Point: Non-surgical Management of Obstructive Sleep Apnea

by
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Sleep Disordered Breathing

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

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)

OA Modes of Action

Mandibular Repositioners
Preformed “Boil and Bite”
Laboratory Manufactured
Single jaw position vs titratable

Tongue Retainers
Preformed
Laboratory Manufactured

OA Modes of Action

Mandibular Repositioner
Herbst

SnoreGuard

Narval
SomnoDent

TAP

Klearway

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.
Why are Oral Appliances Effective?

Airway Size
Tongue and Jaw Muscle Activity
Mandibular Posture and Bruxism

VERTICAL MANDIBULAR POSTURE BEFORE DURING AND AFTER APNEIC EVENTS

During NREM
  Opening was larger in latter half of apneic event than before and at onset
  Opening progressively increased during apneic event
  Opening decreased at end of apneic event

During REM
  No significant change

Oral appliances may be effective since they stabilize mandibular posture during apneic events

TIME IN EACH RANGE DURING NREM AND REM FOR OSA PATIENTS AND CONTROLS

During NREM
  Open 2 to 2.5 less in OSA
  Open 5 to 10 and more greater in OSA

During REM
  Open 0 to 2.5 less in OSA
  % total time open more than 5 is larger in OSA patients (69.3) than in controls (11.1) during NREM sleep
### 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

Landy-Schonbeck et al., Int J Prosthodont 2009; 22:251-259

### 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

Gagnon et al., Int J Posthodont 2004;17:447-53

### Minimum \( \text{SaO}_2 \)

<table>
<thead>
<tr>
<th></th>
<th>Baseline</th>
<th>Outcome</th>
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<tbody>
<tr>
<td>CPAP</td>
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<tr>
<td>OA</td>
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\( ^{*}p<0.001 \)

### 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

SAQLI Total Score

CPAP OA

*p<0.001

Systolic (SBP) & Diastolic (DBP)

Carotid Artery Calcification (CAC) Shapes

Ovoid Linear Irregular

Case 1 Ovoid

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

Case 2 Linear + Osteophyte

Japanese 53Y M
BMI: 24.7
AHI: 28.1
Shape: linear
Visualization: good

Prevalence of calcification 9.5%
Prevalence of calcification 6.7%

<table>
<thead>
<tr>
<th>Japanese Data</th>
<th>Canadian Data</th>
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<tbody>
<tr>
<td></td>
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</tr>
<tr>
<td>Total</td>
<td>Calcification</td>
</tr>
<tr>
<td>N</td>
<td>1012</td>
</tr>
<tr>
<td>Sex (M/F)</td>
<td>82/191</td>
</tr>
<tr>
<td>Age</td>
<td>50.5±14.5</td>
</tr>
<tr>
<td>BMI</td>
<td>26.0±4.7</td>
</tr>
<tr>
<td>AHI</td>
<td>27.4±23.6</td>
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* Statistical significance (p<0.01)
** Statistical significance (p<0.000)
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.

Occlusal Changes After Five Years of OA Use

<table>
<thead>
<tr>
<th>Favorable Change</th>
<th>Unfavorable Change</th>
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<tbody>
<tr>
<td>Correction of Class II molar</td>
<td>Edge to edge incisors</td>
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<tr>
<td>Correction of Class II cuspid</td>
<td>Reverse OJ or OB</td>
</tr>
<tr>
<td>Reduced OJ or OB</td>
<td>Vertical open bite</td>
</tr>
<tr>
<td>Reduced palatal impingement</td>
<td>Reduced interarch contacts</td>
</tr>
<tr>
<td>Reduced lower incisor crowding</td>
<td>Posterior cross bite</td>
</tr>
</tbody>
</table>

Favorable Change: 29 (40.5%)
Unfavorable Change: 31 (44.3%)
No Change: 10 (15.3%)

Change: 60 (85.7%)

Skeletal Type and Outcomes

<table>
<thead>
<tr>
<th>Class I</th>
<th>Class II/1</th>
<th>Class II/2</th>
<th>Class III</th>
</tr>
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<tbody>
<tr>
<td>No Change</td>
<td>12.5% 10% 30% 50%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Favorable</td>
<td>25.0% 90% 60% -</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unfavorable</td>
<td>62.5% - - 50%</td>
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70 OA patients
Four Years of Profile Lite Nasal Mask (Respironics)

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

NASAL PILLOW ALTERNATIVES

Profile Lite Nasal Mask - Respironics
Mirage Swift - ResMed
Breeze SleepGear - Puritan Bennett
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

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Web Site: www.aadsm.org

The Web site has information about the AADSM, a geographic listing of members, certification status and Web site links.

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