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Insights into Orthodontic Treatment

Almost a century was necessary to find some new alternatives for orthodontic treatment. Since the introduction of brackets, the most significant change in orthodontic industry has been moving from weld brackets to resin bonded brackets and some improvements in wires features. However, the philosophy of treatment did not change as the only purpose of treatment was to move teeth and to expect that the whole oral system might adapt to the performed changes.

Although the influence of the soft tissue on teeth alignment was proposed a long time ago, we now better understand the biology and physiology of the oral system. Up to date, a lot of information is available about the dynamics of the mandible. The morphology of the skeleton and the arrangement of the teeth are mainly determined by jaws growth and the development of the dentition, over which functional aspects have a large influence. The mode of breathing, the position of the tongue, lips and cheeks, the interdigitation of the posterior teeth, and the forces provided by the occlusion all contribute to the developmental process. Functional aspects affect orthodontic therapies, influence the result that can be achieved, and determine to a large extent the changes that occur in the dentition when retention devices are discarded. Therefore, knowledge of the functional aspects of the orofacial region is a prerequisite for those dentists treating malocclusions with orthodontic appliances and, treatment must be planned considering all dysfunctions present in the orofacial region.

Functional appliances have been described in the literature as an effective method to correct functional alterations in the orofacial region. Furthermore, a two-phase orthodontic treatment, where a functional appliance is used to treat the functional problems, and then, brackets are used to align teeth, has been reported to improve relapse frequently occurring after orthodontic treatment with brackets. During the last decades, better functional appliances have been developed and have been reported to produce significant changes in oral function, as well as to stimulate mandibular growth.

However the success of the treatment with functional appliances depend on two important issues: Firstly, patient's collaboration and, secondly, the appliance should be properly

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and correctly built. The former depends on the ability of the dentist to show his/her patient the importance of the treatment and how all the dysfunctions present in his/her oral system may affect its performance and health. Fortunately, the later has been addressed by the orthodontic industry. A pre-fabricated functional appliance was developed, which is designed to adjust to different groups of ages, and thus, to correct functional problems present in kids, adolescents or adults.

This pre-fabricated functional appliance has been commercialized as the Trainer System™ (Myofucntional Research Co, Australia), and it permits to correct the malocclusions not by directly moving the teeth, but by correcting the muscular functional alterations, and so, permitting the teeth to get a more physiological position into the mouth, which means, teeth alignment. For example, a patient with an open bite generally has an increased activity of the muscles in the mental region, whereas, the muscles of the upper lip has a decreased activity. Furthermore, tongue thrust is added to the problem. In this context, these patients tend to incline the upper teeth forward as the tongue is pushing the upper incisors over every swallowing without any resistance of the upper lip, which must occur in a normal occlusion.

In addition, the increased activity of the mental muscles is pushing the mandible backward and downward affecting mandibular growth, which leads to a retro-positioned mandible

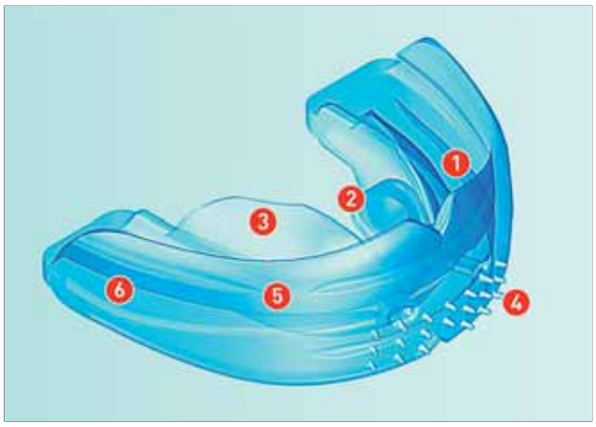

Figure 1 Picture showing the various components of the Trainer™ which are designed to stimulate different muscles in the oral system while repositioning the mandible. (1) Dental channels to reposition the mandible into a Class I relationship; (2) Lingual tag to exercise the tongue to remain into a physiological activity; (3) Internal flanges to lead the tongue into an upper position; (4) Device designed to decrease the muscular activity in the mental region; (5) External flange separating the muscles of the cheek from the teeth; (6) Aerodinamic base to make the appliance wearing more comfortable

and characterizes Class II malocclusions. The use of this pre-fabricated functional appliance during orthodontic treatment treats the muscular altered activity by the various components introduced in the Trainer™.

In figure 1, the different segments composing the Trainer™ are shown. Thus, the dental channels reposition the mandible, guiding it to a forward position, in case of Class II malocclusions, or a backward position, in case of Class III malocclusions. Also when the mandible shifts laterally because a cross-bite, the Trainer™ realigns the mandible to a more medial position. Mandibular reposition is achieved by a re-education of the masticatory and supra- and infra-hyoid muscles. Additionally, transversal development is stimulated by the external flanges in the Trainer™. These external flanges separate the muscles of the cheek releasing the inward forces deliver by these muscles on the teeth, whereas they load the jaws stimulating bone formation on the buccal aspect. The labial shield is designed to decrease the muscular activity on the mental region, and so, allow these muscles to deliver more physiological forces on the anterior segment of the mandible. Another feature of the Trainer is the lingual tag on the upper segment of the functional appliance, which exercises the tongue to remain in a more physiologic position and decrease the forces delivered on the anterior teeth. Therefore, the Trainer™ performs a physiologic therapy in the oral system leading to more equilibrated forces released on the teeth, and so, permitting teeth alignment into a better position.

Conclusion

In conclusion, development in the orthodontic industry appears to be stuck during the last century going for improvements in the brackets design and wires features. However, this was about moving teeth which are only one of the multiple participating factors in the development of malocclusions. The Trainer System™ is one of the latest developments, which is an important asset in orthodontic treatment. It permits to treat several problems that are participating in the malocclusions development, and thus, permits to treat the problem at different points. In addition, this system is composed by various appliances permitting to treat oral dysfunctions and malocclusions at different ages and furthermore, to treat them with other systems commercially available, such as brackets. Complete information about the modus operandi and all the research supporting this pre-fabricated functional system is available on the manufacturer webpage (www.myoresearch.com). DA

Dr German Ramirez-Yañez is a dentist from Colombia (South America) with more than 20 years of experience in guiding craniofacial growth and development. He is a specialist in Pediatric Dentistry (Mexico) and Functional Maxillofacial Orthopedics (Mexico & Brazil), as well as trained in Orthodontics (Mexico). He has published more than 20 articles about early orthodontic treatment and craniofacial biology in peer review international journals such as the European Journal of Orthodontics, World Journal of Orthodontics, Journal of Clinical Orthodontics, International Journal of Jaw Function, Journal of Histochemistry and Cytochemistry, Bone and Archives of Oral Biology. He is also the scientific advisor of Myofunctional Research Co. in Australia and of Osteopharm Inc. in Canada. His research interest is in Craniofacial Growth and Development, the Patho-Physiology of Functional Disorders in the Cranio-Cervico-Mandibular system and how the craniofacial structures are modified by functional appliances.