

Fixed orthodontic technique without bracket: an alternative to conventional orthodontic treatments

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Abstract—The search for orthodontic treatment goes far beyond the correction of mismatches in the teeth, prevention of occlusal problems or functional benefits, the patient also associates orthodontic treatment with the aesthetic benefit, which becomes a motivator in choosing which appliance model to use during your treatment. Therefore, this article presented the difference between fixed and removable orthodontic techniques, analyzing their pros and cons, established by scientific basis so that the reader understands and determines which technique to use for each patient. During the literature review, it was noted that aesthetics and comfort are determining factors in choosing the type of orthodontic appliance to be used in the treatment, and fixed orthodontics without brackets is capable of meeting this need. Over the years, 3D technology was introduced, making it possible to perform a virtual set-up, giving the professional a precise preview of the necessary movements. Fixed orthodontics without brackets was improved in Brazil by Guaracy Fonseca and Ney Tavares, with the emergence of the 3D-BOT - Bracketless Orthodontics Tratamento (three-dimensional orthodontic treatment without brackets) technique, which stood out for being one of the best alternatives in orthodontic treatment in which refers to aesthetics, as it idealizes highly relevant advantages, such as aesthetically invisible and comfortable, it does not impair diction and does not make cleaning difficult, in addition to the low cost and treatment completion in less time.

I. INTRODUCTION

Dentistry is an area that has presented several innovations over the years, and when it comes to orthodontics, there are a multitude of new treatments, which in turn are even more effective and not always aesthetic and comfortable. The customer who seeks to solve their problem does not always want to give up the result just for the aesthetic part. Over the years, the famous

orthodontic appliances have evolved, with the patient's comfort in mind (MARINIELLO; COZZOLINO, 2008).

There are several treatment models offered, such as: conventional buccal and lingual orthodontics, aligners and others. Although conventional vestibular orthodontics offers satisfactory final results, there are many injuries caused to the oral mucosa if the treatment is continued for a long period. On the other hand, lingual orthodontics with the use of brackets is uncomfortable, making hygiene,

phonetics and tongue space difficult, which is one of the main muscles responsible for chewing and swallowing. Aligners, in turn, are not fully aesthetic, due to attachments and because they depend almost completely on the patient's cooperation (FONSECA et al., 2019).

Based on this new perspective, fixed orthodontics without brackets has emerged as one of the best options in aesthetic orthodontic treatment. Macchi and Nunzio (2000) was the first to use the technique, which initially took the name of active fixed containment, indicated for the correction of diastemas, small crowding and dental rotations. A technique that consists of using nickel-titanium wires, fixed on the lingual surface of the teeth, with fluid resin.

Mussili (2008) demonstrated a 7 to 10 year study where he followed the procedures and realized that the restraints are capable of generating minimal movement in post-orthodontic treatment. However, Guaracy and Ney Tavares (2019) developed in Brazil the 3D-BOT (Bracketless Orthodontics Treatment), it receives this name for being able to perform the movements of the 3 planes of the oral cavity.

Although the technique requires a longer service time, greater training of the orthodontist and the need for posterior occlusal lifting, it continues to be one of the best treatment options, taking into account its low cost, ease of cleaning, ability to complete the treatment in less time and keeping faithful to the esthetics (TAVARES et al., 2019).

In view of this, it is the objective of this work to demonstrate, through a literature review, a possible alternative to conventional orthodontic treatments.

II. LITERATURE REVIEW

Smiling is one of the ways to express emotions, having an aesthetically pleasing and harmonious smile facilitates communication, self-image security and a feeling of physical and psychological emotional well-being. Malocclusion or an aesthetic misalignment can lead to decreased self-confidence (SHARMA et al., 2017).

Orthodontic treatment becomes an option for malocclusion correction, but the patient, when seeking treatment, ponders the choice of the appropriate device in terms of function and aesthetics. The market has a wide variety, being the conventional with brackets (metallic, porcelain, ceramic and polycarbonates) to aligners, although the latter presents itself as an aesthetic device, it is not effective, due to the attachments and completely depend on collaboration of the patient (FONSECA et al., 2019).

According to Couto and Abreu (2020), it is clear that orthodontic appliances have an effect on the appearance of patients and, for this reason, orthodontic evolution in recent years has been accompanied by an increase in aesthetic search and with the objective of create a dental occlusion that meets functional standards. This stimulated the generation of orthodontic devices that meet the demand of these patients. The use of conventional orthodontic appliances, consisting of bands, brackets, wires and ligatures, is associated with a general impairment of facial appearance.

