# Myofunctional therapy plays a key role in the orthodontic practice

## Dr. Daniel Klauer uses MFT for his patients on a daily basis for malocclusion and OSA

The TMJ & Sleep Therapy Centre of Northern Indiana (my practice) is limited to treating craniofacial pain, TMD, headaches, and sleep-disordered breathing for both children and adults. What started as a TMJ and Sleep Therapy practice for adults morphed into a wellness-driven practice ensuring all our patients are breathing adequately through the nose. I didn't set out to incorporate myofunctional therapy (MFT)/orofacial myology into my practice; this happened by necessity.

The practice currently welcomes 75 new patients a month, presenting with chief complaints of fatigue and sleepiness to migraines and jaw locking — truly an array of presenting symptoms that typically have similar etiologies. As the practice started to expand, many of my adult patients began to inquire about their children and wanted to ensure that they didn't grow up and develop the same issues their parents encountered. The parents described a very common situation:

- "My son is wetting the bed as I did growing up. Is that related to what you just treated for me?"
- "My daughter is constantly sick and congested as I was as a child. Can we address this now, so she doesn't have the same issues I had for years?"

By necessity I had to begin offering increased services for children related to sleep-disordered breathing, mouth breathing, and orthodontics.

### Introduction

Myofunctional Therapy (MFT)/Orofacial Myology can be defined as the study and treatment of oral and facial muscles as they relate to breathing, speech, dentition, chewing/bolus collection, swallowing, and overall mental and physical health (Holtzman, 2014).[1]

It used to be uncommon to need orthodontic treatment; now it is a regular phenomenon. *The International Journal of Pediatric Dentistry* in 2006 showed that 75% of children, ages 6 to 11 and 89% of youths 12 to 17, have some malocclusion.[2] Furthermore, Evensen and Øgaard (2007) wrote that the prevalence of malocclusions in modern populations is higher than in excavated samples from ancient times.[3]

Proffit, Fields, and Sarver stated: "Respiratory needs are the primary determinant of the posture of the jaws and tongue [and head]. … Therefore, it seems entirely reasonable that an altered respiratory pattern, such as breathing through the mouth rather than the nose, could change the posture of the head, jaw, [teeth,] and tongue."[4]

These manifestations include, but are not limited to, those listed in Table 1.

The younger patients with these symptoms can be treated, the better they will develop craniofacially and maintain healthy lifestyles into adulthood. Done correctly, MFT will allow for better results with orthodontic treatment in the future, if orthodontic treatment is needed at all.

Proper tongue function is necessary for success with future braces. The tongue will be trained to function like a natural retainer that can minimize aggressive orthodontic work and relapse. Many clinicians have heard that patients' teeth shift because they did not diligently wear their retainers for the recommended amount of time. Yet MFT trains the tongue to rest high in the roof of the patient's mouth, which will naturally help prevent potential relapse of orthodontic cases. Clinicians should seek to answer the question of why teeth became crooked in the first place. If we know the patients need to wear retainers, and we know that their tongue is the culprit for the relapse, why not address that as part of treatment?

**Table 1: Presenting symptoms of respiratory problems[4]**

| | |
|---|---|
| Mouth breathing (day and night) | Vaulted palate |
| Forward head posture | Enlarged tonsils and/or adenoids |
| Tongue scalloping | Tubes in the ears |
| Coated tongue | Fatigue |
| Bruxism (clenching and/or grinding of the teeth) | Snoring |
| Deficient midface | Low-resting tongue posture |
| Deficient mandible | Dental malocclusions (tooth crowding, overjets, overbites, open bites, and crossbites) |
| Narrow or collapsed dental arches | Lip incompetence |

Daniel Klauer, DDS, earned a Bachelor of Science degree at the University of Notre Dame and his Doctor of Dental Surgery at The Ohio State University. He has completed over 2 years of postgraduate training and over 1,500 hours of continuing education in Craniofacial Pain, TMD, and Sleep Medicine. He is board certified with the American Board of Dental Sleep Medicine, American Board of Craniofacial Pain and the American Board of Craniofacial Dental Sleep Medicine. He is Diplomate Eligible with the American Board of Orofacial Pain. He is the only doctor in a 100-mile radius that carries these three board credentials.

