

Effects of Myofunctional Therapy in Orthodontic Patients with Class 2 Division 1 Malocclusion: a Case Report

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Abstract:

A research was conducted on eight patients aged 7.5-12 years with Class II Division 1 malocclusion who underwent myofunctional therapy with the Myobrace system. All patients were examined clinically, functionally and radiographically, before, during and after treatment. Analyses were also performed on dental casts before and after treatment, and at both stages frontal and lateral photographs were taken for documentation. All eight patients had a decrease in the overbite and overjet, a noticeable expansion of the dental arches, as well as an increase in the intercanine, interpremolar and intermolar widths. Regarding the correction of atypical swallowing, the results were generally positive – in five out of eight patients, there was a correction from infantile to mature swallowing, and in one there was a significant improvement. A successful correction of Class II Division 1 malocclusion was achieved in all eight patients. We conclude that, with proper cooperation, Myobrace treatment is an effective and reliable solution for growing orthodontic patients with Class II Division 1 malocclusions.

Key Word: Myofunctional; myobrace; orthodontics; malocclusion; correction

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I.Introduction

Malocclusions are one of the most common disorders that can negatively impact functional, aesthetical and psychological development¹.

As early as 1899, Edward Angle classified malocclusions into Class I, Class II and Class III based on the relative position of the permanent maxillary first molar⁷. In mixed dentition, the prevalence of these malocclusions is 73% for Class I, 23% for Class II, and 4% for Class III, with Caucasians showing the highest prevalence of Class II in mixed dentition (26%)².

According to Mitchell, the most commonly treated malocclusion in the (Western) world is the Class II Division I.

Class II Division 1 malocclusion is described as a distal relationship of the mandible to the maxilla with maxillary dental protrusion and/or mandibular dental retrusion due to which an increased overjet occurs. These components result in an altered facial profile (convex), and reduced lower facial height, with or without a lower lip trap^{3,4,5}.

Etiological factors in Class II Division 1 malocclusion include genetic predispositions such as inherited growth patterns of the maxilla and mandible, and environmental factors, such as persistent thumb-sucking and pacifier use. Early loss of primary teeth, abnormal swallowing habits, and mouth breathing can also contribute to the development of Class II Division 1 malocclusion, as can an imbalance of forces from the oral soft tissues, such as diminished muscle tone of the lips, poor tongue resting posture and tongue-forward thrust. All aforementioned factors can result in the displacement of teeth due to changes in equilibrium⁶.

Functional appliances are able to minimize dentoalveolar discrepancies by influencing the neuromuscular control of the jaw and facial muscles to simultaneously facilitate maxillary dental retraction and mandibular dental protrusion⁷. Randomised trials have provided valuable information regarding early versus later treatment of Class II problems, demonstrating that children treated with functional appliances have a

statistically significant improvement in their jaw relationship and overjet, with a greater improvement when the treatment is initiated earlier^{8,9}.

Myofunctional appliances transmit pressures that are directed to the dental arches, tongue, lips and cheeks. The aim is to modify the behavior of the orofacial muscles, with the final objective being the correction of habituated and deleterious muscle patterns that contribute to the development of Class II Division 1 malocclusions, as well as related swallow and respiratory patterns^{10,11,12,13}. Prefabricated myofunctional appliances are considered a legitimate option for an early treatment of Class II Division 1 malocclusion, with studies reporting not only improved skeletal and dental relationships but also enhanced facial aesthetics¹⁴.

II. Aim of the Study

The purpose of this paper is to evaluate the extraoral and intraoral effects of myofunctional therapy with the Myobrace system in the early treatment of Class II Division 1 malocclusion in growing patients, as well as to check the efficiency of said system in the correction of atypical swallowing patterns.

III. Material And Methods

A total of eight patients aged 7,5-12 years with Class II Division 1 malocclusion were included in the study, of which four were male and four female. All were treated with myofunctional appliances (Myobrace system).

Myobrace is a myofunctional device system for treating malocclusions by addressing the underlying breathing and myofunctional causes. The system includes a range of appliance designs based on the type of dentition, age group of the patents as well as the intended usage.

Myobrace system for kids (K1, K2, K3) is a three-stage appliance system for an early treatment of patients in mixed dentition. Stage 1 (K1) is a soft and flexible appliance, which adapts to diverse arch forms and stimulates the proper purging of poor habits, while encouraging nasal breathing. The Stage 2 (K2) appliance expands the arch and resumes the process of habit correction, while promoting a correct tongue posture, mature swallowing and lip seal. More specifically, its Frankel cage helps in the development of proper arch form and dental alignment. Stage 3 (K3) is the firmest appliance of all three and serves to finalize any remaining mild malocclusions while also providing retention and maintenance.

