Myofunctional Therapy, An Evidenced Based Treatment for ADD/ADHD and More Without the Use of Medication

Martin Denbar, DDS
General Dentist
Diplomate, American Board of Dental Sleep Medicine
7800 N. Mopac #300
Austin, Texas 78759
(512) 514-0403
www.austinmyofunctionaltherapy.com
www.austinapnea.com

Myofunctional Therapy

My Simple Premise

By reducing or removing the abnormal structural or functional state of a disease condition, there is less pathology remaining to negatively affect a patient or to treat.

Objectives

- What is Myofunctional Therapy. (MFT)
- What do we look for when examining the patient?
- What is the evidenced base research relating airway to ADD/ADHD and other health issues?

Pediatric Obstructive Sleep Apnea and the Critical Role of Oral-Facial Growth

Conclusion:

- Pediatric OSA in non-obese children is a disorder of oral-facial growth.

Myofunctional Therapy

- Myofunctional therapy is not speech therapy.
- Myofunctional therapy is the “neuromuscular re-education or re-patterning of the oral and facial muscles that impact the airway”.
- Myofunctional therapy includes facial and tongue exercises that improve or correct muscle function, reduce negative habits, improve breathing, chewing and swallowing and can also improve patient aesthetics.
Orthodontics and sleep-disordered breathing

- Re-education of tongue muscles and exercising the upper airway muscles has been going on for years in countries such as Brazil or the University of Liege (Belgium), where it is not only applied to children but also to adults with documented improvement by polysomnography.

Sleep Breath Editorial 4 May 2011 Chad M. Ruoff & Christian Guilleminault

What does Myofunctional Therapy Treat?

- Mouth Breathing
- Lip Seal
- Reverse swallowing pattern
- Dark shadows under the eyes
  (Venous pooling from lack of oxygen absorption.)
- Airway
  (High palatal vault, narrow posterior airway space)
- Posterior cross bite
  (Upper teeth fit inside lower teeth.)
- Tongue Thrust
- Speech
- Posture
- Orthodontic Relapse
- Habits (thumb sucking, Sippy cups, pacifiers)

Oral breathing in children

- 92 children aged between 8 and 12 years were studied, of which 30 were mouth breathers and 62 were nasal breathers. The study concluded that mouth breathing negatively affected respiratory biomechanics and exercise capacity.


The Oxygen Advantage: Courtesy of Patrick McKown

Short Lingual Frenulum and Obstructive Sleep Apnea in Children

Conclusions: Short lingual frenulum may lead to abnormal orofacial growth early in life, a risk factor for development of SDB. Careful surveillance for abnormal breathing during sleep should occur in the presence of short lingual frenulum.

Yu-Shu Huang 1, Stacey Quo2, J Andrew Berkowski3 and Christian Guilleminault1

Influences of the breathing route on upper airway dynamics properties in normal awake subjects with constant mouth opening

Conclusions:
- When compared with nasal breathing, mouth breathing decreases the stability of the lower airway independent of mouth opening.
- This effect of mouth opening and moving from nasal breathing to mouth breathing may add to the effects of sleep on upper airway muscle tonic activity to worsen upper airway stability and favor the occurrence of upper airway obstruction during sleep.

Effect of nasal or oral breathing route on upper airway resistance during sleep

- Upper airway resistance during sleep and the propensity to obstructive sleep apnea are significantly lower while breathing nasally rather than orally.

Eur Respir J. 2003 Nov;22(5):827-32

The Effects of Breathing on Emotion and Behavior

- Nose breathing imposes approximately 50 percent more resistance to the airflow stream in normal individuals than does mouth breathing, resulting in 10-20 percent more oxygen uptake.

Cottle, 1972; Rehme, 1915

Mouth breathing: Adverse effects on facial growth, health, academics, and behavior

- Nitric oxide inhaled via nasal respiration has been shown to increase oxygen exchange efficiency and increase blood oxygen by 18%, while improving the lungs’ ability to absorb oxygen.

Growth & Development 2005

The nose and sleep-disordered breathing: what we know and what we do not know.

- SDB (sleep disordered breathing) can both result from and be worsened by nasal obstruction.


The impacts of open-mouth breathing on upper airway space in obstructive sleep apnea: 3-D MDCT analysis.

- Open-mouth breathing during sleep is a risk factor for obstructive sleep apnea (OSA) and is associated with increased disease severity and upper airway collapsibility.

Eur Arch Otorhinolaryngol. April 2011, Volume 268, Issue 4, pp 533-539

David aged 10 is a nose breather and has a good-looking, broad face with everything in proportion.

