ADENOID HYPERTROPHY AND SLEEP DISORDERED BREATHING

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Abstract*: Summarize and synthesize the most recent evidence about adenoid hypertrophy, impact on craniofacial growth, role in sleep disordered breathing, and effects of treatment.*

Key words: *adenoids, adenoidectomy, craniofacial growth, diagnosis, palatal expansion, obstructive sleep apnea, orthodontics, sleep disordered breathing.*

The adenoids are a collection of lymphatic tissue located in the most superior-posterior aspect of the nasopharynx. They are situated at the inflection point between the horizontally oriented nasal passage and the vertically oriented oropharynx. Being a lymphoid tissue, the adenoids play a role in immunity housing large numbers of immunocompetent cells such as B cells, T cells, lymphocytes, and macrophages. As a result, the adenoids are highly prone to inflammation when an immune response is elicited against foreign antigens. Even in healthy children, a physiologic amount of adenoid enlargement is a part of normal craniofacial growth and development. The adenoid lymphoid tissue naturally increases to its largest size sometime between age 5-10 years, then continually decreases in size until adulthood. Since children of this age range naturally have some element of relative lymph enlargement, additional inflammation—actual inflammatory hypertrophy beyond physiologic adenoid enlargement—can introduce partial or complete nasopharyngeal obstruction.

Adenoid Hypertrophy and Altered Craniofacial Growth Although previous research studied the link between nasal function and facial pattern, it was Linder-Aronson's seminal work that helped solidify the association between adenoid hypertrophy and altered human craniofacial growth. He noted that adenoid obstruction occurred in all facial types, but children with adenoid hypertrophy presented more frequently with a recurrent craniofacial phenotype. This phenotype was characterized by a narrow maxillary dental arch, posterior dental crossbite, steep mandibular plane, and long anterior face height. Such a craniofacial phenotype was often termed "adenoid facies."

Sleep disordered breathing is a spectrum of disorders unified by respiratory disturbance or inadequate ventilation during sleep. In this context, sleep disordered breathing can range from primary snoring to upper airway resistance syndrome to severe obstructive sleep apnea. In the pediatric population, the epidemiology of sleep disordered breathing is poorly described, as its presence and consequences on overall health and wellness have been widely underappreciated. Only recently has pediatric sleep disordered breathing become more widely acknowledged as a public health problem. Best available estimates suggest the frequency of obstructive sleep apnea is approximately at 1% to 5%,20 while the frequency of sleep disordered breathing (i.e., snoring) is estimated much higher, ranging from 3% to 27%. The consequences of sleep disordered breathing to overall health can be severe. Neurocognitive dysfunction including attention deficit, hyperactivity, reduced grades in school, and aggression, and cardiovascular dysfunction including hypertension, ventricular hypertrophy, valvular damage, and cor pulmonale and delayed growth have all been reported.

Numerous tools are available to evaluate the nasal and nasopharyngeal airway. Clinical exam alone, acoustic rhinometry, lateral cephalometry, multi-row detector CT imaging, video fluoroscopy, and cone beam computed tomography (CBCT) have all been described as methods for evaluating nasopharyngeal patency. However, each of these methods has significant drawbacks. Clinical exam alone lacks the sensitivity to be useful. Lateral cephalograms provide fair diagnostic value but tend to overestimate adenoid size. Multi-row detector CT scans and video fluoroscopy are both very accurate but require specialized equipment and expose patients to unjustifiably high levels of radiation. Beyond all other diagnostic methods, nasoendoscopy using a standardized grading system is the gold standard for diagnosis of adenoid hypertrophy. Nasoendoscopy is minimally invasive, highly reliable, and easy for an otolaryngologist to perform. However, performing nasoendoscopy is outside the scope of practice for other health-care providers concerned with adenoid size, such as orthodontists or sleep medicine specialists. While nasoendoscopy is an excellent diagnostic procedure,

gaining access to an otolaryngologist is the most difficult step to getting a reliable diagnosis of adenoid hypertrophy.

At the present time dentist's most important role in airway management is to act as an early detector of airway dysfunction, and coordinate timely referral to appropriate health professionals. However, if recent research is any indication of future clinical practice, dentists are likely to gain increasing prominence also in managing specific sleep related problems.

In summary, chronic adenoid hypertrophy is the most common etiology of pediatric sleep disordered breathing. It has been strongly implicated in the altered craniofacial growth pattern termed "adenoid facies"—that is, long face, maxillary constriction with an associated dental crossbite, increased overjet, and weak chin projection. Currently adenotonsillectomy is the front-line treatment for pediatric sleep disordered breathing. A new paradigm is emerging that recognizes a multitude of additional causes for nasal obstruction and pediatric sleep disordered breathing. Recognition of the comorbidities and collaborative disease contributors can be very important for evaluating individual patient risk profiles and prognosis of treatment. Unsurprisingly, new treatment options are emerging as alternative or collaborative therapy modalities that specifically address these alternative disease etiologies. Dentists and orthodontists have an increasingly important role in the early detection of children with sleep disordered breathing and adenoid hypertrophy. Dentists' ability to recognize altered craniofacial growth patterns and access to alternative diagnostic techniques enables dentists to screen children with sleep disordered breathing with high accuracy. Furthermore, new research suggests that dentists and orthodontists may have a critical role in treating select subgroups of children with sleep disordered breathing.

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