The Myobrace system is the most commonly used system for the treatment of malocclusions in children, owing its efficacy to the fact that it does not interfere too much with the remaining period of craniofacial development, nor does it impose too much pressure on the patient's compliance abilities.

In the study, as per the manufacturer's protocol, the patients were given instructions to wear the appliance with a closed mouth, for one to two hours during the day as well as for eight hours overnight, during sleep. They were also directed to perform swallowing exercises with pursed lips and the tongue tip positioned behind the upper tongue tag. The Stage 1 appliance was used for 6–8 months when it was replaced by the Stage 2 appliance until acceptable results were achieved. Finally, the Stage 3 appliance was prescribed for finishing and retention.

All patients underwent clinical, functional and radiographic examination before and after treatment. Measurements on dental casts were performed before and after treatment, as well as clinical extraoral, intraoral and functional examinations. Photographs of the patients were also taken, before and after treatment.

The effect of the therapy with myofunctional devices (K1, K2, K3) was evaluated by comparing the following measurements: anterior arch height, intercanine, interpremolar and intermolar width, overjet and overbite – before and after myofunctional therapy. The pretherapy and posttherapy measurements for all patients are presented in Table 1 below; in the interest of clarity and brevity, however, the Case Report has been limited to the in-depth description of only one representative case.

IV. Representative Case Report KS

An 8.5-year-old female patient was presented with the chief complaint of forwardly placed and “crooked” anterior teeth. Extraoral examination (Figure 1b) showed a mesoprosopic facial morphology, convex facial profile and reduced lower facial height, due to retrognathic mandible. Lips were potentially competent, albeit with hypotonic upper lip. A hyperactive m. mentalis was observed during swallowing.

Intraoral examination (Figure 1a) showed mixed dentition, Class II Division 1 malocclusion, and crowded, mesially rotated and proclined upper incisors, with 7 mm overjet and deep bite with 7 mm overbite. The dental and facial midline coincided. There were signs of a poor oral hygiene and multiple carious lesions. In relation to poor habits, the patient retained inconstant, but mostly infantile swallow pattern.

The orthopantomograph (Figure 2) revealed the presence of all permanent teeth, as well as an early extraction of the right deciduous premolar due to conservative reasons.

Figure 1a: Pretreatment intraoral photographs



Figure 1b: Pretreatment extraoral photographs



Figure 2: Pre-treatment oropantomograph



The treatment consisted of using Myobrace K1 – Stage 1 for 8 months, after which the patient was given the K2 – Stage 2 appliance; after an active treatment time of 18 months, the patient was provided with K3 for final alignment and retention.

Dental changes (Figure 3a) derived from the treatment included correction in the sagittal and transversal plane, improvement of the Class I molar and canine relationship, expansion of the maxillary and mandibular arches, as well as a retrusion of the maxillary incisors and the mandibular dental protrusion. The patient's overjet and overbite were reduced by 5 mm and 3 mm, respectively. An improvement of dental hygiene was also observed.

Figure 3a: Post-treatment intraoral photographs



Figure 3b: Post-treatment extraoral photographs



Figure 4: Post-treatment oropantomograph



The patient's soft tissue facial profile (Figure 3b) was greatly improved and, with the mandible moving forward, good facial balance was attained. The lips became fully competent. There was a noticeable correction of the tongue-thrust pattern as well, from mostly infantile to constant somatic swallowing. The oropantomograph (Figure 4) displays root parallelism and normal tooth position.

V. Results and Discussion

In all eight patients, correction in the sagittal and transversal planes was achieved, as well as a reduction of the overjet and overbite (Table 1). An expansion of the maxillary and mandibular dental arches, along with an increased height of the dental arch, was also observed.

Regarding the correction of atypical swallowing, the results were mixed, but nevertheless positive: in five out of eight patients, the atypical swallowing was fully corrected from infantile to mature, and in one patient the mostly visceral swallowing pattern was replaced by a somatic one. Facial profile improved in all eight patients, as a result of a more mesial posture of the mandible at the end of the treatment.

Better dental hygiene was also observed in all patients, not only due to the improved access of the interdental spaces and the soft tissue, but also because of the encouraging effects the initial results had on the patients' morale and motivation.

That said, it must be noted that there are several factors that can influence one's decision to undergo myofunctional therapy, regardless of its relation to the final outcome of the treatment itself. Namely, for some patients with early mixed dentition, the malocclusion is so aesthetically distressing – especially if it comes coupled with teasing and bullying – that treatment is sought out for this reason alone, even without a clear understanding of the underlying etiology. These emotional and social aspects of the facial and dental-related quality of life in children are often overlooked, even though they are commonly a more powerful motivator for early treatment than the clinical implications of the malocclusion itself, or even the long-term health benefits of myofunctional therapy.

