

# Segmental osteotomy for mobilization of dental implant

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**Purpose:** The aim of this work is to evaluate a surgical technique for mobilization of mal posed dental implant in anterior area.

**Methods:** A 38-year-old patient consulted our unit for esthetic dissatisfaction with the implant treatment of a central incisor. An implant was observed in 11 and 21, where 11 was 3 mm above the ideal limit, with excessive vestibular angulation. The choice was made to perform a segmental osteotomy and mobilize the bone block and the implant down and forward; a bone block extracted from the mandibular ramus was installed between the implant block and the bed to stabilize the segment.

**Results:** After 4 months, a conventional fixed prosthesis was created and the esthetic result achieved was close to what the patient wanted, with no need for further surgery. The surgical condition was stabilized and maintained for the long-time and no complications how necrosis, infection or bone defects was present.

**Conclusions:** It was concluded that the procedure is efficient, and the biological arguments in favor of the procedure are discussed.

**Keywords:** Dental implants, Osteotomy.

## INTRODUCTION

Implantology has greatly evolved in recent years. Changes in design, surface types, connection systems, and varied installation alternatives are fulfilling the demands for function and esthetics requested by patients [1,2].

Given these conditions of improvement, error, and failure, treatment with dental implants is becoming increasingly complex to manage. In this sense, the adequate three-dimensional positioning of implants and integral planning of the case are highly relevant when the procedure is performed [3]. This involves a suitable esthetic rehabilitation combined with the medium- and long-term stability of the implant [3].

When a dental implant is poorly positioned, the options for

solving the case are either 1) through prosthetic compensation or 2) through replacement or transfer of the position of the implant. When the option chosen is to modify the prosthesis, it is possible to change the position of the abutment, to construct abutments specially designed for the implant, and/or to modify the characteristics of the crown both in size and in its form of construction [4]. In these situations, the esthetic objective is often difficult to achieve, particularly when the implant is in the anterior sector [5].

If the malposed implant is osseointegrated, the only options for modifying the position are either replacement with a new implant, which often requires procedures prior to reconstruction with a bone graft [5], or the transfer of the osseointegrated implant by means of a peripheral osteotomy

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that includes the block with the implant inside it. Osteogenic distraction has been reported where the osteotomy performed with the implant inside the block has achieved repositioning [6]. Another option is alveolar segmental osteotomy, which involves movement of the block with the implant inside it, together with its stabilization by means of some fixation system [7].

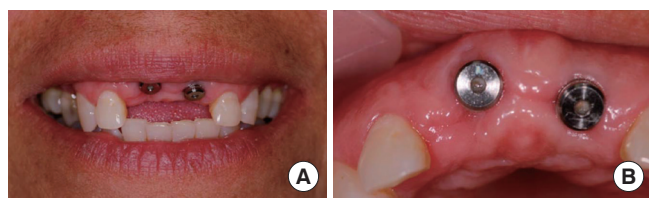
The aim of this article is to present a case of the segmental osteotomy of a block with an implant in the upper central incisor in order to lower the implant's position for better angulation and final position.

## CASE DESCRIPTION

The patient, a 38-year-old female, visited the Oral Implantology Unit in conjunction with the Oral Rehabilitation Unit of the Universidad de La Frontera for problems she had detected in the installation of a singular fixed prosthesis in implants that had previously been installed by other professionals.

### Initial condition and planning

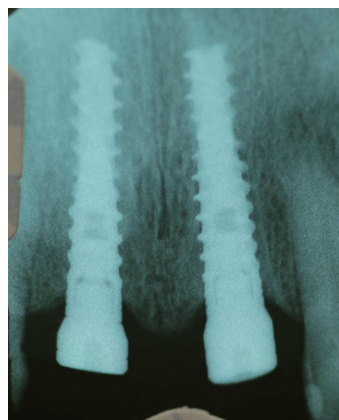
The clinical examination revealed a mesomorphic patient, facially proportionate, with no prior alterations or surgeries at the facial level. A slight vertical excess of the maxilla (approximately 3 mm) was observed, coinciding with a high smile level and greater tooth exposure with the lips at rest.



**Figure 1.** (A) Inadequate positioning of implant 11, 3 mm over the ideal cervical limit. (B) Anterior position of 11 in relation to the lateral incisor and adjacent implant.

