Commentary

Mutifaceted care of OSA: The role of mandibular advancement splints

Himanshu Garg

Head, Respiratory, Critical Care and Sleep Medicine, Artemis Hospitals, Gurgaon, Haryana, India. E-mail: drhimgarg@yahoo.com

Mandibular advancement splints (MAS) are increasingly being used to treat obstructive sleep apnea (OSA). They work by protruding the patient's lower jaw in a forward position, thereby creating more space and reducing obstruction to breathing. MAS are now recommended to be used for the treatment of snoring with mild to moderate OSA, and for any sleep apnic unable to tolerate continuous positive airway pressure (CPAP) therapy.[1] Although CPAP therapy is consistently more effective, patients often tolerate MAS better.[2,3] The superior patient satisfaction associated with the use of MAS reflects the relative convenience of this form of treatment. Imaging studies have shown that MAS enlarge the upper airway dimensions by specifically increasing the lateral dimensions of the velopharynx.[4,5]

In this issue of "Lung India," Upadhay and colleagues have illustrated how they were able to successfully treat a patient of sleep apnea with MAS and CPAP who was earlier unable to tolerate CPAP therapy and was considered not fit for surgery.[6] The patient had severe OSA with an apnea-hypopnea index (AHI) score of 66 and an Epworth sleepiness scale (ESS) score of 20, and not receiving any treatment would have left him highly susceptible to such consequences of sleep apnea as the increased risk of heart diseases and diabetes. The authors, however, did not elaborate why the patient could not be treated with MAS alone, which could have been gradually titrated, even though the approach has been documented to work.[7] This is otherwise a very common clinical scenario where a number of patients are unable to tolerate CPAP and thus the need for multifaceted sleep medicine services.

Adjustable MAS appliances allow progressive protrusion of the mandible, and the amount of anteroposterior mandibular movement varies considerably among patients. Multiple studies have shown that MAS efficacy is related to the amount of mandibular advancement,[8-10] and determining the optimal degree of mandibular advancement is the most important step in using MAS therapy successfully.[11,12] This is similar to CPAP in that the amount of pressure required for each patient cannot be predetermined based on OSA severity or craniofacial characteristics; therefore, to determine the amount of CPAP pressure required for each patient, there is a need of a titration night or the use of an auto-CPAP machine. In other words, the complexity required for effective CPAP is mainly related to the adjustability of the pressure, a unique pressure of 8 not being adequate for everyone, and the complexity required for effective MAS mainly depends on it being custom-made and allowing for titration/protrusion of the mandible.

There are several published randomized controlled trials (RCTs) comparing MAS to CPAP. Most of these RCTs have found that MAS and CPAP have a similar impact on daytime sleepiness and quality of life.[13-15] Despite MAS being inferior to CPAP in ability to reduce the AHI score, it is hypothesized that a higher compliance to MAS likely translates to a similarly adjusted AHI score and effectiveness. Success with MAS treatment has been associated with factors such as female gender, younger age, supine-dependent OSA, lower body mass index (BMI), smaller neck circumference, and craniofacial factors; however, a reliable, validated method for prediction in the clinical setting has yet to be established.[1,16] MAS are well-tolerated; however, short-term side effects are common, although generally minor and transient. Long-term dental changes are for the most part subclinical but can be problematic for a minority of patients.[17] MAS are a form of dental-based treatment for a medical sleep disorder and, as such, an interdisciplinary care model is considered important for the attainment of optimal patient outcomes.

An important point to discuss is the cost-benefit analysis of a treatment. It is known that titratable appliances require consultation and adjustments provided by a dentist skilled in sleep medicine and that their fabrication is more expensive. Despite fixed MAS being typically less expensive and requiring a shorter period of adjustment, they are significantly less effective. A patient's economic status may be a factor in his/her choice of treatment. Patient-tailored treatment is synonymous with good medicine, and lifelong therapies are very dependent on the patient's cooperation and adherence. We believe that it is important to include patients in the decision-making process regarding their treatment and also to offer more than one type of therapy.

