Obstructive Sleep Apnea and Sleep Disorders in All Age Groups

Treatment

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Sleep Center
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Obstructive Sleep Apnea and Sleep Disorders in All Age Groups

Treatment

- Allergic rhinitis and sinusitis
- Asthma
- Obstructive Sleep Apnea
Allergies
Allergies

CT-SCAN OF SINUSES

M - maxillary sinus, + thickening of the maxillary sinus (4-6 mm), E - ethmoid sinuses, P - polyp, * - middle meatus
ALLERGIC RHINITIS THERAPY

• Avoidance
• Pharmaceutical therapeutics
• Immunomodulation
  • Allergy shots/immunotherapy/vaccination
    • SCIT and SLIT
  • Monoclonal antibodies
    • Omalizumab
Prevalence of Sleep Complaints and Sleep Disorders in Patients with Allergic Rhinitis (Ages 18-50 years)

<table>
<thead>
<tr>
<th>Complaint/Disorder</th>
<th>Control Group % N=502</th>
<th>Mild AR % N=140</th>
<th>Mod-Sev AR % N=451</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sleep Complaint</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Difficulty falling asleep</td>
<td>18</td>
<td>18</td>
<td>50*</td>
</tr>
<tr>
<td>Nocturnal awakening</td>
<td>21</td>
<td>15</td>
<td>52*</td>
</tr>
<tr>
<td>Early awakening</td>
<td>13</td>
<td>15</td>
<td>33*</td>
</tr>
<tr>
<td>Feeling lack of sleep</td>
<td>25</td>
<td>48</td>
<td>80*</td>
</tr>
<tr>
<td>Snoring</td>
<td>27</td>
<td>31</td>
<td>40*</td>
</tr>
<tr>
<td>ESS score &gt;10</td>
<td>17</td>
<td>11</td>
<td>25*</td>
</tr>
</tbody>
</table>

*p<0.05 vs. control group

Arch Intern Med 2006; 166: 1744-1748
Prevalence of Sleep Complaints and Sleep Disorders in Patients with Allergic Rhinitis (Ages 18-50 years)

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</thead>
<tbody>
<tr>
<td>Sleep Disorders</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insomnia</td>
<td>16</td>
<td>15</td>
<td>42*</td>
</tr>
<tr>
<td>Severe insomnia</td>
<td>10</td>
<td>11</td>
<td>27*</td>
</tr>
<tr>
<td>Sleep apnea</td>
<td>0.5</td>
<td>2</td>
<td>3*</td>
</tr>
<tr>
<td>Hypersomnia</td>
<td>24</td>
<td>20</td>
<td>35*</td>
</tr>
<tr>
<td>Regular use of sedatives</td>
<td>3</td>
<td>4</td>
<td>11*</td>
</tr>
</tbody>
</table>

*p<0.05 vs. control group

Arch Intern Med 2006; 166: 1744-1748
Effect of Allergic Rhinitis and Antihistamine Use on Learning in Children

Ages 10-12 Years

* p=0.002 vs healthy

Composite learning score

Healthy (n = 21)
Loratadine
Placebo
Diphenhydramine

Effects of Loratadine & Montelukast on Nighttime Symptoms

Nighttime Symptoms Score
(Mean Baseline = 1.46) *p<0.001

Am J Rhinol 2005; 19: 591-8
Olopatadine Nasal Spray: Significantly Improved QoL Variables

Intranasal Corticosteroid Improves Nasal Congestion and Sleep Quality (N=20 crossover)

- **Stuffy Nose**: Flunisolide (P=0.009)
- **Sleep Quality**: Flunisolide (P=0.01)
- **Daytime Sleepiness**: Flunisolide (P=0.08)


*J Allergy Clin Immunol 2004; 114: S146-53*
Mometasone Nasal Spray in PAR: Change in Epworth Sleepiness Score (ESS) Scores

Change in ESS Scores From Baseline

<table>
<thead>
<tr>
<th></th>
<th>MFNS 200 µg od (n=20)</th>
<th>Placebo (n=9)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>12.50</td>
<td>13.33</td>
</tr>
<tr>
<td>Change in ESS score (points)</td>
<td>+0.45</td>
<td>-1.90</td>
</tr>
</tbody>
</table>

*P<0.05 vs placebo.

Meltzer EO. Ann Allergy Asthma Immunol submitted
Asthma
Diurnal Variation In Peak Expiratory Flow

J Respir Dis 11:138, 1990
Nocturnal Asthma

Salmeterol

Lockey RF, et al CHEST 115:666, 1999
Nocturnal Asthma
Salmeterol and QOL

Lockey RF, et al CHEST 115:666, 1999
Nocturnal Asthma
Salmeterol

Lockey RF, et al CHEST 115:666, 1999
Nocturnal Asthma & Theophylline
Uniphyl 24 hr. vs. Theo-Dur 12hr.

