Sleep Disorders & Edema

Columbia Wound Care Care Symposium
January 2016

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Take Home Points

• Sleep disorders are common, readily diagnosed, and treatable
  • You can play a role in this
• Treating some sleep disorders may have a significant impact on wound healing and on lower extremity edema management
  • OSA
• Bilateral leg edema is likely an important clinical marker for underlying OSA
  • Having some understanding of OSA can assist in managing this difficult disorder
• Comprehensive wound & edema management can be enhanced with sleep management
Spectrum Of Sleep Disorders

- Insomnia
- Sleep Disordered Breathing
  - Apnea
  - Hypoventilation syndromes
- Restless Leg Syndrome
- Circadian Rhythm Disorders
- Disorders of Excessive Daytime Sleepiness
  - Narcolepsy
  - Idiopathic Hypersomnia
- Parasomnias
- Nocturnal Seizures
Obstructive Sleep Apnea

- Consequences of OSA
  - cardiovascular disease
  - Daytime sleepiness
OSA & Cardiac Disease

- Hypertension & Pulmonary HTN
- Cardiac arrhythmia
- Myocardial infarction
- Stroke
- Congestive heart failure
CPAP therapy
OSA & Cardiac Death

A

Cumulative incidence of fatal CVS events (%)

- Controls
- Snorers
- Mild OSAH
- Severe OSAH
- OSAH with CPAP

www.thelancet.com Vol 365 March 19, 2005
OSA & Non Fatal Cardiovascular Events
Treatment of OSA with CPAP and heart failure

$P=0.09$

$P<0.001$

Left Ventricular Ejection Fraction, %

Baseline 1 Month

Control Group

Baseline 1 Month

Group Treated With CPAP

Not Significant
Pulmonary Hypertension

• 17-53% of patients with OSA have pulmonary HTN
• 82% of patients with pulmonary HTN have OSA
Idiopathic Edema & OSA

- Edema is often associated with OSA
- It is usually attributed to obesity, pulmonary disease, or cor pulmonale
- Does OSA alone cause edema independently?
- Can idiopathic leg edema be a marker for OSA?
• 78 adults, all obese
  • 44 with bilateral pitting pre tribal edema
  • 34 without edema
  • None had cardiac disease, pulmonary disease, hypoalbuminemia
  • All underwent formal sleep testing
Demographic, medical, and laboratory characteristics of obese subjects with and without bilateral leg edema

<table>
<thead>
<tr>
<th></th>
<th>Edema</th>
<th>No edema</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(N=44)</td>
<td>(N=34)</td>
<td></td>
</tr>
<tr>
<td>Age (mean ± SD, years)</td>
<td>53.8 ± 12.9</td>
<td>49.1 ± 13.6</td>
<td>0.13</td>
</tr>
<tr>
<td>Body mass index ± SD (kg/m²)</td>
<td>47.0 ± 9.3</td>
<td>36.5 ± 4.6</td>
<td>0.002a</td>
</tr>
<tr>
<td>Apnea–hypopnea index ± SD</td>
<td>34.1 ± 27.7</td>
<td>17.0 ± 19.4</td>
<td>0.002a</td>
</tr>
<tr>
<td>Spirometry data</td>
<td></td>
<td></td>
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<tr>
<td>FVC, % predicted ± SD</td>
<td>71.1 ± 14.8</td>
<td>76.6 ± 13.1</td>
<td>0.10</td>
</tr>
<tr>
<td>FEV 1, % predicted ± SD</td>
<td>75.2 ± 15.6</td>
<td>82.0 ± 14.2</td>
<td>0.06</td>
</tr>
<tr>
<td>FEV 1/FVC, % ± SD</td>
<td>106.2 ± 8.9</td>
<td>106.9 ± 7.1</td>
<td>0.68</td>
</tr>
<tr>
<td>Oxygen saturation ± SD, awake (%)</td>
<td>96.2 ± 2.0</td>
<td>97.1 ± 1.5</td>
<td>0.05</td>
</tr>
<tr>
<td>Epworth sleepiness scale score ± SD</td>
<td>11.2 ± 5.9</td>
<td>5.7 ± 3.4</td>
<td>0.001</td>
</tr>
<tr>
<td>Cigarette smokers</td>
<td>58%</td>
<td>15%</td>
<td>0.001</td>
</tr>
<tr>
<td>Restrictive spirometry pattern</td>
<td>73%</td>
<td>64%</td>
<td>0.38</td>
</tr>
<tr>
<td>Female sex</td>
<td>59%</td>
<td>65%</td>
<td>0.61</td>
</tr>
<tr>
<td>Caucasian</td>
<td>93%</td>
<td>94%</td>
<td>0.87</td>
</tr>
<tr>
<td>Asthma</td>
<td>16%</td>
<td>15%</td>
<td>0.88</td>
</tr>
<tr>
<td>Hypertension</td>
<td>41%</td>
<td>41%</td>
<td>0.98</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>18%</td>
<td>18%</td>
<td>0.95</td>
</tr>
<tr>
<td>Varicose veins</td>
<td>7%</td>
<td>12%</td>
<td>0.45</td>
</tr>
<tr>
<td>Use diuretic medication</td>
<td>39%</td>
<td>9%</td>
<td>0.003</td>
</tr>
</tbody>
</table>

