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Ridge Widening and Immediate Implant Placement

Abstract

For increasing the width of the narrow ridge bone, there are new concepts emerged to overcome the drawbacks of the conventional bone splitting and spreading techniques. The aim of this new concept is to improve the esthetics in prosthetic outcome, overcome the risk of ridge fracture and ultimately patient satisfactions. Its success depends on correct patient selection. Using this technique showed success by 4 mm gain in width and perfect primary stability and it's recommended to be used in further more atrophied cases.

Key Words

Implant; ridge widening; immediate placement

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INTRODUCTION

Alveolar atrophy is a major problem that has limited the use of endosseous implants since their introduction. When an anterior tooth in the maxilla is lost, often as a result of trauma or endodontic complications, bone loss can occur up to 60% in the first 2 to 3 years.[1] The labial wall of the alveolar socket resorbs rapidly and the residual ridge actually consists of the previous palatal wall, mean horizontal reduction in ridge width:3.8mm.[2] Therefore, the alveolar ridge is predominantly reduced in the horizontal dimension, and implant placement with routine techniques is not possible because of the discrepancy between the thickness of the ridge and the diameter of the implant. Although numerous procedures have been devised to augment the alveolar crest with autogenous bone grafting, such as the ribs and iliac crest,[3,4] sometimes in conjunction with a barrier membrane, a risk of dehiscence and infections of the mucosa may jeopardize the graft.[5] Furthermore, a two-stage approach to implant placement is generally advocated, lengthening treatment time and increasing cost. In 1992, Simion *et al.*, introduced a split-crest-bone manipulation technique. The purpose of this technique was to create self-space making defects by splitting the atrophic crests into two parts with a longitudinal greenstick fracture and placing the implant between them, which is also an effective technique for severely thin alveolar bone. This is advocated when a standard osteotomy technique in which a crest width 4 mm is recommended cannot be applied.[6] Various types of implants have been used within the ridge widening procedure. Because the taper-shaped implants (Core expansive implant Microdent system) are tapped into position similarly to the driving of a wedge, it is considered to be appropriate for this procedure.

In 1996 Dr. Joaquin Garcia introduced the use of non-traumatic be expanders technique in which he used a tapered shape threaded expanders to create enough gap between the splited 2 parts of the atrophic crests to allow a space for implant placement. Those expanders or spreader was an alternative to the summer's oteotomes. The crest expansion technique is a less invasive procedure in which the facial wall expands after the medullary bone is compressed against the cortical wall. It improves the density of the maxillary bone, which allows for greater initial stability of implants. It also achieved a controlled and standardized dilation of the bone horizontally. The use of spreaders to enhance the dental implant site is a highly predictable procedure.[4] The present study reports a case of severe maxillary alveolar atrophy in incisor area during placement of an immediate taper-shaped implant associated with a ridge widening procedure (RWP) using non traumatic expanders.

