Segmental osteotomy with interpositional graft in the posterior mandible: a case report

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Introduction: *After tooth loss, bone resorption emerges, which most often results in defects of the alveolar ridge, thus hindering dental implant placement. Bone gain in these regions is a great challenge, especially in terms of height gain.* ***Objective:*** *In this sense, the present study reports a case that shows the posterior ridge of the mandible with insufficient height for conventional dental implants placement. With a view to readjusting this ridge, the treatment of choice was segmental grafting with autogenous bone.* ***Results:*** *Four months after graft completion, two conventional implants were installed in the region, which provided adequate implant-supported rehabilitation.* ***Conclusion:*** *In conclusion, it can be claimed that, in this clinical case, segmental osteotomy proved to be feasible and predictable to correct the height defect in the posterior mandible.* ***Keywords:*** *Alveolar bone loss. Bone transplantation. Osteotomy.*

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» Patients displayed in this article previously approved the use of their facial and intraoral photographs.

Introduction

Dental implants are installed to prosthetically rehabilitate areas that are partially or completely edentulous, based on esthetic and functional criteria. However, after the loss of a tooth, bone resorption occurs, which can lead to a lack of sensory stimuli, trauma, gum disease, pathologies or malformations, often resulting in deficiencies in bone height, bone thickness or an association of both.[1-4]

The treatment of these bone deficiencies, particularly those related to height, remains a great challenge in oral rehabilitation. The treatment options available for this type of defect include alveolar distraction osteogenesis, block grafts, particulate bone grafts with a titanium mesh, and more recently, segmental osteotomy.[5-8]

Segmental osteotomy with an interpositional graft is also known as "sandwich osteotomy" and has been described in the literature as a viable and predictable procedure, with low rates of complications and a high percentage of success. This technique is recommended for the repair of moderate vertical defects (between 4 and 8mm) in the anterior region of the maxilla and the anterior/posterior regions of the mandible. It can also be used to reposition badly-positioned implants.[1,3,5-7]

Given the above, the aim of the present study was to report a clinical case in which segmental osteotomy with an interpositional bone graft was used in the posterior region of the mandible.

Case report

Patient I.Z., a 58-year old white female, sought rehabilitation with implants due to the loss of lower posterior teeth. After performing clinical and tomographic examinations, it was possible to observe the absence of elements 34,35 and 36 (class II Kennedy), an increase in occlusal space and insufficient bone height for the installation of conventional implants between the crest of the ridge and the upper cortical plate of the lower alveolar nerve (Figs 1 and 2).

Figure 1: Initial clinical image showing the increase in the prosthetic space in the posterior region of the mandible, as well as the bone loss in height.

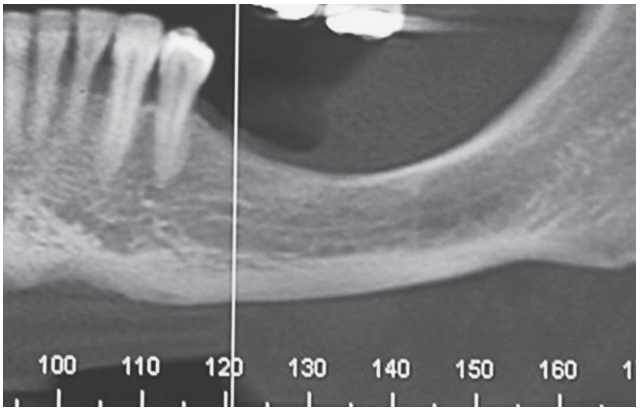

Figure 2: Tomographic image of the posterior region of the mandible showing the vertical bone loss and the need for reconstruction.

The treatment plan involved the use of segmental osteotomy with an interpositional bone graft (removed from the mandibular ramus) to repair the mandibular alveolar ridge, prior to the installation of dental implants.

The procedure began with the anesthetic block of the inferior alveolar nerve (lingual and buccal) using lidocaine (2%) and a vasoconstrictor of 1:100.000 (Dfl, Rio de Janeiro-Brazil). This was followed by a linear incision 3mm below the mucogingival junction. Mucoperiosteal displacement was performed and subsequently, two vertical (and one horizontal) osteotomies were prepared using a 701 drill (Fig 3).

The completion of the osteotomies, as well as the mobilization of the bone segment were performed with chisels, taking care not to lacerate the lingual mucosa (Fig 4).

The next stage of the surgery involved the removal of a bone block from the mandibular ramus, close to the location of the receiving area (Figures 5 and 6). This block was then adapted between the osteotomized segments, with the cortical section facing the buccal direction (Fig 7).