The intraoral examination showed partial edentulism, alterations in occlusal balance, diastemas with poor tooth positions, and the position of two implants in 11 and 21 (3.75 mm × 13 mm) with their respective healing abutments. Both implants were found with the emergence in a more anterior position than appropriate, but implant 11 was found with high (3 mm over the ideal) and anterior emergence, suggesting an angulation greater than 30° (Fig. 1A and B). The radiographic study revealed stability of the implants with no signs of peri-implantitis or alterations in the osseointegration (Fig. 2).

After studying some treatment options, it was determined that a segmental osteotomy of implant 11 should be performed for inferior and posterior repositioning, placing it closer to the position and angulation of implant 21. In the study model, the model surgery was conducted that would make it possible to define the inferior repositioning as having to be at least 3 mm and the anterior displacement in the upper sector as having to be 2 mm using the middle area of the implant as the rotation axis that allowed the cervical sector to perform a 2 mm movement posteriorly (Fig. 3).



**Figure 2.** Periapical radiograph of implants 11 and 21 free of pathology, peri-implantitis, or any other type of alteration.



**Figure 3.** Study of models and surgery on models to identify the planned movement needed for repositioning 3 mm downwards and 2 mm posterior.

### Surgical treatment

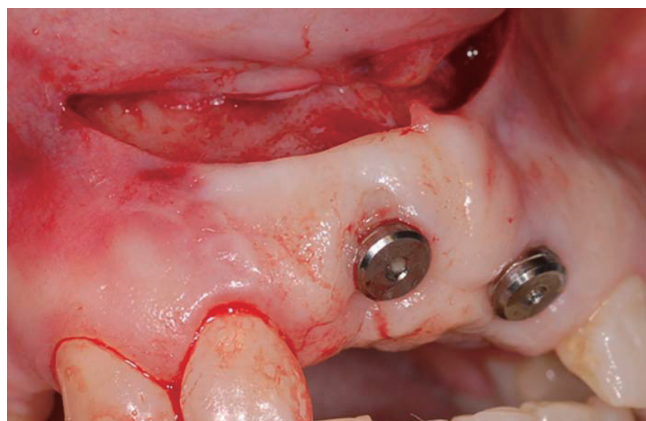
The procedure was performed under local anesthesia with 8 mL of lidocaine with 2% epinephrine, 1:100,000, in the vestibular and palatal sector.

A 2-mm linear incision was made on the mucogingival border 3 cm long (Fig. 4), a total subperiosteal detachment of the vestibular region was performed, and the implant area was completely exposed from the cervical to the lower edge of the piriform aperture.

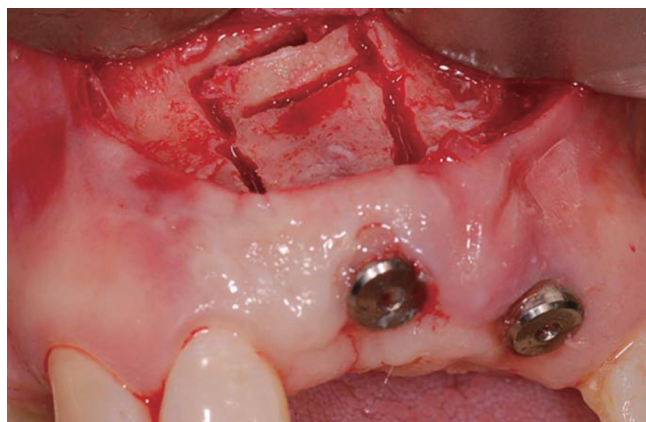
After identifying the entire extension of the implant, the horizontal osteotomy was conducted 5 mm above the edge of the implant and vertical osteotomies in the medial and lateral sectors with a 5-mm safety margin (Fig. 5). The osteotomies went from the vestibular cortical to the palatal cortical layer. For this, a 701 drill mounted on a low-speed (20,000 rpm) handpiece was used. The osteotomy was completed

with a straight chisel and the block was mobilized, keeping it adhered to the palatal periosteum to ensure the blood supply of the mobilized block.

Later, a bone block of the mandibular ramus was obtained (Fig. 6), extracted using a conventional technique [8] that allowed the insertion of this block into the upper sector of the mobilized block to stabilize the sector, permitting stabilization of the planned 3-mm descent. The remaining autogenous bone was crushed and served to fill the spaces from the osteotomy and defects caused by the procedure (Fig. 7). Given the overall stability of the block, another type of fixation system was unnecessary. The suture was made on a plane with simple 3-0 Vycril stitches. The emergence of the implant that would allow prosthetic rehabilitation was confirmed intraoperatively (Fig. 8A and B).