Figures 1A and 1B: Myofunctional Trainer

## Treatment

Treatment includes a series of activities aimed at training (and retraining) muscles of the face and the oral cavity to function to their maximum benefit. These cannot be learned overnight. After all, patients have to unlearn a lifetime of habits. Activities may be supplemented with a Myofunctional Trainer (see Figures 1A and 1B) that is designed to help patients develop dental arches to their full genetic potential. Patients who are given a trainer to utilize while progressing through MFT will likely transition into a total series of three or four trainers throughout treatment. Photographs should be taken along the way to evaluate progress and make additional recommendations during treatment. Active treatment typically encompasses anywhere from 3 months to 1 year followed by maintenance visits. Ultimately, these activities can be utilized indefinitely. Training activities begin with proper education on where the tongue should rest at the incisive papilla (Figure 2) and to how to swallow without any extraoral muscle forces.

Since malocclusion is caused by altered respiratory patterns and tongue position, as Proffit, Fields, and Sarver stated,[4] then doesn't it seem reasonable to state that all orthodontists should know or have a myofunctional therapist for their patients? That was my realization before my clinical team started to train and certify two myofunctional therapists within our office. Now the practice has a full-throttle program for both children and adults to address these issues, and the results have been nothing short of incredible.

## Case study

A 9-year-old patient, D'Lyla, sought treatment to sleep better and to stay in her own bed. D'Lyla's mother, a labor and delivery nurse, brought her in as a self-referral because she noticed her daughter was sleeping with her mouth open, snoring, and waking up repeatedly throughout the night. Her mother knew something was off but couldn't quite put her finger on it. Our staff gladly welcomed D'Lyla into our practice to solve this problem (Figure 3).

My mentor, Dr. Steven Olmos, recently stated, "Why is the single most important thing to life, breathing, the least evaluated by doctors?"[5] Clinicians have set out to change that. Our clinical evaluation process follows the medical model in first obtaining a detailed medical history and review of symptoms.

## Medical history

D'Lyla's usual bedtime is 10 p.m. She awakens by 8 a.m., and her mother reports on average that D'Lyla gets 8 hours of sleep. She starts the night in her bed, but will always leave and go to her parents' room. A parent has to be present for her to fall asleep, and she resists going to sleep every night. She has difficulty breathing throughout the night, snores, and is extremely difficult to wake in the morning. Her parents have tried numerous modalities to get her to stop sucking her thumb but have been unsuccessful. D'Lyla was prescribed 3 mg melatonin by her pediatrician for the sleep problems; however, the supplements proved to offer no benefits, although she has continued to take them. The pertinent negatives in her medical history review include no restless legs, no history of abuse, no thyroid problems, no cardiovascular disease, no bed-wetting, no recurrent infections, no excessive weight, no headaches, and no history of any surgeries or procedures. Her medical history is otherwise within normal limits.

## Clinical examination

Like all medical practitioners, the history of symptoms and chief complaints are reviewed, followed by a clinical evaluation to get one step closer to rendering a differential diagnosis. As the saying goes, 95% of effective treatment is an accurate diagnosis. With no disrespect to her pediatrician, D'Lyla's problem was not an insufficiency of melatonin; otherwise, the supplement would have been effective.

My practice's exam is rather robust and, in this case, included evaluation of all oral structures at rest and in function; documenting range of motion; posture photos; cranial nerve evaluation; respiratory rate; resting lip, tongue, and mouth posture; and CBCT to evaluate the developing dentition, facial development, and patency of her airway.

