

# The Efficacy of Multilevel Surgery of the Upper Airway in Adults With Obstructive Sleep Apnea/Hypopnea Syndrome

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Issue



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## Abstract

**Objective:** Many patients with obstructive sleep apnea/hypopnea syndrome (OSAHS) are incapable of using continuous positive airway pressure. These patients therefore turn to surgical options as a salvage treatment. Early studies and reviews focused on the efficacy of uvulopalatopharyngoplasty, a single-level procedure for the treatment of OSAHS. Since OSAHS is usually caused by multilevel obstructions, the true focus on efficacy should be on multilevel surgical intervention. The purpose of this paper is to provide an overview of the literature on multilevel surgery for OSAHS patients.

**Study Design:** Systematic review of the literature and meta-analysis focusing on subjective and objective outcomes of patients with OSAHS treated with multilevel surgery of the upper airway.

**Methods:** We searched PubMed, the Cochrane database, and MEDLINE bibliographic databases up to March 31, 2007, for studies dealing with multilevel surgical modification of the upper airway for the treatment of OSAHS. Additional studies were identified from their reference lists. Articles were included only if the surgical intervention involved at least two of the frequently involved anatomic sites: nose, oropharynx, and hypopharynx.

**Results:** After applying specific inclusion criteria, 49 multilevel surgery articles (58 groups) were identified. There were 1,978 patients included in the study. The mean minimal follow-up time was 7.3 months (range, 1 to 100 months). A meta-analysis was performed to redefine the success rate to be consistent with the commonly agreed upon criteria, namely “a reduction in the apnea/ hypopnea index (AHI) of 50% or more and an AHI of less than 20.” “Success” implies an improved condition and is not meant to imply cure. The recalculated success rate was 66.4%. The overall complication rate was 14.6%. The evidence-base medicine (EBM) level of these 49 studies revealed that only one study was EBM level 1, two papers were EBM level 3, and the other 46 papers were ranked as level 4 evidence.

**Conclusions:** Multilevel surgery for OSAHS is obviously associated with improved outcomes, although this benefit is supported largely by level 4 evidence. Future research should focus on prospective and controlled studies.

## Multilevel Surgery for Obstructive Sleep Apnea: Short-Term Results

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## Abstract

**OBJECTIVE:** To determine the efficacy of a new multilevel surgical protocol for obstructive sleep apnea (OSA).

**STUDY DESIGN AND SETTING:** Sixty patients with moderate to severe OSA because of multilevel pharyngeal obstruction were enrolled into this prospective, controlled clinical trial after clinical examination, endoscopy, and polysomnography. Surgery included uvulaflap, tonsillectomy, hyoid suspension, and radiofrequency treatment of the tongue base (group A). A second group did not receive hyoid suspension (group B). In both groups, nasal surgery was performed if necessary. Polysomnography and Epworth Sleepiness Scale (ESS) were recorded at baseline and 2 to 15 months after surgery.

**RESULTS:** In group A, the mean apnea–hypopnea index (AHI) decreased significantly after surgery ( $38.9 \pm 20.0$  vs  $20.7 \pm 20.6$ ,  $P < 0.0001$ ), whereas in group B the AHI did not. All secondary variables (minimal oxygen saturation, mean oxygen saturation, arousal index), and the ESS significantly improved in group A with only changes in arousal index and ESS reaching levels of significance in group B.

**CONCLUSION:** The presented protocol including the hyoid suspension proved to be effective in the treatment of OSA, whereas surgery without hyoid suspension was less successful.

## First-Choice Treatment in Mild to Moderate Obstructive Sleep Apnea

### Single-Stage, Multilevel, Temperature-Controlled Radiofrequency Tissue Volume Reduction or Nasal Continuous Positive Airway Pressure

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**Objective** To compare the efficacy of single-stage, multilevel, temperature-controlled radiofrequency tissue volume reduction (TCRFTVR) for the soft palate and base of the tongue with that of nasal continuous positive airway pressure (CPAP) in primary treatment of mild to moderate obstructive sleep apnea.

**Design** A prospective nonrandomized clinical study.

**Setting** Tertiary care referral center.

**Patients** Data from 47 patients with mild to moderate obstructive sleep apnea treated between January 1, 2003, and October 31, 2006, were reviewed.

**Interventions** Twenty-six patients underwent TCRFTVR and 21 underwent nasal CPAP as a primary treatment modality.

**Main Outcome Measures** Baseline and 12-month posttreatment measurements using the Epworth Sleepiness Scale and polysomnography were compared.

**Results** The baseline characteristics of the groups were not significantly different. Both methods showed meaningful results for the Epworth Sleepiness Scale and polysomnography variables 12 months after treatment compared with baseline measurements. The results were not significantly different in the posttreatment intergroup comparisons. Treatment success rates were 52.4% for nasal CPAP and 53.8% for TCRFTVR ( $P = .92$ ).

**Conclusion** Similar comparison results with nasal CPAP in objective and subjective variables make single-stage, multilevel TCRFTVR a good alternative in primary treatment of mild to moderate obstructive sleep apnea.

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# Surgical Treatment of Obstructive Sleep Apnea

## Upper Airway and Maxillomandibular Surgery

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## ABSTRACT

Upper airway surgery is an important treatment option for patients with obstructive sleep apnea (OSA), particularly for those who have failed or cannot tolerate positive airway pressure therapy. Surgery aims to reduce anatomical upper airway obstruction in the nose, oropharynx, and hypopharynx. Procedures addressing nasal obstruction include septoplasty, turbinectomy, and radiofrequency ablation (RF) of the turbinates. Surgical procedures to reduce soft palate redundancy include uvulopalatopharyngoplasty, uvulopalatal flap, laser-assisted uvulopalatoplasty, and RF of the soft palate with adenotonsillectomy. More significant, however, particularly in cases of severe OSA, is hypopharyngeal or retrolingual obstruction related to an enlarged tongue, or more commonly due to maxillomandibular deficiency. Surgeries in these cases are aimed at reducing the bulk of the tongue base or providing more space for the tongue in the oropharynx so as to limit posterior collapse during sleep. These procedures include genioglossal advancement, hyoid suspension, distraction osteogenesis, tongue RF, lingualplasty, and maxillomandibular advancement. Successful surgery depends on proper patient selection, proper procedure selection, and experience of the surgeon. Most surgeries are done in combination and in a multistep manner, with maxillomandibular advancement typically being reserved for refractory or severe OSA, or for those with obvious and significant maxillomandibular deficiency. Although not without risks and not as predictable as positive airway pressure therapy, surgery remains an important therapeutic consideration in all patients with OSA. Current research aims to optimize the success of these procedures by identifying proper candidates for surgery, as well as to develop new invasive procedures for OSA treatment.