

Horizontal Ridge Augmentation with Symphysis Autograft in Maxillary Central Incisor for Dental Implant

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ABSTRACT

Alveolar bone deficiency in horizontal or vertical dimension is one of the major challenges in placing a dental implant especially in maxillary aesthetic region. However, autogenous bone grafts or various bone substitutes can be used to harbour an implant in compromised alveolar bone. Here, we present a case of traumatic single tooth loss in maxillary aesthetic region in a young female presenting with a deficient crestal width which was successfully grafted with mandibular symphysis autograft and subsequently rehabilitated with a dental implant.

Keywords: Alveolar bone deficiency; autogenous grafts; dental implant; maxillary aesthetic region; symphysis.

INTRODUCTION

Autogenous bone grafts, allografts, xenografts, alloplastic materials, bone morphogenetic proteins (BMPs) etc., are among the materials universally used to augment bone volume for dental implants.¹ Autogenous bone has been long considered the gold standard of grafting materials and is currently the only osteogenic graft material available to clinical practitioners. Mandibular bone grafts have been associated with less resorption as compared with iliac crest autografts.² Here, we present a case of young lady with history of traumatic single tooth loss in maxillary anterior region who was managed with block onlay grafting from mandibular symphysis and subsequent implant placement done successfully.

CASE REPORT

A 34-year-old female presented with the chief complaint of missing upper right front tooth as a

result of trauma four years back. She was on an acrylic removable partial denture since then.

On clinical examination, the edentulous mesiodistal space in relation to 11 was maintained but a significantly thin alveolar bone with labial concavity was evident (Figure 1). Preoperative cone beam computed tomography (CBCT) scan revealed sufficient vertical alveolar bone height for implant placement but the crestal bone width measured only 1.52 mm (Figure 2). Horizontal alveolar bone augmentation with block graft from mandibular symphysis was planned.

Basic haematological investigations were carried out and procedure planned under local anaesthesia. Graft recipient site was exposed via a triangular flap approach and defect measured with a plastic template 14 mm long and 10 mm wide. Mandibular anterior vestibular approach was taken to gain access to the symphysis, the template applied to left paramedian aspect and guide holes drilled with



Figure 1: Edentulous 11 with labial concavity.

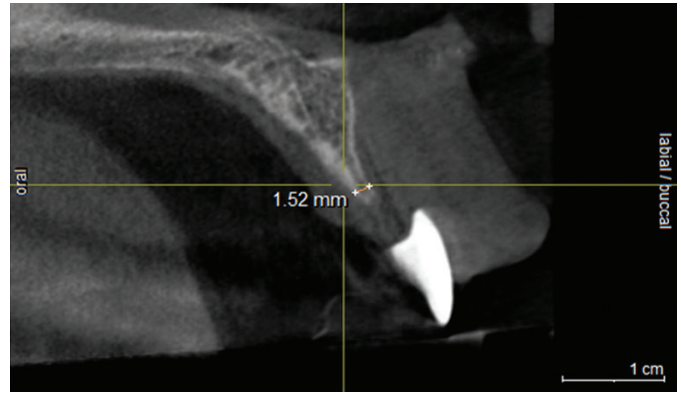


Figure 2: CBCT image showing deficient crestal bone width.

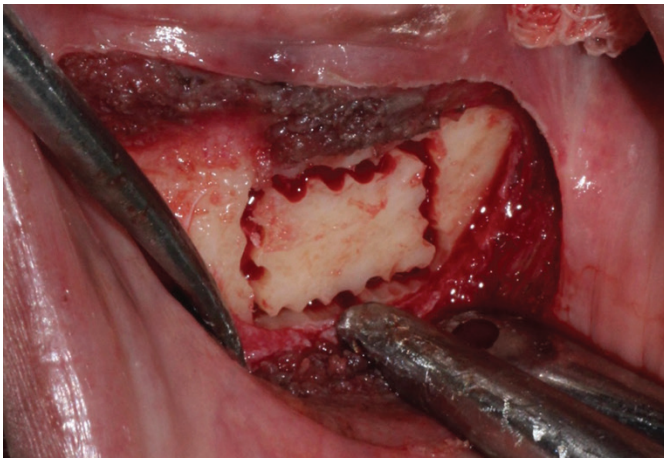


Figure 3: Postage stamp method of graft harvesting.



Figure 4: Block graft fixated to the recipient site.

0.5 mm round carbide bur along the borders of template in a "postage-stamp" fashion (Figure 3). The holes were joined together with straight fissure carbide bur in a slanting angle in order to make sure osteotomy along the grooves would facilitate harvesting of block graft in single piece without fracturing. Consequently, a 5 mm osteotome was tapped along the grooves and graft procured. Intra-marrow penetration was done in the recipient site to favour osseous healing, graft was trimmed to exactly fit the defect and fixation done with two

1.5X8 mm titanium screws (Figure 4). Donor site was closed in layers with 4-0 resorbable suture and recipient site with 4-0 interrupted polydioxanone sutures. Elastic compression bandage was provided extraorally over donor site, antimicrobials and analgesics were prescribed and strict hygiene and graft maintenance instructions were given to the patient.

