

## Anteroposterior Osteogenic Distraction of Maxilla to Allow Rehabilitation with Implants

Rafael Manfro<sup>1\*</sup>, Marcelo Carlos Bortoluzzi<sup>2</sup>, Vinícius Fabris<sup>3</sup> and Gislaine Felipe Garcia<sup>4</sup>

<sup>1</sup>Coordinator of the Department of Implantology Soebrás/Funorte – Florianópolis/SC, Brazil

<sup>2</sup>Professor of the Universidade Estadual de Ponta Grossa-UEPG/PR, Brazil

<sup>3</sup>Professor at the Post Graduation in Implantodontics Soebrás/Funorte – Passo, Fundo, Brazil

<sup>4</sup>Professor of the Universidade do Sul de Santa Catarina – UNISUL, Brazil

**\*Corresponding Author:** Rafael Manfro, Coordinator of the Department of Implantodontics at CEO – Florianópolis/SC, Presidente Coutinho 264/903, CEP 88015-230, Florianópolis/SC, Brazil; Tel: (55) 48 32061410 ); E-mail : manfroimplante@hotmail.com

**Citation:** Rafael Manfro, Marcelo Carlos Bortoluzzi, Vinícius Fabris and Gislaine Felipe Garcia (2016) Anteroposterior Osteogenic Distraction of Maxilla to Allow Rehabilitation with Implants. Oral Health Dent Res 1: 002.

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### Abstract

The treatment of atrophic maxilla is one of the greatest challenges in implantodontics. In situations in which the patient shows class III ridge relation, bone resorption caused by the loss of teeth increases the discrepancy, thus making the treatment more difficult. Here we report a case treated with osteogenic distraction to make the maxilla advance and later rehabilitate the maxilla with osseointegrated implants.

**Keywords:** Osseo integrated Implants; Atrophic Maxilla; Osteogenic Distraction.

### Introduction

The rehabilitation of lost teeth with osseointegrated implants has allowed improved functional treatments with the desired aesthetics, i.e., as close as possible to the lost natural teeth.

This is only possible when all tissues, bone and alveolar mucosa have also been satisfactorily recovered. At many times it is necessary to apply several and varied surgical techniques and/or treatments concomitantly with other specialties.

The alveolar bone has 25% of its volume reduced [1] in the first year following the loss of any anterior tooth. If there is loss of all anterior teeth, besides the loss of volume, the sustentation of the corresponding soft tissues will also be compromised.

Therapeutic possibilities are more difficult in patients whose dental losses show anteroposterior deficiency of maxillary growth associated to class III malocclusion [2, 3]. In such situations, bone reconstruction with grafting alone is insufficient to allow satisfactory prosthetic rehabilitation, requiring great prosthetic compensation and the use of fixed or removable artificial gingiva [2-4].

The most popular technique for maxillary anteroposterior repositioning is Le Fort I osteotomy in orthognatic surgery with interpositional grafting [5]; however, the precision of maxillary repositioning depends exclusively on the superior central incisive. There is high risk of bad three-dimensional positioning, mainly vertically, in the absence of such dental elements [6-8].

The aim of this work is to present a clinical case treated with anteroposterior distraction of the maxilla associated to bone grafting and osseointegrated implants to correct a class III maxillary deformity associated to anterosuperior dental loss.

**Figure 1: A, B and C:** Intraoral aspect in which it is possible to notice the absence of anterior superior teeth, great loss of gingival and bone tissue



Figure 1A



Figure 1 BB



Figure 1B



Figure 1 C



**Figure 2:** Facial aspect in pre-surgery profile. Notice the retro projection of the maxilla, the reverse lip relationship and the loss of vertical dimension with shortening of the lower third of the face.

Diagnostic waxing showed great need of anteroposterior compensation at the prosthesis, thus making treatment prognostics difficult.

Initially, we installed a fixed orthodontic appliance with rectangular arch and vestibular clasps that would be used to allow anterior traction.



Figure 3

**Figure 3:** Le Fort I osteotomy allowing anteroposterior distraction of the maxilla.

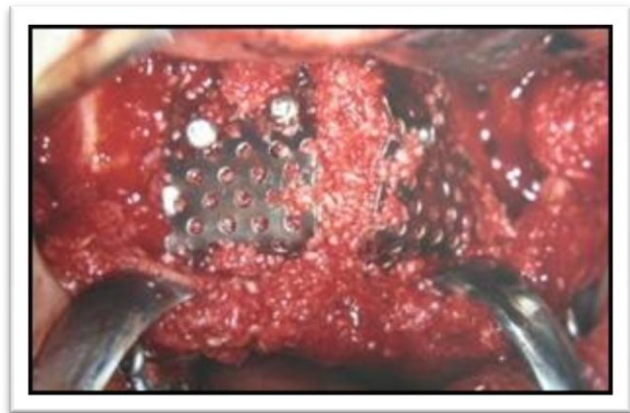


Figure 4

**Figure 4:** GTR surgery for bone reconstruction. Notice the presence of the titanium mesh and the particulate autogenous bone.

