

## Airway, Obstructive Sleep Apnea and Orthodontics:

There have been recent developments in the realm of airway obstruction and sleep apnea. Apnea is assessed by nocturnal polysomnography to record the Apnea-Hypopnea Index ( apneic event being a  $\geq 70\%$  airflow reduction with a drop in oxygen saturation for 10 sec.; hypopneic event being  $\geq 50\%$  airflow reduction and  $\geq 4\%$  decrease in blood oxygen saturation for  $\geq 10$  sec.; AHI being the number of events averaged per hour).<sup>1,2</sup> OSA is considered significant when AHI is  $\geq 5$ <sup>3</sup> and mild if the AHI is between 5 and 15, moderate between 15 to 50, and severe if  $\geq 50$ .<sup>2</sup>

Symptoms and predictors of OSA can include<sup>2</sup>:

1. Snoring (OSA is unlikely in the absence of habitual snoring)<sup>2</sup>
2. Apneic pauses (choking, gasping, snorting during the night)<sup>2</sup>
3. Restless leg syndrome (RLS); restless sleep and increased body movements<sup>2</sup>
4. Bruxism (nocturnal tooth grinding)<sup>4</sup>
5. Nocturnal and daytime enuresis<sup>5-9</sup>
6. Sleep position (side and stomach sleepers) or neck hyperextended<sup>2,10,11</sup>
7. Growth failure/restriction
8. Sleep walking or sleep terrors
9. Obesity
10. Also see p22 and 174-5<sup>2</sup>

Daytime symptoms can include<sup>2</sup>:

1. Mouth breathing, due to adenoidal hypertrophy, and dry mouth.
2. Chronic nasal congestion/rhinorrhea
3. Adenotonsillar hypertrophy<sup>2,3</sup>
4. Hyponasal speech (Good Bording instead of Good Morning).
5. Fatigue
6. Excessive daytime sleepiness; difficulty waking or falling asleep at school
7. Mood changes; irritability, low frustration tolerance, impatience, depression anxiety, and social withdrawal, a negative sense of well being<sup>12-15</sup>
8. Acting-out behaviors including aggression and hyperactivity
9. Cognitive impairment and poor school performance
10. Inattention, poor concentration, and distractibility
11. ADHD-like symptoms<sup>16-19</sup>
12. Infraorbital venous congestion

Cardiovascular assessment is often recommended for OSA as it is commonly associated with hypertension<sup>2,20-22</sup>; cardiovascular evaluation is recommended prior to stimulant medication for ADHD.<sup>23</sup> Also associated with OSA are gastro-esophageal reflux (GERD; associated pharyngeal edema <sup>2</sup>, as well as acid reflux due to paradoxical chest and abdominal wall movement and negative intrathoracic pressure; be aware of signs of GERD such as the loss of enamel on the lingual of the incisor, or patients with Rx of Prevasid or

Prilosec) and may be associated with exacerbation of epilepsy<sup>24,25</sup>, brain and neural degeneration<sup>13,26,27</sup> (developmental and possibly associated with progression of Parkinson's<sup>28</sup> and Alzheimer's<sup>29</sup>). Additional neuromuscular, endocrine (diabetes; blood sugar levels fluctuate) and congenital syndromes may display a tendency toward OSA; see p174<sup>2</sup>. Restricted growth may be a consideration related to metabolic factors influenced by airway.<sup>30,31</sup>

Assessment of the adenotonsillar tissues can be made visually and radiographically (lateral cephalogram). I also plan to have at least one pulse oximeter available that can be lent to patients or parents for a home sleep assessment of the patient.<sup>32</sup> Appropriate referral for further evaluation could then be assessed.

Extirpation of the adenotonsillar tissues is effective in re-establishing airway (75-100%)<sup>33</sup>, correcting growth patterns<sup>31,34,35</sup> and reducing bruxism.<sup>4</sup> However, there are the immediate risks of surgery as well as questionable risks for future occurrence of rheumatoid arthritis<sup>36</sup>; there seems negligible risk of haematolymphopoietic malignancies (lymphomas, myelomas and leukaemias).<sup>37</sup>

Alternative treatment options include maxillary expansion to increase the transverse nasopharyngeal airway<sup>6,7,38-41</sup>, in addition to maxillary protraction<sup>42</sup> and mandibular propulsors/functional appliances to increase the sagittal nasopharyngeal/oropharyngeal airway. Adult (non-growing) patients have the option of tooth borne mandibular advancement apnea appliances or orthognathic surgery.<sup>43-48</sup>

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