

What is obstructive sleep apnea (OSA) and why do dentists care? A whirlwind introduction to a new area of practice

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I have no conflict of interest.

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Course Objectives:

Get a basic understanding of obstructive sleep apnea (OSA)
What is it? Where is it? And Why is it?

Start to learn a new vocabulary needed to treat this disease
and understand that we must partner with medical providers.

Gain a basic understanding of the overall disease and its
medical consequences

Understand some of the device designs, choices and side-
effects

Add simple procedures to your daily evaluation of new
patients to screen for patients who may have obstructive
sleep apnea



Partnership.
Dual ownership.

OSA is a medical disease that dentists can
often treat.

It affects ~ 16 % of the US population; this is
more than the number of people who have
asthma T Young et al Epidemiology of OSA AJRCCM Vol 165 1217-1239. 2002

Moderate-Severe ~ 11.3% of adults. P Peppard.
Increased incidence of Sleep-Disordered Breathing in Adults Am J of Epidemiol. 2012;177(9):1006-1014

Treatment is covered by medical insurance

Who gets OSA?



What is obstructive sleep apnea and snoring?

Occurs only during sleep

Results in a narrowing of the upper airway and may prevent adequate air flow to the lungs. This may lead to multiple medical problems. Just the effort of breathing through a smaller airway causes side-effects.

May not cause any overt symptoms

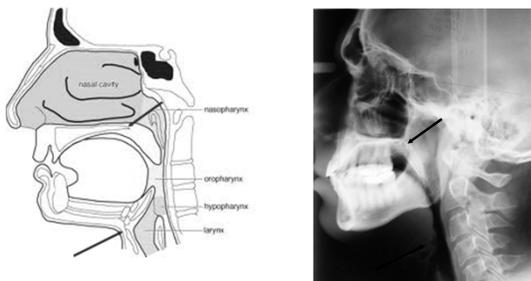
Has multiple factors any of which may be a 'tipping point' that causes airway collapse

Primary snoring requires that the patient have normal empirical testing and no symptoms (EDS, HTN, etc.)

Simple description

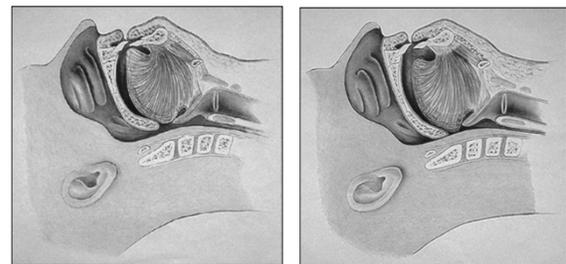
- The upper airway is collapsible from the posterior aspect of the nasal spine to the base of the epiglottis; it can be small or unusually collapsible which then limits the amount of air getting to the lungs at night.
- So even though one is trying to breathe, the decrease in air flow may result in a drop in the amount of oxygen in the blood stream and allow build up of carbon dioxide. The body responds by slightly 'waking up' the patient and interfering with restful sleep.

Where is the collapsible airway?



*

Obstructive Sleep Apnea



The UA muscles are enclosed in a bony box:



MRI photo courtesy of Richard Schwab, MD *

Of the 20+ muscles that make up the upper airway, not one of them has the primary function of pharyngeal dilation!

Arens, et al Pathophysiology of Upper Airway Obstruction: a Developmental Perspective. Sleep 2004 Aug.1 ;27(5):997-1019

A minor narrowing of the upper airway may result in snoring but frequent narrowing over the course of the night can result in significant sleep disordered breathing.

Severe sleep apnea can be life threatening

Snoring

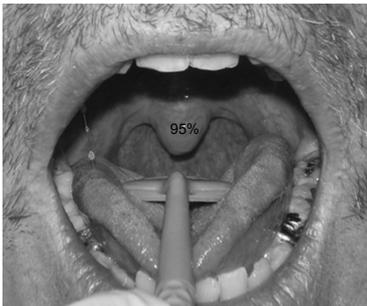
When air enters the narrow part of an airway it creates turbulence which causes loose tissue to vibrate, making the noise we call snoring.

50% of children who habitually snore have OSA

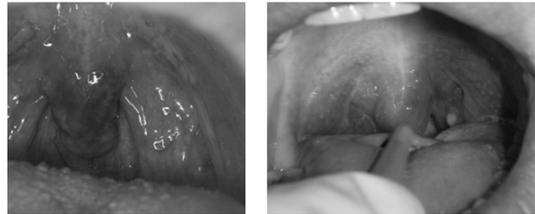
17% of women with sleep disordered breathing do not snore

3% of men with OSA do not snore

What tissue vibrates?



Snoring causes tissue damage



Courtesy of Nancy Addy, DDS

Meet the grandmother who snores at 111 decibels... louder than a JET plane



Mrs Chapman, from Deeping St James, Cambridgeshire, Daily Mail, UK 2011

Why do we have to partner with MDs?

Legally, only a physician can diagnose obstructive sleep apnea; OSA must be ruled out before you treat a patient for "snoring"

Most patients with OSA have concomitant medical disorders that require a physician's care

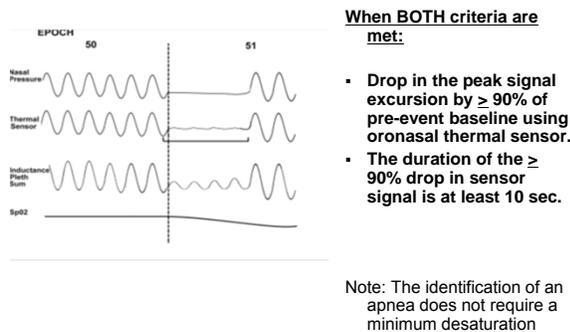
Treatment of a patient for snoring without first determining the level of OSA could result in prevention of proper medical care and leave the dentist liable for negative legal outcomes

Since MDs don't speak "Dental speak" and OSA is a medical disease, dentists need to learn the medical vocabulary used by physicians

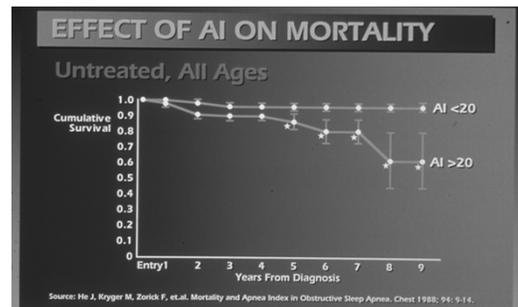
Apnea

A total blockage of the upper airway regardless of continued effort to breathe.

Obstructive Apnea

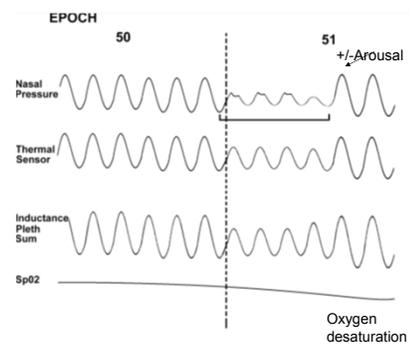


Apneic events are dangerous

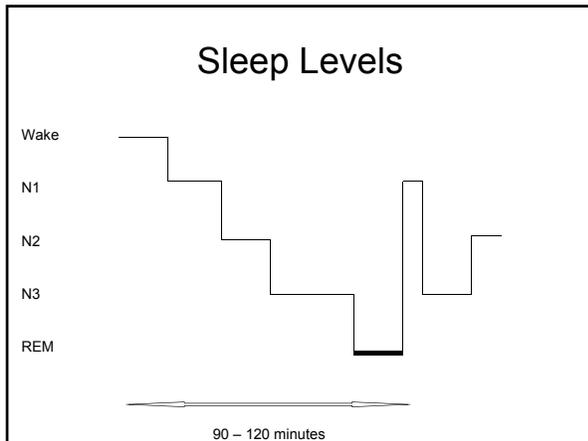


Hypopnea

A partial blockage of the upper airway that is severe enough to cause a shift in sleep level and or a drop in blood oxygen saturation.



AASM Scoring Manual



Arousals

These are shifts in sleep level from deeper to lighter precipitated by increased diaphragmatic action, drop in oxygen level or physical movement.

Arousals fragment sleep and result in many negative outcomes

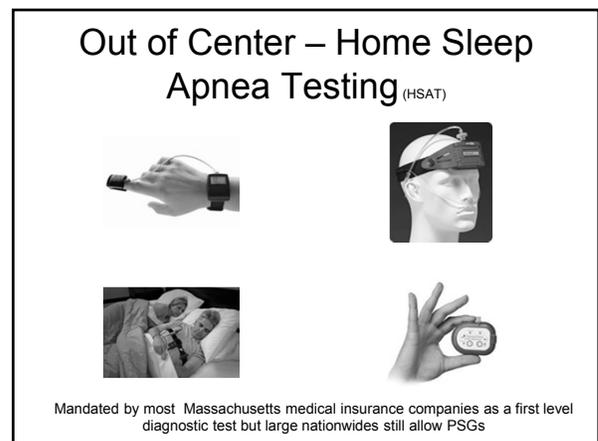
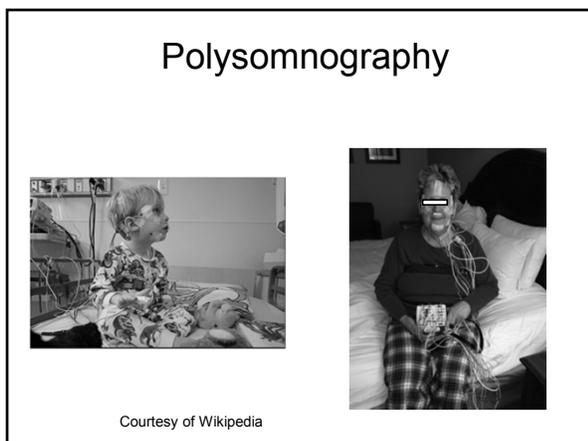
Oxygen Desaturation

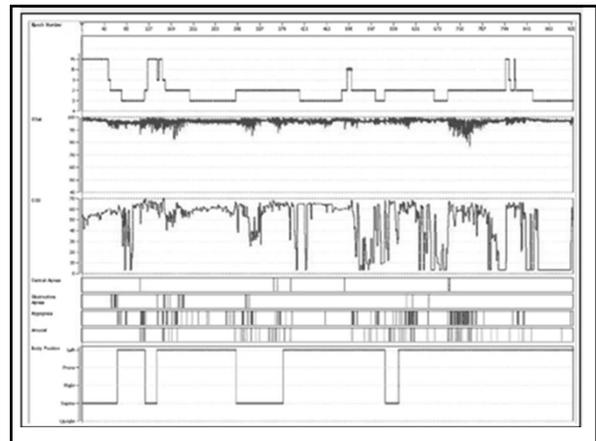
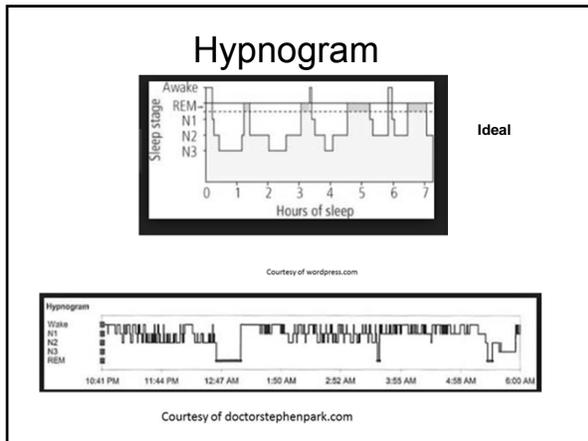
Below 90% is abnormal
Triggers sympathetic response
Can go below 50%!!!!