Nocturnal Asthma
Montelukast & Beclomethasone

Malmstrom K et al. Ann Intern Med 1999;130:487-495
©1999 by American College of Physicians
Nocturnal Asthma

Tiotropium

Peters SP, et al. NEJM 363:1715, 2010
Nocturnal Asthma

OSA & CPAP

Nasal CPAP improves PEFR in nocturnal asthma

Obstructive Sleep Apnea
Behavioral Treatment

- Weight loss
- Avoidance of alcohol and sedatives
- Avoidance of sleep deprivation
- Nocturnal bed positioning

Strollo NEJM 334: 102, 1996
Obstructive Sleep Apnea
Adenotonsillectomy
Obstructive Sleep Apnea in Children

Adenotonsillectomy

Obstructive Sleep Apnea
Weight Loss

Nolan, J. Tampa Trib 12/28
OSA and Weight Loss
Upper Airway Volumetric MRI

Welch Sleep 25:536, 2002
Obstructive Sleep Apnea
Medical Treatment

• First-line therapy
  • Positive pressure with a mask

• Second-line therapy
  • Oral appliance

• Other
  • Fluoxetine or protriptyline
  • Thyroid hormone (in hypothyroid patients)
  • Nocturnal oxygen

Strollo NEJM 334: 102, 1996
Benefits of Nasal CPAP for OSA

Randomized placebo-controlled trials

- Decrease somnolence
- Decrease auto accidents
- Improve quality of life
- Improve mood and alertness


Cohort studies

- Improved pulm. hemodynamics and mortality

Positive Airway Pressure

PAP

• CPAP

  Continuous Positive Airway Pressure
  • BiPAP

  BiLevel Positive Airway Pressure
  • AutoPAP/SmartPAP

  Automatic/Smart/Self-Adjusting Positive Airway Pressure
# Modes of PAP Therapy

<table>
<thead>
<tr>
<th>Mode</th>
<th>Diagram</th>
<th>Pressure Level</th>
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</thead>
<tbody>
<tr>
<td>Manual CPAP Mode</td>
<td><img src="image" alt="Diagram" /></td>
<td>0 pressure</td>
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<tr>
<td>Bi-level Mode</td>
<td><img src="image" alt="Diagram" /></td>
<td>0 pressure</td>
</tr>
<tr>
<td>Auto-CPAP Mode</td>
<td><img src="image" alt="Diagram" /></td>
<td>0 pressure</td>
</tr>
</tbody>
</table>
Positive Pressure Therapy Interfaces

Nasal Interface
Positive Pressure Therapy Interfaces

Nasal Pillows
Positive Pressure Therapy Interfaces

Full Face Masks
PAP Humidification

OSA Intervention - Mechanical

- Heated
- Combination
- Passover
OSA Treatment
Mandibular Advancement Device

- Ten nonapneic adults
- 4 mandibular positions
- Most retruded, 33% - 67% and max. protrusion
- The AP width of the velopharynx increased

Tsuiki Sleep 24:554, 2001
OSA Treatment
Mandibular Advancement Device

- KlearWay device
- Enlarges velopharynx
- Hyoid bone and third cervical vertebra moved forward
OSA Treatment
Mandibular Advancement Device
Obstructive Sleep Apnea
Surgical Treatment

- Upper-airway bypass
  - Tracheostomy
- Upper-airway reconstruction
  - Uvulopalatopharyngoplasty
  - Genioglossal advancement
  - Maxillomandibular advancement

Strollo NEJM 334: 102 1996
OSA Treatment

Uvulopalatopharyngoplasty

- UPPP at 29 year review
- 40% success rate
- UPPP is probably overused as an isolated procedure

Sher Sleep 19:160, 1996
OSA Treatment
Genioglossal Advancement

Sher Sleep 19:160,1996
OSA Treatment

Maxillomandibular Advancement

Sher Sleep 19:160,1996
# OSA Treatment

## Maxillomandibular Advancement

<table>
<thead>
<tr>
<th>Date</th>
<th>N</th>
<th>% Respond</th>
<th>Date</th>
<th>N</th>
<th>% Respond</th>
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<tbody>
<tr>
<td>1986 Riley</td>
<td>5</td>
<td>AHI 73 to 20</td>
<td>1989 Riley</td>
<td>25</td>
<td>&gt;90</td>
</tr>
<tr>
<td>1989 Riley</td>
<td>55</td>
<td>67</td>
<td>1989 Waite</td>
<td>23</td>
<td>65</td>
</tr>
<tr>
<td>1993 Riley</td>
<td>239</td>
<td>61</td>
<td>1993 Riley</td>
<td>91</td>
<td>&gt;90</td>
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<tr>
<td>1994 Johnson</td>
<td>9</td>
<td>69</td>
<td>1997 Hochban</td>
<td>38</td>
<td>&gt;95</td>
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<tr>
<td>1996 Ramirez</td>
<td>12</td>
<td>53</td>
<td>1999 Prinsell</td>
<td>50</td>
<td>100</td>
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<tr>
<td>1998 Yoa</td>
<td>23</td>
<td>68</td>
<td>2002 Bettega</td>
<td>20</td>
<td>75</td>
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<tr>
<td>2000 Wagner</td>
<td>21</td>
<td>25</td>
<td></td>
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<tr>
<td>2001 Bettega</td>
<td>44</td>
<td>23</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>2002 Vilaseca</td>
<td>20</td>
<td>35</td>
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<tr>
<td>2003 Neruntarat</td>
<td>31</td>
<td>70</td>
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