A face mask was installed ten days later and elastic rings joined the facial mask to the appliance clasps. That system allowed the slow anterior traction of the maxilla similarly to the use of a specific distractor. The advance of the maxilla was monitored with controls every two days and the diameter of the elastic rings was gradually diminished, keeping the same strength and the same rhythm of movement. Advance was performed up to class III overcorrection. The elastic rings were maintained after the end of the distraction for contention and bone formation and for stabilizing the movement achieved.

During control the patient did not come to the dental office for 7 days, which coincided with the end-of-the-year celebrations. When she returned, the right side of her maxilla showed recidive with class III occlusion. The patient admitted not using the elastic rings and the face mask as prescribed. Prying was carried out on that day in the region of tuberosity and the right side of the maxilla was pushed to

the front, so as to try to correct the recidive. After that movement the patient started using elastic rings again for stabilization and those were kept for 9 weeks. The final result allowed correcting the malocclusion on the left side and a small class III position on the right side. The treatment allowed the anterior correction of the ridge and the improvement of facial aesthetics.

A new complication was found during the stabilization period. The titanium mesh was exposed to the oral medium, showing infection of the grafting. Attempts were made to control the situation with antibiotics and local irrigation. That treatment was not as efficient as expected, so the titanium mesh was removed after 35 days; after 07 days the infection was treated. Some of the grafting was lost for this reason, making impossible to install the implants as planned. A choice was then made for block grafting removed from mandibular (Figure 5), and after 5 months the programmed implants were installed (Figure 6).



Figure 5



Figure 6



**Figure 5:** Block grafting for bone reconstruction after the loss of part of the first graft.

**Figure 6:** Installation of implants in the graft area

The implants were reopened after 6 months of osseointegration and procedures for the installation of provisory prosthesis were performed (Figures 7 and 8).



Figure 7



Figure 8

**Figure 7:** Intraoral aspect of the prosthetic rehabilitation

**Figure 8:** Facial aspect in post-surgery profile. Notice the recovery of the positioning of the maxilla with the improvement of facial aspect. Notice the recovery of vertical dimension and the normal lip relationship.

## Discussion

Good three-dimensional positioning of the teeth involved is fundamental in any dental treatment requiring aesthetics. The anteroposterior position of fixations is a key factor for satisfactory results in rehabilitations involving multiple implants, for it determines factors such as smile and the positioning of the upper lip; it also permits satisfactory physiognomic reconstruction with prosthetic rehabilitation with little or no artificial gingival [9].

In cases in which the maxilla is repositioned, needing repositioning of bone bases, the presence of the superior central incisor is fundamental so that, after L<sup>ê</sup> Fort I osteotomy, it be repositioned horizontally, transversely and mostly vertically [6-8]; thus, for proper positioning, the orthognatic surgery to advance the maxilla should ideally be performed only after the installation of the implant and a provisory prosthesis.

As the anterior maxilla loses from 40 to 60% of its width within the first 3 years after exodontias, the installation of implants is only possible after the adequate bone reconstruction of the alveolar process usually with block grafting [3, 10-12]. Despite having more predictable results, that possibility of treatment exposes patients to a larger number of surgical procedures and also increases treatment time.

In order to optimize the treatment, we performed anteroposterior osteogenic distraction with bone reconstruction in the same surgical intervention [13-16]. By

performing anteroposterior repositioning slowly and gradually, the technique allows the professional to direct the movement to be made along the maxilla during the movement, diminishing the possibility of errors in the three-dimensional positioning of the maxilla.

The choice for face mask associated to elastic traction was due to the cost of specific distractors for the procedure, as the patient could not afford their use.

During L<sup>ê</sup> Fort I osteotomy, the vascularization of the whole maxilla is made by the palatine mucosa alone [17]. Due to such decreased vascularization, we decided for GTR with the aid of a titanium mesh and particulate bone, as we believed the vascularization of the grafting would be easier if it were carried out like this instead of traditional block grafting [18]. We believe this was a good choice, as the exposition of the mesh caused the loss of great part of the grafting, requiring new reconstruction, then made in block. We believe the chances of successful reconstruction would have been greater if we had chosen block grafting in the first intervention.

