Italian recommendations on dental support in the treatment of adult obstructive sleep apnea syndrome (OSAS)

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Italian dentist work group about OSAS
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Summary

Background. **The aim of the present article is to present a set of proposed clinical recommendations aimed at Italian dentists involved in the management of patients with obstructive sleep apnea syndrome or snoring.**
Methods. **With the purpose of creating a study group, some of the most important Italian scientific societies operating in fields relevant to the issue of sleep medicine in dentistry were asked to appoint a representative. Each member of the study group was required to answer questions regarding the clinical management of OSAS and snoring.**
Results. **Oral appliances can be used to treat: - simple snoring, in patients who do not respond to, or do not appear to be suitable candidates for behavioral measures such as weight loss or positional therapy; - mild or moderate OSAS, in patients who prefer OAs to continuous positive airway pressure (CPAP) or who are not suitable candidates for CPAP, because of its failure or failure of behavioral approaches like weight loss or positional therapy; - severe OSAS, in patients who do not respond to or do not tolerate CPAP and in whom no indication for either maxillofacial or ENT surgery appears applicable.**
Conclusions. **The application of oral appliances is highly desirable in cases of simple snoring or mild to moderate OSAS, whereas considerable caution is warranted when treating severe OSAS. It is fundamental to ensure that the patient understands his problem and, at the same time, to present all the various treatment options.**

Key words: obstructive sleep apnea syndrome, snoring, guidelines, oral appliance.

Introduction

Recent decades have seen dentists becoming increasingly involved in the treatment of disorders that also fall within the domain of other medical specialists. These disorders include obstructive sleep apnea syndrome (OSAS), sleep bruxism and temporomandibular disorders. The fact that dentists today are more aware of sleep disorders, in which they could potentially play a diagnostic and therapeutic role, stems from a growing recognition of orofacial characteristics as important developmental factors, and from the realisation that they have therapeutic implications in disorders such as OSAS, snoring and bruxism. These trends indicate the need for an interdisciplinary approach to these disorders and, therefore, for optimal collaboration among the different specialists involved (1-4).
In this paper, we focus on the role of dentists in the screening and treatment of sleep-disordered breathing (ranging from snoring to OSAS) in adult patients. From the screening perspective, it can immediately be remarked that dentists, on account of their contact with many members of the general population, are ideally placed to screen for potential OSAS sufferers. This could be done using simple questionnaires. As regards the treatment of sleep-disordered breathing, an increasing body of published literature reflects the growing worldwide recognition that oral devices have a role to play in the treatment of OSAS. Indeed, the various possible therapeutic strategies in adults with OSAS include the application of removable oral appliances similar to those normally employed in orthodontics. As long ago as 1902 Pierre Robin proposed the "monobloc", a

device used to obtain mandibular and lingual protrusion as a means of increasing the opening of the tracheal and esophageal tract and freeing the oropharynx (the "vital confluent" in his conception) and the upper airways from obstruction. The numerous devices marketed today for the treatment of sleep apnea or snoring are essentially based on the same principle (5).

As regards the situation in Italy, it is to be considered that dentists, given the number currently practicing across the country and their extensive contact with the general population – they see approximately 30% of the entire population –, could play an important role in terms of the interception and treatment of patients with sleep disordered breathing, and in this sense could be a valuable resource for the country's national health system. During the anamnesis, asking a simple question, such as "Do you snore?" or "Do you feel refreshed in the morning?" could be the first step, of considerable diagnostic significance, in a complex, diagnostic and therapeutic process. Involving dentists in this kind of activity would also change the way they are viewed by patients. Indeed, patients, appreciative of the care received and finding themselves able to sleep better, would see that they are the focus of clinical attention that goes beyond their teeth, and thus develop a different perception of the dentist's expertise and role. Substantially, they would see the dentist as someone who provides care and not just treatment. A further consideration, not to be underestimated, is that the treatment provided by dentists often enhances the patient's quality of life. This, in itself, is fulfilling, but if we consider that enhanced quality of life promotes wellness and general health, then it also underlines the status of dentists as full members of the medical profession.

