Interceptive treatment with elastodontic appliance: case report

Dinu Ş.[1], Popa M.[1], Matichescu A.M.[2], Crăciunescu E.L.[3], Brăilă E.B.[4], Horhat R.M.[5]

[1]*Department of Pediatric Dentistry, Faculty of Dental Medicine, "Victor Babeş" University of Medicine and Pharmacy Timişoara, Pediatric Dentistry Research Center (Pedo-Research)*
[2]*Department of Preventive, Community and Oral Health Dentistry, Faculty of Dental Medicine, "Victor Babeş", University of Medicine and Pharmacy Timişoara, Translational and Experimental Clinical Research Center in Oral Health (TEXC-OH)*
[3]*Department of Prostheses Technology and Dental Materials, Faculty of Dental Medicine, "Victor Babeş" University of Medicine and Pharmacy Timişoara, Research Center in Dental Medicine Using Conventional and Alternative Technologies*
[4]*Department of General Dentistry of Municipal Emergency Clinical Hospital, Timişoara*
[5]*Department of Endodontics, Faculty of Dental Medicine, "Victor Babeş" University of Medicine and Pharmacy Timişoara, TADERP Research Center*

Correspondence to:
Name: Matichescu Anamaria
Address: Splaiul Tudor Vladimirescu nr.14A
Phone: +40 788251979
E-mail address: matichescu.anamaria@umft.ro

Abstract

Purpose: Aim of this report is to describe a case of a patient with mixed dentition, dento-skeletal class II malocclusion, deep bite and increased overjet. The objectives of treatment were to correct the dento-skeletal malocclusion, to obtain a correct overbite and overjet, to control the permanent teeth in a good eruption and to improve aesthetical conditions.

Materials and Methods: Treatment plan for a female patient with class II division 1 malocclusion with mixt dentition included interceptive treatment with two elastodontic appliances Myobrace® K1 and K2.

Results: In this case, it shows that the use of the elastodontic interceptive appliance series shows a significant change in class II division 1 malocclusion.

Discussion: Various authors present solved clinical examples and recommend the use of elastodontic appliance in non-extraction malocclusion patients with permanent canines and bicuspids at the onset of eruption to treat overbite and overjet issues of any severity.

Conclusions: Early orthodontic diagnostic and treatment is important to guide dentitions during the development of a functional and morphological occlusion

Keywords: elastodontics appliance, deep bite, interceptive therapy

INTRODUCTION

The major concern in the advancement of proper occlusion is proper dentition development and growth.[1] Early orthodontic therapy has the goal of guiding dentitions as they form a functional and morphological occlusion. [2] Children under the age of six have a lot of bad behaviours that they can break on their own (spontaneously). If these unhealthy practices continue after the age of six, children may develop malocclusion. Oral myofunctional therapy is one of the therapies for malocclusion in paediatric dentistry (OMT). [3] The Myobrace appliance is one of the myofunctional device that may be used to address malocclusion and poor behaviours in children. Myobrace is an intraoral removable appliances comprised of silicone elastomer, used in interceptive orthodontics to correct malocclusion in children.[4] The appliances are basic in design and function, easy to use, and safe. [5]

The following statistically significant changes occur when Class II malocclusion is corrected using eruption guiding appliances: increase in lower anterior and total anterior face height, increase in mandibular growth and degree of mandibular protrusion, lingual tipping and retrusion of the maxillary incisors, increased mandibular molar mesial drifting and mandibular posterior dentoalveolar height, protrusion of the mandibular incisors, improvement in maxillo- mandibular and molar relationships, inhibition of the vertical development of the maxillary incisors, decrease in overjet and overbite. [6]

Aim and objectives

The purpose of this study is to describe the benefits of using myofunctional appliances to treat a patient who had a skeletal and dental class II division 1 malocclusion, a significant deep bite, retrognatic profile, increased overjet and overbite. Using this appliance, the problem was solved during mixed dentition.

MATERIAL AND METHODS

The subject, S.M., a 8 year old Caucasian female, was selected in our clinic. Nothing remarkable showed in her medical history. The patient's face was symmetric low retrognathic profile. Clinical examination showed right and left class II molar relationship, coincident midlines, no crowding in mandibular arch, increased overjet, deep bite.

