Treatment of Class Ii Malocclusion with Klammt Appliance: Clinical Case Report

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Abstract: *Objective:* to report a clinical case of a young patient with Class II malocclusion, treated with the Klammt II Elastic Activator device, emphasizing the benefits of early treatment through Facial Jaw Orthopedics.

Case Report: patient G.N.S., Class II division 1, female, caucasian, Brazilian, 10 years and 10 months old, with good oral health, mixed breathing and onychophagia, attended the teaching clinic of UNIFIP/ Brazil, for orthodontic treatment due to aesthetic dissatisfaction. After clinical evaluation and radiographic and cephalometric examinations, a Class II, division 1 malocclusion with retruded mandible was diagnosed. The Klammt II functional orthopedic appliance was prescribed, with full use, for a period of 12 months and bimonthly appointments. The evolution of the case was satisfactory, with mandibular advancement and satisfactory change in the patient's facial profile.

Conclusion: it is concluded that the Klammt II open elastic activator minimized the damage caused by class II division 1 with mandibular retrognathism, redirecting the growth of the mandible in a functional way, thus generating psychological benefits and favorable aesthetics for the profile and facial proportionality.

Keywords: Malocclusion, Orthodontics, Class II Angle Malocclusion.

INTRODUCTION

Dental occlusion disorders are frequent dentoalveolar alterations in the clinical routine of the dentist. Under this bias, the diagnosis of malocclusions is essential and should be performed as early as possible, within the stages of development of the patient [1].

Several scholars of occlusion developed different classifications, such as Carabelli in 1842, Lisher in 1911 and Simon in 1922. However, among dental surgeons, the theory of Edward Hartley Angle, which was defined in 1899, is recommended. proposed in his classification that the first permanent maxillary molar would be the most constant in taking its normal position in the craniofacial skeleton, indicating that the disharmonies were a consequence of anteroposterior alterations of the lower arch in relation to the molar. Malocclusions were therefore separated into three categories: I, II and III [1].

Class II, division 1 malocclusion is characterized by mandibular retrognathism and protrusion of the upper anterior teeth, resulting in protrusion of the upper lip and convex facial profile, which are considered aesthetically unfavorable. In general, the maxilla and the mandibular incisors are well positioned, unlike the maxillary incisors which tend to be protrusive [2].

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The treatment of Class II, division 1 malocclusion, with mandibular deficiency in growing patients, aims at mandibular advancement to achieve better relationships between bone bases and improve the convex facial profile [3]; covers one or two phases. In the two-phase treatment, the first is carried out in mixed dentition with potential application of functional jaw orthopedics, followed by a corrective phase in the early permanent dentition [4]. The expected corrections through functional devices are more easily achieved in the transitional dentition, because the dental and skeletal structures are in full change, although the peak of puberty is still far away [5].

The functional orthopedic device that presents excellent results in its action is the elastic open activator Klammt II, being considered an activator for inducing the anterior positioning of the mandible and stimulating the activity of the facial muscles; elastic because it consists of two segments of acrylic joined by a steel wire, in the shape of a palatal arch, which allows the expansion of the dental arches, improving the arch shape, aligning the teeth and modifying the functional occlusal plane; and open because it provides adequate space for the tongue, allowing contact with the palate [6].

The Klammt II is a bioplastic device that determines this type of therapeutic posture change (TPM) by direct action. This feat understands that the physical presence of the device in the oral cavity determines a mandibular advancement. Clinically, when installing a

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bioplastic device, TPM must be achieved immediately [7].

The aim of this study is to report a clinical case of a class II, division 1 patient treated with a Klammt II device, as well as to highlight the static and functional repercussions achieved by functional orthopedic therapy.

CASE REPORT

Patient G.N.S., class II division 1, female, Caucasian, Brazilian, 10 years and 10 months old, sought the Orthodontics service of Centro Universitário de Patos, Brazil, complaining of functional and occlusal problems. On clinical examination, he showed good oral health, mixed breathing and habit of onychophagia; I had already had another orthopedic treatment, but without success. Figure **1** illustrates the initial appearance of the patient's face.

