

Case Report Dental Implants

Segmental osteotomy with interpositional bone grafting in the posterior maxillary region

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Abstract. Tooth loss is followed by a natural bone resorption process that often leads to defects in the alveolar ridge, making the installation of dental implants unfeasible. Correction of such bone defects, especially loss of height of the ridge or associated loss of thickness, is a great challenge to dental surgeons. The technique of segmental osteotomy accompanied by interpositional bone grafting has been shown to be a viable option for addressing the problem. This report describes a successful application of the technique in the treatment of vertical dimension deficiency in the posterior maxillary region. Four months after graft surgery, 3 implants were successfully placed in accordance with the original reverse planning.

Keywords: segmental osteotomy; interpositional bone grafting; vertical dimension deficiency; posterior maxillary region.

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Dental implant rehabilitation depends fundamentally on the presence of an adequate alveolar bone structure. After tooth loss due to trauma, periodontal disease, pathology or malformation, a natural process of bone resorption occurs that often leads to vertical (ridge height), horizontal (ridge thickness) deficiencies, or both^{1–5}.

Correction of such bone defects, especially loss of height of the ridge, or associated loss of thickness, is a challenge to dental surgeons. In the literature, the technique of segmental osteotomy accompanied by interpositional grafting has been reported as a viable and predictable procedure with a low incidence of complications and a high percentage of success. The technique has been recommended for the correction of moderate vertical defects (4–8 mm) in the anterior maxillary and

posterior mandibular regions, and it can also be used to reposition badly placed implants^{2,4,6–9}.

This case report describes a clinical case of segmental osteotomy with interpositional bone grafting designed to rehabilitate the alveolar ridge in the posterior region of the maxilla.

Case report

A 47-year-old, white, male patient sought implant rehabilitation to compensate for tooth loss and chewing difficulties. Clinical and radiological examinations revealed the absence of teeth in positions 14, 15 and 16 and osteo-deficiency of the vertical dimension (6 mm) of the crest of the alveolar ridge and of the thickness the

ridge to the floor of the maxillary sinus was found to be approximately 16 mm (Fig. 1).

The proposed treatment entailed a segmental osteotomy and an interpositional graft using bone removed from the ramus of the mandible to restore the posterior maxillary alveolar ridge prior to placing dental implants.

The procedure began by anaesthetizing the inferior alveolar, lingual and buccal nerves using a 2% lidocaine solution with a vasoconstrictor 1:100,000 (Dfl, Rio de Janeiro, Brazil), followed by a linear incision 3 mm above the mucogingival junction. The mucoperiosteum was detached and the preparation of the vertical and horizontal osteotomies was carried out using sagittal saws. Chisels were used to finalize the osteotomies and for the



Fig. 1. Reduced height and thickness of the posterior maxillary alveolar ridge due to bone loss. Note the distance between the floor of the maxillary sinus and the reabsorbed crest of the alveolar ridge, approximately 16 mm.



Fig. 2. After mobilization of the osteotomized bone segment a bone graft block obtained from the ramus of the mandible was inserted to obtain a gain in height.

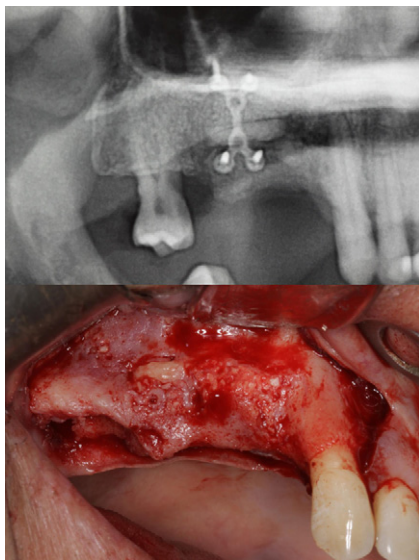


Fig. 3. X-ray examination after 4 months showed satisfactory vertical gain and incorporation of the bone graft; gains in height and thickness of the alveolar ridge were confirmed during surgery.

mobilization of the bone segment. Care was taken not to damage the palatine mucosa.

The surgery proceeded to the removal of the bone graft block from the ramus of the right mandible and adapted it to the receptor area with its cortical portion facing the vestibule side (Fig. 2). The set formed by the mobilized bone segment and the interposed bone graft block was fixed using a 1.5 mm system of plates and screws (Engimplan, Rio Claro, Brazil). Lyophilized bovine bone was applied to the region of the graft and the whole covered with an absorbable collagen membrane (Consulmat, São Paulo, Brazil). The procedure was finalized using a running stitch for closure with 3.0 absorbable catgut (Point-suture, Fortaleza, Brazil).

4 months after surgery, radiological examinations were carried out and the patient underwent implant placement. Careful separation of the mucoperiosteum revealed that the fixation system was in place, the interpositional bone graft had been incorporated and gains in the height and thickness of the alveolar ridge had been achieved (Fig. 3). The fixation system was removed and three dental implants (Conexão, São Paulo, Brazil) were placed in accordance with the original backward planning and the respective surgical guidance (Fig. 4).

Discussion

The technique of segmental osteotomy coupled with interpositional bone grafting was described by Schettler in the 1970s in an attempt to increase the retention of a total inferior prosthesis. Since then, research, technological progress and the good results obtained with this technique have made it useful for correcting vertical deficiencies for the purpose of placing dental implants^{4,5,8,10,11}. Recently, Borman et al.⁶ have demonstrated that this technique also makes it possible to increase the thickness of the alveolar ridge due to the occurrence of an inclination of the osteotomized segment.

Studies have shown it to be a relatively simple technique providing satisfactory results in terms of surgical success and high levels of predictability. The technique is more predictable because the grafts are in contact with 4 walls which increases its nourishment and reduces resorption levels^{6-9,12}.

The technique has several advantages over alveolar osteogenic distraction, such as lower cost, absence of the activating screw housing in the patient's mouth, a



Fig. 4. Dental implants placed in the grafted area in accordance with the original planning and final rehabilitation results with the prosthesis installed.

lower incidence of infection and suture rupture, and because it allows the patient to use a prosthesis in the postoperative period^{1,2,4,12}.

This paper reports on a segmental osteotomy procedure with an interpositional graft in the posterior maxillary region. No similar report has been found in the literature. Normally after tooth loss in the posterior maxilla, the maxillary sinus undergoes intense pneumatization reducing the thickness of the bone structure between the floor of the sinus and the alveolar ridge. In the present case, the bone loss from the crest of alveolar ridge reduced its distance from the maxillary sinus by about 6 mm so a satisfactory distance between the reabsorbed ridge and the floor of the maxillary sinus persisted, making it feasible to apply the proposed technique successfully. During the implant procedure, gains in height and thickness of the alveolar ridge were confirmed and they permitted adequate placement of the implants.

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None.

Competing interests

None declared.

Ethical approval

Not required.

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