The combination formed between the mobilized bone segment and the interposed block was fixed using the 1.5mm system of plates and screws (Engimplan, Rio Claro-Brazil) (Fig 8). Lyophilized bovine bone was placed on the graft site (Lumina Bone, Criteria, São Carlos-Brazil), together with an absorbable collagen membrane (Lumina-Coat, Critéria, São Carlos-Brazil) (Figs 9 and 10). To complete the procedure, we performed continuous suture with absorbable thread (Catgut 3-0, Point-suture, Fortaleza-Brazil) and obtained a panoramic radiograph (Fig 11).

Four months after the surgery, the patient underwent a new radiographic examination, which confirmed an excellent vertical gain (Fig 12). In the clinical assessment, there was adequate occlusal space for the crown-to-implant ratio (Fig 13).

After careful mucoperiosteal displacement, the fixation system was seen to be in position, with an excellent incorporation of the interposed bone block, a gain in bone height and an increase in the thickness of the alveolar ridge (Fig 14).

The fixation system was removed and we began the milling for the installation of the two implants, based on reverse planning and a surgical guide: placement of the two implants and preparation of the three crowns with a mesial cantilever (due to the presence of the mental nerve) (Figs 15, 16 and 17).

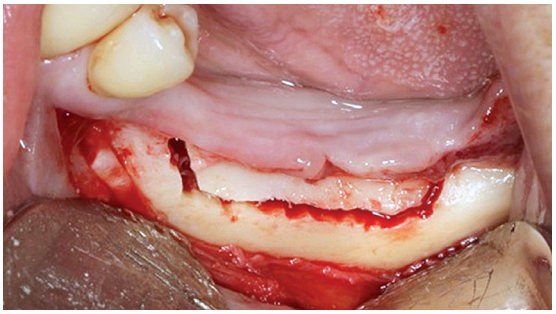

Figure 3: After mucoperiosteal displacement, two vertical (and one horizontal) osteotomies were prepared using a 701 drill.

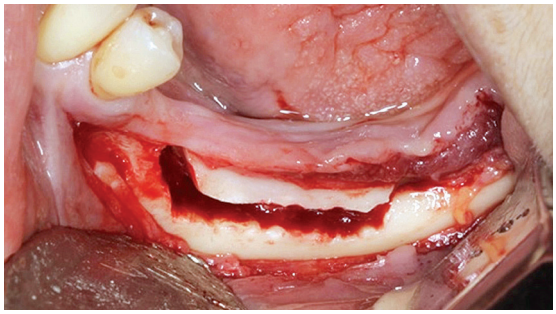

Figure 4: Bone segment mobilized for the interposition of the graft.

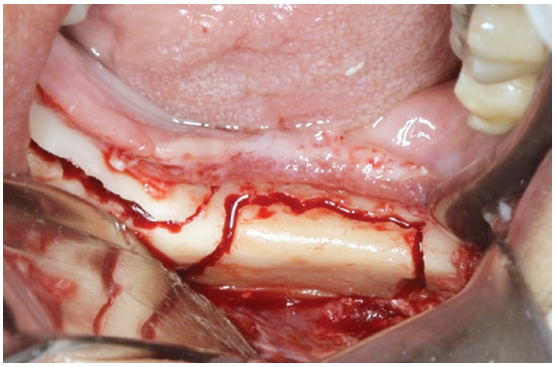

Figure 5: Bone block graft marked for removal.

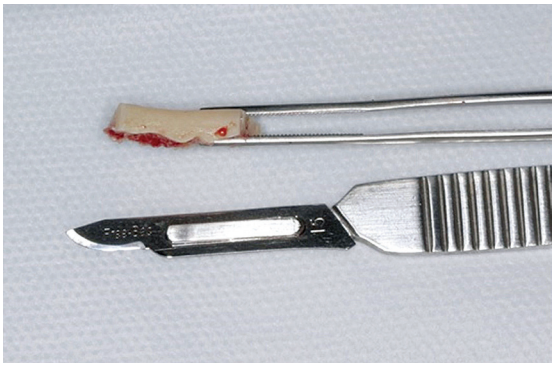

Figure 6: Bone block removed and positioned as it would be interposed between the bone segments.

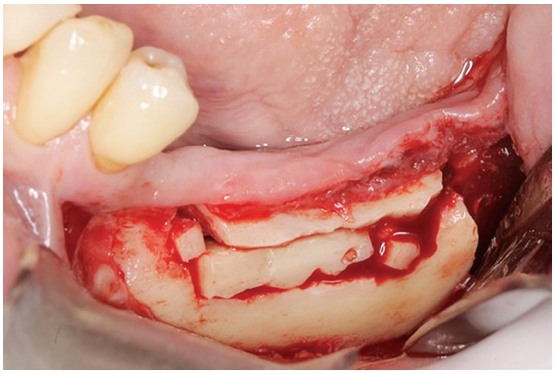

Figure 7: Interposition of the block graft between the osteotomized segments.