(Courtesy of “The Oxygen Advantage”)
On David’s 14th birthday, he was given a gerbil as a present. Soon after, his nose began to block, causing him to breathe through his mouth. David aged 17

(Courtesy of “The Oxygen Advantage”)

High palate / narrow arch

Oral Breathing in Children

Nasal Breathing in Children

Plumb Line

Posture

(Courtesy of AOMT)
- Do they carry the head forward! Shoulders Slumped?

The Oxygen Advantage: Courtesy of Patrick McKeown

The Oxygen Advantage: Courtesy of Patrick McKeown

The Oxygen Advantage: Courtesy of Patrick McKeown
What does their back posture look like?
(Courtesy of AOMT)

Is there a swallowing grimace?
(Courtesy of AOMT)

Does the mentalis muscle activate when they swallow or close their lips?
(Courtesy of AOMT)

Thumb Sucking
(Courtesy of AOMT)

Do they drool?
(Courtesy of AOMT)

Mouth Breathing, Open Mouth Posture, Anterior and Bilateral Tongue Thrust
(Courtesy of AOMT)
Bruxism & Tonsils
(Courtesy of AOMT)

Tongue Tied
(Courtesy of AOMT)

Tongue Tied
(Courtesy of AOMT)

Before and After MFT
(Courtesy of AOMT)

Five Months of MFT Treatment
(Courtesy of AOMT)
Diagnostic Issues in Pediatric Sleep Apnea

The peak incidence of OSAS occurs between 2 to 8 years of age and parallels the prominent growth of lymphoid tissue around the airway during these years.


"Sleep Disordered Breathing in a Population-Based Cohort: Behavioral Outcomes at 4 and 7 Years."

- Observed children’s snoring, mouth breathing, and witnessed apneas from age 6 months to 7 years of age.
- Found that young children with sleep-disordered breathing are prone to developing behavioral difficulties such as hyperactivity and aggressiveness.
- Shows clearly that SDB symptoms do precede behavioral problems and strongly suggests that SDB symptoms are causing those problems.

Pediatrics  March 5, 2012 Bonuck, Freeman, Chervin, Xu

"Sleep Disordered Breathing in a Population-Based Cohort: Behavioral Outcomes at 4 and 7 Years."

- We found that children with sleep-disordered breathing were from 40 to 100% more likely to develop neurobehavioral problems by age 7 compared with children without breathing problems ... The biggest increase was in hyperactivity.

Pediatrics  March 5, 2012 Bonuck, Freeman, Chervin, Xu

"Sleep Disordered Breathing in a Population-Based Cohort: Behavioral Outcomes at 4 and 7 Years."

- Behavioral problems resulting from these adverse effects on the brain include impairments in executive functioning (i.e., being able to pay attention, plan ahead, and organize), the ability to suppress behavior, and the ability to self-regulate emotion and arousal.

Pediatrics  March 5, 2012 Bonuck, Freeman, Chervin, Xu

"Sleep Disordered Breathing in a Population-Based Cohort: Behavioral Outcomes at 4 and 7 Years."

- This is the strongest evidence to date that snoring, mouth breathing, and apnea can have serious behavioral and social-emotional consequences for children.

Pediatrics  March 5, 2012 Bonuck, Freeman, Chervin, Xu

Research by Dr. John R. Neil (OB/GYN) 1996

- Dr. Neil did 4 years of ultrasonic research in Australia on suckling. Study of 50 normal / 80 difficult cases.

Conclusion:
- Normal breastfeeding tongue action has a “rocker” or peristaltic like motion.
- Bottle feeding has an abnormal “piston” action.
Research by Dr. John R. Neil (OB/GYN) continued

- 100% of babies who had a piston tongue action had used a bottle teat.
- Of those who had not used a bottle teat, 0 had piston and 48 had rocker action.

Infant-feeding methods and childhood sleep-disordered breathing.

**Conclusion:** Our findings support the notion that breastfeeding may provide long-term protection against the severity of childhood sleep-disordered breathing.

Front Neurol. 2013 Jan 22;3:184.

Association between breastfeeding and the development of breathing patterns in children.

**Conclusion:** Extended breastfeeding was associated with correct development of the breathing pattern.


Breastfeeding and non-nutritive sucking patterns related to the prevalence of anterior open bite in primary dentition

- Nutritional, immunological and psychological benefits of exclusive breastfeeding for the first 6 months of life are unequivocally recognized. However, mothers should also be aware of the importance of breastfeeding for promoting adequate oral development.
- **CONCLUSIONS:** Non-breastfed children presented significantly greater chances of having anterior open bite compared with those who were breastfed.