Right from the beginning, the clinical team noted lip incompetence. D'Lyla did not breathe with her lips closed and has an anterior tongue thrust (Figure 4). As a result, note the forward head posture and again the lips remaining open upon normal function (Figure 5). Upon viewing the width of her dental arches, it is clear there is not enough room for her tongue (Figure 6). Being that mouth

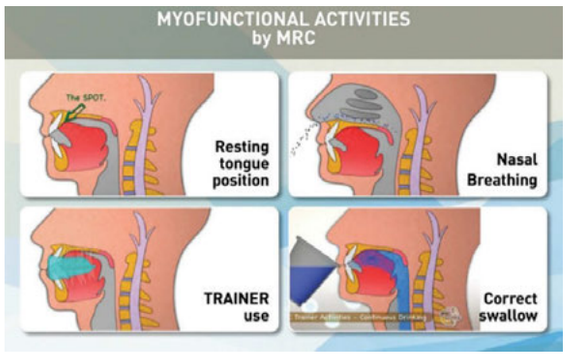


Figure 2: Proper tongue spot

Figure 3: D'Lyla, a 9-year-old patient

Figure 4

Figure 5: side view with mouth open

Figure 6

breathing causes chronic forward head posture, this condition is of great concern in a developing child who now will have the net effect of increased weight distribution on the spine from the extra weight experienced from the head being forward.

While the patient's mandibular ranges of motion are adequate, her ability to open with her tongue touching her incisive papilla is limited — referred to as "tongue to the spot." Clinicians typically want to see this at 75% of max opening, but the patient's was 30 mm with a max opening of 53 mm (Figure 7). Thus, her percentage of opening with tongue to the spot was only 57%. Her tongue mobility is certainly limited and restricted.

In evaluating the oral structures, clinicians noted attrition of the dentition, posterior tongue-tie, anterior open bite, malocclusion, and a coated tongue. The rest of her features were within normal limits. Her cranial nerve evaluation was thankfully unremarkable.

A CBCT was taken and reviewed with the patient and her mother that same day. A 16 x 13 cm FOV CBCT was taken with the patient sitting upright. For our diagnostic CBCT, we instruct the patients to swallow once and then rest on their back teeth. We are more or less getting their image at maximum intercuspation. (Figure 8).

I start my evaluation of the image by following the way the air is supposed to flow through the nose and down the throat. After all, people must breathe through the nose to warm, moisten, and purify the air they breathe. Guilleminault states that the "finish" line is ensuring children have functional nasal breathing,[5] so clinicians want to evaluate this immediately as children are worked up for a differential diagnosis. As my clinical team began to evaluate D'Lyla's CBCT, it was quite alarming. Her maxillary sinuses were nearly 100% full of

Figure 7: Tongue to spot

congestion bilaterally, yet her mother, who is a nurse, did not report any symptoms of sinus congestion. Furthermore, the patient had bilateral turbinate hypertrophy, ethmoid sinus congestion, and profoundly enlarged adenoids. The rest of the structures evaluated in the CBCT appeared to be healthy and within normal limits. At this point, the clinical team explained to the patient's mother that her daughter's situation is likely chronic in nature being that she feels normal and does not complain of congestion as she is seemingly just used to it (Figures 9-10).

## Assessment/Diagnosis

In review of her medical history, presenting symptoms, and clinical evaluation, D'Lyla was diagnosed with malocclusion (M264), mouth breathing (M2659), sleep disorder, unspecified (G4779), and snoring (R0683).

This is the part of the appointment where clinicians have to ensure their explanation is heard and said in a fashion that the patient and parent can understand. The results from our evaluation proved that the patient's obstructive breathing is contributing to her overall symptoms. It is clear that her nasal passages aren't functioning properly as proven by her open mouth resting posture, anterior open bite, and coated tongue. Now her thumb sucking is also most likely contributing to her open bite. What's interesting is that she can breathe only through her nose when her thumb is in her mouth. This, of course, forces nasal breathing and promotes incorrect tongue posture. However, it also brings the jaw forward, opening up the