AH1 much higher in Edema group
1. Edema was associated with OSA in the entire sample, and most did not believe they had a sleep disorder.

2. After adjusting for differences in BMI, OSA alone was identified as an independent determinant of edema in women but not in men.
• Small case series, 8 subjects
• All had idiopathic edema
• 7 of 8 had severe OSA
• 7 of 8 had reductions in edema after initiation of cpap therapy
Demographic, clinical and laboratory variables for subjects with edema treated with nasal continuous positive airway pressure

<table>
<thead>
<tr>
<th></th>
<th>Less edema after CPAP (N=7)</th>
<th>No change in edema after CPAP (N=1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age ± SD, years</td>
<td>49 ± 13</td>
<td>64</td>
</tr>
<tr>
<td>Sex, % female ± SD</td>
<td>43 ± 19</td>
<td>100</td>
</tr>
<tr>
<td>Body mass index ± SD, (kg/m²)</td>
<td>40.4 ± 5.2</td>
<td>47.0</td>
</tr>
<tr>
<td>Duration of edema, years</td>
<td>2.1 ± 7.0</td>
<td>20</td>
</tr>
<tr>
<td>Apnea-hypopnea index ± SD</td>
<td>53 ± 27</td>
<td>35</td>
</tr>
<tr>
<td>Oxygen saturation</td>
<td>95 ± 2</td>
<td>93</td>
</tr>
<tr>
<td>(while awake), % ± SD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lowest oxygen sat</td>
<td>72 ± 18</td>
<td>73</td>
</tr>
<tr>
<td>(during sleep), % ± SD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>% time nocturnal oxygen sat</td>
<td>27 ± 32</td>
<td>6</td>
</tr>
<tr>
<td>sat &lt;90, % ± SD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FVC, % pred ± SD</td>
<td>70 ± 9</td>
<td>85</td>
</tr>
<tr>
<td>FEV1, % pred ± SD</td>
<td>71 ± 11</td>
<td>97</td>
</tr>
<tr>
<td>FEV1/FVC, % ± SD</td>
<td>103 ± 0.1</td>
<td>114</td>
</tr>
<tr>
<td>Cigarettes, % smokers ± SD</td>
<td>43 ± 19</td>
<td>0</td>
</tr>
<tr>
<td>Epworth sleepiness</td>
<td>16 ± 5</td>
<td>20</td>
</tr>
<tr>
<td>scale score ± SD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CPAP (cmH₂O) ± SD</td>
<td>10 ± 3</td>
<td>12</td>
</tr>
</tbody>
</table>
Why Would OSA Cause Idiopathic Edema?

- Bilateral leg edema is likely an important clinical marker for underlying OSA
  - Intermittent right ventricular failure
  - OSA activates the renin-angiotensin-aldosterone system
    - nasal cpap lowers aldosterone levels
How Can You Help?

• Ask patient’s about their sleep
• Inquiry about apnea
  • Have you had a sleep study?
  • Do you snore?
  • Are you tired during the day?
• Many of your patient’s will already carry a diagnosis of OSA
  • Ask them if they use their CPAP machine
  • If they don’t encourage them to see a sleep physician
Other Important Principles

- Patient’s recovering with wounds often struggle with other sleep problems.
  - Insomnia—multifactorial
    - pain, anxiety/mood disorders, lack of constraints on their time, medications
    - sick patients often develop a complete breakdown in basic elements of sleep hygiene
  - Restless limb syndrome

- Sick patients often develop a breakdown in basic sleep hygiene
  - Establish a sleep window
  - Light in the morning, dark in the evening
  - Eliminate afternoon and evening caffeine
  - Nap avoidance
Take Home Points

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  • You can play a role in this

• Treating some sleep disorders may have a significant impact on wound healing and on lower extremity edema management
  • OSA

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References


Blankfield et al. Bilateral Leg Edema, Obesity, Pulmonary Hypertension, and Obstructive Sleep Apnea. Arch intern Med. 2000; 160 (15): 2357-2362