

## The use of mini-implant in pre-prosthetic orthodontic treatment

Dikson Claudino<sup>1</sup>; Caio Vinícius Martins do Valle<sup>2</sup>; Karyna Martins do Valle-Conti<sup>2</sup>; Cristiano Duarte Peres<sup>3</sup>; Jefferson Ricardo Pereira<sup>4</sup>

<sup>1</sup> PhD student, Postgraduate Program in Health Sciences, University of Southern Santa Catarina, Tubarão, SC, Brazil.

<sup>2</sup> Associate Professor, Dental Education Institute – IEO, Bauru, SP, Brazil.

<sup>3</sup> Associate Professor, Island Dental Education Center – CEOI, Florianópolis, SC, Brazil.

<sup>4</sup> Associate Professor, Postgraduate Program in Health Sciences, University of Southern Santa Catarina, Tubarão, SC, Brazil.

### Autor Correspondente

Dikson Claudino

PhD student, Postgraduate Program in Health Sciences,  
University of Southern Santa Catarina, Tubarão, SC, Brazil.

(+55) 48 99906.7203

[dikson.claudino@unisol.br](mailto:dikson.claudino@unisol.br)

Recebido em 25 de junho (2018) | Aceito em 20 de setembro (2018)

## RESUMO

O uso de ancoragem esquelética através de mini-implantes tem sido amplamente difundido no tratamento ortodôntico atualmente, destacando terapias com movimentos ortodônticos complexos e necessidade de ancoragem máxima. O objetivo deste artigo é descrever um caso de tratamento ortodôntico com mini-implante, para preparar a reabilitação protética em uma situação clínica de múltiplas perdas dentárias em um paciente adulto. A colagem parcial dos braquetes foi também realizada na maxila, também alinhando e nivelando com arcos de níquel-titânio e aço inoxidável. Posteriormente, um mini-implante com 8 milímetros de comprimento foi inserido para movimentação e retração com o máximo controle da ancoragem no hemi-arco superior direito, juntamente com molas elásticas e mecânicas. A mecânica ortodôntica propôs-se a alcançar um alinhamento e nivelamento satisfatórios dos dentes envolvidos, recuperando espaço para adequada reabilitação protética. O tratamento demonstrou ser muito auto-suficiente, com satisfação do paciente e satisfação do paciente. O uso de mini-implante para auxílio no tratamento ortodôntico mostrou eficácia no caso apresentado. A sua manipulação foi fácil com baixo custo, as diferentes possibilidades de configuração para os vetores de carga e eliminação de perdas de ancoragem em movimentos ortodônticos complexos são feitas algumas características que o mini-implantes uma forte aliado para ortodontista em atividades clínicas diárias.

**Palavras-chave:** Ortodontia; Ancoragem ortodôntica; Mini-implantes.

## ABSTRACT

The use of skeletal anchorage through mini-implants has been widely widespread in orthodontic treatment today, detaching therapies with complex orthodontic movements and need for maximum anchorage. The aim of this article is to describe an orthodontic treatment case report using mini-implant, in order to the preparation for prosthetic rehabilitation in clinical situation of multiple dental losses in an adult patient. Partial bonding of brackets edgewise prescription in maxilla was carried out, also the alignment and leveling with sequence of nickel-titanium and stainless steel arches. Posteriorly, a mini-implant with 8 millimeters length was inserted for movement and retraction with maximum control of anchorage in the right superior region hemi-arch, together with elastics and mechanic springs. Orthodontic mechanics proposed reached satisfactory alignment and leveling of teeth involved, recovering space for an appropriate prosthetic rehabilitation. The treatment demonstrated very acceptable itself, with maintenance of face balance and patient's satisfaction with the result obtained. The use of mini-implant to help orthodontic treatment showed efficiency in the clinical case presented. Its handling was easy with low cost, the different possibilities of configuration for load vectors and elimination of anchorage losses in complex orthodontic movements are some characteristics which made the mini-implants a strong ally for orthodontist in daily clinical activities.

**Key-words:** Orthodontics. Orthodontic Anchorage Procedures. Mini-implant

## 1. INTRODUCTION

The growing demand for orthodontic treatment that requires maximum anchorage boosted the development of implant systems which present easy handling and good clinical predictability[1]. Creekmore and Eklund<sup>2</sup> were the early authors to propose orthodontic movement through skeletal anchorage using mini-implants (MIs). According to these authors, the system could support loads with enough magnitude and duration for repositioning teeth without causing pain, infection and other pathological changes.

One of the main advantages of MIs is their reduced size, what enables the installation in several regions of the alveolar process, especially in intra-root spaces. The possibility to apply orthodontic loads over the mini-implant (MI) immediately after its installation is another great advantage of this anchorage system, also associating little need for patient's collaboration during the treatment [1].

MIs are indicated in cases which present need for maximum anchorage with reduced number of teeth and requiring orthodontic movements considered complexes by traditional methods, like in cases of pre-prosthetic treatments in order to adequate the occlusion and the teeth positions to reach better esthetical conditions and functions for the future prosthesis.