Figure 8: CBCT lateral pretreatment

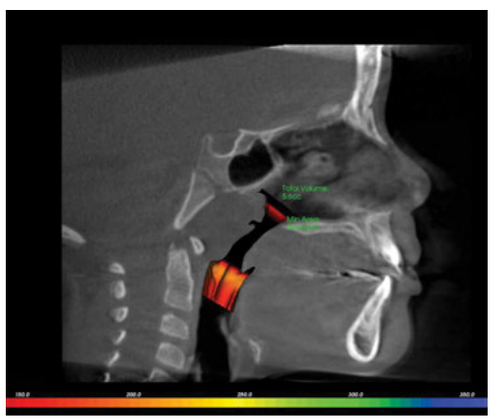

Figure 9: CBCT lateral with airway pre-treatment. Min Area: 42 mm$^2$

Figure 10: CBCT Frontal sinus pretreatment

posterior oropharynx. Maybe that's why she "can" breathe through her nose when only thumb sucking but not at rest. We don't know and can't know for sure, but that is certainly plausible. At this point, I am fairly confident that the patient is suffering from sleep-disordered breathing, given her clinical presentations. This is likely the culprit for patient's concerns. Furthermore, her impaired nasal breathing and open mouth resting posture are likely responsible for sleep disturbances. Thus, her respiratory patterns are contributing to her malocclusion. At this point, the mother was 100% onboard as answers were offered to problems she was searching to solve.

## Treatment/Care plan

The 2012 American Academy of Pediatric Guidelines for *Diagnosis and Management of Childhood Obstructive Sleep Apnea Syndrome* clearly states in its conclusion:

"The following recommendations are made. (1) All children/adolescents should be screened for snoring. (2) Polysomnography should be performed in children/adolescents with snoring and symptoms/signs of OSAS.[6]

My practice tries its best to follow the practice parameters set forth by our colleagues, and our clinical team followed these steps appropriately.

1. Ordered diagnostic Polysomnography at Memorial Sleep Lab
2. Ordered a follow-up office visit with an Ear, Nose, Throat (ENT) Physician and Sleep Medicine Physician. (In this case that happened to be one doctor.)
3. Initiate Myofunctional Therapy and Habit Eliminations immediately

The patient and her mother were very compliant with treatment from the start and followed the treatment plan precisely. Her diagnostic sleep study showed the following:

- mild obstructive sleep apnea
- AHI: 1.2
- REM AHI: 3.8
- delayed REM sleep onset
- decreased REM% of sleep
- five central apneas

D'Lyla followed up with the ENT/sleep physician, regarding these results, to review the adenoid hypertrophy and sinus congestion. Upon review, it was recommended that she utilize topical nasal steroid (Flonase® Sensimist™) and schedule for an adenoidectomy and turbinate coblation in 8 weeks. Prior to the scheduled surgery, it was recommended to get an updated CBCT to evaluate if the sinuses would need to be operated on as well, given the profound sinus congestion noted on the CBCT. The ENT/sleep physician also encouraged her to initiate myofunctional therapy to help establish adequate nasal breathing in preparation for the adenoidectomy and turbinate coblation. He reviewed with the mother that following adenoidectomy, it is imperative that nasal breathing is established as 75% of children will redevelop sleep-disordered breathing within 2 years post surgery. (Guillinault study).[6] At this time, the physician elected not to prescribe an antibiotic as the patient was clinically asymptomatic for any sinus symptoms.

Figure 11: MF Trainer

**Proper tongue function is necessary for success with future braces.**

So the clinical team proceeded and started with myofunctional therapy and habit elimination as the patient began topical nasal steroid treatment. The mother elected to postpone her daughter's surgery and scheduled it 6 months out in hopes to avoid the procedure. In my practice, two hygienists carry out our MFT treatment plans, so they got to work. My clinical team chose to utilize a myofunctional trainer as part of her treatment, which profoundly helps with thumb-sucking habit elimination (Figure 11). The patient was also instructed to stay in her bed all night. D'Lyla was a champion right from the start and worked diligently throughout treatment. Our practice protocols for MFT include a series of progressing exercises starting with tongue position awareness to proper swallowing technique. As the patient masters each step, he/she progresses to the next, always reviewing the basics. The clinical goal is habituation and having the patient establish adequate and functional nasal breathing while keeping the tongue in the correct position. D'Lyla eliminated her thumb sucking starting at the first appointment, and her symptoms improved tremendously fast. Within 3 months, the patient's mother reported the following improvements in her chief complaints:

