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Myofunctional Analysis and its Role in Dental Assessments and Oral Health

A Peer-Reviewed Publication
Written by Paula Fabbie, RDH, BS

Abstract

Dental healthcare professionals are encouraged to assess orofacial myofunctional disorders (OMDs) in their patients. Interest in myofunctional therapy by sleep experts is compelling dental healthcare professionals to revisit the evaluation of myofunctional disorders. Many dental offices pay little attention to orofacial myofunctional disorders (OMDs) and the role they play in airway, dentofacial growth and development and overall health. Professional dental programs that once required clinicians to recognize and treat OMDs have been abandoned. Resurgence in the identification and treatment of these disorders by sleep experts are encouraging the re-education of dental professionals in assessment and treatment of myofunctional disorders.

Educational Objectives

At the conclusion of this educational activity participants will be able to:

1. Define orofacial myofunctional disorders.
2. Discuss the origins of orofacial myofunctional therapy (OMT) and its role in dentistry today.
3. List the signs that may indicate the presence of an orofacial myofunctional disorder.
4. Identify the basic components of orofacial myofunctional therapy and parameters that are required for success.

Author Profile

Paula has enjoyed over thirty years of practice in clinical dental hygiene. Myofunctional therapy was first introduced during her dental hygiene education. She currently operates Paula Fabbie LLC, where she teaches children and adults with orofacial myofunctional disorders on improving proper rest postures and oral functions. As part of a team approach, she works closely and consults with referring dentists and physicians.
Paula has taught continuing education courses to dentists, hygienists, and physicians, and other healthcare professionals here and abroad. Her prime focus is on early identification and treatment of myofunctional disorders and how they relate to overall health. Paula can be reached at tonguetutor@gmail.com.

Author Disclosure

Paula Fabbie has no potential conflicts of interest to disclose.

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Dental healthcare professionals are encouraged to assess orofacial myofunctional disorders (OMDs) in their patients. Interest in myofunctional therapy by sleep experts is compelling dental healthcare professionals to revisit the evaluation of myofunctional disorders. Many dental offices pay little attention to orofacial myofunctional disorders (OMDs) and the role they play in airway, dentofacial growth and development and overall health. Professional dental programs that once required clinicians to recognize and treat OMDs have been abandoned. Resurgence in the identification and treatment of these disorders by sleep experts are encouraging the re-education of dental professionals in assessment and treatment of myofunctional disorders.

Introduction

Dental healthcare professionals need to be evaluating orofacial myofunctional disorders (OMD) in patients early during their development, and they need to be knowledgeable in recognizing the presence of OMDs. Negative dentofacial growth can be attributed to OMD. Improper facial growth and development can contribute to a restricted upper airway and associated sleep disorders. Form and function are interdependent. Delay in addressing the primary etiology may lead to orthodontic re-treatment and the possible need for surgical realignment of the jaws. Indeed every pediatric patient deserves the same scrutiny, regardless of the reason for consultation, and regardless of the dental setting or specialty. In general dental practice, the patient should receive the appropriate referral when there is a problem that needs to be addressed. Not every dentist is comfortable addressing OMDs that can lead to malocclusion and improper facial growth. Most orthodontists prefer to see the patient for a consult at age 7. However, this may be too late to achieve optimal results. Experts agree that 60-70% of facial growth is complete at age 7.[4] Continuing education courses on identifying sleep problems in children and adults are available to dental health professionals. Early identification and timely treatment of OMD may diminish the risk factors for sleep disordered breathing. Eliminating OMD and establishing proper rest postures assist in achieving long lasting orthodontic and restorative dental treatment outcomes.

History of Orofacial Myology and its Dental Origins

Orofacial myology is defined by Hanson and Mason as the study of the normal and abnormal patterns of use of the mouth and face and their relationships with dentition, speech and vegetative functions. The term orofacial myofunctional disorders refers to a collection of oral patterns that are variably related to psychological and physiological factors. The tongue thrust swallow is the most commonly identified orofacial myofunctional disorder by dental and speech professionals.[1] (Figure 1)

Orofacial myofunctional therapy (OMT) is used to re-pattern orofacial functions such as chewing, the oral phase of swallow, and to promote nasal breathing. Therapy also treats non-nutritive sucking, nail biting, and open mouth and other rest postures. (Figures 2 and 3) [2]

Orofacial myofunctional therapy in orthodontics dates back to the early 1900's and is attributed to Alfred Paul Rodgers, DDS. In the 1960's Walter Straub, an orthodontist, developed a method for reeducating atypical swallowing.[3] Hansen wrote; orofacial myofunctional therapy came into existence because orthodontists found their work being thwarted and undone by improperly functioning oral musculature. Their efforts to produce improved teeth and faces were being blocked by hostile tongues and incompetent lips. Hanson went on to explain that anything that promotes mouth breathing including hypertrophic adenoids and swollen nasal membranes are responsible for a restricted airway and tongue thrusting in many children.[1] (Figures 4 and 5)

