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CASE REPORT

Piezo osteotomy with all-on-4 implants to enable a full-arch rehabilitation

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ABSTRACT

The rehabilitation of full-arches with implant-supported prostheses is a widespread practice in implant dentistry. However, some cases require additional techniques to solve the same clinical case. The purpose of this case report is to present a maxilla total rehabilitation with implant-supported prosthesis in a patient with vertical maxillary excess requiring osteotomy, which was performed with piezoelectric to remove the bone platform, providing the patient with better esthetics and prosthetic space for proper hygiene and maintenance of the prosthesis.

KEY WORDS: Dental implants, dental rehabilitation, full-arch, piezosurgery

INTRODUCTION

Full-arch rehabilitation of the maxilla using implants requires a prosthetic reverse planning, due to the numerous esthetic challenges for making a hybrid prosthesis.

The all-on-4 technique is an option, since the dental surgeon is faced with the dilemma of removing the bone platform through osteotomy for the implant's placement, because most often, after bone removal, a maxillary sinus lifting surgery is necessary, so the implants can be properly placed.[1]

This clinical case aims to report the maxillary ridge osteotomy with the use of piezoelectric for the full-arch rehabilitation using the all-on-4 technique.

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CASE REPORT

A 50 year old male patient presented maxillary ede ntulous and with American Society o f Anesthesiologists 1. The patient has complained about full maxillary muco supported prosthesis regarding the esthetics, besides speaking and chewing insecurities. The following procedures have been carried out, to set a plan: Intraoral clinical examination, photographic record, study molding, and tomographic examination [Figure 1].

Two procedures have been proposed for obtaining an implant-supported full-arch prostheses. Due to the patient's bone availability, especially in the anterior region of the maxilla, the initial offered plan was a dental implant-supported full-arch ceramic prosthesis. However, on account of financial issues, the patient could not bear the costs of this type of prosthesis. Then, a second treatment plan was suggested, using an acrylic resin implant-supported full gingival arch prosthesis, which was more affordable for the patient.

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After selecting the type of prosthetic resolution, a maxillary record base was used, without flanges, to determine the vertical dimension of the occlusion, buccal corridors, midline, smile line, and canine line. Once these measurements were taken, it was possible to choose the shape, size, and color of the teeth in the patient's prosthesis. The teeth were then tested inside the mouth and some simple changes in tooth positioning were suggested for a more functional and harmonious result [Figure 2].

Due to the great bone availability and the type of the chosen prosthetic resolution, it was necessary to plan a bone ridge osteotomy; this way a space for both the metallic infrastructure and a better cleaning could be made. In addition, this procedure was necessary for the nonvisibility of the intersection between the prosthesis and the ridge in a gummy smile. These measurements were taken using a compass in the mouth and then transferred to be marked on a dental cast used for reference [Figure 3].

To proceed the rehabilitation, four Grand Morse Helix implants (Neodent– Curitiba, Brazil) were planned to be used; two of them anterior implants (3.75 mm × 11.5 mm) and two of them distal implants (3.75 mm × 16 mm and the other 3.75 mm × 13 mm).

Regarding the teeth assembly process, the laboratory was asked to prepare a multifunctional guide to be used at the surgery.

After all previous planning, the patient underwent a surgical procedure with intravenous sedation. Local anesthesia and a supracrestal incision with two more posterior oblique incisions for relaxing purposes were performed. The length of this incision was determined using the multifunctional guide positioned inside the mouth [Figure 4].

Tissue folding was proceeded using a full-thickness flap followed by a 4-mm height bone ridge marking to perform the osteotomy, which was carried out with Piezosonic Vario Surgic NSK Surgical Ultrasound [Figure 4].

With the multifunctional guide properly set-the implant position was marked. First, the tilted distal implants drills were made, followed by the drills of the anterior implants. Four implants were placed, with a final torque of 60 N.

After 7 months, the excess of soft tissue was removed through the wedging technique, to obtain the prosthetic space. Then, mini conical abutments were selected, the tissue was sutured, and the transfer molding was conducted using the multifunctional guide [Figure 5].

Figure 1: Initial intraoral status of the patient. (a) Patient in occlusion using a full maxillary muco-supported prosthesis. (b) Patient without full maxillary muco-supported prosthesis, maxilla ridge status. (c) Occlusal photo of the maxillary ridge. (d) Antagonist arch with functioning implant-supported prosthesis

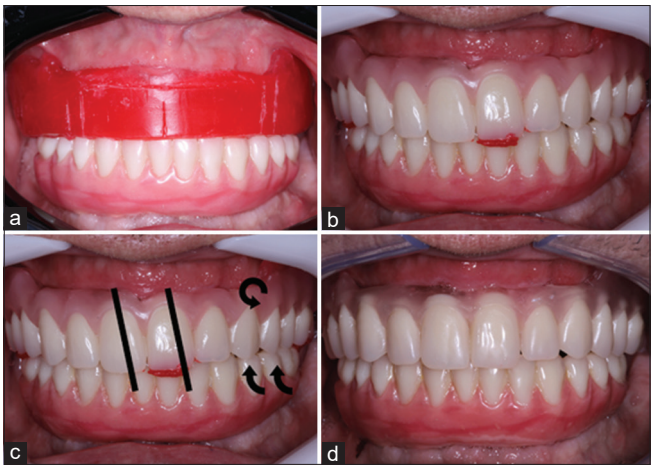

Figure 2: (a) Maxillary record base fitting, determination of the vertical dimension of occlusion, buccal corridors, midline, smile line and canine line. (b) Dental wax molding. (c) Dental wax fitting with. (d) Teeth fitting after laboratory adjustments

