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Case Report

# An alternative distraction osteogenesis method for atrophic posterior mandible: Case report

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**Abstract**

Vertical lenghtening by distraction osteogenesis has been widely used for reconstruction of dentoalveolar defects. However if bone height between the alveolar crest and the anatomical structures is insufficient, performing an appropriate osteotomy and placement of distractors in desired position is impossible. In the presented case sagittal lengthening of the posterior mandible with distraction osteogenesis was achieved. After horizontal augmentation of the crest by intraoral cortical bone graft, 2 implants were inserted to the distraction area.

**Keywords:** Transport distraction osteogenesis; mandible; alveolar bone

## INTRODUCTION

Insufficient alveolar ridge width and/or height may complicate the successful placement of dental implants. Autogenous bone grafting, distraction osteogenesis, guided bone regeneration, ridge splitting and bone spreading are commonly used surgical procedures to resolve this problem (1,2).

Among all these techniques autogenous bone grafting and alveolar distraction osteogenesis (ADO) are commonly applied procedures, generally with the aim of simplyfying the placement of dental implants (1,3-5). ADO is effective for vertical ridge lengthening, autogenous bone grafting is effective for horizontal ridge widening (1).

In ADO, minimum 4-5 mm of bone height should be present above the osteotomy line for device fixation and avoiding avascular necrosis of the transport segment (3). If the height of bone is less than this amount, performing ADO for vertical lengthening may be impossible.

In this case report sagittal lengthening of the posterior mandible with distraction osteogenesis is presented.

## CASE REPORT

A 53 year old woman with severe vertically and horizontally atrophic, partially edentulous mandible referred to the clinic for dental implant insertion. The patient had no familial or systemic disease. Clinical and radiographic examination revealed that inferior alveolar nerve and mental foramen was so close to alveolar crest at the right mandibular posterior area and there was a periapical abscess on the right lateral incisor tooth (Figure 1). Lateral incisor was extracted and distraction was delayed for bone healing. Under general anesthesia with orotracheal intubation 2 cc Ultracaine DS Forte (Articaine HCl, 1/100.000 epinephrine) supraperiosteal injection was performed. Following the vestibular sulcular incision, mucoperiosteum was released and unidirectional alveolar distractor (KLS Martin, 20mm, Zurich Ramus Distractor, Tut-tlingen/Germany) was inserted. The vertical osteotomy line was designed parallel to the axis of lateral incisor and the horizontal osteotomy line was designed parallel to the alveolar crest on the same level with the mental foramen (Figure 2). After 1 week of latency period, sagittal distraction of the transport alveolar segment was initiated. The device was activated 0, 50 x 2 times a day to achieve 1 mm of advancement. On the 20th day of the distraction period, alveolar segment was transported 20 mm posteriorly (Figure 2-3-4). After 3 months of consolidation, the distractor was removed (Figure 5) and a horizontal ridge augmentation with mandibular ramus graft was performed. Mild paresthesia due to mental nerve damage was observed. Six months

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later, implants were inserted to augmented bone (Figure 4) and it was noticed that sensation of the lower lip was normal.