Orthodontists are aware of the harm caused by myofunctional disorders. The text Contemporary Orthodontics states, "Because of rapid growth exhibited by children during the primary dentition years, it would seem that treatment of jaw discrepancies by growth modification should be successful at a very early age. If treated from ages 4-6 when rapid growth occurs, significant improvements in skeletal discrepancies can be accomplished in a short period of time: It was concluded; "stability of these results are dependent on eliminating OMDs and establishing harmonious muscle function." [4]

Mouth breathing has a significant impact on dentofacial development and overall health. Studies on mouth breathing by Harvold in the 1970's revealed the harmful effects of mouth breathing. Researchers inserted latex plugs into the nasal openings of young rhesus monkeys to evaluate changes in the dental structure, forcing the monkeys to switch from nasal breathing to mouth breathing. To compensate for the inability to breathe through the nose, the monkeys developed postural changes, which were then followed by soft tissue changes. The craniofacial muscles then caused various malocclusions, including retrognathia, prognathism and anterior open bites, when forced by the new functional demand. The interaction between oral and facial structural growth and muscle activity starts early in development and continues through childhood. Chronic oral breathing is an important clinical marker of orofacial muscle dysfunction, which may be associated with palatal growth restriction, nasal obstruction, and/or a primary disorder of mus-

Figure 1.
Open bite and constricted dentition.

Figure 2.
Habit contributing to improper oral postures.

Figure 3.
Anterior open bite, high narrow vault.

Figure 4.
Cephalometric x-ray of patient in Figure 1 showing tonsil and adenoid hypertrophy and restricted airway.

cular or connective tissue dysfunction. It is easily documented during sleep. [5]

Stanford pediatric sleep researchers concluded in a 2014 study, "Treatment of pediatric obstructive-sleep-apnea (OSA) and sleep-disordered-breathing (SBD) means restoration of continuous nasal breathing during wakefulness and sleep; if nasal breathing is not restored, despite short-term improvements after adenotonsillectomy (T&A), continued use of the oral breathing route may be associated with abnormal impacts on airway growth and possibly blunted neuromuscular responsiveness of airway tissues. Elimination of oral breathing, i.e., restoration of nasal breathing during wake and sleep, may be the only valid end point when treating OSA. Preventive measures in at-risk groups, such as premature infants, and usage of myofunctional therapy as part of the treatment of OSA are proposed to be important approaches to treat appropriately SDB and its multiple co-morbidities." [6]

In Dental Clinics of North America, Josel described how habits influence facial growth, oral function, occlusal relationships and facial esthetics of the child. [7]

Orofacial myofunctional disorders may include the following:

- Nasal insufficiency
- Nasal pharyngeal obstructions that contribute to open mouth posture
- Improper rest postures of the lips, tongue
- Predominant oral breathing
- Tongue thrusting tendencies
- Lip incompetency

Signs that an OMD may be present:

- Oral breathing, lymph tissue hypertrophy, nasal obstruction
- Non-nutritive sucking, nail biting, mouth propping
- Low forward tongue posture
- Ankyloglossia and lip tie
- Inability or difficulty with breast feeding
- Drool
- Narrow, crowded dental arches
- Scalloped tongue
- High Mallampati or Friedman score which predict ease of intubation and sleep apnea. (Figure 6)
- Snoring
- Difficulty swallowing pills
- Crossbites
- Forward head posture and or slumped shoulders
- Head tilted upward
- Jaw shift during oral functions
- Tongue sucking, object sucking
- Bruxism, parafunctional habits
- Temporal mandibular joint disorders
- History of obstructive sleep apnea and associated comorbidities

- History of low muscle tone
- Craniofacial and neuromuscular disorders

Tongue and lip tie

Ankyloglossia, a birth defect, is a contributing factor to myofunctional disorders. (Figures 7, 8, 9) Lactation consultants and pediatricians are assisting with identifying tongue and lip tie. It fosters a low forward tongue posture, is attributed to difficulty with breastfeeding and swallowing, doesn't allow the palate to develop, affects the airway during sleep, and harnesses the tongue's ability to function properly during eating and when cleaning teeth.[2,8]

Ideally, the best time to address these defects is shortly after birth. In many instances, an ankylosed low forward tongue and tongue thrust may be blamed for moving the natural teeth adjacent to implant restorations creating open contacts and food impaction.[9] Dentists are becoming increasingly aware of parafunctional habits that go undetected and therefore untreated. These harmful habits undermine the longevity and appearance of dental restorations. Immediately following revision of lingual frenectomy, OMT rehabilitation of the lingual musculature is advised in addition to a physiotherapist/osteopath collaboration. According to researchers, clinical and functional criteria for surgical intervention of ankyloglossia include: [8]

- Breastfeeding difficulties
- Speech impediment
- Atypical swallow
- Inability to sweep upper, lower lips
- Limitation of the tongue to reach palatal retroincisal spot when the mouth is wide open
- Shape of the tongue, distortion and/or invagination at the tongue tip during protrusion
- Postural alterations; altered postures may be present due to the interconnectedness of the tongue, bone and facial structures of the head and torso

Orthodontic observations that may be related to tongue and lip restriction

- Possibility of anterior or posterior crossbite development, where growth of the upper arch is not stimulated (transverse or sagittal)
- Possibility of open bite due to improper tongue rest posture
- Inadequate labial seal and tendency to mouth breathe
- Possible opening of diastema from low resting posture of the tongue, [8] restrictive maxillary lip frenum and resulting diastema

Basic Goals of Myofunctional Therapy [2]

1. Clinical assessment: Identifying and treating etiologies utilizing a team approach
2. Treatment

- Restoring proper oral rest posture
- Re-patterning of facial muscles

Figure 5.
Tonsil obstructing airway in a 12 year old diagnosed with OSA.