Leads to:

Cardiac Disease

- ## Polysomnography
- (In laboratory sleep testing)
- Considered the gold standard for diagnosis
 - Patient supervised by trained personnel
 - Multiple channels recorded including:
 - EEG
 - EOG
 - EMG (Chin and legs)
 - Oximetry
 - Airflow
 - Respiratory effort
 - Snoring
 - Body position





‘Index’ measurements

The number of events recorded during a sleep study averaged over the hours of sleep time is the event index.

AI: Apnea Index

AHI: Apnea Hypopnea Index

REI: Respiratory Event Index

*

There is no way to tell the difference between primary snoring and obstructive sleep apnea without empirical testing

Out of Center Sleep Testing underscores events because they do not score both airflow and EEG arousals.

A full health history and physical is required by a physician

Severity Rating

The following is a commonly used severity scale:

AHI < 5 is normal
 AHI = 5 - 15 is mild OSA
 AHI = 15.1 - 30 is moderate OSA
 AHI > 30 is severe OSA

However this article also indicated that severity of OSA syndrome should be specified based on not only the AHI but also the severity of daytime sleepiness and oxygen levels.

Sleep-related breathing disorders in adults: recommendations for syndrome definition and measurement techniques in clinical research. The Report of an American Academy of Sleep Medicine Task Force. Sleep, Aug 1 1999;22(5):667-689.

Why does the upper airway to collapse?

It is really an accumulation of physiologic / anatomic and chemical alterations whose proportions are slightly different for each patient.

Predisposing factors for OSA:

- Obesity, especially upper body fat
- Male Gender
- Family history (genetics)
- Age
- Menopause
- Neurologic dysfunction
- Craniofacial abnormalities
- Alcohol or sedative use
- Smoking
- Racial background

ANATOMICAL ABNORMALITIES:

People with OSA, on general, have smaller upper airways than controls

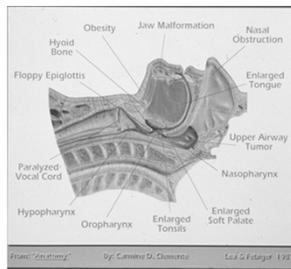
FUNCTIONAL ABNORMALITIES:

e.g. Respiratory control mechanisms

DEVELOPMENTAL ABNORMALITIES

ACQUIRED ABNORMALITIES (Obesity)

GENETICS ACCOUNTS FOR > 35% of OSA



The size of the airway, in an awake healthy volunteer, decreases 29% just by going from an upright to a supine position.

Not so a sleep apneic!

Craniofacial abnormalities



Hypoplastic Maxilla



Retrognathia

People with seemingly normal anatomy can have significant OSA while others with obvious abnormal anatomy have no problem at all.

The response to breathing events depends on the individuals susceptibility to these events
The Tipping Point

Free nasal breathing is important to proper airway dynamics.

OSA can be created in the laboratory by forcing mouth breathing.

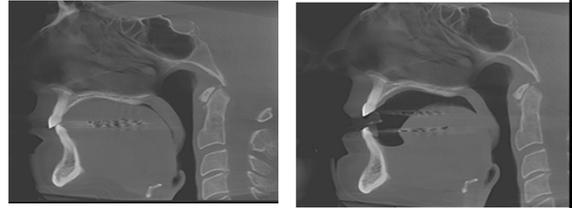
Healthy male subjects had their noses completely blocked with impervious plugs.

With normal nasal breathing the men had an AHI of 1.5 ± 0.5

With oral breathing these same subjects increased their AHI to 43 ± 6

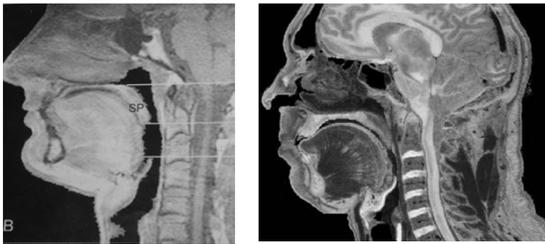
Fitzpatrick, et al Eur Respir J 2003;22(5):827-32

Mouth breathing prevents proper tongue position



And alters muscle activity in the upper airway and compensatory mechanisms

Obesity



Richard Schwab, MD Sleep 2004

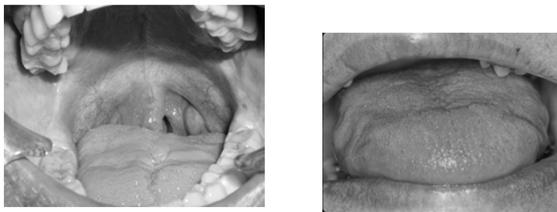
50% of American adults are overweight
25% of American adults are obese
10-20% of American children are obese

Fat deposition increases in both the muscles and the other soft tissues of the upper airway

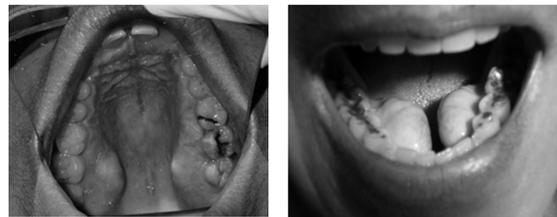
OSA interferes with most major hormone pathways, and actually causes weight gain

*

Increased intraoral soft tissue



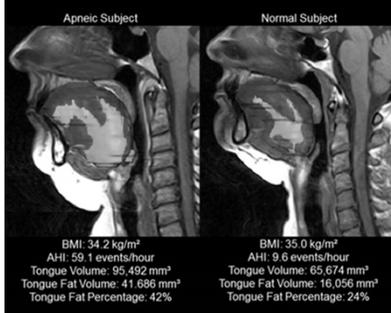
Increased intraoral hard tissue has not been shown to exacerbate OSA



Nor interfere with dental treatment of these patients

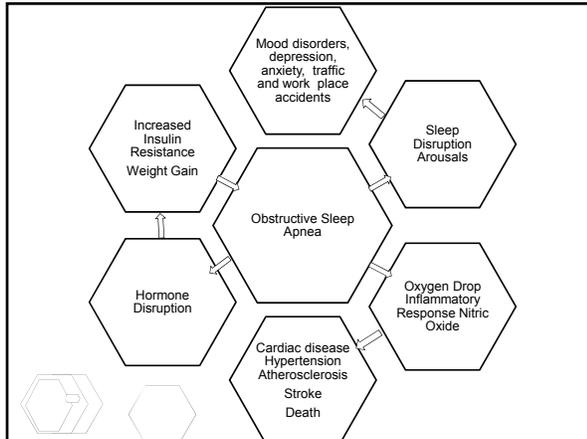
Palm E et al. Mandibular tori size is related to OSA and treatment success with OAT. Sleep Breath 2014 May; 18 (2):431-8

Obesity is NOT pathognomonic for OSA nor indicative of severity



Kim et al Sleep 2014;37(10) 1639-1648

What happens to patients with OSA?

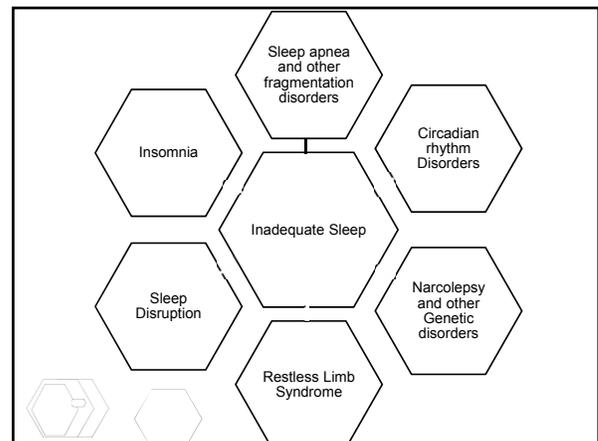


When patients are tired:

- They have 7x number of MVAs
- Find it difficult to maintain healthy relationships
- They fall asleep at inappropriate times
- It is difficult to get out of bed in the morning
- Their major complaint may be 'insomnia'

*

Why are patients tired?



While dentists may *screen* for OSA
OSA is a medical disease and the diagnosis is made by a *physician*

As we screen for BP we can screen for OSA:

Health History
Questionnaires

A screening does not diagnose OSA

The patient needs a medical diagnosis by a physician because the oral devices are legal *medical* devices.

All the impact of OSA is medical.

Screening patients in the office with a home sleep apnea test may put you outside your scope of licensure.

Work with your local physicians

Health History

Add questions to your medical history:

Do you or anyone in your family snore?

Have you ever been told you stop breathing or gasp in your sleep?

Questionnaires

The image shows two forms: the STOP BANG Questionnaire and the Epworth Sleepiness Scale. The STOP BANG questionnaire includes questions about snoring, fatigue, blood pressure, BMI, age, and neck circumference. The Epworth Sleepiness Scale is a table for rating sleepiness in various situations.

STOP BANG Questionnaire

Weight _____ Inclusion Weight _____ (kg)
Age _____
Male _____ Female _____
BMI _____
Collar size of shirt S, M, L, XL or _____ Inclusion
Neck circumference _____ (cm)

1. Snoring
Do you snore loudly (louder than talking or loud enough to be heard through closed doors)?
Yes No

2. Tired
Do you often feel tired, fatigued, or sleepy during daytime?
Yes No

3. Hypertension
Has anyone observed you stop breathing during your sleep?
Yes No

4. Blood Pressure
Do you have or are you being treated for high blood pressure?
Yes No

5. BMI
BMI more than 35 kg/m²?
Yes No

6. Age
Age over 50 years old?
Yes No

7. Neck circumference
Neck circumference greater than 40 cm?
Yes No

8. Gender
Gender male?
Yes No

* Neck circumference is measured by staff right out of OSA answering yes to three or more items. Low risk of OSA answering yes to less than three items.