Another factor that may influence one's decision to choose early treatment – as opposed to waiting for the permanent dentition to form – is that myofunctional appliances are removable, and offer the patient some flexibility and autonomy. The fact that fixed appliances are a long-term commitment and are always visible, may deter some patients from orthodontic therapy altogether.

Table 1: Comparison of measurement results during the course of the treatment

	Age	3-3		4-4		5-5		6-6		OJ	OB	VDL													
		Maxilla	Mandible	Maxilla	Mandible	Maxilla	Mandible	Maxilla	Mandible																
S.G ♂	Before	8	31	24	33	28	37	33	40	35	5	6	18												
	After K1	8.75	33.5	25.5	34.5	31	38.5	34.5	41.5	36.5	4	4.5	18.5												
	After K2	12	36	27	36	34	40	36	43	38	3	3	19												
	Δ	4	▲	5	▲	3	▲	3	▲	3	▲	3	▼	-2	▼	-3	▲	1							
J.G. ♂	Before	8	35	/	33	27	37	33	43	37	7	7	20												
	After K1	8.75	36	/	35	29.5	39.5	35	44	38	4.5	4.5	20.5												
	After K2	12	/	36	37	32	42	37	45	39	2	2	21												
	Δ	4	/	/	▲	4	▲	5	▲	5	▲	4	▲	2	▲	2	▼	-5	▼	-5	▲	1			
N.S. ♀	Before	7.5	35	27	36	30	40	36	45	40	4	-1	18												
	After K1	8.25	35.5	28	37.5	31.5	41	36.5	45.5	40	3	0	19.5												
	After K2	12	36	29	39	33	42	37	46	40	2	1	21												
	Δ	4.5	▲	1	▲	2	▲	3	▲	3	▲	2	▲	1	▲	1	▲	0	▼	-2	▲	2	▲	3	
M.G. ♀	Before	7.5	30	27	34	30	38	34	44	39	-3	5	16												
	After K1	8.25	31.5	27	35.5	31.5	40	35.5	45.5	40	0	3.5	17												
	After K2	12.5	33	27	37	33	42	37	47	41	3	2	18												
	Δ	5	▲	3	▲	0	▲	3	▲	3	▲	4	▲	3	▲	3	▲	2	▲	6	▼	-3	▲	2	
T.P. ♀	Before	7.5	30	27	35	32	39	/	45	40	7	7	19												
	After K1	8.25	32	28	36	33	40	/	45.5	40	5	5.5	20												
	After K2	9	34	29	37	34	41	/	46	40	3	4	21												
	Δ	1.5	▲	4	▲	2	▲	2	▲	2	▲	2	/	▲	1	▲	0	▲	0	▼	-4	▼	-3	▲	2
N.P. ♀	Before	8	34	27	37	29	43	35	47	41	4	3	15												
	After K1	8.75	34.5	27.5	37.5	29.5	43.5	36	47	41.5	3	2.5	15.5												
	After K2	11	35	28	38	30	44	37	47	42	2	2	16												
	Δ	3	▲	1	▲	1	▲	1	▲	1	▲	1	▲	2	▲	0	▲	1	▲	1	▼	-2	▼	-1	▲
K.S. ♀	Before	8	32	27	35	/	40	37	47	42	8	7	15												
	After K1	8.75	34	27.5	36	/	41.5	37	47	42.5	5.5	5.5	15												
	After K2	11.5	36	28	37	32	43	37	47	43	3	4	16												
	Δ	3.5	▲	4	▲	1	▲	2	/	▲	3	▲	0	▲	0	▲	1	▲	1	▼	-5	▼	-3	▲	0
E.D. ♀	Before	8	/	30	40	36	46	/	51	44	9	9	21												
	After K1	8.75	/	30.5	41	36.5	46.5	/	51.5	45	7	7.5	22												
	After K2	12	39	31	42	37	47	42	52	46	5	6	23												
	Δ	4	/	▲	1	▲	2	▲	1	▲	1	▲	2	▲	2	▲	2	▲	2	▼	-4	▼	-3	▲	2

▲ Increase ▼ Decrease ■ No change

VI. Conclusion

Therapy with a myofunctional device (Myobrace) is effective in the treatment of malocclusion Class II Division 1 in patients with early mixed dentition. It displays satisfactory effectiveness in correction of atypical swallowing, as well as incremental improvements in mandibular retrognathism. With proper compliance, there is a good chance that at the end of the treatment period, further orthodontic therapy with fixed appliance may not be needed, or if needed, would be of shorter duration and would not require extraction.

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