Among the models offered on the market, such as conventional buccal and lingual orthodontics with the use of brackets, offer satisfactory results that have been the gold standard for decades, they have better torque control during anterior retraction (MÁRTHA et al., 2013).

Lingual orthodontics presents itself as an aesthetic technique, but with low acceptance by patients, as there are reports of maladaptation, swallowing problems, difficulty in cleaning, phonation alteration and reduction of the lingual space. During the initial research, it is clear that the orthodontist must have great skill in performing the technique, as there is difficulty when bonding the brackets, due to limited visualization (KAIRALLA et al., 2010). The use of the device when not followed up correctly brings negative consequences to the patient's gingival health, brackets facilitate the accumulation of plaque and etiological factors can cause gingivitis and consequently progress to a periodontal problem (MADARIAGA et al., 2020).

Aesthetic aligners are different from traditional models, it is a set of removable transparent plates with the objective of gradually moving the teeth and one of the benefits for the patient is visual, since the aligner is practically imperceptible. Aligners, like any orthodontic technique, have their limitations, as in the treatment of malocclusions that require premolar extractions and require patient cooperation, as their use requires discipline. In this technique, it is not possible to measure the activation levels, since during the treatment there is tooth movement, which will possibly generate intense pain, and because it is a removable aligner, the patient can remove the appliance and not have a satisfactory tooth alignment (VIEIRA et al., 2013).

Based on the premise that limitations and difficulties were found in existing orthodontic devices, the fixed orthodontic technique without brackets was developed. Macchi and Nunzio (2000) designed the first active fixed retainer that has been used since 1996, thinking of patients who had relapsed orthodontic treatments, making a new intervention necessary. The device was well accepted by

the patients, being easy to apply, using a Nickel-Titanium (Ni-Ti) wire, bonded by light-curing fluid composite resin, fixed by the lingual or palate surface to the dental elements to be moved. The construction of the device is simple and inexpensive, having been perfected over the years by the authors to achieve more complex malocclusion resolutions.

Mussili (2008) conducted a study of 7 to 10 years, where he realized that fixed retainers without brackets are able to generate minimal movement in post-orthodontic treatment, noted that the cases in which it was worked, there was a significant result in a period of 4 to 5 months. With the correct preactivation, it is possible to achieve good results such as: diastema closure, arc alignment resolution, tip and torque control.

Tavares and Fonseca (2019) presented the 3D technique – Bracketless Orthodontic Treatment (three-dimensional orthodontic treatment without brackets), which consists of moving the dental element in the transverse direction, rotating on its axis, in the coronal plane, instructing and extruding it and in the sagittal plane, taking it from buccal to lingual or palate, that is, it can work with a device in all three planes. In this technique, an intraoral scan with 3D technology is performed, with images of the superior, inferior and occlusal arches. The images are included in orthodontic software, to carry out the Set Up (movement of the teeth to the desired position). When performing this movement, it is possible to accurately determine both the final shape desired for the arches and define how much incisor protrusion is necessary. The final perimeter of the arc pre-established in Set Up, helps in defining the arc. The wire is glued in the occlusal of the posterior teeth and lingual of the anterior ones, being necessary to make the posterior occlusal lifting in the last occlusal teeth, the lifting works by releasing the contact of the other teeth, which facilitates the leveling of the arches and transversal corrections and individual rotation.

The 3D-BOT does not use brackets, the fluid resin is what keeps the wire fixed to the teeth, Fonseca (2019) also reports that, to be well executed, the technique needs a good helper to make the resin light curing, because the wire must be exactly well-aligned with the Sputnik instrumentation to drive the drawing generated by the 3D technology. It allows the application of aesthetic buttons via the buccal or the lingual to facilitate auxiliary mechanics with intermaxillary elastics and rotations via binary, and for slippage it is necessary to wax the wire.

The technique has some negative points, such as: patients who have a tendency to anterior open bite, where the tongue is interposed between the teeth and can favor

the appearance or aggravate the anterior open bite; need for posterior occlusal lifting and must be performed by a more experienced professional (TAVARES et al., 2019).

