Snoring and Obstructive Sleep Apnea: Oral Appliance Therapy Management

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Snoring And Sleep Apnea in the U.S.
- Approximately 40% of adults over 40 years old snore (about 100 million Americans)
- 4% of men and 2% of women have signs and symptoms of OSA (about 12 million Americans)
- OSA is as prevalent as diabetes or asthma

Definitions
- **Apnea**: Cessation of ventilation for ≥ 10 seconds
- **Hypopnea**: 30-50% reduction in airflow ≥ 10 seconds
- **Apnea Index (AI)**: Average number of apneic episodes per hour of sleep
- **Apnea-Hypopnea Index (AHI)**: Average number of apnea plus hypopneas per hour of sleep

Defining Severity of OSA
- Length of time in apnea event
- Percentage decrease in oxygen desaturation
- **Apnea-Hypopnea Index**:
  - Mild OSA= 5-15 events/hour
  - Moderate OSA= 15-30 events/hour
  - Severe OSA= >30 events/hour

Obstructive Sleep Apnea

Dangers of Obstructive Sleep Apnea
- Individuals with OSA:
  - 5 times more heart attacks
  - 30-45% high blood pressure
  - 50% stroke patients have OSA
- Loss of Employment
- Uninsurability
- Marital Discord
- Increased Role of MVA’s (20%)
Clinical Signs & Symptoms

- Snoring: Intermittent with pauses
- Excessive daytime sleepiness
- Awakenings / gasping or choking
- Fragmented, non-refreshing, light sleep
- Poor memory, clouded intellect
- Irritability, personality changes
- Decreased sex drive, impotence
- Morning headaches

Predisposing Factors

- Age: Prevalence progressively increases with advancing age
- Obesity: Prevalence progressively increases with increasing weight
- Gender: 5 to 10 times more common in males
- Disproportionate upper airway anatomy
- ET0H, sedative-hypnotic drugs in late PM
- Hypothyroidism

Diagnosis

Management of Snoring and OSA

- Non-Surgical
  - Avoidance of risk factors
  - Pharmacologic agents – not very effective
  - Positive airway pressure (continuous or bilevel)
  - Oral appliance therapy
- Surgical
  - Tracheostomy
  - Uvulopalatopharyngoplasty – UPPP
  - LAUP
  - Pillar Procedure
  - Hyoid Suspension/Genioglossus Advancement
  - Max. / Mand. Advancement

Oral Appliance Therapy

How Do They Work?

Oral appliances are worn in the mouth during sleep to prevent the oropharyngeal tissues and the base of tongue from collapsing and obstructing the upper airway.
Advancement = Increased Airway

Oral Appliances May Function in 3 Basic Ways

- Repositioning the Mandible, Tongue, Soft Palate and Hyoid Bone
- Stabilizing the Mandible / Tongue / Hyoid Bone
- Increasing Baseline Genioglossus Muscle Activity

Case Types

- Primary Snoring
- Mild / Moderate OSA
- CPAP Intolerant – any level
- Surgical Failures
- Adjunctive Therapy
- Occasional, Short-term Substitutive Therapy

Contraindications

- Central Sleep Apnea
- Significant TMJ Disorder (MRD’S)
- Inadequate Dental Status (MRD’S)
- Unmotivated Patient

Functional Classification of Oral Appliances

Categorized by Mode of Action:

- Mandibular Repositioners
- Tongue Retainers
Design Variations
- Method of Retention
- Flexibility of Material
- Adjustability
- Vertical Opening
- Freedom of Jaw Movement
- Lab vs. Office Construction

Tongue Retaining Device (TRD)

PM Positioner

TAP 3

Somnodent
Klearway

Evaluation and Consultation
- MD Referral
- Review Sleep Study
- Review History
- Oral Examination
- Informed Consent
- Models and George Gauge Bite
- MRD Type
- Letters to MD and Patient's DDS
Final GG bite registration

- Starting mandibular treatment position is 60% of maximum protrusion
- Minimum of 7mm protrusion needed
- 3-5 mm interincisal opening in anterior
- Mandible positioned symmetrically forward

Side Effects and Complications

- **Common Side Effects:**
  - Excessive Salivation
  - Transient Discomfort – Teeth, TMJ
  - Dry Mouth
  - Soft Tissue Irritation
  - Temporary, Minor Disharmonies

- **Complications:**
  - Significant TMJ Discomfort/Dysfunction
  - Permanent Occlusal Changes

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MRD Success Rates

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>% Success</th>
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<tbody>
<tr>
<td>snoring</td>
<td>90+</td>
</tr>
<tr>
<td>mild OSA</td>
<td>80+</td>
</tr>
<tr>
<td>moderate OSA</td>
<td>70+</td>
</tr>
<tr>
<td>Severe OSA</td>
<td>50-50</td>
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</tbody>
</table>

Periodic Follow Up

- Medical Assessment
- Dental Assessment

Follow-up Evaluation During Appliance Therapy

**History:**

- Snoring
- Apneic Events
- Quality of Sleep
- Daytime fatigue (EDS)
- Focus
- Side Effects
Follow-up Evaluation During Appliance Therapy

**Examination:**
- Appliance Fit and Comfort
- OB, OJ
- Occlusal Contact
- Muscle Tenderness
- TMJ Assessment

Follow-up Schedule During Appliance Therapy

**First Year:**
- 3 weeks post insertion
- 3 month intervals

**Second Year:**
- 6 months

**Annual Thereafter**

Recommend Follow-up Evaluation with Physician and PSG with Oral Appliance

For patients with moderate to severe OSA:
- Refer for sleep study when patient has relief of symptoms
- During study, mandibular position is advanced 1 mm/1/2 hour, if needed, until estimated AHI is below 10 events/hour

Long-Term Sequellae of Oral Appliance Therapy in Obstructive Sleep Apnea


<table>
<thead>
<tr>
<th>Skeletal Types and Outcomes</th>
<th>Class I</th>
<th>Class II/1</th>
<th>Class II/2</th>
<th>Class III</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Change</td>
<td>12.5%</td>
<td>10%</td>
<td>20%</td>
<td>50%</td>
</tr>
<tr>
<td>Favorable</td>
<td>25%</td>
<td>90%</td>
<td>80%</td>
<td>---</td>
</tr>
<tr>
<td>Unfavorable</td>
<td>62.5%</td>
<td>---</td>
<td>---</td>
<td>50%</td>
</tr>
</tbody>
</table>

**Other Findings**

- **Overjet:** Decreased anterior to mesial of the first molars
- **Overbite:** Significantly decreased in the entire arch
- **Arch Width:** Mandibular arch increased more than the maxillary
- **Curve of Spee:** Flattened significantly in the premolar area after long-term therapy.

Conclusions

Long-term oral appliance therapy affects the entire occlusion in all three dimensions:

**Transversely:** Arch widths increase; overjets decrease.

**Antero-posteriorly:** Mandibular dentition moves forward; anterior overjets decrease

**Vertically:** Overbites decrease
Tooth movement is much more common in patients who have had orthodontic therapy

Tooth movement is guaranteed in patients who have had adult orthodontics.

Alan Lowe BDS, PhD

Risks vs. Benefits

Our responsibility lies in adequately treating a medical condition with a dental device while recognizing and managing (as best we can) occlusal changes and to a lesser degree TMJ symptomatology.