- Teaching proper chewing and swallowing

A Team Approach

In 2006, a study on tongue thrust stated that by assessing the child's habits and improper rest postures, a customized exercise program can be developed that addresses and retrains the dysfunctional muscle patterns at rest and during function. A team approach that includes the dentist, orthodontist, myofunctional therapist, speech pathologist and otolaryngologist along with other healthcare professionals as indicated will ensure the best outcomes. Treatment by the myofunctional therapist can begin as early as early as age five. Tongue thrusting and other OMDs have been associated with posterior crossbites, anterior open bites, excessive overjet, retruded jaws as well as speech issues. The researchers went on to say; "Orofacial myofunctional therapy has been shown to produce improved outcomes over orthodontic habit trainers." [10]

Results of a 2010 study by Smithpeter and Covel show a clear difference between the outcomes of subjects with anterior open bites when treated with orthodontics alone compared with those treated with orthodontics and OMT. Orofacial myofunctional therapy, when combined with orthodontics was efficacious in closing and maintaining closure of dental bites in Angle Class I and Class II malocclusions, and it dramatically reduced the relapse of open bites in patients who had forward tongue posture and tongue thrust. They went on to say, correcting low forward tongue posture and tongue thrust swallows minimized the risk of orthodontic relapse.[11]

What needs to be considered for successful myofunctional therapy outcomes?

Roadblocks to successful OMT treatment must be considered. Saccomanno et al found that success of treatment can be granted only if the following are obtained:

- Patient compliance and parental support
- Removal of all negative factors able to affect the success of the treatment (i.e. maxillary contraction, short lingual frenum)
- Cooperation between orthodontist and myofunctional therapist

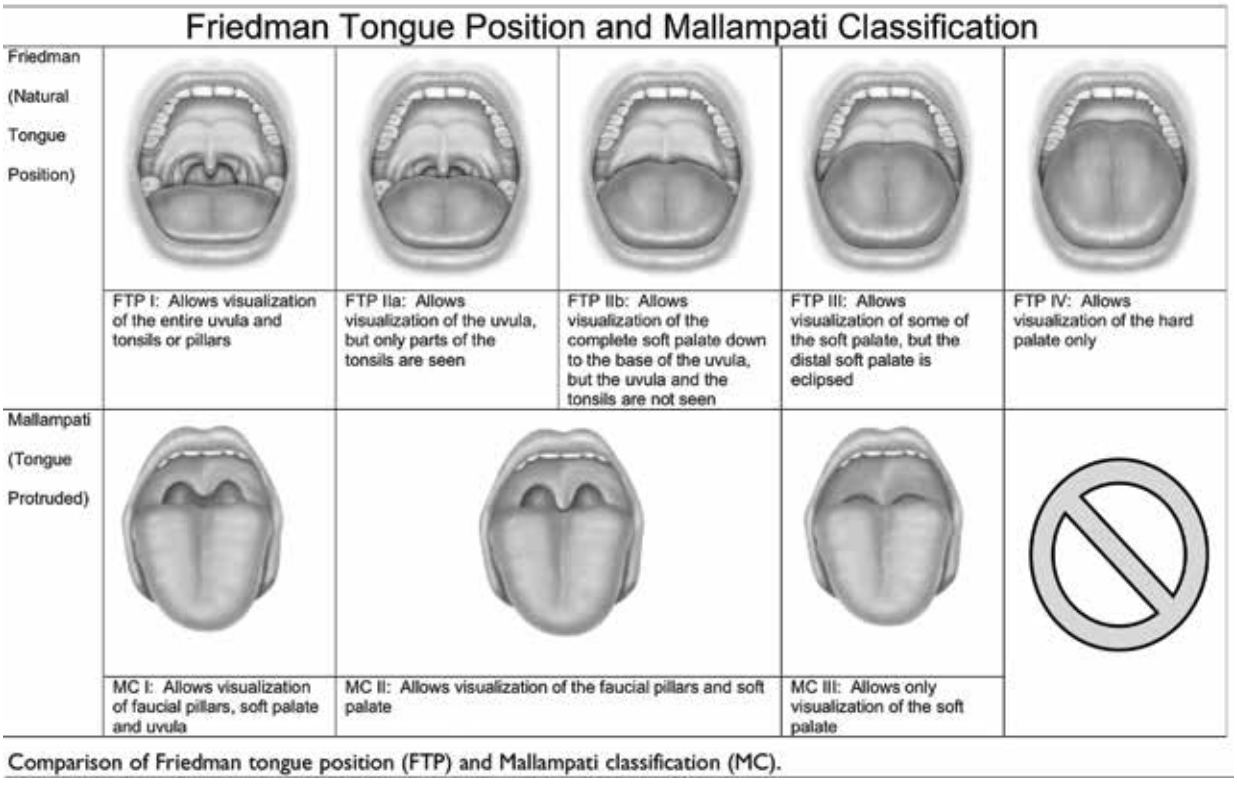

Figure 6.
Tongue position classifications.