In the facial analysis, it was verified that the patient has a convex profile, absence of labial sealing, deep labiomentonian sulcus and reduced lower third of the face (Figure **2**).

On intraoral examination it was found that the patient had permanent dentition; Dental molar Class I and bilateral canine dental Class II; 7mm overjet and

Figure 1: Frontal facial view: at rest and smiling.

Figure 2: Lateral facial view.

Figure 3: Front and lateral occlusal views.

3.5mm overbite; bilateral Brodie's bite; rotation of element 12. These aspects can be seen in Figure **3**.

In the panoramic radiograph, the presence of all permanent teeth is observed; lack of space in the lower arch for the eruption of teeth 35 and 45; elements 18, 28, 38 and 48 in formation (Figure **4**).

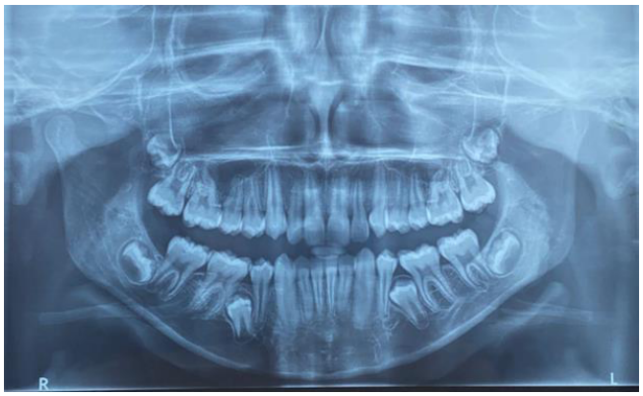

Figure 4: Panoramic view of the jaws.

In the lateral teleradiography, the reduced nasopharyngeal air space can be seen (Figure **5**).

In the cephalometric analysis, it was observed that the maxilla was well positioned in relation to the skull base (SNA=83.05), while the mandible was retruded (SNB=74.57). The ANB (8.47) demonstrated that it was a skeletal Class II division 1 malocclusion. It was also observed that the patient has a tendency to vertical growth (FMA=30.51; S-N.Go-Me=38.01).

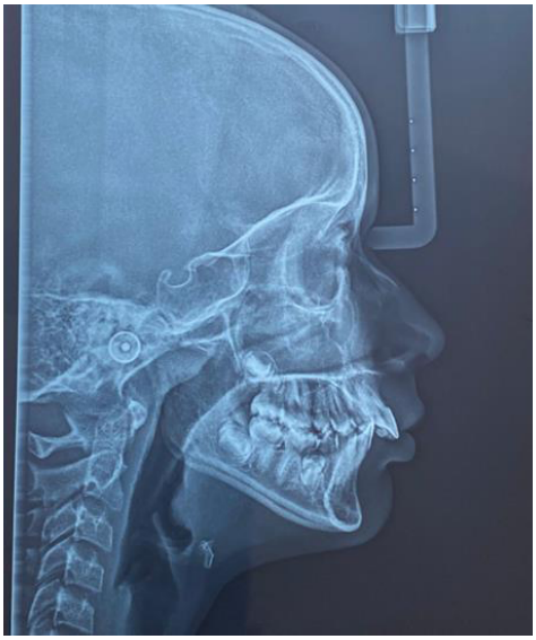

Figure 5: Lateral teleradiography.

Regarding the dental pattern, it was verified that there was protrusion of the upper incisors (1.NA=29.37), whereas the lower incisors were well positioned (Table **1** and **2**).