**Figure 4.** Vestibular maxillary incision close to the bottom of the vestibule 3 cm long.



**Figure 5.** Horizontal and vertical osteotomy of the block with the implant. The osteotomy reaches the palatal periosteum. The superior vertical osteotomy is performed 5 mm over the apical limit of the implant recorded by another osteotomy guide.

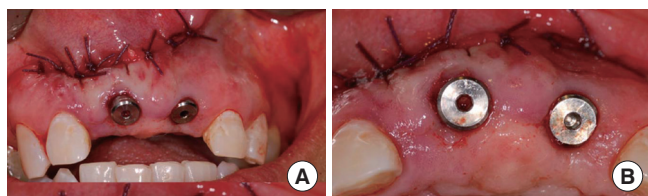


**Figure 6.** Mobilized bone block, maintaining contact with the palatal periosteum. A bone graft is installed in the superior sector to ensure the mobility and stability of the 3 mm downward movement.



**Figure 7.** Autogenous particulate bone graft installed in the osteotomies and in the defects caused by mobilization of the bone block.





**Figure 8.** (A) Simple suture of the incision without excessive traction of the flap. (B) Implant 11 located posteriorly at its cervical level after rotating the apical sector vestibularly.

### Rehabilitation therapy

After 4 months of follow-up, new radiographs were taken, identifying the total repair of the bone tissue and the stability of the installed implant. No complications associated with the procedure were observed. The conventional rehabilitation techniques for implants were then used, with tailor-made casting abutments with a chromium-cobalt machined base, and the angulation and desired form of the abutment were attained to make cemented metal ceramic crowns (Fig. 9); Ketac Cem permanent glass ionomer cement was used for this (3M ESPE Dental Product, St. Paul, MN, USA).

### DISCUSSION

The segmental osteotomy has been used successfully in the surgical treatment of facial deformities; in such cases, the maintenance of the periosteum and the stability of the bone block ensure the blood supply that supports the vitality of the mobilized segment [9]. Osteogenic distraction is also based on the execution of a segmental osteotomy, which demands that the palatal periosteum be maintained in order to maintain the blood supply [10].

The biological bases of how these techniques are applied to the technique of segmental osteotomy for implant mobilization. A complicated situation to tackle is that inside the mobilized block there is a dynamic interface between implant and bone [11], which demands that the stability for the blood exchange in the block be even more precise. To our knowledge, there are no studies that evaluate this interface in this clinical situation, although some previously reported cases have proven successful [7,12-15].

Therefore, the stability of the mobilized block seems to play a fundamental role in the success of treatment. In the case reported by Kassolis et al. [7] an osteotomy of two maxillary implants in place of the lateral incisors was performed, stabilizing them by means of the fixed prosthesis anchored to the central incisors with resin and wire. In another situation presented by Raghoebar et al. [13], an osteotomy was performed on an implant in the anterior sector of the mandible for subsequent rehabilitation with a total prosthesis. The block was



**Figure 9.** Metal ceramic fixed prosthesis installed on the implants, maintaining adequate esthetics and correct functionality. The regional esthetic can be optimized with manipulation of the soft tissue and dental management in a second operation.

stabilized with plates and titanium screws, in addition to a ferrule fixed to the implant abutment together with the others prostheses installed in the patient. In the case described by Martin et al. [12], a block with an implant in position 11 was mobilized, anchoring the respective fixed prosthesis to the neighboring teeth with resin and wire. In a previous case from one of the present authors [15], the same technique was used, where stabilization was performed with only a bone graft block obtained from the mandibular ramus and maintaining the implant only with the cover in order to avoid undesired exposure and movement of the implant. This technique was successful.

Mobilization of the implant ensured that its rehabilitation was compatible with the patient's condition, solving an initial complication. The change in angulation by approximately 15° allowed the preparation of a fixed prosthesis using a castable abutment with a machined base to lock in the prosthesis and give suitable shape to the future prosthetic contours, with no disadvantages thanks to the adequate platform depth of the implant [16].

We can, thus, conclude that the segmental osteotomy to reposition malposed implants is a viable and useful technique, limiting the need for subsequent operations or performing prosthetic compensation. It is possible to obtain adequate esthetics and stability with this type of procedure when it is part of correct planning on models prior to surgical intervention. The patient's previous gingival condition and soft tissue support is also relevant.

### CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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