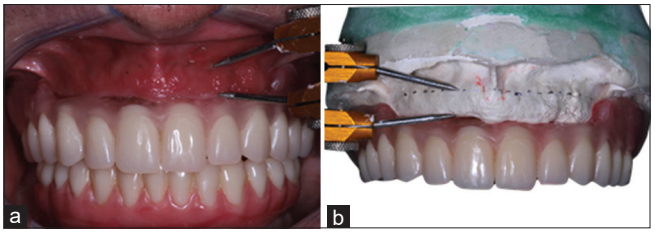

Figure 3: Augmentation of prosthetic space osteotomy plan (a) Compass measurement of the ridge exposure in the patient's high gummy smile. (b) Measurements transfer to a dental cast

Two days later, there was a teeth fitting. Some esthetic adjustments were made and, 24 h later, the final prosthesis was installed.

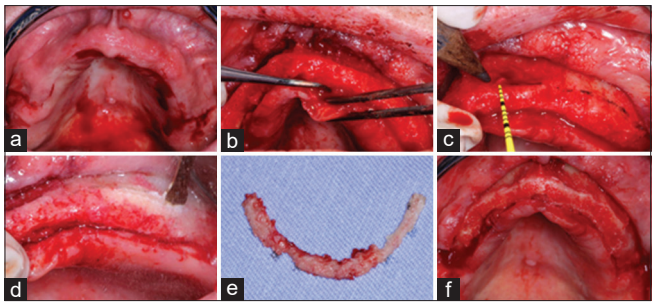

Figure 4: (a) Supracrestal incision with two other posterior oblique incisions for relaxing purposes. (b) Tissue detachment. (c) Bone ridge osteotomy measurements. (d) Bone ridge osteotomy. (e) Bone maxillary plateau remotion. (f) Postosteotomy maxillary ridge

DISCUSSION

The total maxilla rehabilitation is a well-established procedure in the literature. Maló *et al*.[2] achieved at his clinical study, an implant survival rate of 97.6% after 1 year of follow-up applying the immediate loading approach, using the all-on-four technique. Graves *et al*.[3] concluded that the total maxilla rehabilitation with four implants method has numerous benefits, such as the elimination of bone graft need-reducing, this way, the treatment period, as well as the patient morbidity; possibility of immediate loading; elimination or reduction of cantilevers; preservation of anatomical structures; and, fewer implants are needed to support the prosthesis.

In this clinical case, the all-on-4 technique was chosen with the distal implants tilted, so the maxillary sinus lifting surgery could be avoided. Moreover, the implant inclination technique is an option in which the biomechanics of the prosthesis is not disadvantaged, and this can be observed in the patient's follow-up.

Bone platform osteotomy for the all-on-four approach in the maxilla is a technical, biological, and biomechanical benefit for the resolution of rehabilitations.[4] In the described clinical case, osteotomy was essential, so that the prosthesis intersection would not be exposed in the patient's smile; also, this way the patient could be able to perform a proper hygiene and long-term maintenance of the prosthesis.

The osteotomy can be carried out using rotary instruments or piezoelectrics. Degerliyurt *et al*.[5] showed that the excess heat provided by conventional rotary instruments during osteotomy can affect the viability of bone cells and lead to thermal necrosis. In this clinical case, the use of piezoelectric was chosen to avoid tissue overheating and, consequently, to preserve bone cells.

The osteotomy, in this case, was conducted for reasons beyond aesthetics; it was also proceeded with a functional hygiene purpose. Carpentieri *et al*.[6] described the minimum vertical space required for different types of implant prostheses. They defined that a hybrid prosthesis at the abutments level requires approximately 15 mm of restorative space. In this clinical case, an osteotomy was performed, since the vertical dimension could not be increased.

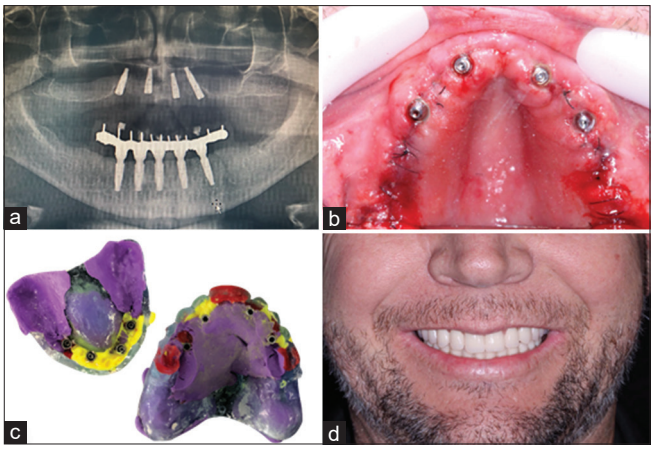

Figure 5: (a) Panoramic radiography after implant placement. (b) Postoperative picture: after positioning the prosthetic components. (c) Multifunctional guide with shaping material and occlusal registration after capturing the transfer of the prosthetic components positioning. (d) Setting of acrylized final prosthesis

It can therefore be concluded that piezoelectric osteotomy in patients with vertical maxillary excess is a practical and viable option for rehabilitation, using the implant-supported prosthesis by the all-on-4 approach.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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