Epworth Sleepiness Scale

Situation

Situation	High	Moderate	Low	None
1. Sitting and reading				
2. Watching TV				
3. Sitting inactive in a public place (e.g. movie theater or meeting)				
4. As a passenger in a car for an hour without a driver				
5. Lying down to rest in the afternoon when circumstances permit				
6. Sitting and talking to someone				
7. Sitting quietly after lunch without alcohol				
8. In a car, while stopped for a few minutes in traffic				

(Please check the appropriate box)

Behavior During Sleep

Use the following scale to choose the most appropriate number for each situation.

Situation	0-4	5
0 - never during usual sleep		
1 - less than once a week		
2 - once a week or more often		
3 - several times a week		
4 - almost always or every night		
5 - every night or almost every night		

1. Snoring loudly _____
2. Loud snoring _____
3. Choking or gasping for breath _____
4. Sleep talking _____
5. Waking up with a headache _____
6. Excessive daytime sleepiness _____
7. Witnessed apnea _____
8. Witnessed snoring _____
9. Witnessed choking or gasping _____
10. Witnessed snoring _____
11. Witnessed snoring _____
12. Witnessed snoring _____
13. Witnessed snoring _____
14. Witnessed snoring _____
15. Witnessed snoring _____
16. Witnessed snoring _____
17. Witnessed snoring _____
18. Witnessed snoring _____
19. Witnessed snoring _____
20. Witnessed snoring _____

Load number from above (right) _____
Number of times you snore per year (left) _____

You **CAN NOT** diagnose OSA from:

Radiographs (Cephalometric, CbCT)

Questionnaires

Oral and oropharyngeal examination

Patient history

Dental Patients at High Risk for OSA

Pacemakers (88%)
Women with CAD (30% have AHI > 10)
Late Pregnancy (opposing results)
Morbidly Obese Males
Post menopausal Women
36% of patients with OSA have a first degree relative with OSA



Referrals / Communication

- Physician order for OAT / MAD to the dentist
 - Documentation needed
 - Who calls whom
 - Paperwork
- Keep in mind the mandates and documentation required by insurance (letter of medical necessity, Rx, tried PAP, etc)
- Work in a collaborative fashion, do not make assumptions
- HIPAA / Release of info

If you are sending the patient to see the sleep physician:

Explain oral device therapy to the patient before he goes to see the MD

Send a note to the physician explaining what made you suspect a sleep disorder in the patient

The physician will always want the patient to try PAP but very few insurance companies insist on a trial of PAP except for patients with severe OSA

If you treat a patient diagnosed with primary snoring:

You are responsible for referring that patient back to the sleep physician if:

Symptoms return

Weight gain

Aging

Menopause

Change in medical status (HTN, arrhythmia)

Treatment Options

Positive Airway Pressure (CPAP, BPAP, APAP)
Surgical Intervention (MMA and soft tissue)
Oral Appliance
Behavioral changes (weight loss, positional changes)

Positive Airway Pressure CPAP, APAP, BiLevel PAP, etc

Mask with headgear

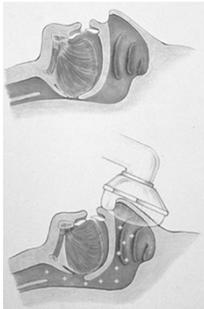
PAP machine

Tubing



Courtesy of Kelly Carden, MD

Positive Airway Pressure



Courtesy of the AASM

PAP Therapy

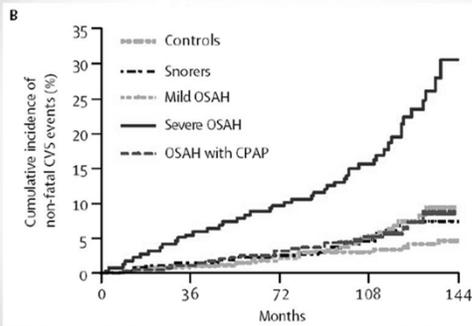
Advantages

- Quickly and demonstrably effective
- Reverses symptoms
- Improves CV dysfunction
- Cost Effective, reduces health care costs
- Reduces MVAs

Disadvantages

- Chronic therapy
- Poor adherence to therapy

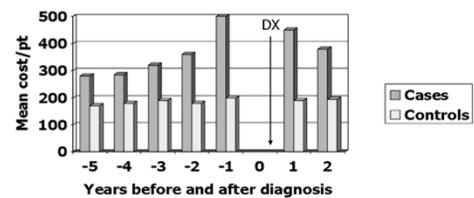
Cumulative Incidence of Non-fatal Cardiovascular Events



Marin et al. *Lancet* 2005;365, 1046

Benefits of CPAP: Health Care Utilization

Physician Claims Pre and Post Dx

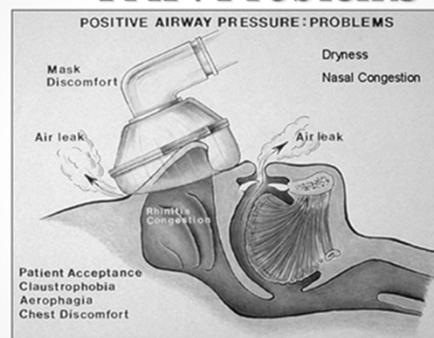


Bahammam et al. *Sleep* 1999, 6:740-7.

PAP was FDA accepted for adults only, but now it is accepted for children as young as 8. Premaxillary changes will occur in both groups.



PAP: Problems



86 % of patients using CPAP complain of side-effects

- Air leaks
 - Interrupted sleep
 - Pressure sores
 - Mask dislodgement
 - Claustrophobia
 - Eye discomfort
 - Aerophagia
 - Maxillary tooth movement
 - Sinus infection / Rhinorrhea
- Mucosal Drying (15-50%) *

CPAP moves teeth



Adherence to Therapy?



Surgical Intervention

Maxillomandibular / Telegnathic surgery



Soft Tissue Throat Surgery / Tracheotomy

MMA Surgical Considerations

Insurance may cover only for severe OSA unless there is an underlying skeletal abnormality

Can leave the patient with permanent numbness, esthetic changes

Requires orthodontics that is not covered by medical insurance

Soft Tissue Surgery

Fallen out of favor except in selected patients
Over 14 soft tissue surgeries have been developed

Originally done as part of multilevel surgery; this Stanford staging is out-of-date

It is considered a salvage treatment

It is NOT considered curative

Nasal surgery is more common and effective

Behavioral Changes

Weight Loss

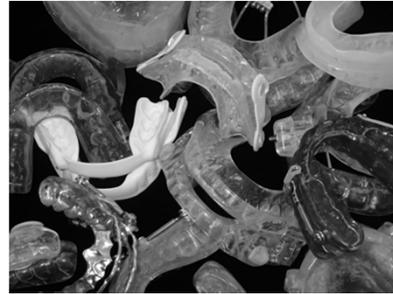
Avoid alcohol and sedative /
narcotics

Smoking cessation

Avoid exogenous androgens

Avoid supine sleep position

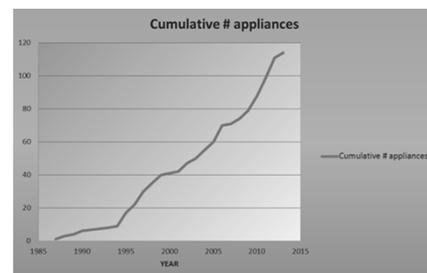
Oral Appliance Therapy for OSA



The most common Oral Appliances
for the treatment of OSA are dual
arch adjustable dental devices that
limit mandibular movements

Acronyms abound: MRD MAS

FDA 510 Market Approval



U.S. Food and Drug Administration. fda.gov; c2013 [updated 2013; cited 2013 Mar 22]. Available from:
<http://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfPMN/pmn.cfm>. FDA product codes: LQZ and LRK

Medical insurance companies
demand FDA accepted oral
devices

While there are > 120 oral devices cleared
by the FDA for the treatment of OSA

Medicare limits the field to only 3 different
types of devices.

Efficacy of treatment

CPAP returns 90 -95 % to normal breathing

MMA returns 46 – 75% to normal breathing

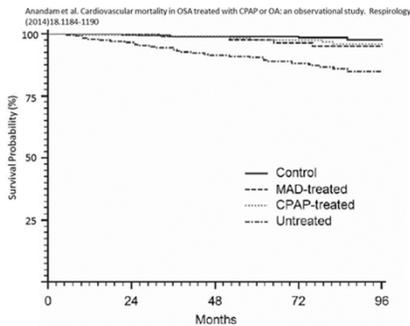
Oral devices return 37-56 % to normal breathing

(Almeida 2007, Holley 2011, Lettieri et al 2012, Gotsopoulos 2002, and many others)

Soft tissue surgery in adults returns 13 % to
normal breathing
(Eisshaug, Sleep 2007)

Normal Breathing is fewer than 5 breathing events per
hour.

Is AHI the most important outcome?



Pearls:

- OSA is a common disease
- OSA is a potentially fatal disease
- OSA is an insidious disease
- It affects all ages from infants to the elderly
- It cannot be diagnosed without a sleep study
- Oral devices are very effective in treatment of OSA

Oral Appliances

Decrease blood pressure
Improve daytime sleepiness
Decrease snoring
Improve quality of life
Decrease inflammatory markers
Have high adherence
Decrease cardiac fatalities

Pearls

Dentist can treat >50 % of sleep apneics as well as physicians.
Patients are more than twice as compliant with oral devices as they are with CPAP
Dentists and their staffs can screen for sleep apnea in the dental office
Medical insurance will often cover treatment

Oral appliance therapy
(OAT). How? Who ?
Which one? Why?
Fabrication and Follow-up

B. Gail Demko, DMD
www.SleepApneaDentist.com

Biomechanics of
Mandibular
Advancement

All MRDs:

- Are tooth retained on at least one arch
- Alter VDO and interincisal distance
- Advance the mandible with some sort of mechanism
- Impact the TMJ
- Cause side effects



Courtesy of Silencer Corp.

So what do they do?