The literature already contains specific and precisely defined protocols, both diagnostic and therapeutic, for the treatment of adults affected by OSAS and snoring (2, 5, 6). However, to provide a customised medical service, these protocols need to take into account the differences between different settings, both local and national. For this reason, and also because of the growing number of dentists in Italy becoming involved in the treatment of this condition, we decided to propose a set of "Italian guidelines" on adult OSAS in dentistry. The German Society of Dental Sleep Medicine have issued similar recommendations (3).

Material and methods

Study Group

The head of this project (Luca Levrini, Como, Italy) appointed the coordinator of the study group (Franco Sacchi, Milan, Italy) and also asked the most important Italian scientific societies operating in fields relevant to the issue of sleep medicine in dentistry to appoint delegates willing to take part to this project. The participating scientific societies and their delegates, who formed the study group, are as follows:

- Società Italiana Medicina del Sonno Odontoiatrica, Francesca Milano
- Associazione Italiana Medicina del Sonno, Marco Zucconi
- Surgical commission, Associazione Italiana Medicina del Sonno (ENT representative) and Associazione Otorinolaringologi Ospedalieri Italiani, Claudio Vicini
- Collegio dei Docenti di Odontoiatria, Paola Cozza
- Associazione Nazionale Dentisti Italiani, Edoardo Bernkopf
- Associazione Italiana Odontoiatri, Marzia Segù
- Associazione Italiana Pazienti con Apnee del Sonno, Enrico Brunello.

Scientific associations were chosen as representative of Italian dental sleep medicine, all of which have been officially directly involved by the Italian Association of Sleep Medicine (founded in 1990 and active in promoting scientific research and clinical training for sleep disorders in Italy). All the study group members declared that they had no conflicts of interest.

Questions

Each delegate proposed questions regarding the clinical management of OSAS and snoring patients; delegates were aware that responses would be results of literature, evidence and experience of the working group, in accordance with the indications of the Italian national Guidelines program (7). The proposed questions were jointly discussed and the delegates, on the basis of these discussions, decided unanimously to address the following four questions:

- What approaches, anamnestic and clinical, might be helpful to dentists seeking to identify adult patients affected by OSAS or snoring?
- When can an intraoral device be applied in an adult patient with OSAS or snoring?
- What are the features of a device employed for the treatment of adult patients affected by OSAS or snoring?
- What therapeutic process should the dentist follow in the case of an adult patient affected by OSAS or snoring?

Answers

The group coordinator drafted an initial document on the basis of the delegates' answers and considerations. A general overview was also drafted. The document was then forwarded to the delegates individually for revision. On the basis of their amendments, a second document was drafted in which the coordinator highlighted the conclusions that had not been reached unanimously. The process was repeated, with the coordinator continuing to modify the answers, until a final document, approved by all the delegates, was obtained. The answers contained in the final document are based on the available literature data; where data were absent, conclusions were reached on the basis of a combined evaluation of the clinical and practical evidence together with expert opinion. Each conclusion is associated with a lev-

el of evidence and a power of recommendation, in accordance with the indications of the Italian national Guidelines program (Piano Nazionale Linee Guida) (7) the levels of evidence assigned are defined as follows:

- I: evidence based on meta-analysis of randomized controlled studies;
- II: evidence based on at least one randomized controlled study;
- III: evidence based on at least one controlled non-randomized study;
- IV: evidence based on at least one non-controlled experimental study;
- V: evidence based on non-experimental descriptive studies (including comparative studies);
- VI: evidence based on a high level of consent and/or experts' clinical experience.

The power of recommendation was instead classified as follows:

- A: performance of the specific procedure (or diagnostic test) is highly recommended. "A" indicates a recommendation supported by good quality scientific evidence, albeit not necessarily type I or II evidence;
- B: there is some doubt over whether the particular procedure should always be recommended, but the possibility of performing it should always be given careful consideration;
- C: there is still considerable uncertainty over whether or not performance of the procedure should be recommended;
- D: performance of the procedure is not recommended;
- E: performance of the procedure is highly discouraged.