This article aims to report the use of MI with the purpose for skeletal anchorage for unilateral distalization of superior canine and pre-molars in an orthodontic treatment with pre-prosthetic purposes.

## 2. CASE REPORT

Female patient, 27 years old, searched for attendance with main complaint of smile esthetic dissatisfaction due to absence of lateral right superior incisive (agenesis), superior arch medial diastema and dissatisfactory prosthetic crown on the right superior central incisive (Fig. 1).



**Figure 1: Inicial**

Extra oral examination showed frontal and lateral normal face, as well as appropriate labial positioning at rest and during the smile. Intra buccal examination showed malocclusion class II in canines, several teeth absences (16, 12, 24, 27, 36, 45 and 46) and appropriate vertical and horizontal trespass. Superior medial line presented deviation to the right (3mm), with teeth mesialization (13 and 14), distalization (tooth 11) and crown mesial inclination (21). Lack of space was also verified for prosthetic rehabilitation in the region of tooth 12, as well as prosthetic crown dissatisfactory and invasion of the biological space in the tooth 11.

Radiographic evaluation and periodontal examination evidenced normal conditions to start the orthodontic movement and the function of temporomandibular articulation was considered normal.

### • Treatment proposed

In this clinical case, requirements for pre-prosthetic preparation were restricted to the superior arch. The treatment proposed aimed to recover space for prosthetic rehabilitation on the region of tooth 12, as well as correction of deviation of the superior medial line, performing the distalization on the arch of teeth 13,14 and 15, mesialization of tooth 11 and correction and inclination of 21 one.

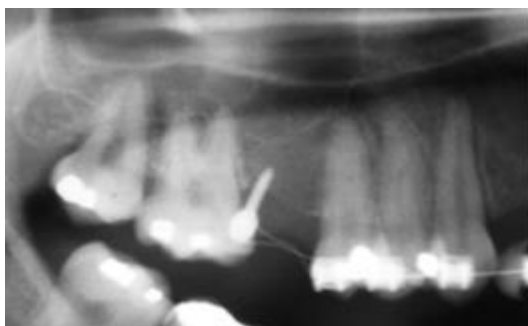
Application of conventional techniques for orthodontic anchorage to achieve the objectives proposed could imply anchorage losses, characterized by mesialization of posterior teeth, making impossible an appropriate prosthetic rehabilitation after finishing the orthodontic treatment. Then, the option was the use of skeletal anchorage through MI to reach the expected results, obtaining absolute anchorage, eliminating the disadvantage of anchorage loss by the use of simplified devices and with less time spent, when compared to traditional appliances, such as the transpalatine bar and the Nance button.

### • Treatment performed

Edgewise prescription brackets were bonded in the superior arch of teeth from 15 to 23. The bracket in the tooth 11 was positioned 2mm towards cervical, in order of tooth extrusion and recover the biological space for an appropriate prosthetic rehabilitation. Then, a sequence for alignment and leveling was performed with NiTi arches (.014" and .016") and CrNi (.018" and .020") ones.



**Figure 2**



**Figure 3**

Following the treatment, a self-piercing type MI was installed, with 8mm length, 2mm transmucosal profile and 1.5mm diameter, mesially inserted to the mesial vestibular root of the right superior second molar (Fig. 2). After MI fixation, periapical radiographic test was carried out to exclude the possibility for molar root damage (Fig. 3). The patient was oriented to perform the hygiene of MI head through daily mouthwash with chlorhexidine gluconate 0.12%, and soft cleaning the region with soft bristles toothbrush.

After 7 days of MI installation, teeth 15 and 14 distalization was started uniting them through elastic chain to the MI, with 250g applied load, characterizing the skeletal anchorage (Fig. 4). To correct the angulation

of tooth 21, a twist tie was installed uniting the tooth to the 22 and 23 ones, adjusting the twist tie every visit (Fig. 5). Opened section NiTi spring was positioned between the teeth 13 and 11 in order to provide mesialization of tooth 11 and distalization of 13 one, to the space reached due to the skeletal anchorage (Fig 6).



**Figure 4**



**Figure 5**



**Figure 6**

After obtaining appropriate space for prosthetic rehabilitation of the right superior incisor, a provisory prosthetic crown was installed in this region, initially fixed at the orthodontic arch (Fig. 7), and posteriorly to the appliance removal, fixed on the right superior central incisor with a cantilever (Fig. 8). It provided maintenance of the space reached and achieving an acceptable smile esthetic until the definitive prosthetic rehabilitation. Total time for this orthodontic treatment was 8 months. At its end, the orthodontic appliance was removed, as well as the MI. The last one through simplified clinical surgical procedure and printed a counterclockwise rotational movement at its head.

Orthodontic mechanical purpose reached a satisfactory alignment and leveling of teeth involved, preserving horizontal and vertical trespasses with correction of the superior medium line, closing the medial diastema and recovering the space for complete prosthetic rehabilitation in the right superior lateral incisor. Distalization of superior right canine and first pre molar was reached successfully. The treatment showed being very acceptable, maintaining the facial balance and patient's satisfaction with the results obtained.

