation (coblation) of the tongue base (LTBR) minimizes postoperative morbidity and complications.<sup>19</sup> Another method developed for tongue base reduction is submucosal minimally invasive lingual excision (SMILE). This technique can be applied by using low-temperature bipolar radiofrequency (SMILE-R) or the harmonic scalpel (SMILE-H).<sup>20</sup>

The objective of this study was to evaluate the efficacy of single-stage, multilevel surgery in supine-dependent OSA patients and to compare the response rates and complications

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