Patient was recalled on seventh day for suture removal and fabrication of temporary acrylic

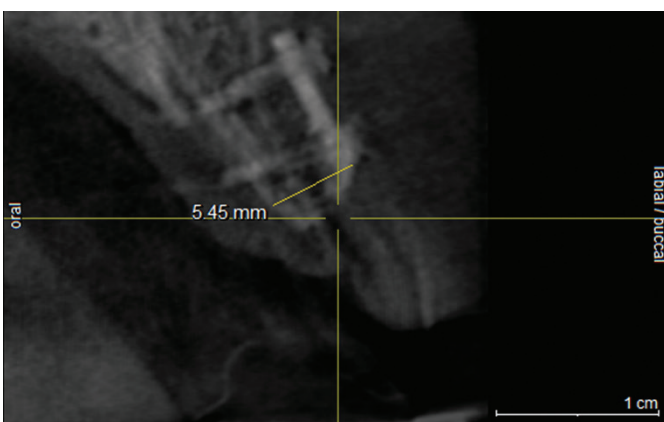


Figure 5: CBCT image showing crestal bone width gain after eight months.



Figure 6: Final prosthesis delivered.

removable partial denture. A CBCT scan was repeated eight months after the graft placement that showed a considerable osseous healing of the graft and crestal width of 5.8 mm in grafted site (Figure 5). The screws were removed via nick incisions over labial gingival aspect and a 3.5X10 mm titanium implant was inserted via midcrestal incision with immediate provisionalisation that was replaced with permanent prosthesis after 3 months (Figure 6).

DISCUSSION

Aplasia, traumatic injuries or therapeutic extractions are the most commonly encountered causes of single or multiple teeth loss. Daily mishaps, sports related injuries, interpersonal violence and various accidents are some frequent causes of traumatic injuries to the teeth.³

Osseointegrated implant is a valid option for rehabilitation of a single missing tooth as reported by numerous studies. A meta-analysis reported survival of implants supporting single crowns after five years of function to be 97.2% and after 10 years to be 95.2%.⁴

Insufficient bone volume in horizontal or vertical dimensions to incorporate a single tooth implant may call for alternative treatment modalities like orthodontics to manage space, or conventional fixed tooth-supported prosthesis. However, optimisation of the bone with autogenous bone grafts or various bone substitutes can be done to harbour an implant in compromised alveolar bone.

The biologic mechanisms that provide a rationale for bone grafting are osteoconduction, osteoinduction, and osteogenesis. Osteoconduction occurs when bone graft material serves as a scaffold for new bone growth, osteoinduction involves stimulation of osteoprogenitor cells to differentiate into osteoblasts and then begin formation of new bone, osteopromotion involves enhancement of osteoinduction without possession of osteoinductive properties and osteogenesis occurs when vital osteoblasts originating from bone graft materials contributes to the growth of new bone along with bone formation.⁵

Autologous or autogenous bone grafting involves utilising bone obtained from same individual

receiving the graft. Bone can be harvested from local sites such as mandibular symphysis, coronoid process and maxillary tuberosity or from distant sites such as calvarium, iliac crest, tibia etc.⁶ The main advantage of using a local donor site is the convenient surgical access that means reduced operative and anaesthesia time utilising a single team effort. The decreased morbidity of local donor sites over distant sites and the use of transoral approach avoiding a cutaneous scar makes this procedure more patient friendly. Moreover, avoidance of general anaesthesia and thus reduced cost and time are also reasons for the high acceptance of intraoral donor sites.⁷

Bone harvested from the mandibular symphysis is mainly cortical in nature, allowing application of rigid fixation in situ and thus providing good primary stability. These grafts can be easily carved to intimately fill in defects and provide good alveolar contour. Fixed onlay grafts also avoid the potential migration that can be encountered with particulate bone grafts.⁸ In addition, significant bone volume can be obtained staying 5 mm anterior to mental foramen, cephalad to inferior border of mandible, caudal to expected position of apices of anterior teeth and at the midline. The maximum volume of block graft that can be harvested as a rectangular graft block from the mandibular symphysis is around 1-1.5 cm in height and approximately 4.0 cm in width, centred at the midline of the mandible.⁹ Symphysis provides dense cortical D1 (>1250 HU) bone or 2 mm thick porous cortical D2 (850-1250 HU) bone with coarse trabeculae type density of the bone graft.¹⁰ In the case reported, the thickness of block graft was 4.6 mm at the time of harvesting which reduced to 3.93 (27%) in the first year.

Various problems associated with iliac crest autografts such as postoperative infection, bone exfoliation, sequestration, varying rates of healing, donor site morbidity, increased patient expense, and procedural difficulty make symphysis autograft a better choice in intraoral bone augmentation. Studies have shown that although the graft resorption may be significant, the choice of mandibular symphysis cortical block graft is valid for ridge optimisation to accommodate dental implants.⁸

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