The Orthodontist’s Role in the Treatment of Snoring and Obstructive Sleep Apnea

by
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Biography
Professor Emeritus of Orthodontics, The University of British Columbia
Specially orthodontic practice in Vancouver, Canada for 35 years
Research career funded by both provincial and federal governments
Total of 140 papers, 180 abstracts and 15 book chapters published
Filed Canadian, US and international patents for three inventions
Founding member of the American Academy of Dental Sleep Medicine

Conflict of Interest
Royalties are paid directly to The University of British Columbia

UBC Dentistry Sleep Apnea Team
Alan A. Lowe  Professor Emeritus
Fernanda Almeida  Associate Professor
Ben Pliška  Assistant Professor
Hui Chen  Clinical Assistant Professor
Mary Wong  Programme/Data Base Manager
Sandra Harrison  Clinical Coordinator
Adam Ludlow  Clinical Trials Manager

Sleep Disordered Breathing

Snoring ➔ Upper Airway Resistance Syndrome ➔ Obstructive Sleep Apnea

Mild Moderate Severe
Mild Moderate Severe
Mild Moderate Severe

Definitions
Apnea
Cessation of airflow >10 sec whereby the drop in airflow amplitude is >90% of the baseline

Hypopnea
Breathing that is shallower or slower than normal by >30% for at least 10 seconds

Desaturation
A drop of >4% SpO2. A value below 90% is considered abnormal

Severity is classified by the Apnea Hypopnea Index (AHI)
0-5 events/hr  Normal
5-15  Mild
15-30  Moderate
>30  Severe

Management of Sleep Disordered Breathing
1) Avoidance of Risk Factors
2) Nasal Continuous Positive Airway Pressure (nCPAP)
3) Oral Appliances – More than 130 options
4) Surgery

-/- Symptoms +/- Symptoms +++++/- Symptoms
-/- Health Implications +/- Health Implications ++++++/- Health Implications
**AADSM Treatment Protocol June 2013**

Physician medical assessment must be made before OA therapy

- Diagnostic sleep study is interpreted by a medical sleep specialist
- After initial calibration of a custom-made OA, dentist may obtain objective data to verify improvement
- After final calibration, dentist refers OA patient back to physician for medical evaluation and assessment of OA outcomes
- Patients diagnosed with primary snoring may be treated without objective follow-up data
- Knowledge of various appliances is recommended
- Dentists have responsibility to routinely pursue additional education in the field and to comply with applicable regulations

**AADSM/AASM Guidelines Feb 2015**

**RECOMMENDATIONS**

42a When a sleep physician prescribes an OA for adult OSA, qualified dentist to use a custom titratable OA (G)

42b Sleep physicians to prescribe OAs for adult OSAs who are intolerant of CPAP or prefer an alternate therapy (S)

42c Qualified dentists oversee dental-related side effects or occlusal changes to reduce their incidence (G)

42d Sleep physicians conduct follow-up OA sleep test for adult OSAs to confirm efficacy (G)

42e Both sleep physicians and qualified dentists request adult OSA OA patients to return for periodic office visits (G)

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**OA and Sleep Bruxism**

- An adjustable OA reduced episodes + number of bursts/hr and SB episodes with tooth-grinding noises
- 25% protrusion reduced SB events by 39%
- 75% protrusion reduced SB events by 47%
- An OA may be an alternative for SB and snoring/OSA patients


**Snoring and Occlusal Splints**

- Maxillary occlusal splint worn for 7 nights in subjects with snoring and OSA
- AHI increased 50% in half of the patients
- Snoring time increased by 40%
- Significant risk of aggravation of respiratory disturbances
- Potential reduction of intraoral and tongue space as well as an increase in the vertical dimension


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**OA Modes of Action**

- **Mandibular Repositioners**
  - Preformed "Boil and Bite"
  - Laboratory Manufactured
  - Single jaw position vs titratable

- **Tongue Retainers**
  - Preformed
  - Laboratory Manufactured

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**Mandibular Repositioner**
Tongue Retaining Device

Titration Aids

- Patient or bed partner titration goals
- Oximetry at home
- Portable monitoring at home
- Polysomnogram attended in the laboratory

OA Patient Titration Goals

- The patient feels more rested during the day and experiences deep uninterrupted sleep.
- A resolution of morning headaches has occurred.
- An inability to tolerate any further advancement.
- A change in dream patterns may indicate REM catch up.
- A history from the bed partner (bed side tape recorder) that the snoring intensity and/or frequency has changed. Usually a Snore Score of 2 or 3 suggests that the airway is open. However, be cautious of silent apneics until after the follow up analysis is completed.

MINIMUM $\text{SaO}_2$

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* $p<0.001$
* * $p<0.01$

APNEA + HYPOPNEA INDEX

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* $p<0.001$

EPWORTH SLEEPINESS SCALE

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* $p<0.001$
* * $p<0.002$
**Quality of Life**

![Quality of Life Graph](image)

**Baseline vs Outcome**

- CPAP: Baseline vs Outcome
- OA: Baseline vs Outcome

**Systolic (SBP) & Diastolic (DBP)**

![Blood Pressure Graph](image)

- Pre-SBP
- Post-SBP
- Pre-DBP
- Post-DBP

**Carotid Artery Calcification (CAC) Shapes**

- Ovoid
- Linear
- Irregular

**Case 1**

**Ovoid**

- Japanese: 53Y F
- BMI: 27.4
- AHI: 20
- Shape: ovoid
- Visualization: fair

**Case 2**

**Linear + Osteophyte**

- Japanese: 53Y M
- BMI: 24.7
- AHI: 25.4
- Shape: linear
- Visualization: good

**Prevalence of Calcification**

- Japanese Data: 9.5%
- Canadian Data: 6.7%

### Japanese Data

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<td>49.8±14.5**</td>
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* Statistical significance (p<0.01)
** Statistical significance (p<0.001)
CAC Follow Up

After identifying a possible CAC on a lateral headfilm or on a panorex, it would be appropriate to refer the patient to a radiologist experienced in the field to confirm the finding.

Further tests coordinated by the patient’s physician may include a CT scan and/or a color Doppler ultrasound image.
Four Years of Profile Lite Nasal Mask (Respironics)

Superimposition on the SN line of a typical OSA subject at baseline and after 35M of nCPAP wear

Some OSA Guidelines for Orthodontists
- Don’t hesitate to refer to adult/pediatric sleep specialists
- Avoid treatment without a written referral from a physician
- Be cautious in patients with previous orthodontic therapy
- Use recognized appliances with RCT research
- Both case and appliance selection are very important
- Be aware of silent apneics and post titration follow up
- Don’t over treat post OA or nCPAP occlusal changes
- Not all Class IIs have OSA / not all OSAs are Class II
- Be engaged in this rapidly changing and exciting field

American Academy of Dental Sleep Medicine

American Academy of Dental Sleep Medicine
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The Web site has information about the AADSM, a geographic listing of members, certification status and Web site links.

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