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## Title

# ***Correlation between polysomnographic parameters and volumetric changes generated by maxillomandibular advancement surgery in patients with obstructive sleep apnea: a fluid dynamics study***

## Abstract

Study Objectives: Maxillomandibular advancement surgery (MMA) is a therapeutic option for obstructive sleep apnea (OSA). The main objective of this study was to determine the impact of MMA on the physical and airflow characteristics of the upper airway based on data obtained by computational fluid dynamics (CFD) and to correlate these data with polysomnography parameters. Other objectives included the identification of presurgical variables that could help avoid surgeries likely to have a low success rate. Methods: This was a retrospective observational study of 18 patients with moderate-severe OSA who underwent MMA. Polysomnography and computed axial tomography imaging were performed before and after the surgery. Three-dimensional models for CFD study were made based on the images obtained. Results: MMA achieved an average increase in airway volume of 43.75%, with a mean decrease in the maximum airway velocity of 40.3%. We found significant correlations between improved apnea-hypopnea index values and both the increase in airway volume and decrease in maximum airway speed. Patients with a maximum velocity of less than 7.2 m/s before the intervention had a high rate of surgical failure (43%). Conclusions: MMA generates a significant increase in the volume of the upper airway, which was associated with improved flow conditions in the CFD simulation. These findings also correlated with improved polysomnography parameters. Thus, CFD simulation on three-dimensional anatomical models of patients with OSA could contribute to the better selection of candidates for MMA. © 2024 American Academy of Sleep Medicine. All rights reserved.

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