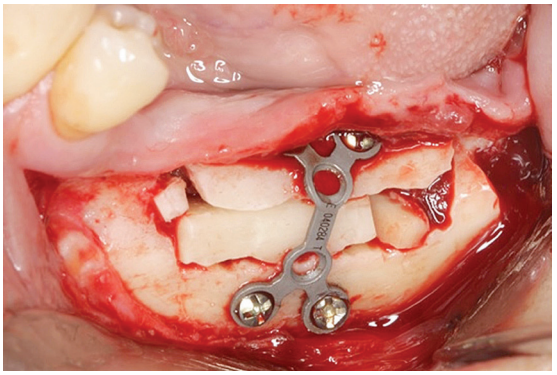

Figure 8: Fixation of the entire set with plate and titanium screws (Engimplan, Rio Claro-SP).

Figure 9: Filling the gaps with lyophilized bovine bone (Lumina-Bone, Critéria).

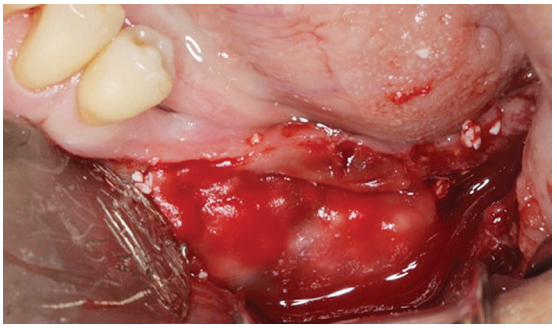

Figure 10: A resorbable collagen membrane was placed on the site (Lumina-Coat, Critéria) to inhibit tissue competition.

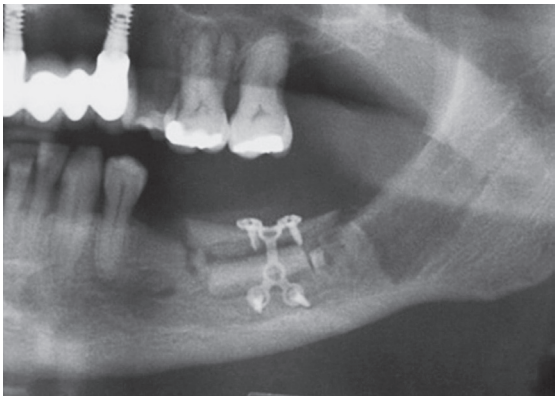

Figure 11: Immediate panoramic radiograph showing the reconstruction that was performed.

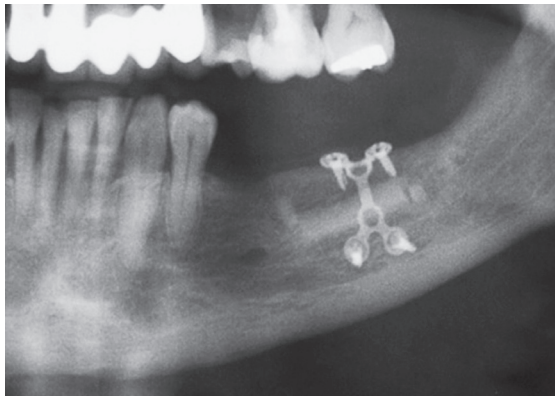

Figure 12: Panoramic radiograph four months after the graft was completed. Note the excellent vertical gain achieved.

Figure 13: Clinical view of the graft site. Note the decrease in prosthetic space, which will provide more adequate crowns.

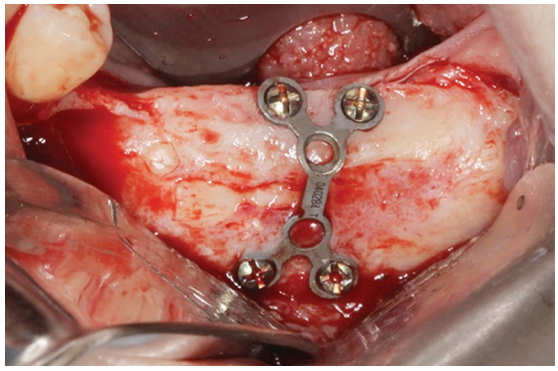

Figure 14: Note the excellent clinical result of the graft four months after the surgery.