Table 1: Cephalometric Analysis USP/ Brazil

Cephalometric Measurements	Value Obtained	Standard Value	Detour
1 (N-Pog).(Po-Orb)	96.65º	88.00 ± 1.00	+++++++
2 (N-A.Pog)	16.22º	0.00 ± 2.00	+++++++
3 S-N.A	83.05º	82.00	
4 S-N.B	74.57º	80.00	
5 A-N.B	8.47º	2.00	
6 S-N.D	72.23º	76.00	
7 S-N.Gn	68.49º	67.00	
8 S-N.Ocl	10.98º	14.00	
9 (S-N).(Go-Me)	38.01º	32.00	
10 (Go-Gn).Ocl	25.34º	18.00	
11 1/./1	141.41º	131.00	
12 1/.NS	112.42º	103.00	
13 /1-Orbita	4.51mm	5.00	
14 1/.NA	29.37º	22.00	
15 1/-NA	3.15mm	4.00	
16 /1.NB	27.74º	25.00	
17 /1-NB	5.34mm	4.00	
18 /1.NPog	3.99mm	0.00	
19 H. (N-B)	18.66º	10.50 ± 1.50	+++++
20 H- Nariz	-1.38mm	10.00 ± 1.00	----- 11
21 Pog-NB	1.95mm	0.00	
22 Mentonian Eminence	6.41mm	7.00 ± 1.00	
23 FMIA	54.32º	68.00	
24 FMA	30.51º	25.00	
25 IMPA	95.16º	87.00	
26 TPi	3.76mm	0.00	
27 /1-Line I	-0,45mm	0,00	
28 (Go-Me).(V-T)	66.05º	72.00	
29 F.(V-T)	83.43º	81.00	
30 A-(V-T)	11.36mm	3.00	
31 Iii-(V-T)	9.17mm	6.00	
32 H. (V-T)	20.02º	5.00	
33 DC (Vigorito)	-1,85mm	0.00	

Table 2: Cephalometric diagnosis

N-A.Pog:	convex profile
S-N.A:	good placement
S-N.B:	mandibular retrusion
A-N.B:	skeletal Cl II
1/.NA:	upper slope
/1.NB:	good positioning

Through the radiography of the hand and wrist, the beginning of the epiphyseal union in the distal phalanges can be observed, with the patient being between 1 and 1.5 years after the peak of growth (Figures **6** and **7**).

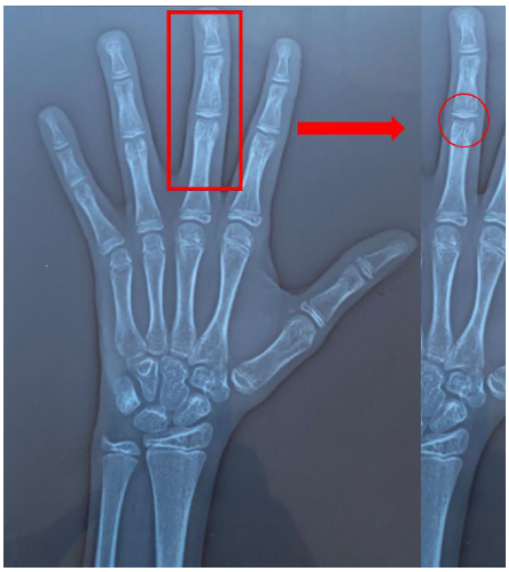

Figure 6: Hand and wrist X-ray.

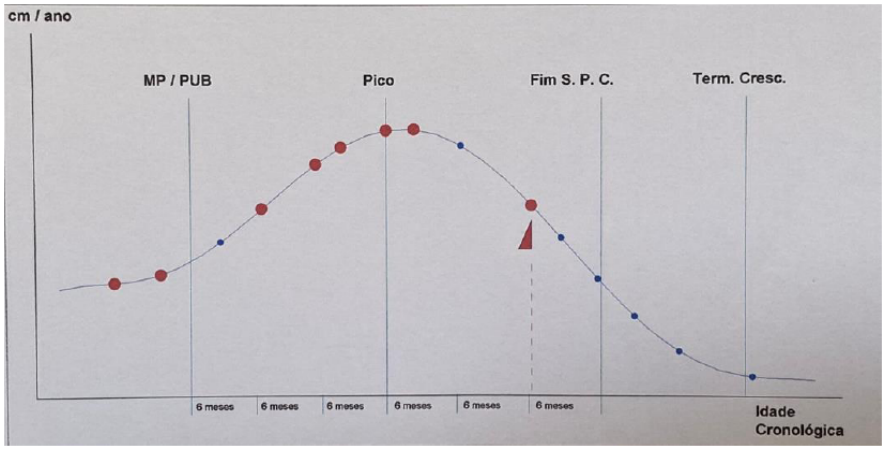

Figure 7: Growth curve.