Results

General overview

Snoring is common among the general population. Around 30% of adults are habitual snorers and this percentage increases rises in those aged 60 years or more (to up to 60% of males and 40% of females) (2). In addition to being a sometimes severe source of disturbance for the individual's sleeping partner, snoring can be a symptom of OSAS, a frequent (4% prevalence) (8) and severe disease which is related to a possible increase in daytime sleepiness and an increased risk of developing hypertension, cardiovascular diseases and stroke. Not all snorers suffer from sleep apnea, however snoring is present in almost every OSAS patient. General population screening can therefore be a useful means of detecting individuals affected by OSAS, a disease that continues to be diagnosed and treated in only a small amount of cases (9).

The role of dentists

A very high percentage of the general population attends a dental office at least once a year for inspections and check-ups, professional oral hygiene procedures or other therapies. For this reason, dentists are ideally placed to perform OSAS screening. An appropriately trained dentist can also evaluate whether or not a single patient meets the requirements for treatment with oral appliances and can also carry out the necessary follow-ups. The dentist must have a role in screening patients with snoring or OSAS: during interdisciplinary managing, he will decide with the sleep specialist (in relation to his culture and experience) to treat or not patients with snoring or OSAS if he has characteristics defined by clinical recommendations.

Oral appliances

The first descriptions of the use of oral appliances (OAs) in OSAS treatment date back to the 1980s. Many devices have been proposed and, of these, the most widely studied are mandibular advancing devices (MADs) (1-10). These appliances are designed to keep the mandible and the tongue in a more advanced position during the night time, and also to increase the vertical dimension. As a result of a direct mechanical effect, and probably also a reflex muscular action, a MAD increases the opening of the lumen of the pharynx, mainly at its lateral portion. Numerous instrumental and clinical studies have assessed the clinical efficacy of OAs in OSAS and snoring, leading to an increase in the relevant scientific evidence over recent years. The features of the various devices have been modified many times and, as a result, today's OAs are much more comfortable, better tolerated and less bulky than those of the past. In addition, their side effects have become far less severe. Even though continuous positive airway pressure (CPAP) has given better results in terms of reducing airway obstruction indices, OAs are far more comfortable for patients. As a consequence, compared with the past, OAs are now recommended internationally for a broader spectrum of clinical conditions. In this regard, it is useful to examine the evolution within the AASM (American Academy of Sleep Medicine) over the past two decades; indeed, the statements issued by this organization in 1995, 2005 and 2009 (2, 11,12) seem to provide very clear indications.

Questions and answers

<u>A – What approaches, anamnestic and clinical, might be helpful to dentists seeking to identify adult patients affected by OSAS or snoring?</u>

A1. Dentists can make a major contribution to screening for OSAS. This can be done through:

a. The inclusion, in the history, of specific questions (1, 6, 12, 13) designed to identify patients with:
   - a history of chronic snoring;
   - daytime sleepiness and/or non-restful sleep;
   - nightly awakenings associated with air hunger and/or apneas reported by the sleeping partner;

- other OSAS-related symptoms such as mouth dryness, headache, difficult awakening, nocturia, chronic weakness, deficit of memory and concentration, libido disorders.

(Level of evidence 1; Power of recommendation B).

b. The use of specific approved questionnaires that can help to quantify daytime sleepiness. These include the "Epworth Scale" and the "Stop-Bang questionnaire" (1, 14, 15), which allows the risk of OSAS to be determined on the basis of the binary (yes/no) answers to 8 simple questions. "Epworth Scale" or "Stop-Bang questionnaire" (1) allow to evaluate and share with the patient the relief of OSAS symptoms; later the final follow-up for treatment evaluation must be performed by a sleep physician with cardio-respiratory parameters.

(Level of evidence 1; Power of recommendation B).

c. Evaluation of clinical characteristics frequently associated with sleep respiratory disorders: for example, obesity, older age (over 45 years for males or postmenopause for females), hypertrophic tonsils or other signs of obstruction of the upper airways, large neck circumference and retrognathia. Dentists should also carefully assess patients' dental and periodontal health status, dental occlusion, TMJ and masticatory muscle function and assess the presence of related diseases, particularly bruxism, gastroesophageal reflux disease and orofacial pain (1, 2, 6, 12).

(Level of evidence 1; Power of recommendation A).

d. In-depth diagnosis with instrumental examination.

(Level of evidence 1; Power of recommendation A).