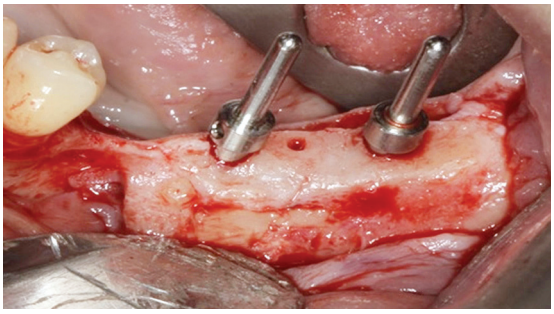

Figure 15: Clinical view of the milling, with paralleling pins in position.

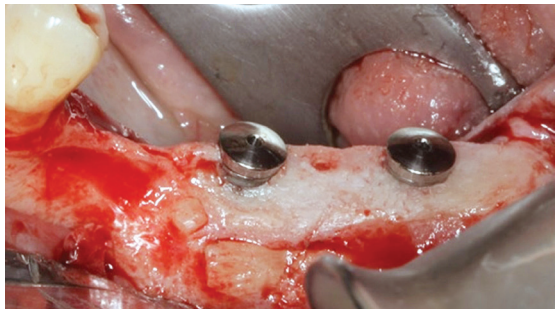

Figure 16: Implants installed in the reconstructed area. Note the upper location of the mental foramen, which prevented the installation of the implant in the area of element 35.

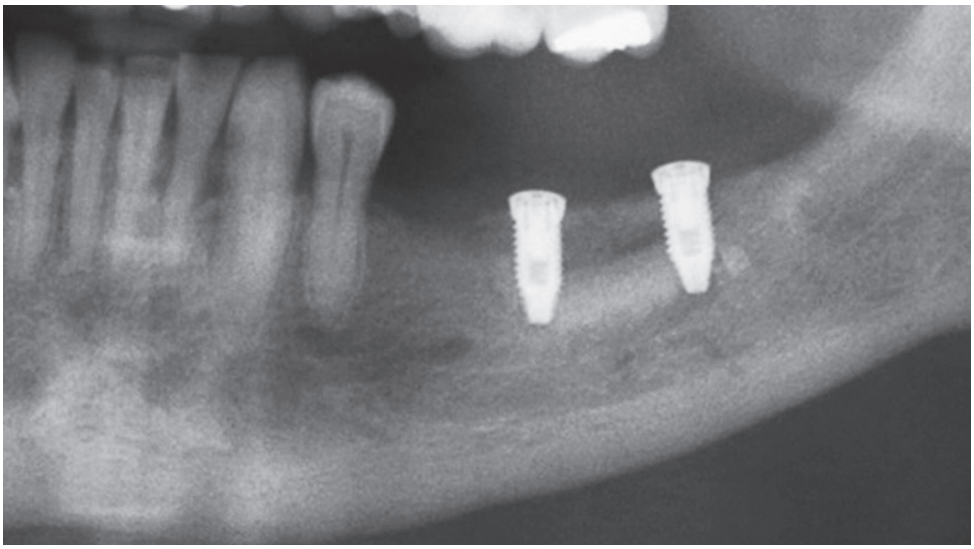

Figure 17: Radiographic examination showing the implants installed (Connection, 4x11.5).

Discussion

Bone atrophy in the posterior region of the mandible exhibits two peculiarities: the presence of the mandibular canal, which limits the height of implants; and an increase in prosthetic space, which mainly hinders the crown-to-implant ratio.

Segmental osteotomy with an autogenous interpositional bone graft was first described in the 1970´s as an attempt to increase the retention of complete lower prosthesis. However, with advances in odontology and the advent of osteointegration, it was introduced into treatment protocols involving dental implants in the area of atrophic ridges.[5,7-9]

This technique is easy to execute and provides satisfactory long-term clinical results, with high rates of success.[4-5] The predictability is directly related to the fact that the graft block is in direct contact with the walls of the defect, thereby increasing the blood supply and decreasing the degree of block resorption.[1-2,5-6]

When compared to other forms of reconstructing the posterior region of the mandible (alveolar distraction osteogenesis, block grafts and particulated grafts), segmental osteotomy exhibits a number of advantages, including the lower cost, less complications (especially graft exposure) and greater predictability, as well as the fact that they can be reopened to put the implants in place after four months.[2-3,7]

The present study reported the use of segmental osteotomy with an interpositional graft in the posterior region of the mandible. The result of this clinical case is contrary to recent studies published in the literature.[10-15] Four months after the completion of the graft, it was found to be in an advanced stage of incorporation, thereby confirming the viability and predictability of the technique.

Conclusion

In this clinical case, segmental osteotomy was shown to be viable and predictable, enabling the installation of two implants in adequate proportions.

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