Another change in a further intervention would be the simultaneous performance of a small palatine disjunction in order to mismatch the osteotomies in the posterior region of the maxilla to facilitate anteroposterior movement.

Regardless the difficulties and complications presented, the final result was considered satisfactory, which makes us believe this kind of treatment is viable for patients with maxillary anteroposterior deformities associated to the loss of central incisors.

## Acknowledgment

The authors thank Dr. Fabio Batassini and Dr Felipe Fronza for prosthetic rehabilitation and orthodontics treatment

## References

1. Johnson K. A study of the dimensional changes occurring in the maxilla after tooth extraction. Part I: Normal healing. *Aust Dent J* 1963; 8: 428-33.
2. Sutton DN, Lewis BRK, Patel M, Cawood JI. Changes in facial form relative to progressive atrophy of the edentulous jaws. *Int J Oral Maxillofac Surg*. 2004; 33: 676-682.
3. Widmark G, Anderson B, Andrup B, Carlsson GE, Ivanoff CJ, Lindvall AM. Rehabilitation of patients with severely resorbed maxillae by means of implants with or without bone grafts. A 1-year follow-up study. *Int J Oral Maxillofac Implants*. 1998; 13: 474-482.
4. Weingart D, Joos U, Hülzeler MB, Knode H. Restoration of maxillary residual ridge atrophy using Le Fort I osteotomy with simultaneous endosseous implant placement: technical report. *Int J Oral Maxillofac Implants*. 1992; 7: 529-535.
5. Kahnberg KE, Nilsson P, Rasmusson L. Le Fort I Osteotomy with interpositional bone grafts and implants for rehabilitation of the severely resorbed maxilla: A 2-stage procedure. *Int J Oral Maxillofac Implants*. 1999; 14: 571-578.
6. Gil JN, Clauss JDP, Manfro R, Lima Jr SM. Predictability of maxillary repositioning during bimaxillary surgery: accuracy of a new technique. *Int J Oral Maxillofac Surg*. 2007; 36: 767-771.
7. Polido WD, Ellis E, Sinn DP. An assessment of the predictability of the maxillary surgery. *J Oral Maxillofac Surg*. 1990; 48: 697-701.
8. Polido WD, Ellis E, Sinn DP. An assessment of the predictability of the maxillary repositioning. *Int J Oral Maxillofac Surg*. 1992; 20: 349-352.
9. Farkas LG, Katic MJ, Hreczko TA, Deutsch C, Menro IR, Anthropometric proportions in the upper lip-lower lip-chin area of the lower face in young white adults. *Am J Orthodont*. 1984; 86: 52-60.
10. Leung A, Cheung LK. Dental implants in reconstruction jaws: patients' evaluation of functional and quality-of-life outcomes. *Int J Oral Maxillofac Implants*. 2003; 18: 127-134.
11. Levi A, Psoter WJ, Agar JR, Reisine ST, Taylor TD. Patient self-report satisfaction with maxillary anterior dental implant treatment. *Int J Oral Maxillofac Implants*. 2003; 18: 113-120.
12. Widmark G, Anderson B, Carlsson GE, Lindvall AM, Ivanoff CJ. Rehabilitation of patients with severely resorbed maxilla by means of implants with or without bone grafts. A 3-to 5 year follow-up clinical report. *Int J Oral Maxillofac Implants*. 2001; 16: 73-79.
13. Erkut S, Eckan S. Alveolar distraction osteogenesis and implant placement in a severely resorbed maxilla: a clinical report. *J Prosthet Dent* 2006; 95: 340-344.
14. Gaggl A, Rainer H, Chiari FM. Horizontal distraction of the anterior maxilla in combination with bilateral sinuslift operation – preliminary report. *Int J Oral Maxillofac Surg*. 2005; 34: 37-44.
15. Gateno J, Engel ER, Teichgraber JF, Yamaji KE, Xia JJ. A new Le Fort I internal distraction device in the treatment of severe maxillary hypoplasia. *J Oral Maxillofac Surg*. 2005; 63: 148-154.
16. Suhr MAA, Kreuzsch T. Technical considerations in distraction osteogenesis. *Int J Oral Maxillofac Surg*. 2004; 33: 89-94.
17. Bell W H. Bone healing and revascularization after total maxillary osteotomy. *J Oral Surg*. 1975; 33: 243-8.
18. Pallesen L, Schou S, Aaboe M, Hjarting-Hansen E, Nattestad A, Melsen F. Influence of particle size of autogenous bone grafts on the early stages of bone regeneration: A histologic and stereologic study in rabbit calvarium. *Int J Oral Maxillofac Implants*. 2002; 17: 498-506.

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