Early study :

Suggested that MAS increased the space between bony structures and provided increased room for soft tissue, but recent studies show action is more complex with substantial inter-subject variation

Ferguson KA et al. A randomized crossover study of an oral appliance vs. nasal-continuous positive airway pressure in the treatment of mild-moderate OSA. *Chest* 1996;109:1269-1275

Advance the Mandible

Protrude the mandible



Advancing the Mandible

“Passive mandibular advancement during general anesthesia stabilizes the upper airway by increasing airway size in both the retropalatal and retroglossal area and by reducing closing pressure”

Isono et al, Advancement of the Mandible Improves Velopharyngeal Patency *J Applied Physiol* 79, 2132-2138 1995

Airway Changes with MRD

The airway opens more behind the soft palate than the tongue

It opens laterally more than antero-posteriorly

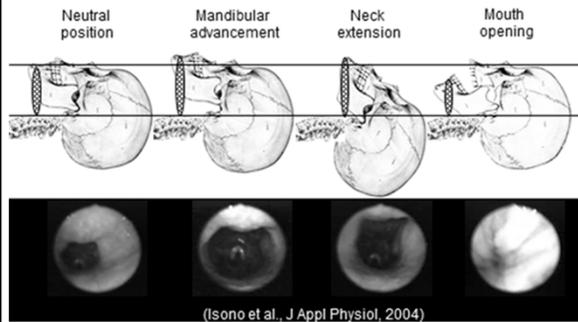
Jia et al. Changes in UA morphology induced by mandibular advancement. *Beijing Da Xue Xue Bao* 2003 Dec 18;35(6): 663-7 abstract
 Ryan et al. Mandibular advancement oral appliance therapy for obstructive sleep apnea: effect on awake caliber of the velopharynx. *Thorax* 1999; 54: 972-977

Increase is most significant in the velopharynx, and least in the hypopharyngeal space

Zhao et al. Three-dimensional upper-airway changes associated with various amounts of mandibular advancement in awake apneic patients. *AJODO* May 2008 661-668)

Kyung SH et al. Obstructive sleep apnea patients with the oral appliances experience pharyngeal size and shape changes in three dimensions. *Angle Orthod. Jan* 2005;75(1):15-22

Alterations in Upper Airway dimensions



Lateral Ceph's show an increase in the A/P dimensions of the oropharynx but show variable effects on nasopharyngeal airway

Johal, et al. Use of videofluoroscopy in the assessment of the pharyngeal airway in OSA. *Eur J Orth* 53 (2011);212-219

Hyoid moves closer to mandibular plane in successful pts (Isono)

Airway shape changes can increase airway stability in some patients (Ng AT et al. Effect of oral appliance therapy on upper airway collapsibility in OSA. *Am J Respir Crit Care Med.* Jul 15 2003;168(2): 238-241

In successful cases, the hyoid moves up and forward

Marklund M et al Non-CPAP therapies in OSA: mandibular advancement device therapy. *Eur Respir J.* May 2012;39(5):1241-1247
 Chan AS et al The effect of mandibular advancement on the upper airway structure in OSA. *Thorax.* Aug 2010;65(8):726-732)

Movement of the hyoid showed great interindividual variation

Battagel J et al. Changes in airway and hyoid position in response to mandibular protrusion in subject with obstructive sleep apnea (OSA) *Eur J of Orthod* 1999;21:363-376

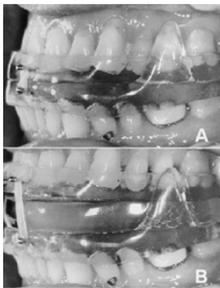
The length of the tongue shortens and the height increases in responders

The base of the tongue moves less than the anterior aspect of the tongue

Soft palate area and width decreased

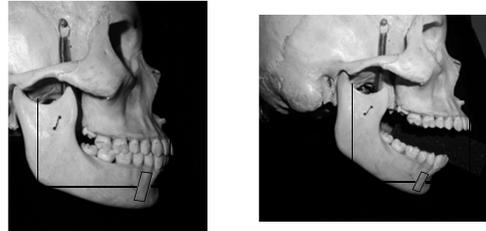
Ogawa T, et al Effect of mandibular advancement splint treatment on tongue shape in obstructive sleep apnea. *Sleep and Breathing.* Jan 2015

Alter: VERTICAL OPENING



Pitsis et al. Effect of Vertical Dimension on efficacy of oral appliance therapy and obstructive sleep apnea. AJRCCM Vol 166. pp850-854, 2002

The Mandible Naturally Rotates Down and Backwards

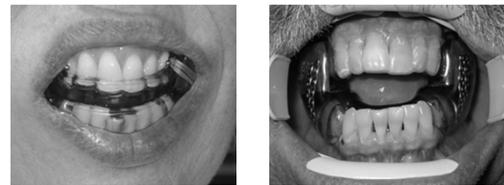


So to prevent downward and posterior movement of the genial tubercles (and, hence the body of the tongue), most devices maintain the mandible in a relatively closed position

Opening the mouth to an interincisal distance of 1.5 cm. correlates to a 1 cm backwards movement of the attachment of the genioglossus muscle.*

Effectively , the more you open the VDO the worse you can make some patients.

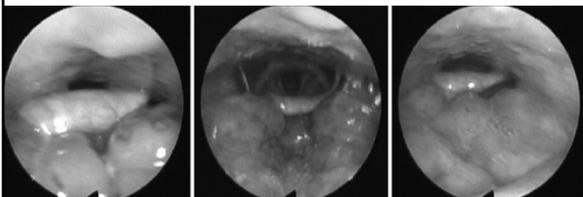
*Sher, AG Otolaryng Clinic North America, 1990; 23:593
Nikolopoulou M, et al J Oral Rehabil. 2011 Sep;38(9):643-7



We conclude that mouth opening *increases* UA collapsibility during sleep

Meurice JC et al. Effects of Mouth opening on upper airway collapsibility in normal sleeping subjects. AJRCCM 1996 Jan ;153

Vroegop AVMT, et al Effects of vertical opening on pharyngeal dimensions in patients with obstructive sleep apnea
Sleep Med.2011.08.005



80 % had adverse effect of airway size with increased vertical opening

In successful patients oral appliances :

- Increase the size of the velopharynx more than the oropharynx or hypopharynx
- Increase the size of the airway laterally
- Alter muscle tone
- Decrease collapsibility
- Bodily move the tongue forward
- The tongue shortens and moves higher
- Move the hyoid up and forward
- Decrease oral breathing

But why?

Tongue displacement could decrease external pressure to the soft palate produced by posterior movement of the tongue base or stiffen the VP through the palatoglossus arch

Kato J et al, Dose-Dependent Effects of Mandibular Advancement on Pharyngeal Mechanics and Nocturnal oxygenation in Patients With Sleep-Disordered Breathing Chest 2000; 117:1065-1072

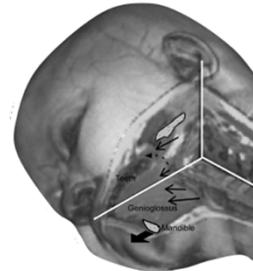


Figure 6—Detailed T1 anatomical image of the axial and sagittal planes intersecting at the narrowest point of the airway, which shows the proposed model of movement with mandibular advancement. The black dashed arrow is slightly posterior to the pterygomandibular raphe. The other arrows surrounding the airway indicate average movement at each point and are roughly to scale.

Brown et al. Tongue and Lateral Upper Airway Movement with mandibular advancement. SLEEP 36(3)2013 397-404

Brown EC et al Tongue and lateral upper airway movement with mandibular advancement . Sleep Vol. 36, No 3, 2013 397-404
Awake supine MRI at end expiration

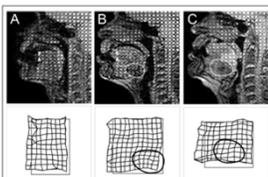


Figure 4—The three patterns of tongue displacement during mandibular advancement. MRI after 15 seconds of mandibular advancement for each pattern of movement is shown in the upper panels. The original grid spacing can be seen in adjacent brain tissue (top right), which has not moved. The lower panels are an enlarged view, showing the border of the original (undeformed) regular grid (gray rectangle) with the deformation after 15 seconds superimposed in black. The original tags were 8.6 mm apart. (A) The posterior tongue moves anteriorly en bloc. (B) The tongue moves anteriorly in the oropharyngeal region only (the oval shows deformation of the tags on the MRI image). Images A and B show superior-inferior compression of the tongue (white arrows on the MRI image). (C) Minimal anterior movement in either region. The oval indicates a region of anterior-posterior elongation.

Muscle tone

Genioglossus EMG decreases with mandibular advancement

Almeida FR et al. Dose-dependent effects of mandibular protrusion on genioglossus activity in sleep apnea. Letter to the editor / case report: Eur Respir J. Jan 2011;37(1):209-241

Submental and masseter EMG increases with mandibular advancement

Kurtulus H et al. The effect of a mandibular splint on electromyographic activity of the submental and masseter muscles in patients with obstructive sleep apnea. Int J Prosthodont. Nov-Dec 2009;22(6):586-593

Lateral Opening

Appears related to fibers connected to the internal aspect of the ramus which project medially and attach to the lateral walls of the upper airway in the area of the pterygomandibular raphe. As the mandible moves forward these fibers are under tension and widen the UA.

Brown et al. Tongue and Lateral Upper Airway Movement with mandibular advancement. SLEEP 36(3)2013 397-404

Minimization of the open posture of the mandible augments nasal nocturnal breathing.

Meurice JC et al, Effects of mouth opening on UA collapsibility in normal subjects. AJRCCM 1996;153:255-9

Fitzpatrick ML et al, Effect of nasal or oral breathing route on upper airway resistance during sleep. Eur Resp J 2003; 22:B27-B32

Movement of tissues with mandibular advancement is influenced by anatomical and physiologic differences between subjects and possible altered local mechanics related to fat deposition and mouth opening

(Isono S et al –pharyngeal patency in response to advancement of the mandible in obese anesthetized persons Anesthesiology 1997 Nov;87(5):1055-62)

(Zeng Influence of nasal resistance on oral appliance treatment outcomes in OSA. Sleep 1008(31) 543-547)

There is substantial inter-individual difference in response to oral appliance therapy

Why are we not really sure how mandibular advancement works?

- Awake patients / Anesthetized patients / Asleep
- Upright vs. supine
- 2-dimensional evaluation vs 3-dimensional evaluation
- DISE / MRI / CT / Cephalometric radiographs
- Variability of protrusion and vertical opening
- Interindividual differences

Questions?



Who?

What constitutes a proper patient evaluation?

AADSM Guidelines

- Medical-Dental Evaluation
- Examination of teeth and restorations
- Intraoral habit assessment
- Radiographs (Pano or FMX)
- TMJ-occlusion examination
- Soft tissue-intraoral assessment
- Periodontal evaluation

Why the in-depth evaluation?:

Is the dentition healthy enough to withstand the forces of an MRD

Does the patient have adequate mandibular range of movement (without significant TMJ problems) to allow for proper advancement?

Baseline the occlusion, position of teeth, interdental contacts, soft tissue, in fact everything that will help you identify unwanted side effects ASAP

Help you determine which device may be a better choice

Hard Tissue Evaluation

- DMF
- Jaw relationship
- Exostoses / Tori
- Bony defects

DMF

Rampant Caries

Needs new bridge

Well Restored

Missing / overclosed

Tooth Position / Mobility

Missing teeth? Open spaces?