A2. It would be preferable to achieve a multidisciplinary approach to OSAS and snoring that also involves dentists in the various phases of the diagnostic work-up (clinical and instrumental) and in the treatment strategy decision-making process. Reports of instrumental examinations (polysomnography or any other method approved by the AIMS-AIPO diagnostic guidelines) (6) should be arranged by a specialist in sleep medicine, who would assume full responsibility for them. The dentist should be involved in general diagnostic work-up, evaluating the patient's dental, periodontal and functional status and craniofacial morphology, and should also contribute to decision making during the treatment-planning phase, by identifying predictive factors of treatment efficacy. In addition, the dentist should participate in the intercepting of OSAS-affected patients (screening) (see point A1). The dentist should also assume sole responsibility for the selection, construction and adjustment of OAs, as well as for the management of their side effects (point 4) (1, 3, 4).

(Level of evidence 4, Power of recommendation B).

If a diagnosis of OSAS or snoring, moderate or mild, is confirmed, the dental analysis and the decision regarding the application of an OA, as well as its characteristics, are exclusively within the competence of the dentist, irrespective of his academic training.

We desire dentists to promote awareness about OSAS and snoring so as to bring to light affected individuals among the population. In this way, dentists may interface with sleep medicine specialists, providing an important link and making a valuable contribution to the addressing of this important but still very little known disorder.

(Level of evidence 4; Power of recommendation A).

A3. The instrumental procedure (polysomnography or any other method approved by the AIMS-AIPO diagnostic guidelines) (6) allowing diagnosis of OSAS and assessment of its severity should be performed before dental treatments. In this way, it is possible to establish, at the time of the clinical work-up, the certainty of the diagnosis and the different therapeutic options and subsequently to evaluate the results obtained, comparing them with the basal conditions (AASM 2009*). The assessment of case severity can be considered completed only after evaluation of any comorbidities present (cardiovascular and respiratory diseases primarily, and also malocclusions) (1, 2, 6, 12, 16, 17).

(Level of evidence 1; Power of recommendation A).

<u>B – When can an intraoral device be applied in an adult patient with OSAS or snoring?</u>

As regards the use of intraoral devices (or oral appliances, OAs), we here refer to what was been agreed by the AASM task force (1). According to its document, OAs can be applied in the following conditions:

- simple snoring, in patients who do not respond to therapy or do not appear to be suitable candidates for behavioral measures such as weight loss or positional therapy.
- mild or moderate OSAS, in patients who prefer OAs rather than CPAP or who are not suitable candidates for CPAP, because of its failure or failure of behavioral approaches like weight loss or positional therapy.
- severe OSAS, in patients who do not respond to or do not tolerate CPAP and in whom no indication either for maxillofacial or ENT surgery appears applicable (1, 18-20).

(Level of evidence 1; Power of recommendation A).

The application of OAs is highly desirable in cases of simple snoring or mild to moderate OSAS, whereas considerable caution is warranted when treating severe OSAS. It is fundamental to ensure that the patient understands his problem and, at the same time, to present all the various treatment options. In other words, it is important, together with the patient, to establish what his needs are and then to choose, together, the best solution to his disorder.

(Level of evidence 6; Power of recommendation A).

<u>C – What are the features of a device employed for the treatment of adult patients affected by OSAS or snoring?</u>

1. Tongue retaining devices (TRD), which seem to be less efficacious and are also less comfortable than mandibular advancement devices (MADs); they are indicated in edentulous patients, or patients who cannot tolerate, or do not qualify as candidates for, mandibular advancement (1, 20-22).

(Level of evidence 2; Power of recommendation C).

2. Mandibular advancement devices (MADs, also referred in the literature as mandibular advance-

ment splints – MASs; mandibular repositioning devices – MRDs; or mandibular repositioning appliances – MRAs), which can be:

3. Boil and bite devices: these are less efficient than customized devices in terms of reduction of respiratory events and also in terms of compliance; these devices are still not indicated as a definitive treatment for OSAS. There are not sufficient data available to establish their ability to predict the efficacy o customized devices (23, 24).

(Level of evidence 2; Power of recommendation C).

4. Monobloc devices: these are fabricated in the lab starting from the patient's impressions; with these devices, the interarch relationship can be fixed or slightly modifiable (25-27).

(Level of evidence 1; Power of recommendation A).

