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RESEARCH ARTICLE

POUCH AND TUNNEL TECHNIQUE, A NEW APPROACH FOR RIDGE AUGUMENTATION-A CLINICAL CASE REPORT

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ABSTRACT

Alveolar ridge deficiencies are the most often problems encountered during implant placement. Reconstruction of these alveolar ridge deficiencies through different bone augmentation technique is very much necessary before implant placement. These Osseous defects occur as a result of periodontal disease, trauma, congenital anomalies, prolonged edentulism and infection, and they often require soft and hard tissue reconstruction. Pouch and tunnel technique is a new technique which helped in good retention of the Autogenous graft and GBR membrane for ridge augmentation. This case study is a 2 year follow up where we placed Autogenous bone graft and guided bone membranes which are considered as gold standard for jaw reconstruction. The results of this case study were very satisfactory which showed that this technique can be used a novel approach for ridge augmentation.

INTRODUCTION

The replacement anterior single tooth, partial edentulism by means of fixed prosthesis, bonding procedure or by means of implant supported prosthesis is most demanding and challenging procedures in dentistry (Thilander *et al.*, 1999). Currently, endosseous implants are have good success in various clinical situations. Periodontal disease, root fracture, abscess formation, developmental defects, surgical trauma or traumatic injury result in resorption of alveolar bone. However due to the predictable healing sequence, the alveolar bone morphology don't always follow a consistent pattern, which results in excessive loss of both height and width of bone resulting in compromised ridge (Raghoobar *et al.*, 1996). Based on clinical experience, the minimum dimensions in the maxilla to insert a dental implant are an alveolar ridge width of 5 mm and a bone height of 10 mm (Raghoobar *et al.*, 1996). Several surgical methods to create sufficient bone volume have been developed, such as split crest technique, onlay technique with autogenous bone grafts, guided bone regeneration, vertical ridge augmentation with autografts from iliac crest, sinus floor elevation, Le Fort I Osteotomy and combinations of these procedures (Raghoobar *et al.*, 1996; Bedrossian *et al.*, 2000; Malchiodi *et al.*, 1998; Artzi Zvi *et al.*, 2000; Hinds *et al.*, 1997).

Buser and Tonetti (Buser *et al.*, 1997), systematically validated that barrier membranes are one of the described indications for localized ridge augmentation. A group of authors followed there guidelines and encountered several complications such as 1. soft tissue dehiscences 2. displacement of barrier membrane 3. partial or complete collapse of membrane during wound healing. Consequently, to overcome above said complications several modifications of the initial surgical technique were made to improve efficacy and predictability of the procedure. This included changes in the incision technique, flap design to improve primary soft tissue healing, the utilization of miniscrews for membrane fixation, and the utilization of autogenous bone grafts (autografts) as a membrane supporting device and as osteoconductive scaffold to accelerate bone regeneration. Autogenous bone grafts are harvested from patient's own body are considered gold standard among graft materials because they are superior at retaining cell viability. These grafts contain live osteoblasts and osteo progenitor stem cells and heal by osteogenesis. osteo progenitor cells or pre osteoblasts proliferate and bridge the gap between the graft and the recipient bone. They provide best osteoregenerative potential based on both clinical and histological evaluations. Guided bone regeneration (GBR) is modified technique of GTR. GBR also employs same principles of specific tissue exclusion, has its main objective-regeneration of single tissue bone. In GBR, the osseous defects are cover with a barrier membrane, which is closely adapted to the surrounding bone surface. Thus the non-osseous cells (i.e.) epithelial cells and

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fibroblasts are prevented from migrating into the space between the bone surface and the barrier membrane.osteoblasts derived from periosteum and bone are selectively induced on the osseous defect area facilitating new bone formation.

CASE REPORT

A 54-year-old male sought treatment at our department with a chief complaint of missing maxillary central incisor. Clinical [Figure-1,2] and radiolographic [Figure-11] periapical examinations revealed that the alveolar ridge height was normal, but that there was a lack of alveolar ridge width. Deficient Bucco-lingual width of the edentulous alveolar ridge made it impossible to place an implant in this area. It was decided to augment the alveolar crest horizontally. Local anaesthesia was administered. A full thickness flap [Figure-3] was raised on buccal and palatal sides leaving out some amount of thickness of flap occlusally, and a pouch and tunnel was created communicating buccal and palatal flaps [Figure-6]. The defect is exposed, [Figure-5] and the surface of the bone was freed from the underlying muscle and periosteal fibers. The alveolar bone height was more than 10 mm. However, the width of the alveolar bone was 3 mm. Subsequently a autogenous bone graft was obtained from the maxillary tuberosity area of the maxilla [Figure-7] by sulcular and vertical incision. The recipient bed was thoroughly debrided and Before placing the autogenous graft onto the missing central tooth area, it was prepared for adaptation to the area. Bleeding is controlled.

Table 1.

Unc 15 probe	Pre operative	Post operative
Vertical component	5mm	3mm
Horizontal component	10mm	5mm



Figure 1.



Figure 2.