Cuspid spaces?

Implants ?

Path of withdrawal?

Dentition vs. Retention

Courtesy of Sheri Katz, DDS

Generally 7 healthy teeth per arch with 4 of the teeth being posterior multirrooted teeth

Overjet

Class 2 and Class 3 patients do better than Class 1. AA Lowe

Overbite

Impacts vertical opening with the device

With an appliance, the overbite helps determine interocclusal distance and, hence, forces on the dentition.



Watch the VO!

The magnitude of forces increases with the distance of advancement and the magnitude of vertical opening.

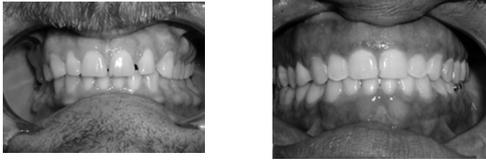
Graber T & Neuman B Removable Orthodontic Appliances 2nd edition, Philadelphia: WB Saunders 1984, 134-147, 165, 175-97

Patients with a steep overbite of > 75% are much less successful with OA therapy.

A. Fransson, Swedish Dental Journal Supplement 163, 2003

*

Wear facets vs. Normal function



Are the wear facets consistent with normal mandibular excursive movements and consistent with the patient's age?



BRUXISM CANNOT BE DIAGNOSED BY TOOTH WEAR !!!!!!!!!!!!!!!!!!!!!

Posterior Intercusation



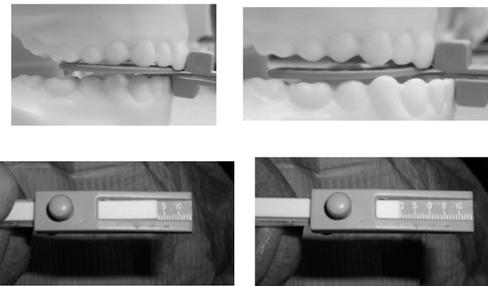
Pre treatment photographs help quantify side-effects

Range of Mandibular Motion

- Lateral
- Opening
- Deviation on Opening
- Protrusive

Limited mandibular movement may indicate TMJ concerns

Protrusive Range : George Gauge



Mandibular range of movement: Protrusion...Why?

Older literature agrees that a patient must advance his mandible at least 8 mm to develop a *statistical* difference in airway cross section but statistics cannot be applied to any one individual

G. Aarab, showed that some patients were treated with only 25% protrusion

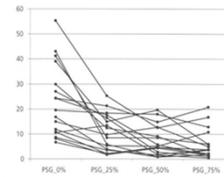


Figure 2. Individual values of the apnea-hypopnea index (AHI) from the ambulatory polysomnographic recordings with the MAD set at 0%, 25%, 50%, and 75% of the maximum protrusion of the mandible (PSG_0%-PSG_75%) in 17 OSA patients

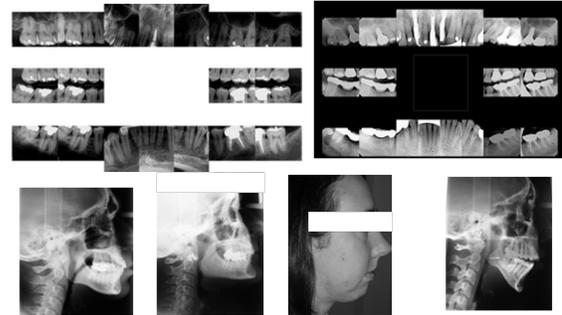
Aarab et al. Clin Oral Investig 2011; 14:339-345

Maximally effective protrusion can be anywhere from 25- >100% of the patient's natural jaw range

Aarab G et al Effects of OAT at Different protrusion Clin Oral Invest 2011 14:339-345

The patient's range of protrusive movement will change with time.

Radiographs

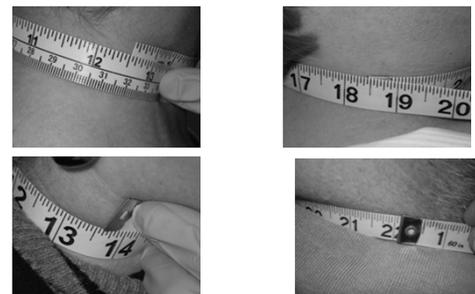


FMX / Pan and BW...Ceph's are good if you do research

YOU DO NOT NEED CbCT

The patient has already been diagnosed
Airway CANNOT be evaluated by scans
It does not differentiate between patients who will be successful with OAT and those who will fail
It is an unnecessary exposure to ionizing radiation

Neck Circumference



Is more important than BMI in determining candidacy for OAT

Intraoral Evaluation

Soft Tissue

Buccal Mucosa

Will you choose a device that interferes with soft tissue?

Periodontal Condition

Minor localized problems

Mouth breathing

OAT puts significant pressure on the dentition...They are orthodontic devices

Tongue Scalloping

This is an indication of a tongue crowded within the dentition

Tongue Size

NB: No scalloping

There are many ways of classifying tongue and soft palate size

Mallampati / Friedman

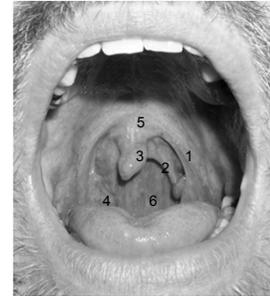
Gives an idea of the size of the tongue body and tongue base

Opening to the oropharynx

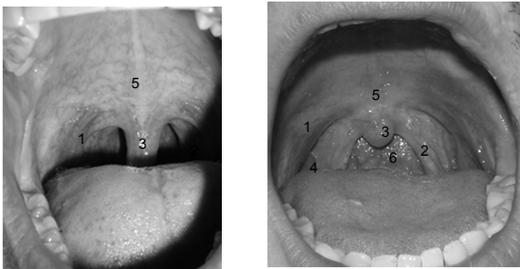
This gives you a better idea of how much “real estate” sits between the oral device and an open airway

Oropharyngeal opening

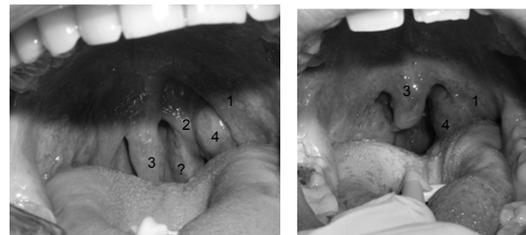
1. Palatoglossal arch
2. Glossopharyngeal arch
3. Uvula
4. Tonsil
5. Soft palate
6. Posterior pharyngeal wall



The anatomy is different from person to person



Crowded Opening to the Oropharynx



What we can't see:

- Lingual Tonsils
- Lateral expanse of Upper Airway (UA)
- A/P expanse of UA
- Adenoids (Normally vestigial in adults)
- Shape of upper airway
- Location of narrowing of UA

Patients who have a low probability of success with OAT

- BMI > 35
- Inadequate dentition
- Retention
- Severe obstructive sleep apnea
- Macroglossia / Mallampati 4
- High CPAP pressures
- Psychological considerations

But the clinical exam should help you choose which device will be most easily tolerated

To have a pretreatment baseline so that side-effects can easily be identified before they become permanent

Treatment:

Appliance design, fabrication, placement

Evaluation of OA over 3 + months

Refer back to MD for F/U PSG

Recall

Look Before you Leap

Oral device therapy for OSA is like a restoration, they are not all single surface fillings.

Various device materials and designs will cause more problems than they are worth.

Oral device therapy is not successful for every patient, don't ever promise them it will work.

Treating OSA is MEDICAL therapy and we work in tandem with a physician.

Review the polysomnogram and physician's notes

Oral devices are only effective in the treatment of obstructive sleep apnea...not the >90 other sleep disorders

Only 40 % of patients with severe OSA are returned to normal breathing but 80% of mild sleep apneics respond positively.

Ferguson et al. Sleep 2006

Now that you have examined the patient , evaluated his medication list and asked questions about snoring / EDS / family history of OSA and reviewed the PSG results:
it is time to pick an appliance.

Remember all of these findings when choosing an oral appliance

- Mandibular Plane Angle
- Lip competence
- Overjet
- Overbite
- Range of motion

Try to understand positive and negative indicators

Devices vary in many ways

- Type of hardware
- Location of hardware
- Vectors of force exerted
- Base material
- Bulk of device
- Ease of adjustment
- Life span

Some of the > 100 appliances accepted by the FDA for the treatment of OSA

- | | |
|---------------------|-----------------|
| > EMA | > SUAD |
| > SomnoDent MAS | > PM Positioner |
| > Equalizer | > MOSES |
| > Herbst (modified) | > Silencer |
| > Klearway | > SNOAR |
| > NAPA | > Hilsen |
| > DynaFlex - Dorsal | > TAP (1-3) |
| > OPAP | > TAP-PAP |

http://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfrr/rr.cfm?start_search=51&establishmentName=®Num=&StateName=&CountryName=&RegistrationNumber=&OwnerOperatorNumber=&OwnerOperatorName=&ProductCode=fr&DeviceName=&ProprietaryName=&establishmentType=&PAGE_NUM=10&SortColumn=EstablishmentName20%25ASC

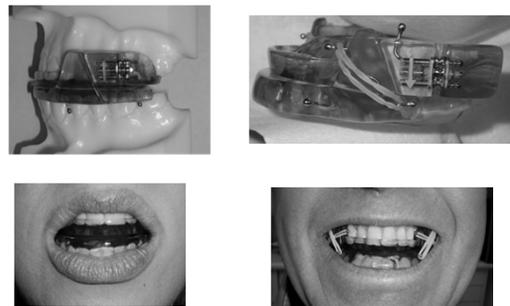
Out of these devices ~ 16 have published in a peer reviewed journal

- | | |
|---------------|-------------------|
| Klearway | SnoreGuard |
| Herbst / IST | Tongue stabilizer |
| SomnoDent MAS | SnoreBan |
| TAP 1, 2, 3 | SomnoGuard |
| EMA | Silencor |
| Narval | Blue |
| Silencer | |
| Elastomeric | |
| Twin Block | |