- Cooperation among medical staff whenever interdisciplinary treatment is required
- Resolution of related pathologies (i.e. maxillary contraction, short tongue frenum, oral breathing caused by adenoids and/or tonsillar hypertrophy)

Moreover, correct diagnosis and treatment timing are important to achieve optimal therapeutic results. [12]

Orthodontic treatment can coincide with OMT. Many functional orthodontic appliance therapies such as, DNA appliance ®, Alternative Lightwire Functionals (ALF), Biobloc Orthotropics and Homeoblock™, utilize OMT to assist in creating harmonious muscle function and elimination of OMD. Osteopathic physicians also play an important role when addressing structural issues and nutritional support during orthodontics and OMT. When OMDs aren't addressed, dental treatment options are often time-consuming and costly. Patients become dissatisfied when the prescribed treatments have produced little improvement. OMD screenings in dental settings may provide an opportunity to address issues that can affect appearance, dental health, overall health and school performance. Sleep dentistry is now looking at the tongue, facial and upper airway development and how it affects sleep, as well as the impact of sleep-disordered breathing on overall health, cognitive behavior and learning issues.

Figure 7.
Lingual frenectomy pre-op, in an 8 yr. old with obstructive sleep apnea.

Implementing OMD screening as part of a team approach to improve overall health

Enlisting the dental and medical team provides the best outcomes. Oral health is being integrated into healthcare. Professional boundaries are being blurred by standard of care. People are seeking dental care once or twice per year and may only visit their medical provider when there is a medical problem. A relationship established between dental healthcare professionals and their patients can span many years.

The American Academy of Pediatric Dentistry in 2013 revised their guidelines on periodic examinations. These guidelines were designed to help practitioners make clinical decisions. "Anticipatory guidance is a way for practitioners to provide practical and developmentally-appropriate information about the child's health. Non-nutritive oral habits that include digit and object sucking, bruxism, abnormal tongue thrusting and nail biting should be addressed before the malocclusion or skeletal dysplasia occurs. Deficiencies and abnormal delays in speech can be recognized, and care coordinated using dental appliances and professional speech and language intervention. From age two to adolescents it is advised to provide treatment or appropriate referral for treatment of non-nutritive habits. Treatment of developing malocclusion is an integral part of comprehensive pediatric dental care. Intervention to improve the dental structure will assist with achieving occlusal harmony, proper oral functions and dentofacial esthetics. Objectives for intervention and treatment include: reversing adverse growth, prevention of skeletal and dental disharmonies, improving esthetics, self-image and improving the dental occlusion." [13]

Risks for heart disease, diabetes, difficult childhood behavior and attention issues, inadequate sleep, poor self-esteem can be increased when orofacial myofunctional disorders go undetected and are overlooked. "Many healthcare professionals are increasing their awareness and understanding of orofacial myofunctional disorders, TMD, respiration, and sleep apnea's impact on the oral facial environment and total health." [14]

Otorhinolaryngologists perform upper airway evaluations to address nasal insufficiency and lymphatic tissue hypertrophy prior to the start of OMT when obstructions are suspected to impair OMT results. Physicians that focus on sleep, airway and allergies are working alongside dentists and other healthcare professionals.

The emergence of dental sleep medicine and orthodontics

Dental sleep medicine brings these medical issues into the dental office. Many dental offices have incorporated dental sleep medicine into their practice. [15] Upper airway imaging has allowed us to begin to understand the biomechanical bases for OSA and mouth breathing. (Figure 10) Imaging of the upper airway forms an essential tool in the field of orthodontics. It is recognized that naso-respiratory function and its relation to craniofacial growth is of great interest not only for orthodontists, but also for pediatricians, otorhinolaryngologists, speech pathologists, and other members of the healthcare community. Nasal airway function has been implicated as an etiological factor in dentofacial development (Figure 11). Craniofacial form and function should be managed closely particularly during the early ages of growth and development. In cases of impeded airway it is important to recognize the disfigurement and take adequate steps to achieve harmony and facial balance in conjunction with the restoration of the physiologic functions. Sharma et al. detail how different methods of measuring the upper airway can be utilized to evaluate growth of the craniofacial structures and assist with treatment planning. [16]

Figure 8.
Lingual frenectomy one month post-op and after OMT exercises.

Figure 9.
Maxillary labial frenum affecting lip rest posture, midline diastema.

