Obstructive sleep apnea (OSA) is a well-recognized disease entity affecting approximately 2% to 4% of the population. Maxillo-mandibular advancement (MMA) surgery is a highly successful surgical alternative to poorly tolerated CPAP therapy and achieves a success rate of 87% in the current literature. Our present study evaluates the effectiveness of MMA surgery in the treatment of patients with moderate to severe OSA based on Shers criteria of 50% reduction in AHI and AHI <20. Radiographic and clinical treatment variables were evaluated in determining predictors of success for MMA in individuals with OSA.

Methods

A retrospective study design was used to assess the outcomes of MMA in patients with moderate to severe OSA (apnea hypopnea index [AHI] >15 events per hour) at Thomas Jefferson University Hospital. Data collected included clinical, radiographic, and polysomnographic findings. Primary outcomes of interest included the AHI, minimal oxygen saturation, and BMI.

Results

Twenty six patients met the inclusion criteria (mean age 50.33 ± 9.7 yr). Mean AHI was 10.4 ± 6.6 mm measured at Pogonion-Gonion with an achieved 3.6-fold increase in minimal cross-sectional area post-surgically. Patients showed an 91% decrease in mean AHI from 59.9 ± 22.6 to 5.66 ± 2.01 events per hour (P < .01). Minimum oxygen saturation increased from a mean of 80.58 ± 8.26 pre-surgically. The overall surgical success was 89% (24 of 26) based on an AHI of fewer than 20 events per hour. BMI, minimum oxygen saturation, and measured changes in posterior airway space were not statistically different between success and failure groups. Cephalometric points Pogonion-C3 (mean 85.75 ± 6.7 mm) and Cross Sectional Airway (CSA) (mean 91.02 ± 28.3 mm²) were statistically different between patients who achieved successful outcomes and those that did not.

Discussion

Evaluation of cephalometric points Pogonion-C3 were found to be statistically significant with an average of 84.82 mm in the successful group and 96.78 mm in the failure group. Longer Pogonion-C3 distances may be associated with larger neck circumference, increased redundant pharyngeal tissues, and macroglossia, however; further studies are needed. Cross Sectional Airway means were statistically different between the successful and failure groups with a CSA of 95.44 mm² and 37.92 mm² respectively. Patients with a preoperative CSA >76.53 mm² were found to have a higher chance of success per post op AHI. Larger pharyngeal volumes at baseline were more likely to have successful outcomes. Maxillofacial advancement is limited by muscular pull, soft tissue stretch and desired esthetic change; patient’s with larger baseline pharyngeal volumes with likely have larger post-operative airway volumes resulting in successful treatment.

Conclusion

Maxillomandibular advancement surgery is a highly predictive and successful treatment option in patients with moderate to severe OSA achieved a success of 89% in our overall sample. Pogonion-C3 and CSA successfully predicted postoperative success. The lack of association between BMI, PAS and minimum oxygen saturation supports that OSA is a disease entity with a multifactorial etiology.

References