- snoring – 100% resolved
- restless sleep – 90% resolved
- waking during the night – 90% resolved
- daytime sleepiness – 98% resolved
- sleeping with mouth open – 90% resolved

At this time, the adenoidectomy surgery was scheduled, but clinicians were ordered to get an updated CBCT to evaluate the sinus disease. The patient's mother was hopeful to avoid surgery as her daughter's symptoms were nearly 100% resolved at this point. The results of the CBCT were quite impressive: The sinus congestion was completely resolved, and her adenoid hypertrophy was

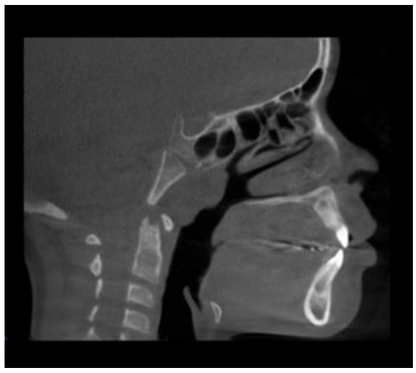

Figure 12: CBCT lateral posttreatment

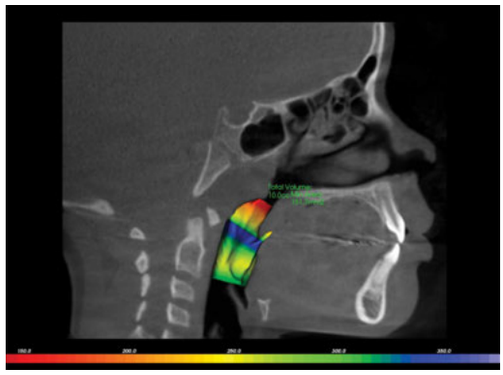

Figure 13: CBCT lateral with airway posttreatment. Min Area: 151mm$^2$

Figure 14: CBCT sinus posttreatment

Figure 15

Figure 16

greatly reduced (Figures 11-14). We immediately shared the results with the ENT/sleep physician along with the patient's clinical improvement. He cancelled her surgery for the following week and recommended that she have an updated PSG to confirm that her obstructive sleep apnea was well under control. Needless to say, the mother was thrilled and proceeded on with the validation PSG. The ENT/sleep physician did say that if OSA was still present, then he would likely proceed with an adenoidectomy and turbinate coblation. D'Lyla went back to the sleep lab and completed the validation PSG. The results illustrated:

- no presence of obstructive sleep apnea
- AHI: 0.1 (only 1 event the entire night)
- REM AHI: 0
- 98% sleep efficiency

Overall, our clinical team was very pleased with the results. When utilizing MFT, patient and parent compliance is probably the single biggest determinant of success. It is a game of compliance and, if educated properly by my entire clinical team, often stellar compliance is the result.

## Review of treatment timeline

- April 2017 — examination
- June 2017 — Initial PSG (mild OSA)
- August 2017 — treatment initiated with MFT and topical nasal steroid spray
- November 2017 — post MFT CBCT
- December 2017 — sleep/ENT physician cancelled surgery and ordered validation PSG
- January 2018 — validation PSG showed complete resolution of OSA

## Conclusion

In closing, MFT is a great tool in our armamentarium for treating both children and adults with malocclusion or OSA. It can be a stand-alone treatment but typically is utilized as an adjunctive means of treatment. In this case, it proved to be effective in combination with topical nasal steroid spray, but the true success was simply re-establishing adequate nasal breathing, and that's what my clinical team helped D'Lyla achieve. Practitioners know maxillary expansion has been proven to treat OSA; but if we don't establish functional nasal breathing and adequate tongue positioning, then how stable will that be long-term? OP


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