

Available online at [www.sciencedirect.com](http://www.sciencedirect.com)

ScienceDirect

journal homepage: [www.e-jds.com](http://www.e-jds.com)

Correspondence

# Maxillomandibular advancement surgery can alleviate mental health issues associated with obstructive sleep apnea syndrome



## KEYWORDS

Mental health;  
Obstructive sleep apnea syndrome;  
Maxillomandibular advancement surgery

Previous research has highlighted that severe snoring during sleep can lead to the development of obstructive sleep apnea syndrome (OSAS), subsequently affecting mental health.<sup>1</sup> Data indicates that OSAS is prevalent in 15–48 % of individuals with schizophrenia, 21–43 % of those with bipolar disorder, and 11–18 % of individuals with recurrent depressive disorder.<sup>1</sup> Numerous individuals seek the psychiatrists to address sleep-related issues.

The American Academy of Sleep Medicine indicates that either polysomnography (PSG) or home sleep apnea testing can be used for the diagnosis of uncomplicated OSAS in adults. Additionally, alternative diagnostic methods may include measuring the peripheral arterial tone signal, assessing cyclic changes in heart rhythm variability along with oximetry, monitoring end-expiratory carbon dioxide concentration, and analyzing acoustic signal variations. A cost-effective approach involves using a lateral cephalogram or a cone-beam computed tomography examination with a lower radiation dose as a preliminary screening tool for OSAS.<sup>2</sup>

Contemporary treatments for OSAS include the use of continuous positive airway pressure (CPAP), which, however, exhibits relatively low patient compliance. Mandibular advancement oral appliances (MAOA) is an alternative for patients with primary snoring and those who cannot

tolerate CPAP therapy for OSAS. The guilleminault method for maxillomandibular advancement (MMA) surgery involves advancing the anterior pharyngeal wall, resulting in the enlargement of the pharyngeal airway. The recommended standard advancement for adult patients with moderate to severe OSAS is approximately 10–12 mm.<sup>3</sup>

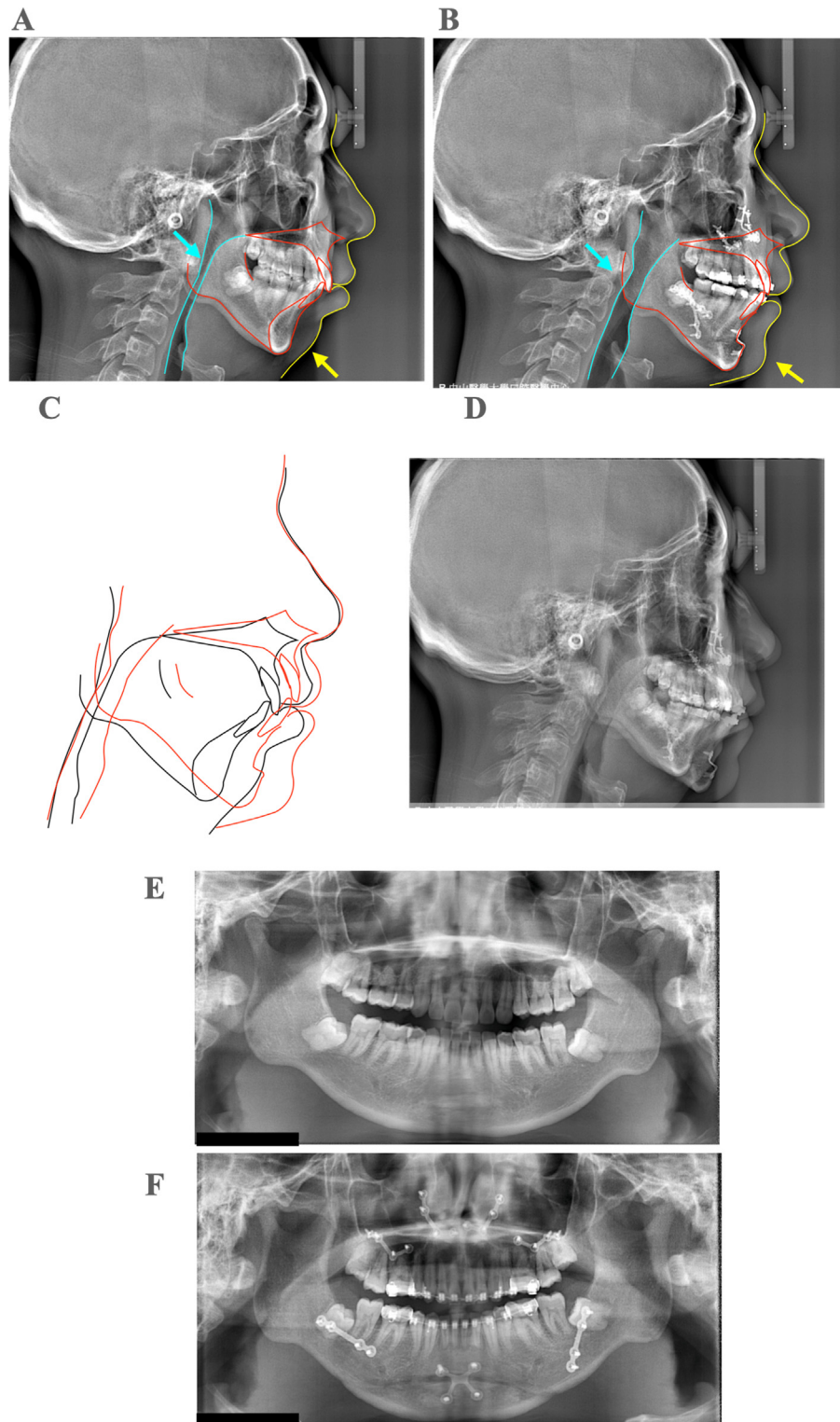
Large cohort study indicated that OSAS is an important factor for developing depression. The frequency of depression in patients with OSAS, can be up to 63 %.<sup>4</sup> In schizophrenia patients, the use of CPAP has been shown to reduce symptoms of depression and lead to moderate cognitive improvement. However, there are opposing arguments suggesting that CPAP may induce schizophrenia in patients. This is believed to occur due to increased dopaminergic activity or stimulation of GABAergic pathways.<sup>5</sup>