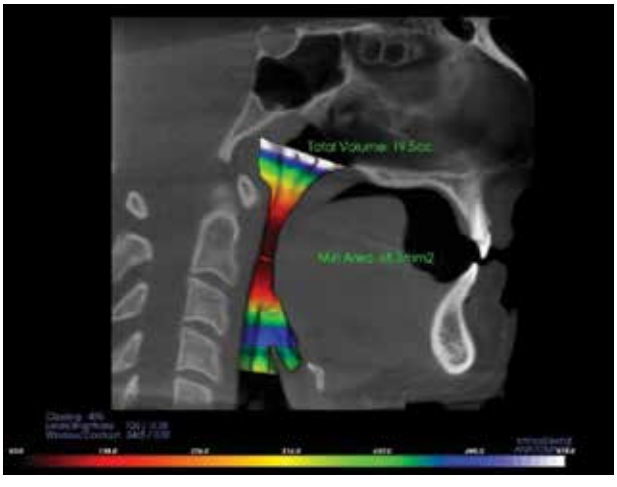

Figure 10.
CBCT imaging software program mapping constricted oropharyngeal airway.

Figure 11.
Mouth breathing, lip incompetence and nasal insufficiency.

Figure 12.
Scalloped tongue in patient with sleep apnea.

Figure 13.
Scalloped tongue, OSA and periodontal disease

Orthodontists collaborated to create the Orthodontic Sleep Apnea Clinical Advisory Team, after their lives were personally affected by OSA. In "Orthodontic Strategies for Sleep Apnea," one of the authors, Quintero, describes how through CBCT his 8-year-old son was diagnosed with severe airway obstruction. The medical team involved missed the etiology. Combined treatment of ENT surgery and orthodontic treatment greatly improved the upper airway volume. Carlyle et al. developed a comprehensive educational course that provides an evidence-based system to implement sleep apnea treatment in the orthodontic practice. The educational goal is to broaden the scope of the orthodontic practice to screen effectively, test and treat patients for OSA. [17] A clinical sign that may indicate sleep apnea is scalloping of the borders of the tongue. (Figures 12, 13)

Screening can start with the dental hygienist taking the medical history and asking parents specific questions regarding their child's sleep. Dental hygienists as oral health educators have a unique opportunity to assess the deviations from normal that may alert the dentist that a sleep referral is indicated. Questionnaires such as Epworth, STOP BANG and BEARS can be provided to patients. Many dental offices are integrating parts of these forms in their medical histories. Dental software programs have areas in exam modules that assist with gathering data regarding myofunctional issues and patients' habits. The user is prompted to evaluate tongue habits, lip habits, speech, nail biting, thumb/finger sucking, gum chewing, teeth grinding/clenching, cheek biting, tongue thrusting, mouth breathing, and a place to write in other patient habits.

The American Dental Association claims that medical screenings for hypertension, diabetes, and high cholesterol in a dental office could save $102 million a year. [18]

Sleep disorders have been estimated to affect 50-70 million Americans and have been linked to increased risk for hypertension, diabetes, obesity, depression, heart attack and stroke. [19]

The risk of a serious car accident increases when the operator is sleepy. Teenage drivers who are sleep deprived are at an increased risk. Hundreds of billions of dollars are spent each year in medical costs related to sleep disorders.[19] Dental sleep medicine brings these medical issues into the dental office.

What impact does sleep-disordered breathing have on children? In children, snoring, mouth breathing and obstructive sleep apnea can negatively affect behavior and ability to pay attention.

In a large, multi-year cohort study, it was shown that in children 6 months to 7 years of age, snoring, obstructive sleep apnea and mouth breathing contribute to neurobehavioral morbidity, including greatly increased risk of ADHD, peer to peer behavior problems, increased aggression and anxiety. [20]

Researchers from Sanford University have published an article that addresses the relationship between OMD and sleep disordered breathing. "The importance of early recognition and treatment in children is paramount to maximizing resolution of symptoms and potential avoidance of OSA syndrome during adulthood. Adenotonsillectomy, palatal expansion and the ad-

dition of myofacial reeducation may play a role in the treatment for sleep-disordered breathing. Tonsil and adenoid hypertrophy, maxillary or mandibular deficiency, orthodontic complications, and craniofacial abnormalities all contribute to these sleep issues."[21]

Many adults with obstructive sleep apnea have long standing OMD and sometimes overlook these problems in their children. A 2003 study by Jaghagen examined snoring, sleep apnea and swallowing dysfunction. This study's results were explained by Dr. Brian Palmer on his website. "Swallowing dysfunction has been found to be more than seven times as frequent among patients with snoring and sleep apnea as it was among controls" [22] (Palmer, 2013). It is frequently observed in practice that patients with sleep-disordered breathing have low forward postured tongues and exhibit tongue thrust swallows. In the 2003 International Journal of Orofacial Myology, Paskay wrote; "The genioglossus muscle (GG) is the most important muscle for airway patency at night and suffers the greatest physiologic damage during OSA. The GG is also the main muscle trained by orofacial myologists in tongue repositioning." She continues; "Orofacial myologists have much to gain from research on muscle behavior during sleep. It could open the door for an interesting and fruitful collaboration, similar to one that already exists between orofacial myologists and orthodontists." [23]

New evidence tells us that there is so much more involved with tongue thrust, non-nutritive sucking and poor rest postures. Pediatric sleep experts are looking at improper facial and jaw growth that has an impact on the upper airway. "These improper rest postures and noxious habits may play a role in the development of sleep-disordered breathing and obstructive sleep apnea. The presence of snoring in a child should be addressed according to Pediatric Clinical Guidelines. Family history of OSA and disruptive snoring is commonly found among children who exhibit these symptoms." [24]

