Myofunctional Therapy
A Novel Treatment of Pediatric Sleep-Disordered Breathing

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KEYWORDS

• Myofunctional • Sleep • Breathing • Nasal • Tongue • Posture • Neuroplasticity • Assessment

KEY POINTS

- Orofacial myofunctional therapy (OMT) is a noninvasive option for the treatment of sleep-disordered breathing (SDB) in children.
- OMT has the potential to become an important alternative to other available nonsurgical treatment modalities.
- Early identification and correction of mouth breathing are recommended as early as the first year of life.
- Removing the tonsils and adenoids does not always change the breathing pattern from oral to nasal, if the habit of mouth breathing has not been corrected.
- Myofunctional therapists use a variety of supportive techniques to promote self-awareness and positive habits and to prevent the dysfunctions that characterize pediatric SDB.

INTRODUCTION

Orofacial myofunctional therapy (OMT) is defined as the treatment of dysfunctions of the muscles of the face and mouth, with the purpose of correcting orofacial functions, such as chewing and swallowing, and promoting nasal breathing. OMT has been used for many years to repattern and change the function of the oral and facial muscles and to eliminate oral habits, such as prolonged thumb-sucking and nail biting, tongue thrusting, open mouth at rest posture, incorrect mastication, and poor oral rest postures of the tongue and lips.[1] Physicians, dentists, and orthodontists have also used myofunctional therapy as an adjunctive noninvasive treatment of temporomandibular joint disorders (TMJD).

In the last few years[2,3] myofunctional therapy has also been proposed as a potentially important component of the multidisciplinary treatment of obstructive sleep apnea (OSA). The use of OMT as a noninvasive option for the treatment of sleep-disordered breathing (SDB) in children in particular represents a new and novel application of this well-established therapeutic approach and has the potential to become an important alternative to other available nonsurgical treatment modalities, such as positive airway pressure and

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oral appliances. This article outlines the development and clinical application of OMT, discusses the rationale for its application to SDB, and presents evidence supporting this treatment as it relates to prevention, assessment, and treatment of pediatric SDB.

HISTORY OF OMT

The history of myofunctional therapy in the United States goes back to the early 1900s and parallels orthodontic treatment.[4] In the 1950s to 1960s, Walter Straub,[5,6] an orthodontist, wrote numerous articles on malfunctions of the tongue and abnormal swallowing habits and their relationship to orthodontics and speech. He thought a major cause of oral problems was bottle-feeding. Inspired by the work of Walter Straub, Roy Langer, Marvin Hanson, and Richard Barrett in the 1970s and 1980s, Daniel Garliner[7,8] was the first to recommend a therapeutic routine for nighttime sleeping consisting of keeping the lips together and the tongue up on the palate. Subsequently, 2 speech pathologists from Brazil, Irene Marchesan and Ester Bianchini, studied with Daniel Garliner in the 1980s and went back to Brazil, where they created a university program for speech pathologists centered on treating orofacial myofunctional disorders. Today, there are over 30 universities with PhD programs in myofunctional therapy and many programs that focus on sleep disorders and myofunctional therapy.

RATIONALE: DEVELOPMENT OF THE UPPER AIRWAY

As man evolved to an upright posture, the larynx descended, the forebrain grew, and the facial framework retreated, as the nasal airway became diminished in size and function. This evolution is one reason humans do not have the olfactory ability of other mammals. As the cranial base angle flexed, the maxilla was compressed and the paranasal sinus size was reduced, creating millions of sinus sufferers as well as other facial changes.

The flattened maxilla and longer face is a relatively recent phenomenon seen in humans, differentiating man from primates. The decrease in nose volume associated with cranial base flexing may have increased high upper airway resistance and increased the potential for collapse further down in the oropharynx. Man was no longer an obligate nose breather, and with increased demands, mouth breathing was born. This trend of mouth breathing, downward migration of the tongue base and descent of the hyoid, is associated with retrognathic changes in mandibular posture. The increase in mouth breathing is associated with less time spent with tongue to the palate, and therefore, with narrowing of the maxilla and an increased facial height. This downward and backward rotation of the maxilla and mandible is a powerful predictor of SDB as well as TMJD and malocclusion. A variety of researchers, clinicians, and anthropologists have identified an underdeveloped maxilla as being the root cause of malocclusion and naso-oropharyngeal constriction. Early identification of mouth breathing is therefore recommended as early as the first year of life.

Although the primary function of the genioglossus muscle is to protect the patency of the upper airway, an improper oral resting posture of the tongue will have a negative influence on the development of the oral cavity and the airway.[9] The anatomy of the upper airway in turn guides the growth and development of the nasomaxillary complex, mandible, temporomandibular joint, and ultimately, the occlusion of the teeth; thus, malocclusion and facial dysmorphism may be the result of compensation for a narrowed airway (**Fig. 1**).

Genioglossus Muscle Stabilizing the Airway

There are several etiologic factors that have been linked in varying degrees to the development of SDB in children, which have implications for the potential utility of OMT as a therapeutic intervention; these implications include feeding methods, oral habits, craniofacial abnormalities, hypertrophic tonsils and adenoids, chronic mouth breathing sleep position, and restricted frenum. For example, bottle-feeding has been shown to be a major contributing factor to an anterior open bite in the primary dentition,[10] whereas overuse of spouted (“sippy”) cups may also contribute to a low tongue-rest posture, thereby leading to a narrow high palate. Oral habits such as the habitual use of a thumb or pacifier may also lead to a low tongue rest posture and OMD. It has been noted that the frequency, intensity, and duration of oral habits and mouth-soothing devices may lead to OMDs. When the thumb or another object is in the mouth often and/or for a prolonged period of time, as a self-soothing strategy for example, it applies pressure against the palate, and the tongue may develop a low rest posture. Also, incorrect pressure exerted on the jaws may lead to airway problems and a TMJD. Other oral habits such as finger-sucking, nail biting, lip biting or licking, and tongue sucking may develop in infancy and persist into adulthood, leading to malocclusion.[11]