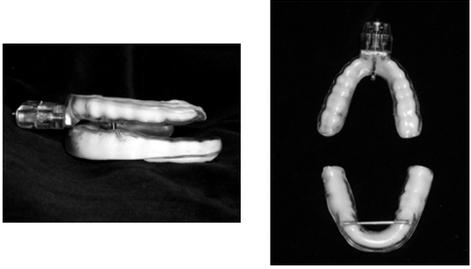
HERBST



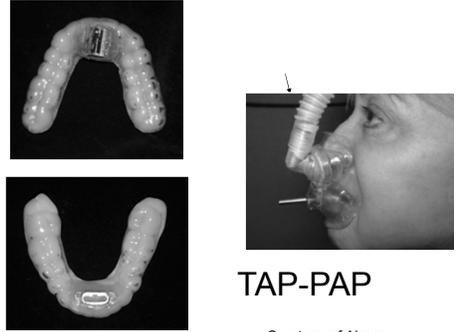
SomnoDent MAS



TAP 1



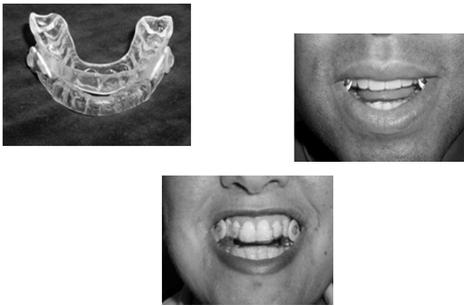
TAP 3



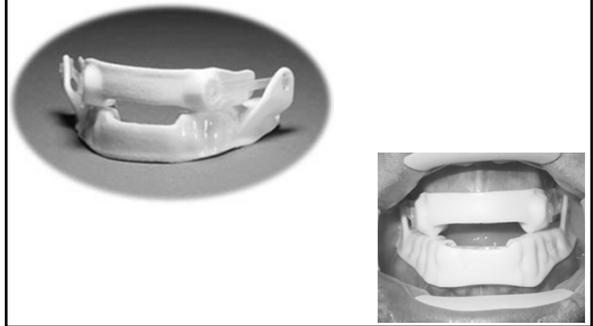
TAP-PAP

Courtesy of Airway Technologies

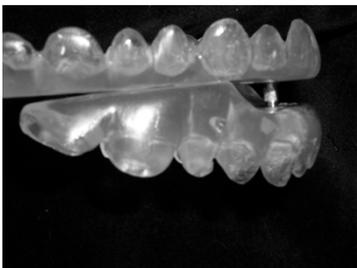
EMA



NARVAL



Silencer



The Moses



Appliance Selection

This matters, Why?

- Patient comfort
- Raised Stenson's Ducts
- Forces on the dentition
- Alteration in vector of mandibular movement
- Wisdom teeth
- Steep Curve of Spee

Sleep position
 Poor eye hand coordination
 Weak teeth
 Hardware location and style
 Interincisal distance
 Ability to alter / increase interincisal distance

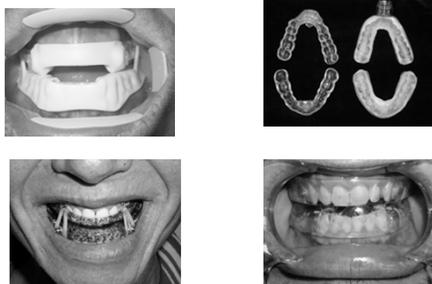
Would you choose:



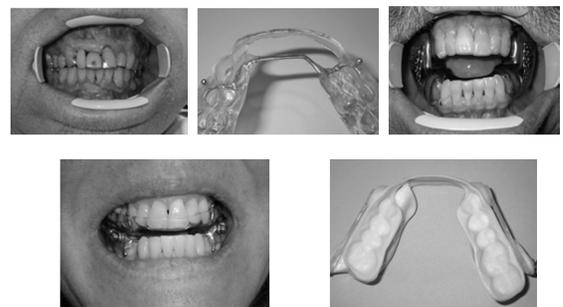
Or:



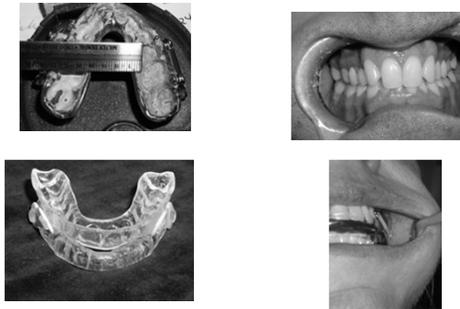
Ability to alter after significant dental care



Can you work around problem teeth?



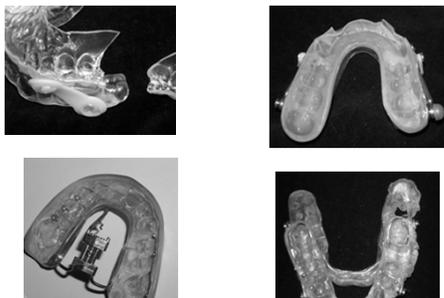
Narrow arches / Thin base



Ease of adjustment



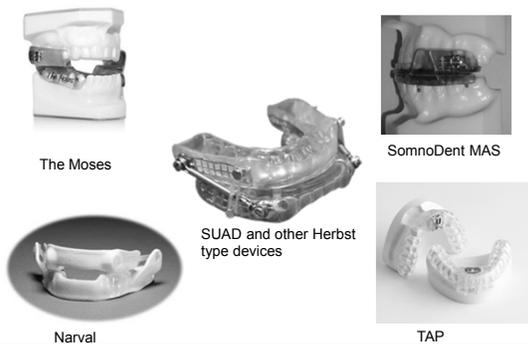
Life span of device



Base materials

- Chrome Cobalt
- Laminates
- Nylon
- Polymethylmethacrylate
- Polyethylmethacrylate
- Polycarbonate
- Triad Material
- Thermacryl
- Thermoplastic acrylics

Most highly marketed appliances



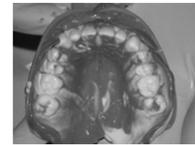
Laboratory Fees

EMA	\$313	PM –Ultra	\$382
Dorsal	\$380 +	Silencer	\$585
Herbst	\$357 +	SNOAR	\$240
LISA II	\$311	SomnoDent	\$536+
NAPA	\$240	SUAD	\$550 +
Narval	\$600	SUAD G 2	\$600 +
Moses	\$336	TAP 1	\$375
OASYS	\$375	TAP 3 Elite	\$420

2014

Fabrication of an oral device

Very accurate impressions are required



Capture the distal aspect of the molars

Look closely at the impressions



Can we identify the optimal mandibular position pretreatment?

- Protrusion
- Vertical
- Lip competence
- Proper midline alignment

What are we trying to accomplish?

Gauge choice for interincisal



Interincisal Registration

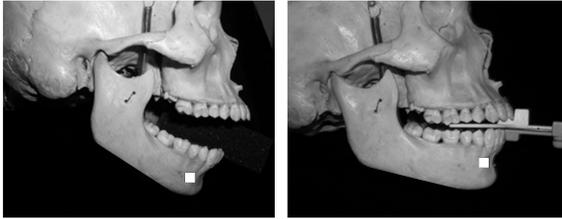


- 2 mm
- 5 mm
- 6 mm
- 10 mm
- 12 mm



T.O.M. : Tongue size, Overbite, Mandibular plane angle

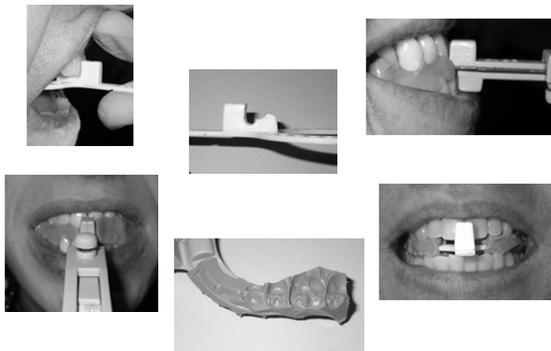
Alteration in mandibular plane angle when changing the interincisal distance



Midline Alignment



Bite Registration



To avoid TMJ discomfort, it is wise to start mandibular advancement at 50% forward of the most retruded position

If you fabricate the device at a starting point of 50% protrusive range and do very slow advancement, it may take 1-2 months for the patient to notice improvement in symptoms.

Remember: ~ 20% of patients will be corrected at the initial position.

Maximally effective protrusion can be anywhere from 25-125% of the patient's natural jaw range

The patient's range of protrusive movement will change with time secondary to tooth and mandibular movement.

Informed Consent

Alternative treatments

Establish that the patient is 'free will'

How the device works

Tell them that $\leq 57\%$ are completely treated

Side-effects

Fee

Send the patient records and prescription to the laboratory.

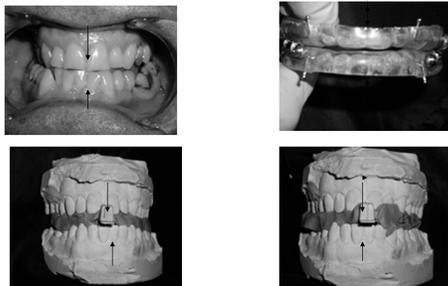


FDA accepted devices can be made only in dental laboratories registered with the FDA
HIPAA Concerns

Placement

Using skills you already have.

Midline relationship verified



Simultaneous bilateral contact

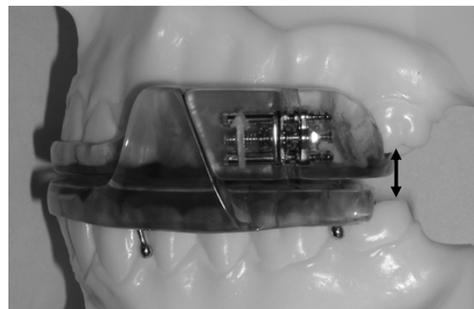


Verify VDO is as requested



Published studies, with data pooled from many patients, shows that vertical opening plays no role in OAT except in patient acceptance. Philo 2002

However, Vroegop showed that an increase in interincisal negatively impacted UA opening in 80% of patients and was positive in only 2.5%. Vroegop et al. Sleep Medicine 13 (2012) 314-316



Now if this were a real patient who opened on a hinge, how far open would the incisors be?

Retention must take in to account patient strength and sleep bruxism



The patient must place this device every night and remove it every morning.



Sleep bruxism will impact any device fabricated to limit free jaw movement

Placement of the device varies from that of other removable prostheses in many aspects but:

Bilateral simultaneous contact is required

Problems can occur in the retromolar pad area, internal to the coronoid process

Soft tissue can be irritated by the hardware and base

Over retention on weak teeth can cause problems

After you have placed the device – Contact the patient's sleep physician

You are expected to keep records as if you were a physician

You need to contact the physician to let him know the patient has received an oral device and will require medical follow-up in 3-4 months.

Calibration of the device

Each individual has a different mandibular position that maximizes upper airway dimensions.

Adjustable devices can be titrated over a prolonged period to maximize effectiveness and minimize side effects.

Some patients can get worse if they advance the mandible too far; some never get to a therapeutic position.

Calibration of an oral device

By the patient

Using Out-of-center sleep testing (often referred to as home sleep apnea testing -)HSAT

During Polysomnography

How far? In what increments?