Impact in response control, attention and hyperactivity behavior on children with Obstructive Sleep Apnea Hypopnea Syndrome by integrated visual and auditory continuous performance test.

- Children with OSAHS should receive treatment as early as possible so as to reduce the influence on psychology.

Pediatric Sleep Disordered Breathing/Obstructive Sleep Apnea

- Recent studies indicate that mild SDB or snoring may cause many of the same problems as OSA in children.

2014 The American Academy of Otolaryngology—Head and Neck Surgery
How Many Children with ADHD Have Sleep Apnea or Periodic Leg Movements on Polysomnography?

- Although their conclusions differ on the extent to which SDB-linked hyperactivity resembles defined ADHD, they all suggest that mild SDB -- even in the range reflected by an AHI between 1 and 5, and sometimes less -- rather than more severe SDB may be particularly common in children with ADHD compared to controls.

SLEEP 2005: 28(9):1143-1148

Increased Behavioral Morbidity in School-Aged Children With Sleep-Disordered Breathing

Conclusions: Children with relatively mild SDB, ranging from primary snoring to OSA, have a higher prevalence of problem behaviors, with the strongest, most consistent associations for externalizing, hyperactive-type behaviors.

Pediatrics

Usefulness of adenotonsillar size for prediction of severity of obstructive sleep apnea and flow limitation.

- Conclusion: Tonsil/adenoid size did not predict the severity of AHI. Nevertheless, adenoid size might be related to lowest oxygen saturation, which is thought to be related to subjective symptoms.


A Clinical Overview of Sleep and Attention-Deficit/Hyperactivity Disorder in Children and Adolescents

- The severity of neurobehavioral and neurocognitive deficits does not appear to be “dose-dependent”, suggesting that disease severity alone does not account for the extent of impairment.


Pediatric obstructive sleep apnea and the critical role of oral-facial growth: evidences

- In summary, premature infants as well as some full-term infants present with abnormal oral-facial features, particularly a high and narrow hard palate. These findings are associated with oral-facial hypotonia. Systematic follow-up to 36 months of age indicates persistence of abnormal tongue position and abnormal breathing, with presence of mouth breathing.

Front. Neurol., 22 January 2013

"Sleep Disordered Breathing in a Population-Based Cohort: Behavioral Outcomes at 4 and 7 Years."

- Even among children whose sleep-breathing difficulties were worst before 18 months and then disappeared on their own, there was a 40 to 50 percent greater likelihood they would have behavioral problems when they were 7 years old.

Pediatrics March 5, 2012 Bonuck, Freeman, Chervin, Xu
A Clinical Overview of Sleep and Attention-Deficit/Hyperactivity Disorder in Children and Adolescents

➢ 50% of children initially meeting criteria for ADHD no longer did so one year after adenotonsillectomy.


Critical role of myofascial re-education in pediatric sleep-disordered breathing.

➢ Limited studies suggest that pubertal development may lead to a recurrence of sleep-disordered breathing (SDB) despite previous curative surgery.

➢ Conclusion: Myofunctional therapy is rarely considered in the treatment of pediatric SDB. Absence of myofascial treatment is associated with a recurrence of SDB.


Myofunctional Therapy to Treat Obstructive Sleep Apnea: A Systematic Review and Meta-Analysis

➢ A total of 2 pediatric studies (25 patients, age 8.4±3.1 years)

➢ At the 4-year follow-up: (post A&T and/or RPE)

The children who practiced Myofunctional Therapy in the long-term remained cured of OSA (AHI 0.5±0.4), compared to children who were never trained to perform the exercises and subsequently had a recurrence of OSA (AHI 5.3±1.5/h)

The searches were performed through June 18, 2014. To be published in Sleep

CONCLUSIONS:

In children with nasal obstruction, RME not only reduces nasal obstruction but also raises tongue posture and enlarges the pharyngeal airway.


Symptoms of sleep disorders, inattention, and hyperactivity in children

➢ The association of snoring with inattention and hyperactivity suggests that Sleep Related Breathing Disorders (SRBD) and perhaps other sleep disorders could be a cause of inattention and hyperactivity in some children. If a causal effect is present, our data suggest that 81% of habitually snoring children who have ADHD—25% of all children with ADHD—could have their ADHD eliminated if their habitual snoring and any associated SRBD were effectively treated.