5. Adjustable advancement devices: these also fabricated in a dental laboratory, customized for each patient. This type of device consists of two parts kept together by an articulation system (screws or sliding surfaces) that allows it to be regulated. The possibility of regulating the advancement of the mandible and thus gradually modifying its position means that this solution allows the best compromise between the different outcomes (verified by polysomnography or other validated instrumental examination) and the patient's comfort (19, 26, 28-30).

(Level of evidence 1; Power of recommendation A).

The term oral appliance is too generic, in the future, in both the research and the clinical setting, it will be necessary to specify the main features of the considered device.

(Level of evidence 6; Power of recommendation A).

<u>D – What therapeutic process should the dentist follow in the case of an adult patient affected by OSAS or snoring?</u>

- It is highly desirable that therapy with OAs be performed exclusively by dentists who have received specific training in sleep medicine/dentistry and the use of OAs.
- The dentist should be familiar with the indications for and contraindications to maxillomandibular advancement, and thus able to identify patients needing to be referred to a maxillofacial surgeon.
- The dentist should be trained to carry out combined treatments involving the use of OAs and soft tissue surgery (otorhinolaryngology), or treatments combining OAs with CPAP.
- To determine whether or not to apply an OA, a preliminary evaluation of the conditions of the oral mucosa, teeth and periodontal structures and of oral function is recommended, focusing especially on the masticatory muscles and TMJ and looking for any malocclusions and dysgnathia.
- Selection of the device is exclusively the responsibility of the dentist who will make the choice taking into consideration the peculiarities of the single case and drawing on his own specific knowledge. We suggest that this knowledge should be extended to cover all the different types of OA, since no one device appears to fit all patients.
- Dentists should monitor the device over time, considering the patient's adaptation to different degrees of repositioning of the mandible and its tolerance to protrusion.
- In the case of simple snoring, the assessment of efficacy is limited to the amount of information provided either by the patient or his/her partner. In situations in which certain signs or symptoms of OSAS persist, a more in-depth study of the case is required in order to select the best therapy. This may involve the use of a cardiac-respiratory monitoring instrument or other approved instrument (AIMS-AIPO guidelines).
- Once the efficacy of the therapy has been confirmed, the patient should attend dental check-ups every 6 weeks for the first year and once a year thereafter for verification of his/her dental, periodontal, functional and occlusal status.
- It is the dentist's responsibility to manage, on the basis of information provided by the patient, the various OA-related side effects that could arise. These include both transitory ones (hypersalivation, dental pain, muscular problems, occlusal complications in the morning) and more persistent ones (changes in the position of teeth and in occlusion). The dentist should take steps to limit these side effects as they are perceived negatively by the patient.
- Dentists involved in the treatment of sleep respiratory disorders, are encouraged to undertake continuous and targeted education about these problems through frequent attendance of refresher courses (1, 10, 17, 19, 20, 31).

We desire universities to include the subject of "sleep dentistry" in their dentistry courses, in particular Gnathology in the Dental School.

(Level of evidence 4; Power of recommendation A).

Conclusion

The role of the dentist in sleep-disordered breathing can be summarized in the following tasks: screening for OSAS; management of treatment with OAs, including titration of the appliance in order to maximize the results and reduce side-effects; assessment and management, within the limits and scope of the dental profession, of related pathologies such as sleep bruxism, orofacial pain and related headache. The diagnosis of SDB and the final follow-up for treatment evaluation must be performed by a sleep specialist and not by the dentist, also for simple snoring. If the doctor in charge of the interdisciplinary team, often a sleep physician, has determined that therapy with an OA is feasible, then he/she should inform the dentist of this. It will then be up to the dentist to establish whether this treatment is advisable, considering the conditions of the patient's teeth and oral tissues, and what type of device is most appropriate for the case in question. The application of OAs is highly desirable in cases of simple snoring or mild to moderate

OSAS, whereas considerable caution is warranted when treating severe OSAS. It is fundamental to ensure that the patient understands his clinical problem and, at the same time, to present all the various treatment options. In other words, it is important, together with the patient, to establish what his needs are and then to choose, together, the best solution to his disorder.

Conflict of interest statement

The Authors declare to have no conflict of interest.

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