Some dentists are considering holding off on complex orthodontic, implant and prosthetic cases until they are assured that there is adequate room for the tongue, a patent nasal airway, healthy temporal mandibular joints and no orofacial myofunctional disorders. "These concerns must be addressed during the treatment-planning phase. The size of the tongue and parafunctional tongue habits must be evaluated. Lateral and frontal tongue thrusts can displace natural teeth as well as certain types of implants." [9]

OMD, OSA and TMD

Sleep deprivation and sleep-disordered breathing (SDB) have profound effects on stage three restorative sleep, which is necessary for repair and regeneration of musculoskeletal tissue, as well as on rapid eye movement (REM) sleep that is needed for well-being and memory consolidation. SDB also profoundly affects tissue inflammation, hypoxia and reperfusion, oxidative stress and endothelial dysfunction, all of which impact the TMJ, muscles of mastication, and general well-being of the patient. AIRWAY CENTRIC TMJ is a new philosophy in dentistry. Ideal health, wellness and brain development depend on an open pharyngeal airway, nasal breathing and restorative sleep. This requires a partnership between the ENT, pulmonologist, lactation consultant, myofunctional therapist, obstetrician/gynecologist, osteopath, chiropractor and physical therapist. [25]

Many adults with sleep apnea will want their children's sleep and airway issues assessed and addressed. Current continuing education courses in airway orthodontics and dental sleep medicine have increased dentists' interest in myofunctional therapy. Screening for OMD in children can easily be included during routine exams. Dental patients can benefit from assessing OMD early and providing adequate treatment at the proper time. Screening for orofacial myofunctional disorders and associated comorbidities will assist with providing our dental patients with a level of care that ensures dental and overall health.

References

1. **Hanson ML, Mason RM.** *Orofacial Myology International Perspectives.2003* Springfield : Charles C. Thomas
2. **Moeller JL, Paskay LC , Gelb ML.** Myofunctional Therapy A Novel Treatment of Pediatric Sleep-Disordered Breathing. *Sleep Medicine Clinics.* 2014,9 : 235-43.
3. **Levrini A,** *Historical review of Orofacial Myofunctional Therapy.* Florence,Italy : s.n., 2007. IAOM-35th International Meeting,"Renaissance in Orofacial Myology"
4. **Proffit W R.** *Contemporary Orthodontics.* 3rd. St. Louis : Mosby, 2000.
5. **Jefferson Y.** Mouth breathing: Adverse effects on facial growth,health academics, and behavior. *General Dentistry.* 2010 Jan 8:7 18-25.
6. **Guilleminault C, Sullivan SS.** *Toward Restoration of Continuous Nasal Breathing as the Ultimate Treatment Goal in Pediatric Obstructive Sleep Apnea.* s.l. 2014 Enliven:Pediatr Neonatol Biol 1(1):001.
7. **Josell SD.** *Habits affecting dental and maxillofacial growth and development.*., Dental Clinics North America, 1995 Oct;39(4): 851-60.
8. **Olivi G, Signore M,Olivi M, Genovese.** Lingual Frenectomy: Functional evaluation and new therapuetical approach. *European Journal OF Paediatric Dentistry.* 2012 Jun;13(2):101-6.
9. **Mills E.** A Clinical Method for the Diagnosis and Treatment Planning of Resorative Dental Patients. *Journal of Oral Implantology.*2002,Jun,vol.28(3): 122-7.
10. **Eslamian L, Leilazpour AP.** *Tongue to palate contact during speech in subjects with and without a tongue thrust.* European Journal of Orthodontics 2006 Oct;28(5):475-9.
11. **Smithpeter J, Covell J.** *Relapse of anterior open bites treated with orthodontic appliances with and without orofacial myofunctional therapy.* American Journal of Orthodontics and Dentofacial Orthopedics, 2010 vol.137(5): 605-14.
12. **Saccamanno S, Antonini G, D'Altri L, D'Angelantantonino M, Fiorita A, Deli R,** *Causal Relationship Between Malocclusion and Oral Muscles Dysfunction: A Model Approach.* European Journal of Paediatric Dentistry.2012Dec;13(4):321-3.
13. **The American Academy of Pediatric Dentistry.** Guidelines on periodicityof Examination, Preventive Denatl Services,Anticipatory Guidance/Counseling, and Oral Treatment for Infants, Children and Adolescents. *Clinical Guideline.* 2013 v35/No6:114-22.
14. **Benkert K.** *The Function-Junction: Using natures bio-adaptibility of hard and soft tissues.* JAOS, 2012;May-June;28-40.
15. **Swecker T, Schroder J.** Sleep Apnea Screening in the Dental Office. *Dimensions in Dental Hygiene.* 2014 Jan;12(1): 42-6.
16. **Sharma K, Shrivastav S, Hotwani K, Murell M.** Orthodontic Airway Imaging; The cutting edge in treatment planning. *General Dentistry.* 2014 July-August;62(4) 54-9.
17. **Carlyle TD, Churma L, Damon PL, Diers N, Paquette D,**

