REHABILITATION OF MANDIBULAR RIDGE HEIGHT FOLLOWING IMPLANT FAILURE USING DISTRACTION OSTEOGENESIS

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ABSTRACT

This paper reports a case of 47 year old female patient with mandibular alveolus resorption followed by a lateral incisor implant failure and its management using alveolar distraction to augment a vertically deficient alveolar ridge at the mandible anterior region.

Keywords: Mandibular Ridge; Distraction Osteogenesis; Implant

Introduction

Distraction osteogenesis (DO) has been employed in the lengthening of long bones for the last 100 years.\(^1\) Distraction osteogenesis is an alternative method for reconstructing atrophic alveolar bone.\(^2,3\) Over the last decade the technique of distraction osteogenesis has been under development for vertical augmentation of the mandible and maxilla prior to implant reconstruction.\(^1,4\) The use of oral implants in the rehabilitation of partially and fully edentulous patients is widely accepted even though failures do occur. The longevity of osseointegrated implants can be compromised by occlusal overload and/or plaque-induced peri-implantitis, depending on the implant geometry and surface characteristics.\(^5\) This paper reports management of alveolar vertical bone atrophy following implant failure using the distraction osteogenesis technique.

Case Report

A 47 year old female patient complained of pain in the lower anterior region of jaw. History reveals she had implants placed in the lower anterior region from a private clinic 18 months back. Her medical history was found to be noncontributory. The patient drinks only occasionally and has no history of tobacco use. Intraoral examination revealed severe destruction of soft and hard tissue around the mandible lateral incisors implants (Figure 1-2). Radiographic findings showed severe bone loss and exposing the apex of the two implants at mandible lateral incisors (Figure 3-5).

Based on the clinical examination and radiological examination findings, the implants were removed followed by reconstruction of alveolar ridge with Bone graft (Bio-Oss and DFD-BA). Resorbable membrane (Bioguard) was placed to cover the defect and primary closure of the flap was achieved with continuous locked sutures (Figure 6-12). According to HVC ridge classification,\(^6\) the present case has both horizontal and vertical defects and the defect is larger than 7 mm. Therefore, it is a class III ridge defect. Morphology of the ridge was assessed three months after bone grafting using Preoperative panoramic radiograph. A significant vertical bone defect is evident in the anterior mandible. Preoperative diagnostic cast was prepared (Figure 13-15).

Under local anesthesia a full thickness flap was raised to expose the alveolar defect and intra oral distractors were placed and the segment were immobilized for a latency period 7 to 10 days (Figure 16-21). Following the latency period, the device is activated; this is done with the ratchet wrench and adapter, screwdriver handle, and straight driver, or with a temporary activation tool. The pitch on the threaded distraction rod is 0.4 mm, so one complete turn equals this vertical distance. Typically, patients are distracted one or two turns (0.4 to 0.8 mm) on a daily basis until the desired amount of vertical distraction has been achieved. Because a clinician can evaluate using only tactile feedback generated by the device, it is recommended that the clinician activate the device in the dental office.

Distraction results in vertical elevation of the transport segment, which enlarges the regeneration chamber. Because the chamber is surrounded by vital bone on four sides and by periosteum on two sides. During distraction phase bone was transported incrementally at the rate close to 1 mm/day. When the desired height of the alveolar crest is achieved, distraction ends and consolidation begins. The threaded rod is left in place for the duration of consolidation, which lasts about 12 weeks; longer consolidation periods may improve results by limiting the amount of relapse. During this time, bony union occurs across osteotomy margins (the vertical osteotomy cut lines and in the distraction zone), and the gingiva expands to the new alveolar bone volume.\(^6,7\) After the completion of consolidation phase the device removed. The entire Alveolar distraction process takes 2-3 months from the time of initial surgery to the time when devices are removed, and possible implants placement.

Discussion

In alveolar distraction the main indication is the vertical augmentation of the ridge with or without soft-tissue deficiency. DO has an advantage over other techniques such as guided bone regeneration and onlay bone grafting in that it can predictably generate more than 5 mm of alveolar height.\(^7,8\) In addition, the mucosa also develops with increase of vestibular height. Thus the technique is useful in either optimization of esthetic looks in the anterior or increasing the volume of bone before implant takes place in the posterior.

Both distraction osteogenesis and onlay bone grafting are applied in the event that traumatic defects occur in complex multidimensional alveolar and mucosal deficiencies. There may be less bone available to distract in extremely atrophic areas. This requires onlay bone graft to be done first and then
Rehabilitation of Mandibular ridge height following implant failure

the grafted area can be vertically distracted after 16 weeks healing. However, in cases of mild to moderate horizontal atrophy, distraction osteogenesis can be done first, followed by onlay bone grafting, or guided tissue regeneration. In the present case infection, impaired healing, and overload have been considered the major factors associated with the ridge resorption which leads to with loss of implants as described by different authors in literature.

The main reason to consider distraction osteogenesis in this case was due to its potential to regenerate bone compared to bone grafting, avoidance of a second surgical site for the donor site, which reduces discomfort, treatment time, and the cost of the procedure and DO creates a vital bone of excellent quality for the placement of implants, and lengthening of soft tissues together with the bone tissue.

Conclusion
In conclusion success in distraction osteogenesis can be achieved by a well planned surgery with care taken to preserve the vitality of the transported segment, educate and follow patients and maintain precise vector control of the regenerating tissue.

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References

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