After the clinical and radiographic analyses, a two-stage treatment was proposed: orthopedics and fixed orthodontics. In the orthopedic phase, the Klammt activator device was used with bimonthly activations. The orthopedic objective was to redirect mandibular growth, verticalize the upper incisors and transversely expand the maxilla (Figures **8** and **9**).

Figure 8: KLAMMT II elastic activator device.

Figure 9: KLAMMT II installed.

For the construction of the appliance, a constructive bite was performed with a wax sheet 7 in the format that coincided with the shape of the arches. It was softened and placed in the lower arch, the mandible was guided to the 6 mm anterior position. The wax bite was cooled and put back in the mouth for further testing, then sent to the lab along with the upper and lower models.

After installation, the patient was instructed to use the appliance full time, removing it only for meals and oral hygiene. The time established for use was 12 months, with bimonthly appointments.

The Klammt II functional orthopedic device achieved the objectives of this treatment, redirecting mandibular growth and favoring a satisfactory improvement in the patient's facial profile (Figures **11** and **12**).

DISCUSSION

Functional jaw orthopedics comprises a therapeutic option to obtain orthopedic and functional results. One of the most frequent discrepancies is Class II malocclusion with mandible deficiency, which occurs when there is a distal position of the mandible in relation to the maxilla [1].

In view of this, the success of the treatment is determined by the accuracy of the diagnosis in conjunction with the patient's characteristics, such as

Figure 11. Facial appearance before orthopedic treatment.

Figure 12. Facial appearance after using Klammt II.

Figure 13: Facial profile before and after using Klammt II.

anteroposterior discrepancy, characteristics of the dental arches, denture phase, age and patient collaboration (who must comply with the use of the appliance 10 to 15 hours a day for 1 to 1.5 years), as illustrated by the case reported in this article [2].

According to Kreia [8], the potential and direction of growth are also important. In addition, it is essential to emphasize that due to the severity of the discrepancy, facial aesthetics may be impaired. Therefore, early orthopedic treatment enables a better dentofacial appearance, which provides a better quality of life, reflecting on greater self-esteem and psychological development of the child or adolescent [9]. These statements corroborate the present study, where static and functional gains were achieved.

Added to this idea, it should be noted that the Klammt is a type of light appliance, which has a system in which the mandible slides in relation to the maxilla, stimulating the activities of the facial muscles, providing expansion of the dental arches, improving the shape of the arches and alignment of the anterior teeth, in addition to promoting adequate space for the tongue, allowing contact with the palate [9].

In the present case, Klammt II was the therapy of choice due to its bimaxillary action, which made it possible to treat mandibular retrognathism, as well as to reduce the proclination of the upper incisors, correcting the accentuated overbite and overjt, in agreement with studies reported in the literature [4]; [5]; [6].

In a prospective study [10] three devices for the treatment of skeletal Class II malocclusion were compared (Bionator, Klammt and SN1). Changes in the maxillary, mandibular and dentoalveolar components were studied through measurements and cephalometric angles in the sagittal plane. The SN1 device showed the highest average change at the base of the mandible, while the Bionator influenced the increase in the mandibular ramus. However, dentoalveolar changes were clinically relevant for all three appliances, and maxillary orthopedic appliances were found to stimulate sagittal and vertical mandibular growth, control the sagittal position of the maxilla, and generate favorable dentoalveolar changes for the correction of Class II malocclusions.

Data obtained from patients who used Klammt indicated positive changes for the correction of malocclusion, in mandibular and dentoalveolar measurements; and maintained constant maxillary position. In patients treated with the Bionator, Klammt and SN1 devices, changes in mandibular growth, maxillary stability and the necessary dentoalveolar variation to achieve dentomaxillofacial harmony were evidenced [10].

CONCLUSION

The Klammt functional orthopedic appliance corresponds to a management approach to Class II malocclusions throughout the patient's growth phase. Furthermore, this artifact interacts with the tongue, fulfilling the basic requirements of a muscular apparatus and, in this way, improves the development

of orofacial structures, providing a change in mandibular posture.

Therefore, it was concluded that Klammt's elastic open activator achieved the objectives of redirecting mandibular growth, intercepting and/or minimizing the existing malocclusion.

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