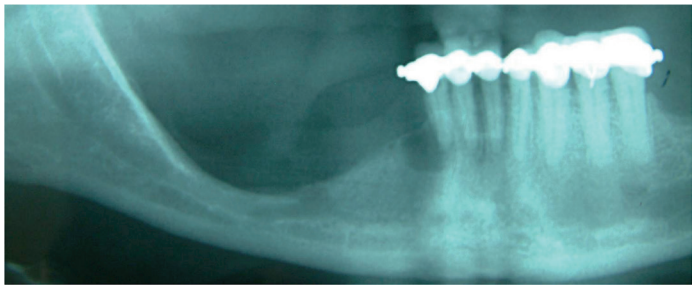

**Figure 1.** Radiographic view of the atrophic mandible before distraction osteogenesis

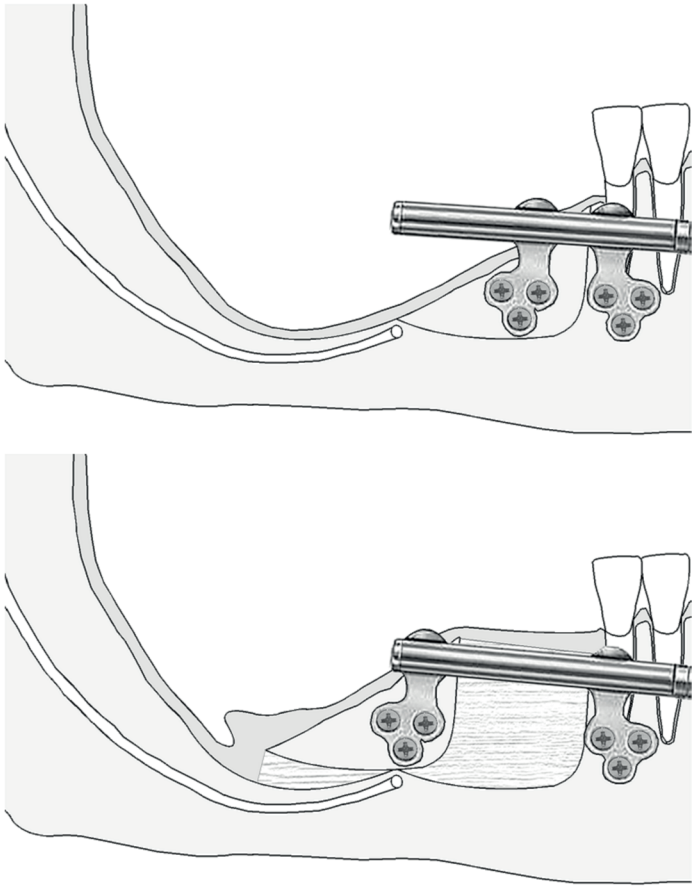

**Figure 2.** Diagram of the osteotomy design and distraction

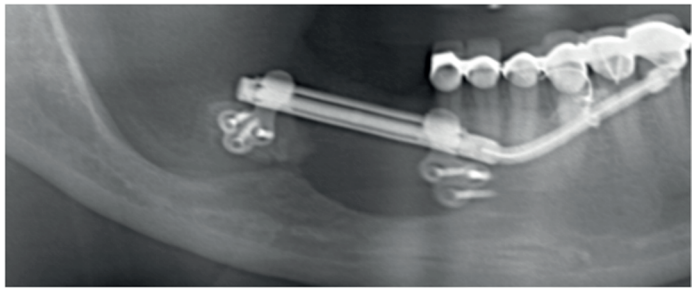

**Figure 3.** Radiographic view of the distractor and transport segment during consolidation period

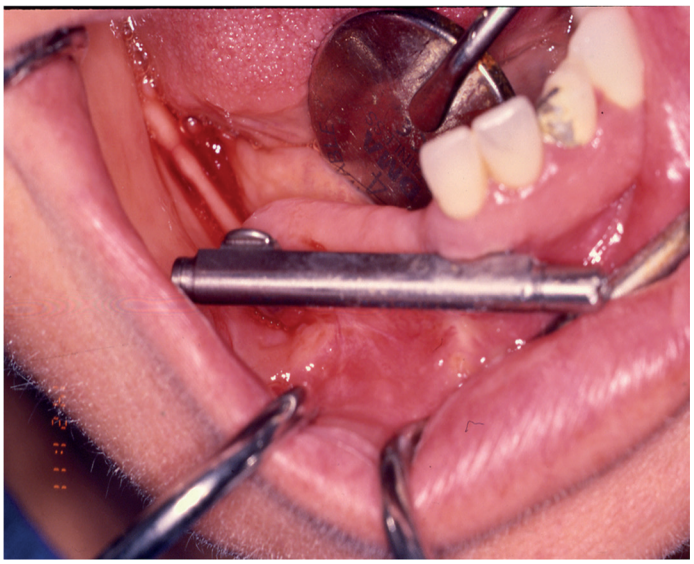

**Figure 4.** Intraoral view of the distractor and transport segment during consolidation period

**Figure 5.** Intraoral view of the distraction area after removal of the distractor

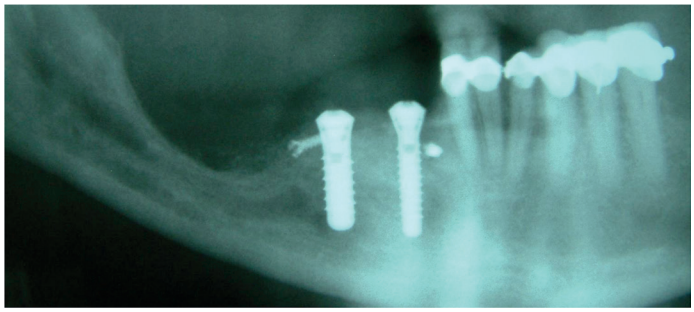

**Figure 6.** Placement of dental implants

## DISCUSSION

Alveolar bone is one of the most difficult areas of the human body to build, because both hard and soft tissues are missing in a wet and mobile area. Alveolar distraction osteogenesis, intraoral or extraoral autogenous bone grafting and guided bone regeneration are commonly performed as surgical procedures to reconstruct the insufficient alveolar ridge height. The volume of the bone maintained in guided bone regeneration is limited. Autogenous bone grafting is a widely accepted treatment modality for the surgical repair of alveolar defects. The technique requires a second surgical site and an adequate soft tissue, for the complete closure (1,6).

Intraoral bone grafting is usually preferred for small defects, and autogenous bone can harvested easily from the ramus, symphysis or tuber maxilla, despite the fact that their size will be limited (7). When large amounts of bone needed, crista iliaca is mostly the preferred donor site. Although autogenous bone grafting is still the gold standard, morbidity of the donor site and resorption of the graft are the known problems. Additionally, graft failure because of the insufficient mucosal coverage is possible (1,8). For the larger defects; reconstruction with free flaps are treatment of choice; however, this technique is difficult and costly, and an experienced microsurgery team is needed (9).