Therefore, the fixed orthodontic technique without brackets idealizes several advantages, such as: aesthetically invisible and comfortable; doesn't get in the way of diction; does not make cleaning difficult; being a self-ligating technique, it allows sliding, if necessary. It has decisive protrusion/lingualization control by determining the wires used in the prototype, regardless of the patient's cooperation and to determine the diagram to be chosen, the final models are already printed, so that the orthodontist can make the initial and final comparison of the treatment. With this, it establishes an early construction of arches, minimizing chair time, which creates a bond of trust between the patient and the orthodontist. Due to the 3D technology, the fixed technique without brackets makes a virtual Set Up, giving the professional an accurate preview of the necessary movements and is not limited to the treatment of anteroinferior recurrences. Thus, it became a fast, efficient and effective technique (FONSECA et al., 2019).

III. DISCUSSION

Through the smile we can express a multitude of feelings, Sharma (2017) says that malocclusion affects the individual's self-esteem and confidence, and from this point onwards, the search for aesthetic orthodontic treatment begins. The fixed orthodontic technique without brackets was developed considering the aesthetic standard required by the population since the 1990s.

Among the most popular aesthetic devices, lingual orthodontics and aligners are offered in dental offices, Kairalla (2010) reports on lingual orthodontics with brackets, a technique that can meet the aesthetic needs of the discreet and invisible patient. Vieira (2013) says that with the use of three-dimensional computational technology, it is possible to make invisible aligners, making them more aesthetic and comfortable than the lingual ones with brackets. Mussili (2008) portrays that fixed orthodontics without brackets is a simple technique, with Nickel-Titanium wires bonded to the lingual face of the elements with fluid resin, capable of leveling teeth in cases of relapse, or in more clinical cases. complicated, being much more aesthetic than those mentioned above.

As for the limitations and difficulties found, (KAIRALLA et al., 2010) mentions that the use of lingual appliances with brackets causes discomfort and can cause injuries to the patient's tongue, speech difficulty, limited vision of the dentist when placing the brackets on the lingual surface and a longer working time. The Aligner

also has its limitations, such as preventing biomechanical control by the professional during orthodontic consultations, even though careful planning was carried out in computerized virtual models. The device still generates a self-cost for the patient, without guarantees of a someone's treatment (VIEIRA et al., 2013). Fixed orthodontics without brackets is not as efficient in cases of patients who have a tendency to the previous open bite, where the tongue is interposed between the teeth and can favor the appearance or worsen the previous open bite (TAVARES et al., 2019).

Fixed orthodontics without brackets, being a simple and low-cost device, brings someone's results in cases completed in less time, Mussili (2008) reports that teeth leveling can be done in relapse cases, and also in more complicated clinical cases. , as in patients who have never undergone orthodontic treatments and are much more esthetic than those mentioned above.

Fixed orthodontics without brackets initially emerged as retainers, authors such as Macchi and Nunzio (2000) talk about active fixed retainers, which have the purpose of being a retreatment for a recurrence of orthodontic treatments, with long years of study and improvements, Mussili (2008)) with his 9-year study, asked questions to know how effective the technique would be, and concluded that despite some limitations that are smaller compared to aligners and much more comfortable compared to lingual orthodontics. In the technique reported by Mussili, named Bracketless Fixed Orthodontics (fixed orthodontics without brackets), all the biomechanical principles of Burstone and Melsen are applied, which makes it reliable.

These retainers, as they were initially called undergoing an evolution, where some authors reported that it could be more than a device for post-orthodontic treatment, Mariniello and Cozzolino (2012) portray that it is an innovative technique, its placement on the lingual surface of the teeth makes it more comfortable and so it is one of the choices of patients. Guaracy (2019) and Tavares (2019) offered technological innovations through three-dimensional planning, which provides the patient with a virtual Set-Up, providing them with a vision of the final result, receiving the name of 3D-BOT (Bracketless orthodontic treatment).

IV. FIGURES



Fig. 1: Before and after the 3D BOT treatment

Fonte: Fonseca Jr GL, Tavares N, Cavalcante GRG, Fonseca CH. Técnica ortodôntica fixa sem bráquetes, com Tecnologia Tridimensional “3D-BOT”.

V. CONCLUSION

It is concluded that there are numerous devices capable of performing an effective orthodontic treatment, but fixed orthodontics without brackets is a technique that has brought changes to the orthodontic market, offering a service of efficiency, quality and low cost, being able to meet the needs esthetic, as they are fixed to the lingual surface of the dental elements and without the use of brackets, providing comfort, without interfering with hygiene and still completing in less time.

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