REFERENCES

1. Kushida CA, Morgenthaler TI, Littner MR, Alessi CA, Bailey D, Coleman J Jr, *et al*.; American Academy of Sleep. Practice parameters for the treatment of snoring and obstructive sleep apnea with oral appliances: An update for 2005. Sleep 2006;29:240-3.
2. Gagnadoux F, Fleury B, Vielle B, Pételle B, Meslier N, N'Guyen XL, *et al*. Titrated mandibular advancement versus positive airway pressure for sleep apnoea. Eur Respir J 2009;34:914-20.
3. Ferguson KA, Ono T, Lowe AA, Keenan SP, Fleetham JA. A randomized crossover study of an oral appliance vs nasal-continuous positive airway pressure in the treatment of mild-moderate obstructive sleep apnea. Chest 1996;109:1269-75.
4. Chan AS, Sutherland K, Schwab RJ, Zeng B, Petocz P, Lee RW, *et al*. The effect of mandibular advancement on upper airway structure in obstructive sleep apnoea. Thorax 2010;65:726-32.
5. Ryan CF, Love LL, Peat D, Fleetham JA, Lowe AA. Mandibular advancement oral appliance therapy for obstructive sleep apnoea: Effect on awake calibre of the velopharynx. Thorax 1999;54:972-7.
6. Upadhyay R, Dubey A, Kant S, Singh BP. Management of severe obstructive sleep apnea using mandibular advancement devices with auto continuous positive airway pressures. Lung India 2015;32:158-61.
7. El-Solh A, Moitheennazima B, Akinnusi ME, Churder PM, Lafornara AM. Combined oral appliance and positive airway pressure therapy for obstructive sleep apnea: A pilot study. Sleep Breath 2011;15:203-8.
8. de Almeida FR, Bittencourt LR, de Almeida CI, Tsuiki S, Lowe AA, Tufik S. Effects of mandibular posture on obstructive sleep apnea severity and the temporomandibular joint in patients fitted with an oral appliance. Sleep 2002;25:507-13.
9. Kato J, Isono S, Tanaka A, Watanabe T, Araki D, Tanzawa H, *et al*. Dose-dependent effects of mandibular advancement on pharyngeal mechanics and nocturnal oxygenation in patients with sleep-disordered breathing. Chest 2000;117:1065-72.
10. Kuna ST, Woodson LC, Solanki DR, Esch O, Frantz DE, Mathru M. Effect of progressive mandibular advancement on pharyngeal airway size in anesthetized adults. Anesthesiology 2008;109:605-12.
11. Fleury B, Rakotonanahary D, Petelle B, Vincent G, Pelletier Fleury N, Meyer B, *et al*. Mandibular advancement titration for obstructive sleep apnea: Optimization of the procedure by combining clinical and oximetric parameters. Chest 2004;125:1761-7.
12. Almeida FR, Parker JA, Hodges JS, Lowe AA, Ferguson KA. Effect of a titration polysomnogram on treatment success with a mandibular repositioning appliance. J Clin Sleep Med 2009;5:198-204.
13. Randerath WJ, Heise M, Hinz R, Ruehle KH. An individually adjustable oral appliance vs continuous positive airway pressure in mild-to-moderate obstructive sleep apnea syndrome. Chest 2002;122:569-75.
14. Tan YK, L'Estrange PR, Luo YM, Smith C, Grant HR, Simonds AK, *et al*. Mandibular advancement splints and continuous positive airway pressure in patients with obstructive sleep apnoea: A randomized cross-over trial. Eur J Orthod 2002;24:239-49.
15. Barnes M, McEvoy RD, Banks S, Tarquinio N, Murray CG, Vowles N, *et al*. Efficacy of positive airway pressure and oral appliance in mild to moderate obstructive sleep apnea. Am J Respir Crit Care Med 2004;170:656-64.
16. Ravesloot MJ, de Vries N. Reliable calculation of the efficacy of non-surgical and surgical treatment of obstructive sleep apnea revisited. Sleep 2011;34:105-10.
17. Marklund M, Stenlund H, Franklin KA. Mandibular advancement devices in 630 men and women with obstructive sleep apnea and snoring: Tolerability and predictors of treatment success. Chest 2004;125:1270-8.

Access this article online

Quick Response Code:

Website: www.lungindia.com

DOI: 10.4103/0970-2113.152649