### 3. Discussão

Nowadays, the use of MIs as anchorage resource has been described in the literature as an important tool for orthodontic treatment[4-6]. The use of MIs present several advantages when compared to traditional osteointegrated implants, like its low cost, easy clinical handling for insertion and removal, and due to its reduced size, the possibility for use in many regions, like between roots, for example[1,4].

This case report was conducted in a clinical situation of multiple teeth losses. As described by several authors[1,7,8], in these cases, which usually involve adult patients, orthodontic treatment is performed in a partial way, and with the aim to preparing for posterior rehabilitation though orthodontic treatment. Using a traditional mechanic for orthodontic anchorage in similar clinical cases is translated into great technical difficult and higher time consumption.

Regarding to the time interval for load applying over the MI after its installation, nowadays it seems a consensus in the literature[9-12] that there is no significant difference in the clinical performance of these devices, when compared to immediate load application right after MI

installation, and the late load one. However, in this report, a wait during 7 days was the option chosen for load application over the MI, observing its stability. This choice was based on researches, such that performed by Barbo et al. [13] who oriented do not apply immediate pressure over the MI in order to avoid its instability, and that by Serra et al.[14] which verified in an animal model histological cuts, that immediate load application results in lower MI bone fixation after 12 weeks from its installation.

As described by other authors in their researches[8,5,6], the use of MI in the clinical case presented in this report provided the conclusion of treatment reaching the objectives proposed, in lower time when compared to the time predictability using orthodontic mechanic with traditional anchorage systems.

In this report, there was effective control over the bacterial plaque and peri-implant infection through orientation to the patient to perform daily mouthwash with chlorhexidine gluconate 0.12% concentration, as indicated by other authors[6,13,12], and soft cleaning of the region with soft bristles toothbrush.

### 4. Conclusões

The use of MI to help pre-prosthetic orthodontic treatment demonstrated efficiency in the clinical case presented. Its clinical handling is easy, including installation and removal stages, as well as the different configuration of load vectors which enable, together the elimination of anchorage loss through complex orthodontic movements, the application of this type of accessory a strong ally for orthodontist in clinical daily activities.

### REFERÊNCIAS

- [1] Namiuchi Jr. OK, Herdy JL, Flório FM, Motta RHL. Utilização dos mini-implantes no tratamento ortodôntico. *RGO* (Porto Alegre). 2013;61(1):453-60.
- [2] Creekmore TD, Eklund MK. The possibility of skeletal anchorage. *J. Clin. Orthod.* 1983; 17(4):266-9.
- [3] Marassi C, Leal A, Herdy JL, Chianelli O, Sobreira D. O uso de miniimplantes como auxiliares do tratamento ortodôntico. *SPO*. 2005;38(3):256-65.
- [4] Marassi C, Marassi C. Mini-implantes ortodônticos como auxiliares da fase de retração anterior. *Dental Press J. Orthod.* 2008;13(5):57-75.

- 
- [5] Lima LAC, Lima C, Lima V, Lima V. Mini-implantes como ancoragem absoluta: ampliando os conceitos de mecânica ortodôntica. *Biomaterials and esthetics*. 2010;5(1):85-91.
  - [6] Janson M, Sant'Ana E, Vasconcelos W. Ancoragem esquelética com mini-implantes: incorporação rotineira da técnica na prática ortodôntica. *Rev. Clín. Ortodon. Dental Press*. 2006;5(4):85-100.
  - [7] Carvalho VM, Lemos ARB, Aguiar HA, Curi-Paccini JV, Valarelli FP. Tratamento de classe II com múltiplas perdas de molares por meio de ancoragem em mini-implantes. *SPO*. 2015;48(3):223-30.
  - [8] Carano A, Velo S, Leone P, Siciliani G. Clinical applications of the miniscrew anchorage system. *JCO*. 2005;39(1):9-24.
  - [9] Miyawaki S, Koyama I, Inoue M, Mishima K, Sugahara T, Takano-Yamamoto T. Factors associated with the stability of titanium screws placed in the posterior region for orthodontic anchorage. *Am J Orthod Dentofacial Orthop*. 2003;124:373-8.
  - [10] Melsen B, Costa A. Immediate loading of implants used for orthodontic anchorage. *Clin. Orthod. Res*. 2000;3:23-8.
  - [11] Araújo TM, Nascimento MHA, Bezerra F, Sobral MC. Ancoragem esquelética em Ortodontia com mini-implantes. *Rev. Dent. Press. Ortodon. e Ortopedi. Facial*. 2006;11:126-56.
  - [12] Carvalho RP, Cançado RH, Valarelli FP, Freitas KMS, Canuto LFG. Fatores clínicos associados com a estabilidade dos mini-implantes no tratamento ortodôntico. *SPO*. 2011;44(6):532-40.
  - [13] Barbo BN, Menezes LM, Lima EMS, Como ter sucesso no tratamento ortodôntico com o uso de mini-implantes. *Rev. Ortodontia Gaúcha*. 2014;18(2):5-16.
  - [14] Serra GG, Morais LS, Elias CN, Andrade L, Muller CA. Mini-implante ortodôntico carregados imediatamente: estudo in vivo. *Matéria*. 2007;12(1):111-19.