Extraoral examination showed convex facial profile with posterior divergence of the face due to retrognathic mandible. Lips were potentially competent and protrusive with 6 mm of interlabial gap, everted lower lip, and hypotonic upper lip.

In this clinical situation the objectives for the treatment were:

- to treat class II malocclusion;
- to control bicuspids and canines eruption;
- to obtain a correct overbite and overjet
- to improve the profile;
- to maintain long-term clinical results.

The first stage of the treatment plan included the use of MYOBRACE K1® appliance (size medium). In the accommodation period, the first month of treatment, the appliance was used for 30 minutes in the first 7 days, and gradually, adding 30 more minutes each week of this period. The patient is instructed to bite into the appliance and keep his lips firmly closed. After the first month, the active phase of the treatment begins, the appliance is used by the patient for 1-2 hours per day, and as much as possible during the nighttime (preferably for 8-10 h). During this period the patient was controlled every month. This phase is recommended

for the first year of usage. After this first year, the patient used the device only at nighttime consisting of a stabilising phase, for six months.

After the first year and a half, the patient was re-evaluated. We decided it was needed to continue the orthodontic treatment using the successive appliance (K2 ®), for the arch expansion and to promote the position of the tongue and improve the lip seal. The patient was controlled regularly every month.

RESULTS

Correction of class II division 1 malocclusion with increased overjet, and deep bite can be detected in the analyzed case, which is connected with satisfactory aesthetic outcomes of soft tisue profile along with lip competency. (Figure 1)

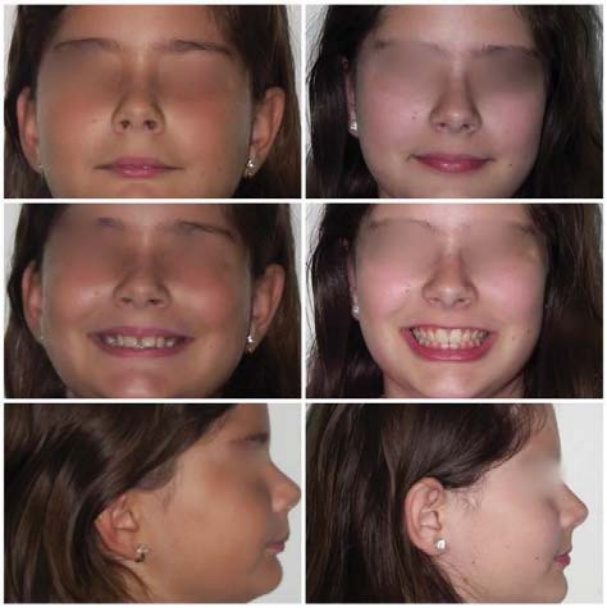

Figure 1. Face, smile and profile before and after treatment

Clinical occlusion research indicates an excellent treatment of dental class II division 1 malocclusion, overjet, and overbite being associated with satisfactory posterior tooth eruption. (Figure 2)

Figure 2. Occlusion in right lateral, frontal and left lateral view before and after treatment

After three years of therapy, the patient has proper intercuspidation, no crowding, normal overjet and overbite, right and left class I canine and molar.

DISCUSSIONS

One of the fundamental goals of pediatric dentistry is to aid in the normal development of teeth and occlusion. [7]

The current study looked at the efficacy of interceptive orthodontic treatment with an elastodontic appliance in participants who had particular early symptoms of malocclusion (mixed dentition stage). The overbite was addressed in the instance treated with Myobrace K1 and K2® appliances: the forces produced into the appliance are orthopedic and create 150 to 600 pounds per square inch in the upper jaw.[8]

Both skeletal and dentoalveolar alterations contributed to the malocclusion's resolution, indicating that elastodontic appliances might be a comprehensive early treatment strategy.

These findings may corroborate earlier research suggesting that one phase of elastodontic therapy followed by a long retention period, encompassing adolescence, is a viable alternative to the traditional biphasic strategy of a functional device followed by fixed appliance therapy. [9]

In terms of dentoalveolar consequences, the patient had a regulated eruption of the maxillary incisors, which prevented future overeruption, as well as the eruption of the posterior teeth at the same time.