Over the years the distraction osteogenesis method has been under development for vertical augmentation of the jaws prior to implant placement. However, if the bone over the anatomic structure is limited, performing the osteotomy lines and placement of the device is difficult and sometimes impossible. Sagittal placement of the distractor may be another treatment option. In the presented case horizontal and vertical osteotomy lines was performed away from the mental foramen. A semicircular transport segment on a level with mental foramen provided better vertical augmentation as the transport segment raised onto mental foramen. New bone formation over the mental foramen and inferior alveolar nerve was observed and soft tissues were reshaped according to this new bone.

A gap may develop between the transport segment and basal segment due to the intervening of the soft tissue between the segments, and this may result in need for secondary grafting (10).

In our case although desired alveolar bone height was obtained, the alveolar ridge width was still insufficient for implant insertion. Onlay bone graft harvested from right mandibular ramus was inserted 3 months following the end of distraction.

Vector control is one of the main issues to be considered during ADO. Basa et al (3) had treated a mandibular defect using a Liou cleft distractor and transported the dentoalveolar segment in the sagittal plane from anterior to posterior. They used an acrylic splint to prevent lingual tilting of the transport segment.

In the presented case transport segment moved easily to desired location without any displacement and sufficient bone height was obtained without any complication.

Mandibular alveolar transport segment distraction is a convenient treatment modality for reconstruction of mandibular posterior alveolar defects. It is recommended for large alveolar defects, for defects that cannot be treated by grafting methods, and for patients who do not accept extraoral bone grafting. In this method hard and soft tissue regeneration is satisfactory. However the necessity for patient adaptation, device cost and insufficient final bone width are the disadvantages of this technique (11).

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