Quintero JC. Orthodontic Strategies for Sleep Apnea. *Orthodontic Products.* 2014 April/May; 68-77.
18. **Goldie MP.** RDH e Village. *The Dentistry IQ Network.* [Online] March 21, 2014. [Cited: March 22, 2014.] www.dentistryiq.com/articles/2014/03/are you screening.html?sponsored=topic9.
19. **Commitee On Sleep Medicine and Research.** *Sleep Disorders and Sleep Deprivation: and Unmet Public Health Problem.* Washington, DC : The National Academies of Sciences, 2006.
20. **Bonuck K, Rao T, Xu,L.** Pediatric Sleep Disorders and Special Education Need at 8 Years: A Population-Based Cohort Study. *Pediatrics.* 2012;130(4):634-42.doi 10.1542/peds.2012-0392.Epub2012 Sep3
21. **Guilleminault C , Huang YS.** *Crtical role of myofacial reeducation in pediatric sleep-disordered breathing.* Sleep 2013,http://dx.doi.org/10.1016/j.sleep.2013.01.013.
22. **Palmer B.** Brian Palmer,DDS, For Better Health. [Online] 2013. [Cited: March 6th, 2013.] www.brianpalmerdds.com/pdfsection_C
23. **Paskay LC.** *Oral Structures and Sleep Disorders: A literature review.*, International Journal of Orofacial Myology.2003 Nov;15-28.
24. **Midell J, Owens, J.** *A Clinical Guide to Pediatric Sleep.* Philadelphia : Lippincott Williams & Wilkins, 2010.
25. **Gelb M L.** Airway Centric TMJ Philosophy. *California Dental Association Journal.* 2014 Aug; 42(8):551-62.
26. **Paskay LC.** OMD Orofacial Myofunctional Disorders Assessment, Prevention, and Treatment. *Journal of the American Orthodontic Society.* 2012 Mar;74-80.

Author Profile

Paula has enjoyed over thirty years of practice in clinical dental hygiene. Myofunctional therapy was first introduced during her dental hygiene education. She currently operates Paula Fabbie LLC, where she teaches children and adults with orofacial myofunctional disorders on improving proper rest postures and oral functions. As part of a team approach, she works closely and consults with referring dentists and physicians.

Paula has taught continuing education courses to dentists, hygienists, and physicians, and other healthcare professionals here and abroad. Her prime focus is on early identification and treatment of myofunctional disorders and how they relate to overall health. Paula can be reached at tonguetutor@gmail.com.

Author Disclosure

Paula Fabbie has no potential conflicts of interest to disclose.

Notes

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Questions

1. At what age do experts agree that 60-70% of dentofacial growth is completed?
   a. Age 3
   b. Age 4
   c. Age 7
   d. Age 12

2. The study of myofunctional therapy dates back to the 1900's in conjunction with what other discipline?
   a. Pediatrics
   b. Dental Hygiene
   c. Orthodontics
   d. Otolaryngology

3. Orofacial myofunctional disorders may include or result in which of the following?
   a. Nasal insufficiency
   b. Lip incompetency
   c. Nasal pharyngeal obstructions
   d. All of the above

4. Some signs to look for when assessing OMD's may include which of the following?
   a. Ankyloglossia of the tongue and lip tie
   b. Crossbite
   c. Drooling
   d. All of the above

5. Which of the following may occur if ankyloglossia is not diagnosed and treated at an early age?
   a. A wide maxilla
   b. A low forward tongue posture
   c. A cleft palate
   d. Inability for baby to bottle-feed

6. Problems that can result due to ankyloglossia include:
   a. Inability of the tongue to contact the palate properly
   b. Speech difficulties
   c. Atypical swallowing pattern
   d. All of the above

7. Before a myofunctional assessment and treatment can begin, several things must take place including:
   a. Prophylaxis completed
   b. All dental restorations completed
   c. Speech therapy completed
   d. None of the above

8. The phases of a myofunctional assessment and treatment can include:
   a. Identifying dysfunctions and their etiologies
   b. Using a team approach for diagnosis and collaborative treatment
   c. Restoring proper oral resting postures
   d. All of the above

9. The team approach may include which of the following professionals?
   a. Orthodontist / Dentist
   b. Speech therapist
   c. Otorhinolaryngologist
   d. All of the above

10. When is the proper time to begin a myofunctional therapy program?
    a. When the child has a complete primary dentition
    b. During the mixed dentition
    c. After orthodontics are complete
    d. All of the above

11. Orofacial myofunctional therapy combined with orthodontics has been shown to:
    a. Prevent orthodontic relapse
    b. Encourage low tongue resting posture
    c. Facilitate improved mouth breathing at night
    d. Discourage nasal breathing

12. To obtain an efficient myofunctional therapeutic result, several factors must take place including:
    a. Correcting ankyloglossia after myofunctional treatment is complete
    b. Resolution of related pathologies of tonsils, allergies, and adenoids prior to treatment
    c. Waiting until orthodontic treatment is complete
    d. Assessment of impacted third molars

13. Sleep dentistry is now looking at which of the following factors?
    a. Upper airway development
    b. Facial development
    c. School performance
    d. All of the above