The same process, in conjunction with the anterior sloping plane for mandibular advancement, provides a force-system in the lower arch that causes vertical control associated with incisor protrusion and molar mesial advancement.

In subjects with class II division 1 malocclusions, the combined effects on the two arches result in the correction of the molar relationship, as well as the decrease of the overjet and improvement of the overbite. [10]

The soft and elastic material of elastodontic appliances is an exciting invention since it enables for myofunctional exercises to rebalance the perioral and lingual musculature equilibrium.

Most crucially, the restoration of normal muscle activity may be due to improvements in both the skeletal and dentoalveolar components of the malocclusion. [11]

Furthermore, because elastomeric equipment functions as a shield, isolating the dentoalveolar structures from the perioral muscles, prior data suggests that the perioral musculature can be rebalanced in the same way as rigid functional equipment, such as the Fränkel appliance, can, but the results are better and faster to achieve. [12]

CONCLUSIONS

The most crucial aspect of Myobrace appliance therapy is selecting the correct clinical scenario. From a clinical point of view the appliance has improved the major physiologic functions such as: nasal breathing, tongue position, lip seal, normal swallowing and phonation. Another important role of these appliances are the skeletal growing patterns and improving the overall aspect of the profile.

Mandibular retrognatism can be successfully treated by myofunctional appliances during growth spurt. Patient cooperation and repeated motivation is a critical factor during the treatment with elastodontic appliances.

REFERENCES

1. Erpenstein H. The role of the prosthodontist in the treatment of periodontal disease. Int Dent J. 1986 Mar;36(1):18-29.

2. Ilisulu C., Uz S., Koruyucu M., Seymen F., "Early İnterceptive Orthodontic Treatments: Case series.," International Journal of Medical Investigation, vol.8, no.3, pp.104-111, 2019
3. Saccomanno S., Coceai Paskay L., New Trends in Miofunctional Therapy, 2020, edi.ermes. Srl, Milan, Italy, pag 15-16
4. Paolantonio EG, Ludovici N, Saccomanno S, Latorre G. Association between oral habits, mouth breathing and malocclusion in Italian preschoolers. European Journal of Pediatric Dentistry 2019;20(3):204
5. Grippaudo C, Paolantonio EG, Antonini G, Saulle R, La Torre G, Deli R. Association between oral habits, mouth breathing and
6. malocclusion. Acta Otorhinolaryngol Ital 2016;36(5):386.
7. Janson G, Nakamura A, Chiqueto K, Castro R, de Freitas MR, Castanha Henriques JF. Treatment stability with the eruption guidance appliance. Am J Orthod Dentofacial Or- thop 2007;131(6): 717-728.
8. Bayrak S, Tunc ES. Treatment of anterior dental crossbite using bonded resin- composite slopes: case reports. European Journal of Dentistry. 2008;2(4):303–307.
9. Ramirez-Yañez, G.; Sidlauskas, A.; Junior, E.; Fluter, J. Dimensional changes in dental arches after treatment with a prefabricated functional appliance. J. Clin. Pediatr. Dent. 2007, 31, 279–283
10. Keski-Nisula, K.; Keski-Nisula, L.; Salo, H.; Voipio, K.; Varrela, J. Dentofacial changes after orthodontic intervention with eruption guidance appliance in the early mixed dentition. Angle Orthod. 2008, 78, 324–331.
11. Janson, G.; Nakamura, A.; Chiqueto, K.; Castro, R.; De Freitas, M.R.; Henriques, J.F.C. Treatment stability with the eruption guidance appliance. Am. J. Orthod. Dentofac. Orthop. 2007, 131, 717–728.
12. Tartaglia, G.M.; Grandi, G.; Mian, F.; Sforza, C.; Ferrario, V.F. Non-invasive 3D facial analysis and surface electromyography during functional pre-orthodontic therapy: A preliminary report. J. Appl. Oral Sci. 2009, 17, 487–494.
13. Nucera, R.; Giudice, A.L.; Rustico, L.; Matarese, G.; Papadopoulos, M.A.; Cordasco, G. Effectiveness of orthodontic treatment with functional appliances on maxillary growth in the short term: A systematic review and meta-analysis. Am. J. Orthod. Dentofac. Orthop. 2016, 149, 600–611.e3.