Once the recipient area is prepared, donor graft material is placed into defect and packed properly [Figure. 8]. Alloderm GBR membrane [Figure-9] was placed onto the graft extending from palatal flap to buccal flap passing through the pouch and tunnel created [Figure-9] and GBR membrane is allowed to cover the bone graft material to stay in place [Figure-9].Then finally the periosteum of the muco periosteal flap was cut at its base to mobilize the flap and allowed to cover the bone graft without any tension.sutures are placed [Figure-10] and are covered by pack. A second operation performed after 9 months for implant placement [Figure-12]. The full thickness flap was raised, we observed that quiet amount of bone about 3to 4 mm of bone was regenerated which made easy for us to place the implant. We placed the [Figure-14] implant in that particular area and closed the flap. The IOPA'S [Figure-15] shows the placement of implant. There was no radiolucency even after a year of implant placement.

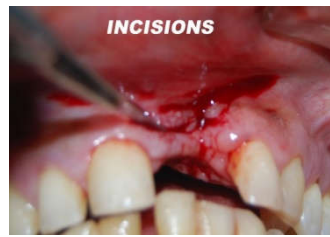


Figure 3.

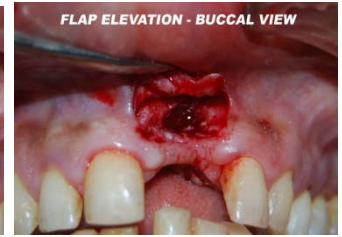


Figure 4.



Figure 5.

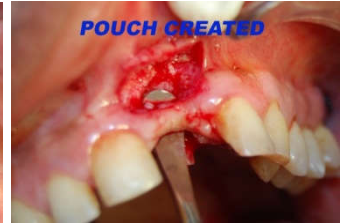


Figure 6.



Figure 7.

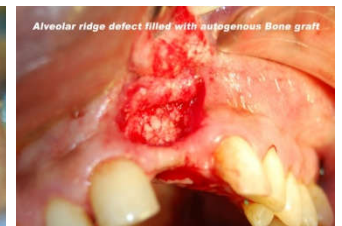


Figure 8.



Figure 9.

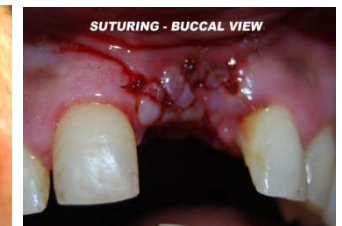


Figure 10.

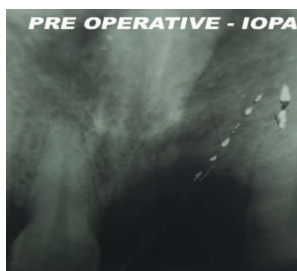


Figure 11.



Figure 11.



Figure 12.



Figure 13.



Figure 14.

Summary

Based on the results obtained clinically we can conclude that Autogenous grafts can be successfully used for the augmentation of alveolar defects in the maxilla. Pouch and tunnel technique helps in proper retention of graft material as well GBR and GTR membranes. GBR membrane helps in regeneration of bone at the deficient site. To conclude pouch and tunnel technique is good approach for clinicians for reconstruction of deficient ridges for proper placement of the implant.

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DISCUSSION

Augmentation or increasing the bone volume or height has been assisted through different methods by using growth differentiation factors, distraction osteogenesis, particulate and block grafting materials, guided bone regeneration [GBR]. The above techniques resulted in long term survival of the implant.alveolar ridge deformities are classified into three groups according to their morphology and severity. This classification is bone by sibert.

- **Class I defect:** Buccolingual loss of tissue with normal apico-coronal height.
- **Class II defect:** Apico-coronal loss of tissue with normal bucco-lingual width.
- **Class III defect:** combination of bucco-lingual and apico-coronal loss of tissue.

The major limiting factor for bone regeneration in these methods appears to be compression of the augmented areas because of the instability of the allogenic materials (Schliephake *et al.*, 2000). Since autogenous grafts are biocompatible, they are preferred to allogenic materials in reconstruction procedures. It has been accepted by several specialists that the main handicap with autogenous grafts is the secondary wound site. The donor site from which the graft is taken increases the infection risk postoperatively (Raghoobar *et al.*, 1996; Bedrossian *et al.*, 2000). The technique applied in this study allows clinicians to place implants in anatomic situations involving insufficient bone thickness. More over this flap technique helps the clinicians to place the bone graft material in place and pouch and tunnel technique helps in replacing the GBR membrane in position. This technique avoids using titanium mesh plates and screws for retention of GBR membrane which can interfere with healing process. Moreover, dislocation of the vestibular cortical bone modifies the buccal profile so that it is possible to obtain a natural emergence profile of the teeth (Malchiodi *et al.*, 1998). In addition, the use of autogenous bone grafts appears to have had a beneficial effect on the degree of bone regeneration.

RESULTS

Table 1. Shows the marked difference between pre operative and post operative measurements of the ridge which was marked with a standard UNC 15 probe.