CASE REPORT

23-years-old Female was referred for prosthetic

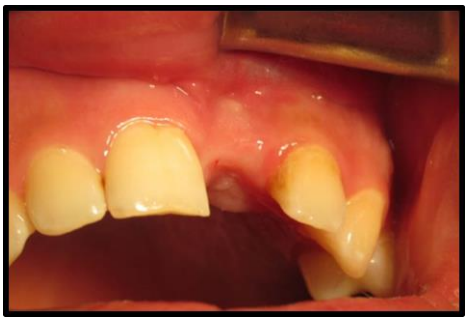

Fig. 1

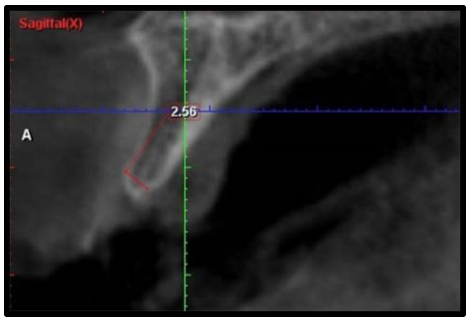

Fig. 2

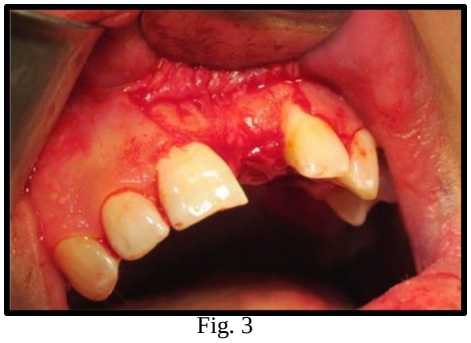

Fig. 3

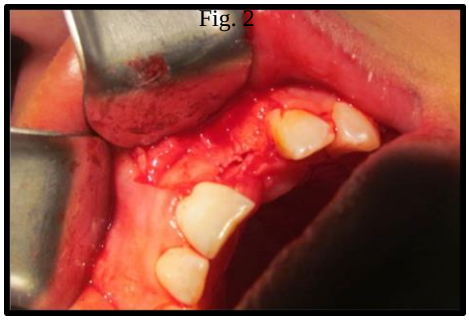

Fig. 4

Fig. 5

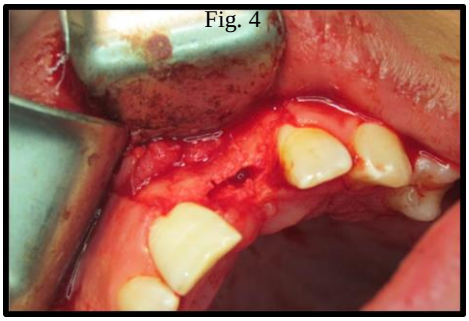

Fig. 7

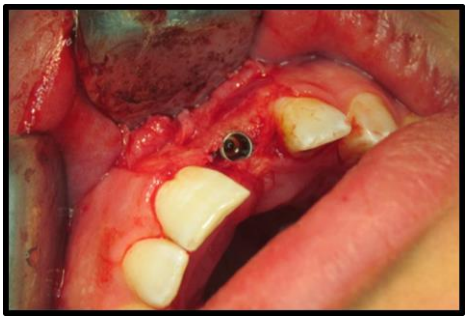

Fig. 9

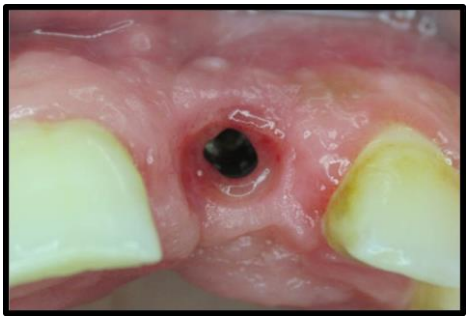

Fig. 10

treatment associated with implant placement. Clinical examination showed an edentulous margin with obvious labial and buccal bone resorption in incisor area (Fig. 1) (Lekholm and Zarb's class D atrophy). The radiographic appearance indicated an adequate bone height for implant placement, except that the tomogram views of the anterior maxilla region revealed knife-edge morphology 2.56mm bucco palatal dimension (Fig. 2). For the purpose of placing the implant with an conical abutment that assists fixed bridge support, one microdent implant were planned to be placed in the anterior segment of the maxilla in incisor area.

Surgical Procedure

Appropriate Anaesthesia (Articaine 4% infiltration), an incision was made on the crest of the ridge of the incisor region slightly toward the lingual aspect. In addition, mesial and distal vertical incisions were extended in the buccal direction for the purpose of flap relief using a periosteal elevator, mucoperiosteal flaps were buccally elevated sufficient to visualize the alveolar ridge anatomy (Fig. 3). After this, the bone crests revealed that the ridge width was approximately 2.56 mm in diameter and the buccal aspect had a concave form. A piezo surgery is used carefully to create a channel along the crest of the bone (bone slitting). The channels were extended to a depth of 8 to 10 mm to reduce the occurrence of cortical plate fracture in the subsequent procedures. After cortical plate separation (Fig. 4), the first yellow expander was inserted to its full length expander left in place for 30 seconds for bone remodeling. Then the expander was removed and the 2nd red expander was inserted in the bone to the length of 14 mm and left in position (Fig. 5) for 30 seconds then removed. Then the blue one was inserted to the length of 14 mm and left in position for 30 seconds. By the use of expander kit, the cortical plates were further widened to approximately 4 mm (Fig. 6). The final depth and orientation of the prepared sites were then checked by inserting the appropriate trial-fit gauge. After saline irrigation, the implant microdent system fixtures (length, 12 mm; diameter, 3.8 mm) were placed and driven into its final fully seated position (Fig. 7). Releasing incisions in the periosteum at the base of the flap were made to enhance the elasticity of the flap. Closure was carried out by using vertical mattress sutures. Stage II surgery was scheduled 3 months after the implantation. Complete healing of the defects had taken place, and the fixtures were covered by regenerated bone (Fig. 8). After the soft tissue was restored by placement of a healing abutment, a conical abutment was attached to the implant fixture. For the final prosthesis, the fixed crown was seated (Fig. 9) and no functional disorders were observed during three months of follow-up.

DISCUSSION

Alveolar atrophy may present an anatomical limitation to the placement of endosseous implants. Many osseous augmentation techniques, including bone grafting, use of membranes for guided tissue regeneration, 8-10 and RWP, have been used in the treatment of this problem.[7] In these treatments, most techniques described placing implants with sufficient bone height (10 mm) but insufficient width (4 mm). The following are the benefits of the RWP compared with other methods:[8]

1. the RWP allows the implant to be placed in a less invasive manner and avoids donor-site morbidity caused by bone grafting;
2. the RWP allows primary implant placement and significantly shortens the treatment time;
3. the RWP allows treatment of narrow ridge location within the context of a routine dental office procedure.

The split-crest technique, applied in the present case, was an RWP showed that a preoperative ridge width of 2.56mm had a postoperative ridge width gain extra 3mm after a healing period of three months. Most RWPs associated with immediate implant placement have used expanded polytetrafluoroethylene membranes or polyglactin 910 mesh for guided tissue regeneration. Although the possible benefits of guided tissue regeneration have received considerable attention in previous studies, the use of a membrane always increases the risk of complications, such as infections, painful inflamed tissues, and disrupted wound healing. In addition, various studies[9] have reported complication rates of 20% to 50% when using membranes. In RWPs associated with immediate implant placement, the primary wound closure is generally more difficult compared with that of a standard implant placement and the risk of membrane exposure increases because the natural crest is dramatically augmented. For these reasons, we treated five atrophy cases, including the present one, without the membrane technique. Subsequent wound healing and osseointegration of the implants were uneventful. Furthermore, the reason for successful regeneration surrounding the implant without the membrane technique may be attributed

to the small size and tapered shape of the expanders, which is a beneficial shape to gradually widen a split crest. Only a small percentage of fusiform defects are made by the splitting process. In a small percentage of defect cases, the membrane is not essential for bone regeneration.

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