Review: Oral appliances are better than control appliances, but not CPAP, in the obstructive sleep apnea–hypopnea syndrome

Lim J, Lasserson TJ, Fleetham J, Wright J. **Oral appliances for obstructive sleep apnoea.** Cochrane Database Syst Rev. 2006;(1): CD004435.

Clinical impact ratings: Pulmonology ★★★★★☆☆

QUESTION

In patients with the obstructive sleep apnea–hypopnea syndrome (OSAHS), how effective are oral appliances (OAs)?

METHODS

Data sources: MEDLINE, Cochrane Airways Group Specialised Register, other Cochrane review groups, NHS Centre for Reviews and Dissemination, National Health Technology Assessment Program, NHS National Research register, Aggressive Research Intelligence Facility, bibliographies of relevant studies, local and national sleep laboratories, and experts in the field.

Study selection and assessment: Randomized controlled trials (RCTs) that compared any intraoral prostheses with surgical, nonsurgical, or no intervention in patients ≥ 16 years of age with OSAHS (≥ 5 episodes of apnea or hypopnea per h of sleep). 16 RCTs (n = 745, mean age range 44 to 55 y) of poor quality met the selection criteria. OAs were compared with oral devices that did not protrude the mandible (control OAs) in 6 RCTs, continuous positive-airway pressure (CPAP) in 9 RCTs, and uvulopalatopharyngoplasty (UPPP) in 1 RCT. Quality assessment was based on concealment and scores on the Jadad scale.

Outcomes: Daytime sleepiness measured by the Epworth Sleepiness Score and sleep-disordered breathing measured by the apnea–hypopnea index. Secondary outcomes included quality of life measured by the Functional Outcomes of Sleep Questionnaire (FOSQ) or Sleep Apnea Quality of Life Index (SAQLI), cognitive function, arousals, oxygen desaturation index, and adverse effects of OA.

MAIN RESULTS

OAs were better than control OAs for reducing sleep-disordered breathing, daytime sleepiness, arousals, and quality of life measured by FOSQ; the groups did not differ for minimum oxygen saturation (Table). OAs were better than UPPP for reducing sleep-disordered breathing and oxygen desaturation (Table). OAs were less effective than CPAP for reducing sleep-disordered breathing, arousals, and minimum oxygen saturation; the groups did not differ for daytime sleepiness, quality of life measured by SAQLI (Table), and cognitive function (2 RCTs). Side effects of OA were common and included jaw and oral pain, excess salivation, and appliance removal during sleep.

CONCLUSION

In patients with the obstructive sleep apnea–hypopnea syndrome, oral appliances are better than uvulopalatopharyngoplasty and control appliances, but not continuous positive-airway pressure.

Sources of funding: NHS Research and Development UK and Garfield Weston Foundation UK.

For correspondence: Mr. J. Lim, Royal Surrey County Hospital, Guildford, Surrey, England, UK. E-mail jeromelim@doctors.org.uk.

Oral appliance (OA) vs control OA, continuous positive-airway pressure (CPAP), or uvulopalatopharyngoplasty (UPPP) in obstructive sleep apnea at 2 weeks to 4 years*

Outcomes	Number of trials (n)	Comparisons	Weighted mean difference (95% CI)
Epworth Sleepiness Score	4 (130) 1 (101)	OA vs control OA OA vs CPAP	–2.1 (–3.8 to –0.4)† –0.2 (–2.0 to 1.6)
Apnea–hypopnea index	5 (156) 2 (121) 1 (72)	OA vs control OA OA vs CPAP OA vs UPPP	–11 (–16 to –6.0)† 13 (7.6 to 18)‡ –7.0 (–11 to –3.0)†
Arousals	3 (112) 2 (121)	OA vs control OA OA vs CPAP	–11 (–16 to –5.3)† 5.2 (2.1 to 8.2)‡
Minimum oxygen saturation (%)	3 (117) 2 (121)	OA vs control OA OA vs CPAP	1.8 (–0.3 to 3.9) 4.4 (2.3 to 6.6)‡
Oxygen desaturation index	1 (72)	OA vs UPPP	–6.4 (–10 to –2.3)†
Functional Outcomes of Sleep Questionnaire	1 (15)	OA vs control OA	17 (2.7 to 31)†
Sleep Apnea Quality of Life Index	2 (124)	OA vs CPAP	0.07 (–0.4 to 0.5)

*CI defined in Glossary. A fixed-effects model was used.
†Favors OA.
‡Favors CPAP.

COMMENTARY

CPAP is a highly effective therapy for OSAHS, although it is sometimes difficult to tolerate. OAs are an alternative treatment for OSAHS and overall are more tolerable. The meta-analysis by Lim and colleagues and the recently released American Academy of Sleep Medicine practice parameter (1) and systematic review (2) give useful direction for therapeutic use of OAs.

Overall, the studies in the review varied widely in the determination of treatment success. They were also inconsistent in the use of standard appliances and relied on self-reports of compliance. Information is lacking to help predict which patients will improve with use of OAs and what degree of mandibular adjustment is appropriate. In addition, the effectiveness of OAs seemed to be weighted toward patients with mild-to-moderate OSAHS.

While OAs were similar to CPAP for relieving symptoms of daytime sleepiness, CPAP showed greater improvement in the AHI and higher minimal oxygen saturation. Aside from the symptomatic complaints of daytime somnolence, OSAHS is known to be associated with cardiovascular consequences (3). Will cardiovascular risk decrease when the AHI is reduced to the lowest possible level and with maintenance of arterial oxygenation? If so, CPAP is superior for more than merely improving symptoms of sleepiness.

This review supports the use of OAs in patients who are intolerant of, or unwilling to accept, CPAP, especially in mild-to-moderate disease. However, before OAs can be accepted as first-line therapy, we need more evidence to sink our teeth into.

Allen J. Blaivas, DO
VA New Jersey Health Care System
East Orange, New Jersey, USA

References

1. **Kushida CA, Morgenthaler TI, Littner MR, et al.** Sleep. 2006;29:240-3.
2. **Ferguson KA, Cartwright R, Rogers R, Schmidt-Nowara W.** Sleep. 2006; 29:244-62.
3. **White DP.** Proc Am Thorac Soc. 2006;3:124-8.