From 5-13 mm

In .2 mm to 2 mm increments

Adjustable by the patient

Adjustable by the provider

After titration of the mandible to a point where the patient feels improvement in his sleep:

Another note to the MD is required that says the patient is ready to come back for follow-up evaluation and testing if the physician feels it is merited

Side Effects with MRD use

Side-effects are caused by how the devices work and how they are designed

Some of them are related to how individual patients respond to the device chosen

If one device is ineffective then a different device will be ineffective

To help control side-effects:

Devices must capture the distal aspect of the last tooth in the arch.

Original casts cannot not be used to fabricate a second device but should be retained to establish a baseline.

Frequent follow-up is necessary, 90 days is mandated.

Fabrication of a bite retainer is standard.

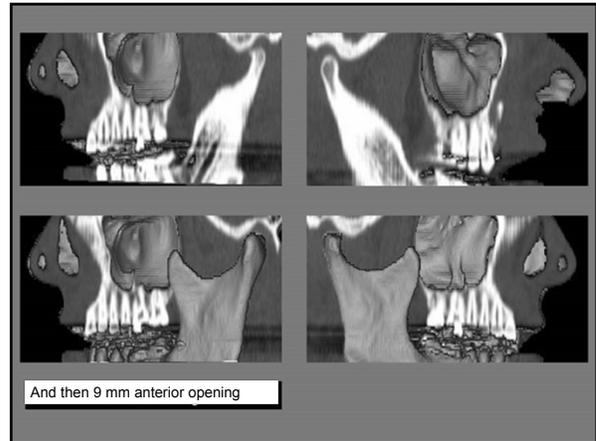
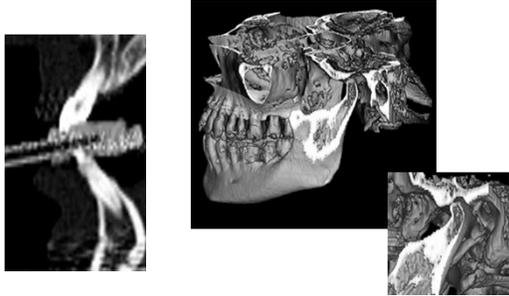
Short term side-effects

- Occlusal changes
- Excessive salivation
- Dry mouth
- Pain in teeth or muscles
- Tooth mobility
- Dislodgement of crowns
- Pain in TMJ
 - Unilateral or Bilateral
- Soft tissue irritation

Short term side-effects are due to:

- TMJ edema
- Retention of the device
- Thickness of the device base
- Materials used in the device
- Location of hardware

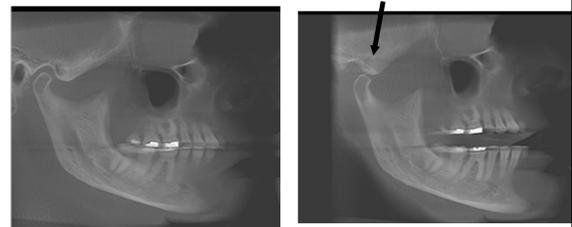
With a silly little 2 mm opening:



Then we advance the mandible



3D data shows the condylar movement more clearly

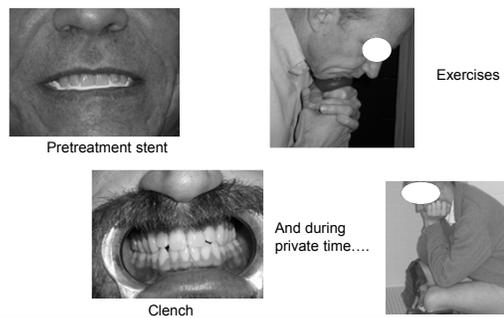


AM Edema in the TMJ is a common occurrence
(it happens with night guards too)

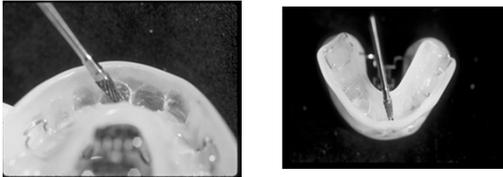
One MRI study of the joint space of 1 year MRD users showed edema in the joint space and proliferation of the posterior fibers, but no bony changes:

D' Almeida, F, et al Sleep 2002

Patients need to address joint edema every day



Mobility of Anterior Teeth



Adjust the device if the material allows

Joint Pain?



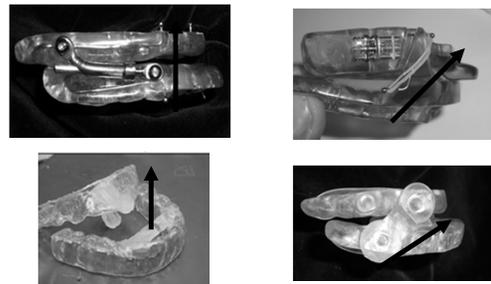
Doff M. Long term oral appliance therapy in obstructive sleep apnea syndrome: a controlled study on temporomandibular side effects. Clin Oral Invest Apr 2011.

Giannasi L et al. Systematic assessment of the impact of oral appliances therapy on the temporomandibular joint during treatment of OSA: long-term evaluation. Sleep Breath. 2009; 13:375-381

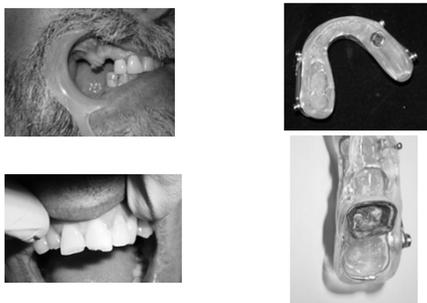
Device dislodges at night

- Not retentive enough
- No dental retention
- Path of withdrawal
- Strong elastics /Straps
- Bruxism
- Removes in sleep

Where is the dislodging force?



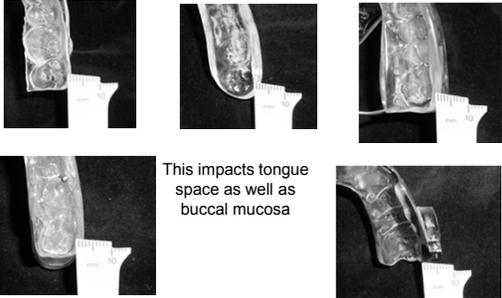
Over retentive on weak teeth? Defective restorations?



Posterior pain may be interference with soft tissue anterior to the ascending ramus

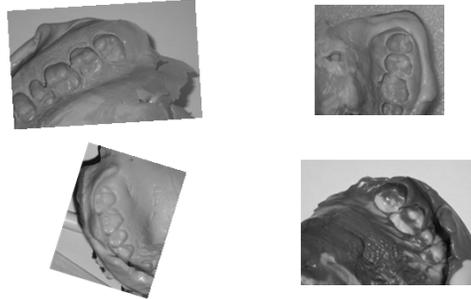


How thick are the contours of the device you chose?

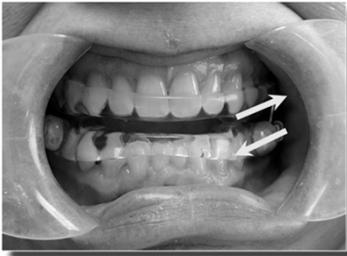


This impacts tongue space as well as buccal mucosa

This is why you check impressions- the lab will trim the casts and lose definition

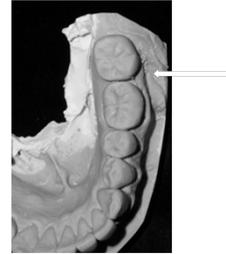


Teeth can move secondary to forces from the muscles of mastication



Courtesy of Jonathan Parker, DDS

Mandibular teeth walk forward away from the last fully covered tooth.



Research Evidence on Occlusal Changes:

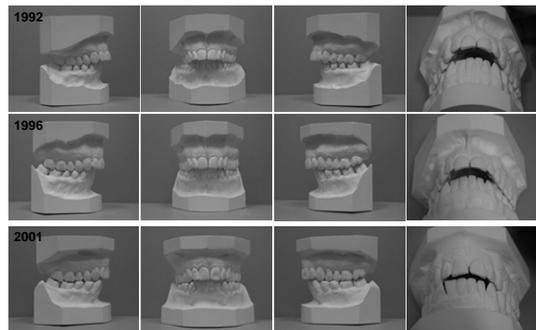
Anterior shifting of mandibular first molars relative to maxillary first molars

Retroclination of max incisors and proclination of mandibular incisors



Pantin, et al; *Sleep* 22:237-240, 1999
Robertson; *Sleep* 24(5): 531-537, 2001
Almeida, et al; *Am J Orthod Dentof Orthop* 129: 205-213,2006

Occlusal Changes Over Time



Slide courtesy of Alan A. Lowe, BDS, PhD

Patients who had orthodontic treatment as adults (> age 21) correlate with tooth movement from OA use ~ 100%

Personal communication with Alan Lowe, DMD, PhD

Jaw repositioning and tooth movement can become permanent side-effects.

There are no permanent side-effects within the first 6 months of treatment

Chris Robertson Sleep 2001

Pain is never a permanent side-effect

- Adjust the device
- Go to a different device
- Remove the device and go back to PAP

Patients are not always aware of early occlusal changes.

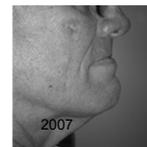
The dentist must maintain strict follow-up to help the patient try to avoid serious side effects.

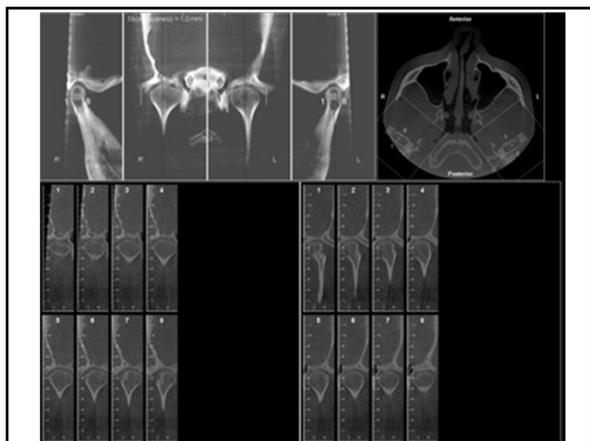
No side effects appear permanent within the first 6 months of oral device use.

The patients who have severe side effects are well aware of what is happening and have decided that the improvement in their quality of life is worth the price they are paying.