A 28-year-old male patient presented with a history of poor sleep quality, leading to daytime sleepiness, mental fatigue, work-related concentration issues, and depression. His previous PSG assessment recorded an AHI of 69.4. Despite trying psychiatric sleep medications and being unable to tolerate CPAP therapy, he sought dental consultation. An initial lateral cephalogram revealed a significantly narrow airway and a retrognathic mandible with almost zero chin-throat length (Fig. 1). With an overjet of 4 mm, MAOA treatment was deemed unsuitable. After discussion, he opted for MMA surgery, advancing both upper and lower jaws by 12 mm, along with genioplasty. A post-surgery lateral cephalogram showed a 12 mm increase in airway width (Fig. 1). A subsequent PSG examination revealed a reduced AHI of 8.2, and the patient reported the complete disappearance of his previous symptoms.

This patient's treatment revealed that airway image size in lateral cephalometric X-rays remains a valid indicator of OSAS improvement, with surgical intervention being the

<https://doi.org/10.1016/j.jds.2023.10.031>

1991-7902/© 2024 Association for Dental Sciences of the Republic of China. Publishing services by Elsevier B.V. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).



**Figure 1** Pre- and postoperative lateral cephalograms of OSAS patients who underwent maxillomandibular advancement (MMA) surgery with LeFort I maxillary surgery, bilateral sagittal split surgery on the mandible, and simultaneous upward and forward genioplasty with miniplate fixation. (A) The light blue line represents the preoperative airway width, which was very narrow (4 mm). The yellow line illustrates the soft tissue profile from the chin to the neck, appearing almost straight. (B) The light blue line displays the postoperative airway width, which increased by 12 mm. The red line indicates the genioplasty performed on the chin bone, moving it forward and upward, while the yellow line shows a noticeable enhancement in the chin-to-neck profile. (C) Overlay of pre- (black line) and postoperative (red line) lateral cephalograms, where the black line corresponds to the preoperative state and the red line represents the postoperative state. Both the maxilla and mandible bones exhibit a counterclockwise rotation, moving them forward and upward. The airway width has notably expanded. (D) Overlay images of pre- and postoperative cephalograms. (E) Panoramic X-ray image before the surgery. (F) Panoramic X-ray image after the surgery.

most effective approach for symptom relief. In conclusion, the best practice for treating OSAS involves a multidisciplinary approach that tailors treatment to underlying causes and timing.

### Declaration of competing interest

The authors have no conflicts of interest relevant to this article.

### References

1. Szaulińska K, Pływczewski R, Sikorska O, et al. Obstructive sleep apnoea in severe mental disorders. *Psychiatr Pol* 2015;49: 883–95.
2. Hsu WE, Wu TY. Comparison of upper airway measurement by lateral cephalogram in upright position and CBCT in supine position. *J Dent Sci* 2019;14:185–91.
3. Butterfield KJ, Marks PLG, McLean L, et al. Linear and volumetric airway changes after maxillomandibular advancement for obstructive sleep apnea. *J Oral Maxillofac Surg* 2015;73: 1133–42.
4. Sharafkhaneh A, Giray N, Richardson P, Young T, Hirshkowitz M. Association of psychiatric disorders and sleep apnea in a large cohort. *Sleep* 2005;28:1405–11.
5. Waters F, Hanken K, Rock D. Sleep-disordered breathing in schizophrenia: an audit. *Schizophr Res* 2013;143:393–4.

Chuan-Yi Kao  
School of Medical, Chung Shan Medical University,  
Taichung, Taiwan

Department of Psychiatry, Chung Shan Medical University  
Hospital, Taichung, Taiwan

Chia-Tze Kao  
School of Dentistry, Chung Shan Medical University,  
Taichung, Taiwan

Department of Dentistry, Chung Shan Medical University  
Hospital, Taichung, Taiwan

Ming Yi Lu  
School of Dentistry, Chung Shan Medical University,  
Taichung, Taiwan

Department of Dentistry, Chung Shan Medical University  
Hospital, Taichung, Taiwan

Tsui-Hsien Huang<sup>\*</sup>  
School of Dentistry, Chung Shan Medical University,  
Taichung, Taiwan

Department of Dentistry, Chung Shan Medical University  
Hospital, Taichung, Taiwan

<sup>\*</sup>Corresponding author. School of Dentistry, Chung Shan  
Medical University, No. 110, Section 1, Chien-Kuo N. Rd.,  
Taichung, 40201, Taiwan.  
E-mail address: [thh@csmu.edu.tw](mailto:thh@csmu.edu.tw) (T.-H. Huang)

Received 23 October 2023  
Final revision received 30 October 2023  
Available online 22 November 2023