Sleep. 1997 Dec;20(12):1185-92

Snoring, Intermittent Hypoxia and Academic Performance in Primary School Children

➢ Snoring "always" was significantly associated with poor academic performance in mathematics, science, and spelling. Snoring "frequently" was also significantly associated with poor academic performance in mathematics and spelling. Thus, habitual snoring (i.e., snoring frequently or always) was associated with poor academic performance in these primary school children.

Habitual Snoring, Intermittent Hypoxia, and Impaired Behavior in Primary School Children

**Conclusions:** We suggest that impaired behavior is a key feature of habitual snoring independent of intermittent hypoxia and improves when habitual snoring ceases.

_Pediatrics_ 2006

Snoring During Early Childhood and Academic Performance at Ages Thirteen to Fourteen Years

**Conclusions:** Children with lower academic performance in middle school are more likely to have snored during early childhood and to require T&A for snoring compared with better performing schoolmates. These findings support the concept that SDB-associated neurocognitive morbidity may be only partially reversible or that a learning debt may develop with SDB during early childhood and hamper subsequent school performance.

_Pediatrics_

Oropharyngeal Exercises to Reduce Symptoms of OSA after TA

**Conclusions:** Oral pharyngeal exercises may be considered as complimentary therapy to adenotonsillectomy to effectively treat pediatric OSA.

Sleep Breathing, May 16, 2014

Orthodontics and sleep-disordered breathing

**Conclusion:** There is also an absolute need to send the child to a muscle re-education specialist to reposition the tongue.

Sleep Breath Editorial 4 May 2011 Chad M. Ruoff & Christian Guilleminault

Causal relationship between malocclusion and oral muscles dysfunction: a model of approach

**Conclusion:** Atypical swallowing is very common and, if it is not corrected early, can cause alterations in the development of the stomatognathic apparatus. For this reason, Myofunctional therapy can be a useful adjuvant treatment to orthodontics in subjects with Myofunctional dysfunction.

European Journal of Pediatric Dentistry vol. 13/4-2012

Rapid Maxillary Expansion for the Treatment of Nasal Obstruction in Children Younger Than 12 Years

**Conclusion:** In cases of maxillary constriction and nasal airway obstruction, RME has proved to be efficient for the improvement of nasal respiration in children via a widening effect on the nasopharyngeal cavity.

Archives of Otolaryngology Head and Neck Surgery January 2009
Rapid Maxillary Expansion Effects on Nocturnal Enuresis in Children A Follow-up Study

**Results:** Positive effects of RME were observed in nearly 50% of the patients within 1 month of treatment: six were completely dry and five had notable improvements.

**Conclusion:** Orthodontic RME is a new option for treating children with NE who are resistant to medical therapy; the treatment has no adverse side effects.


Myofunctional Therapy to Treat Obstructive Sleep Apnea: A Systematic Review and Meta-Analysis

**Conclusion:** Current literature demonstrate that Myofunctional Therapy decreases AHI by approximately 50% in adults and 62% in children. Lowest oxygen saturations, snoring and sleepiness outcomes improve in adults. Myofunctional therapy could serve as an adjunct to other OSA treatments.

The searches were performed through June 18, 2014. Sleep

Towards Restoration of Continuous Nasal Breathing as the Ultimate Treatment Goal in Pediatric Obstructive Sleep Apnea

- **Mouth breathing** is associated with altered oral-facial muscle activity and oral-facial growth. As such, its persistence is never normal.

Pediatr Neonatol Biol 6th September 2014

Towards Restoration of Continuous Nasal Breathing as the Ultimate Treatment Goal in Pediatric Obstructive Sleep Apnea

- We believe elimination of oral breathing, i.e., restoration of nasal breathing during wake and sleep, may be the only valid “finish line” in pediatric sleep disordered breathing.

Pediatr Neonatol Biol 6th September 2014

"Sleep Disordered Breathing in a Population-Based Cohort: Behavioral Outcomes at 4 and 7 Years."

- In many cases, the doctor will simply ask parents, ‘How is your child sleeping?’
- Physicians need to specifically ask parents whether their children are experiencing one or more of the symptoms: snoring, mouth breathing or apnea.

Pediatrics March 5, 2012 Bonuck, Freeman, Chervin, Xu

Pediatric Screening Questionnaire

- Does your child snore?
- Does your child grind their teeth at night?
- Does your child have ADHD?
- Does your child have bed wetting issues?
- Does your child sleep sitting in bed while resting their head on a pillow?
- Does your child sleep in awkward positions with their neck extended?
- Is your child a mouth breather?
- Does your child have consistent dark shadows under their eyes?
- Does your child consistently chew with their mouth open?
Thank You