14. Which of the following oral habits most likely will disappear as the child ages and will not have any deleterious effect?
    a. Digit or object sucking
    b. Nail biting
    c. Mouth breathing
    d. None of the above

15. Early intervention objectives for discontinuing non-nutritive sucking can include:
    a. Prevention of dental and skeletal disharmonies
    b. Allows for proper transition from infantile swallow
    c. Improving esthetics and self- image
    d. All of the above

16. The risk for heart disease may be elevated with OMDs as well as:
    a. Pre-term labor
    b. Diabetes
    c. Hypertension
    d. All of the above

17. Sleep disorders may be related to:
    a. Diabetes
    b. Stroke
    c. Depression
    d. All of the above

18. At what age can sleep disordered breathing have an effect on children?
    a. Infancy
    b. Age 7
    c. Puberty
    d. All of the above

19. In children, snoring, obstructive sleep apnea and mouth breathing can contribute to increased risk for:
    a. ADHD
    b. Peer behavior problems
    c. Increased aggression and anxiety
    d. All of the above

20. Orofacial myofunctional therapy came into existence to:
    a. Modernize orthodontic appliances
    b. Reduce dental lab fees
    c. Assist with improved orthodontic outcomes
    d. None of the above

21. Which of the following is correct?
    a. Craniofacial and neuromuscular disorders may include OMD
    b. A child with low muscle tone will grow out of it and not need to be assessed for OMD
    c. Crossbites in primary dentitions will always self correct
    d. Most of the rapid growth of the face occurs at age 12, or when most of the permanent teeth have erupted

22. Which of the following is responsible for tongue thrusting?
    a. Early addition of a variety of solid foods
    b. Anything that promotes mouth breathing
    c. Transitioning to a cup after breastfeeding
    d. None of the above

23. Orofacial myofunctional therapy goals include:
    a. Proper oral phase of swallow
    b. Proper oral rest postures
    c. Promote nasal breathing
    d. All of the above

24. Which of the following is correct regarding ankyloglossia?
    a. Can be corrected only with a scalpel
    b. Can interfere with breastfeeding and facial development
    c. Frenum can be stretched
    d. Does not interfere with myofunctional therapy

25. Tongue thrusting does not contribute to:
    a. Open bites
    b. Over jet
    c. Retruded jaws
    d. None of the above

26. The 2013 American Academy of Pediatric Dentisrty guidelines on periodic dental exams addresses:
    a. Non-nutritive sucking
    b. Abnormal tongue thrusting
    c. Bruxism
    d. All of the above

27. Orthodontist are utilizing CBCT imaging to:
    a. Evaluate growth of the craniofacial tissues
    b. Evaluate impeded upper airways
    c. Look for hypertrophied adenoids and tonsils
    d. All of the above

28. Sleep questionnaires for dental patients include:
    a. Epworth, STOP BANG, BEARS
    b. Mallampati, Friedman
    c. Hanson and Mason
    d. All of the above

29. Which of the following is affected by sleep disordered breathing?
    a. Stage three restorative sleep
    b. Tissue inflammation, hypoxia, oxidative stress and endothelial dysfunction
    c. TMD development
    d. All of the above

30. Which of the following factors concern pediatric sleep experts when assessing the upper airway?
    a. Snoring
    b. Improper facial and jaw growth
    c. Tongue thrust and non- nutritive sucking
    d. All of the above

ANSWER SHEET

Myofunctional Analysis and its Role in Dental Assessments and Oral Health

Name: Title: Specialty:

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Educational Objectives

1. Define orofacial myofunctional disorders.
2. Discuss the origins of orofacial myofunctional therapy (OMT) and its role in dentistry today.
3. List the signs that may indicate the presence of an orofacial myofunctional disorder.
4. Identify the basic components of orofacial myofunctional therapy and parameters that are needed for success.

Course Evaluation

1. Were the individual course objectives met?

Objective #1: Yes No Objective #2: Yes No

Objective #3: Yes No Objective #4: Yes No

Please evaluate this course by responding to the following statements, using a scale of Excellent = 5 to Poor = 0.

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11. Would you participate in a similar program on a different topic?		Yes		No		

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6.	Ⓐ	Ⓑ	Ⓒ	Ⓓ		21.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
7.	Ⓐ	Ⓑ	Ⓒ	Ⓓ		22.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
8.	Ⓐ	Ⓑ	Ⓒ	Ⓓ		23.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
9.	Ⓐ	Ⓑ	Ⓒ	Ⓓ		24.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
10.	Ⓐ	Ⓑ	Ⓒ	Ⓓ		25.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
11.	Ⓐ	Ⓑ	Ⓒ	Ⓓ		26.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
12.	Ⓐ	Ⓑ	Ⓒ	Ⓓ		27.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
13.	Ⓐ	Ⓑ	Ⓒ	Ⓓ		28.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
14.	Ⓐ	Ⓑ	Ⓒ	Ⓓ		29.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
15.	Ⓐ	Ⓑ	Ⓒ	Ⓓ		30.	Ⓐ	Ⓑ	Ⓒ	Ⓓ

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