There is, at present, no literature on long term joint changes or if there are bony changes occurring

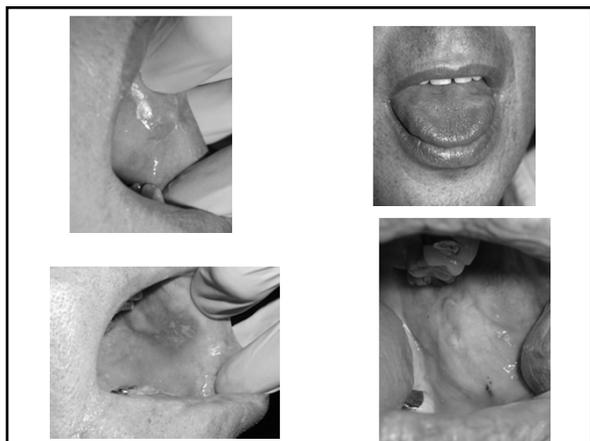
What actually changes long-term is also unknown





All devices have allergenic potential

Acrylics
Dye
Latex
Nickel
Nylon



Side effects happen, they are not to be feared!

All medical therapies have side-effects. Normally these are listed merely as > 10%.

Published data says that side effects (in long term oral device users) can be as high as 84%.

Not all changes are negative.

Published data says 86% of CPAP users report adverse reactions (Waldhorn et al, Long-term compliance with nasal continuous positive airway pressure therapy and obstructive sleep apnea, CHEST 1990;97:33-38)

A well written 'Informed Consent' is very important.

Pearls

Dentist can treat 50 % of sleep apneics as well as physicians.

Patients are more than twice as compliant with oral devices as they are with CPAP . This means that the clinical effectiveness is almost the same

Dentists and their staffs can screen for sleep apnea in the dental office



Referrals / Communication

- Physician order for OAT / MAD to the dentist
 - Documentation needed
 - Who calls whom
 - Paperwork
- Keep in mind the mandates and documentation required by insurance (letter of medical necessity, Rx, tried PAP, etc.)
- Work in a collaborative fashion, do not make assumptions
- HIPAA / Release of info

Major Legal Concerns

Scope of Licensure

Compliance with local licensing requirements (State Dental Law)

Standard of Care

Issues of professional liability



Courtesy of Rob Rogers, DDS

ADA scope of practice

ADA definition of “dentistry” (1997): The evaluation, diagnosis, prevention and/or treatment (nonsurgical, surgical or related procedures) of diseases, disorders and/or conditions of the oral cavity, maxillofacial area and/or the adjacent and associated structures and their impact on the human body; provided by a dentist, within the scope of his/her education, training and experience, in accordance with the ethics of the profession and applicable law.

Standard of care

Negligence, in general, is legally defined as “the standard of conduct to which one must conform... [and] is that of a reasonable man under like circumstances.”⁴ In law, medical malpractice is considered a specific area within the general domain of negligence. It requires four conditions (elements) be met for the plaintiff to recover damages. These conditions are: duty; breach of duty; harm; and causation.

It is the ‘breach of duty’ that is considered the standard of care.

(<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3088386/>)

Standard of Care / Treatment Process



Clinical Guideline for the Evaluation, Management and Long-term Care of Obstructive Sleep Apnea in Adults

Task Force Members: Lawrence J. Epstein, MD (Ohio); David Kales, MD¹; Patrick J. Smith, Jr, MD²; Norman Friedman, MD³; Ash Tabatabai, MD⁴; Susan P. Park, MD, PhD⁵; Karan Kumar, MD⁶; Robert Rogers, DMD⁷; Richard J. Schwab, MD⁸; Edward M. Weaver, MD, MPH⁹; Michael D. Hillman, MD¹⁰

Background: Obstructive sleep apnea (OSA) is a common chronic disorder that often requires lifelong care. Available practice parameters provide evidence-based recommendations for addressing the needs of patients at risk of developing the complications of sleep apnea, guide selection of appropriate treatment, and to provide a baseline to evaluate the effectiveness of subsequent treatment. Once the diagnosis is established, the patient should be involved in devising an appropriate treatment strategy that may include positive airway pressure devices, oral appliances, behavioral treatments, surgery, and/or adjunctive treatments. OSA should be approached as a chronic disease requiring long-term, multidisciplinary management. For each treatment option, appropriate outcome measures and long-term follow-up are described.

Keywords: Obstructive sleep apnea; sleep evaluation; positive airway pressure treatment; oral appliance treatment; behavioral treatment; surgical treatment.

Editor: Epstein LJ, Kales D, Smith PJ, Friedman N, Mahoney A, Park SP, Kumar K, Rogers R, Schwab RJ, Weaver EM, Hillman MD.

Clinical guideline for the evaluation, management and long-term care of obstructive sleep apnea in adults. *J Clin Sleep Med* 2006;12(2):240-3.

2009

PRACTICE PARAMETERS

Practice Parameters for the Treatment of Snoring and Obstructive Sleep Apnea with Oral Appliances: An Update for 2005

An American Academy of Sleep Medicine Report

Chita A. Kushida, MD, PhD¹; Timothy J. Morgenthaler, MD²; Michael R. Littner, MD³; Cathy A. Alessi, MD⁴; Dennis Bailey, DDS⁵; Jack Coleman, Jr., MD⁶; Leah Friedman, PhD⁷; Max Hirschowitz, PhD⁸; Sheldon Kapen, MD⁹; Milton Kramer, MD¹⁰; Teolio Lee-Chiong, MD¹¹; Judith Owens, MD¹²; Jeffrey P. Pancer, DDS¹³

¹Stanford University Center of Excellence for Sleep Disorders, Stanford, CA; ²Mayo Sleep Disorders Center, Mayo Clinic, Rochester, MN; ³Greater Los Angeles Healthcare System and David Geffen School of Medicine at UCLA, Sepulveda, CA; ⁴UCLA Greater Los Angeles Healthcare System, Sepulveda, CA; ⁵Engelwood, Colorado; ⁶Shaker Terrace ENT, Mayfield Heights, OH; ⁷Stanford University School of Medicine, Stanford, CA; ⁸Baylor College of Medicine and VA Medical Center, Houston, TX; ⁹VA Medical Center and Wayne State University, Detroit, MI; ¹⁰Manassas Medical Center, Psychiatry Department, Broadview, NY and New York University School of Medicine, New York, NY; ¹¹National Jewish Medical and Research Center Sleep Clinic, Denver, CO; ¹²Department of Pediatrics, Rhode Island Hospital, Providence, RI; ¹³Zionsville, Ontario, ON

Summary: These practice parameters are an update of the previously published recommendations regarding use of oral appliances in the treatment of snoring and Obstructive Sleep Apnea (OSA). Oral appliances (OAs) are indicated for use in patients with mild to moderate OSA who prefer them to continuous positive airway pressure (CPAP) therapy, or who do not respond to, are not appropriate candidates for, or who fail treatment attempts with CPAP. Until there is higher quality evidence to suggest efficacy, CPAP is indicated whenever possible for patients with severe OSA before considering OAs. Oral appliances should be fitted by qualified dental personnel who are trained and experienced in the overall care of oral health, the temporomandibular joint, dental occlusion and associated oral structures. Follow-up polysomnography or an altered cardiorespiratory (Type 3) sleep study is needed to verify efficacy, and may be needed when symptoms of OSA worsen or recur. Patients with

OSA who are treated with oral appliances should return for follow-up office visits with the dental specialist at regular intervals to monitor patient adherence, evaluate device deterioration or maladjustment, and to evaluate the health of the oral structures and integrity of the occlusion. Regular follow-up is also needed to assess the patient for signs and symptoms of worsening OSA. Research to define patient characteristics more clearly for OSA acceptance, success, and adherence is needed.

Keywords: Practice parameters; practice guidelines; standards of practice; snoring; obstructive sleep apnea syndrome; oral appliances; dental devices

Editor: Kushida CA, Morgenthaler TJ, Littner MR et al. Practice parameters for the treatment of snoring and obstructive sleep apnea with oral appliances: An update for 2005. *SLEEP* 2006;29(2):240-3.

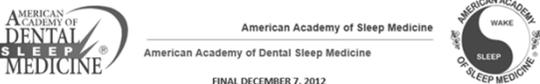
American Academy of Sleep Medicine (AASM) Protocol

2/2006 **Practice Parameters for the Treatment of Snoring and Obstructive Sleep Apnea with Oral Appliances: An Update for 2005** Kushida CA, Morgenthaler TJ, Littner MR, Alessi CA, Bailey D, Coleman J Jr, Friedman L, Hirschowitz M, Kapen S, Kramer M, Lee-Chiong T, Owens J, Pancer JP; American Academy of Sleep Medicine.

Sleep. 2006 Feb 1;29(2):240-3.

2/2006 **Oral Appliances for Snoring and Obstructive Sleep Apnea: A Review** Ferguson KA, Cartwright R, Rogers R, Schmidt-Nowara W.

Sleep. 2006 Feb 1;29(2):244-6



American Academy of Sleep Medicine
American Academy of Dental Sleep Medicine
FINAL DECEMBER 7, 2012

POLICY STATEMENT ON THE DIAGNOSIS AND TREATMENT OF OBSTRUCTIVE SLEEP APNEA

It is the policy of the AASM and AADSM that patients presenting with symptoms of OSA require a face-to-face evaluation conducted by a qualified physician trained in sleep medicine.

The AASM defines a qualified physician trained in sleep medicine as one who is licensed by a state to practice medicine and maintains certification from the American Board of Sleep Medicine or one of the sponsoring sleep medicine boards of the American Board of Medical Specialties

It is the opinion of the AADSM that oral appliances should be fit by a qualified dentist with training and experience in the temporomandibular joint, dental occlusion, and associated oral structures, and dentists who provide OAT as a treatment for OSA must practice within their scope of practice according to the dental practice law in the state in which they are licensed. Dentists are encouraged to follow current AASM Practice Parameters and Clinical Guidelines and current AADSM Treatment Protocols for OAT.

Furthermore, the AADSM encourages dentists providing OAT to complete at least 30 hours of relevant continuing education every three years, of which up to 10 credits may be AMA PRA Category 1 Credits™ in sleep medicine and the remaining credits should be in dental sleep medicine from ADA CERP recognized or AGD PACE approved providers. The AADSM encourages all licensed dentists currently treating OSA with OAT to pursue dental sleep medicine facility accreditation from the AADSM and certification from the American Board of Dental Sleep Medicine (ABDSM) by Jan. 1, 2018

Summary of legal liability

Any healthcare provider who **exceeds the scope of a professional license** risks civil and criminal liability.

Those who practice within the scope of licensure but **do not satisfy the standard of care** also risk liability.

Presently, **diagnosis** appears to fall into the realm of medicine while **management** of oral appliance therapy dwells within that of dentistry.

Courtesy of Rob Rogers, DDS

For more information

www.AADSM.org
www.AASMnet.org

