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Case Report

Two dimensional alveolar ridge augmentation using particulate hydroxyapatite and collagen membrane: A case report

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ABSTRACT

Background: Ridge augmentation procedures require bone regeneration outside of the existing bony walls or housing and are therefore often considered to be the most challenging surgical procedures. The bony deficiencies can be managed with GBR techniques involving bone grafting material and membrane while vertical augmentation may require the use of space-creating support mechanisms. Non-degradable membranes have been used for ridge augmentation with encouraging results however; requirement of second surgery for its removal and associated infection on exposure may compromise the desired results. These problems can be overcome by employing resorbable collagen membranes. Different bone graft materials are also used in combination with resorbable membranes, for prevention of membrane collapse and maintenance of space, as they lack sufficient rigidity. Particulate hydroxyapatite bone graft may be better alternative, because it treats the underlying bone defect to restore the natural support of the tissue architecture. Moreover, its use avoids potential donor site complications associated with autogenous block grafts.

Method: Patient described in this report presented with missing right maxillary incisor with ridge deficiency. A treatment approach involving localised ridge augmentation with particulate hydroxyapatite and collagen membrane was used.

Result: Six month post-operative periapical radiograph demonstrated a significant vertical bone fill.

Conclusion: The clinical and radiographic findings of the present case suggests that HA in conjunction with a resorbable collagen membrane may be an acceptable alternative to the autogenous block graft and non-resorbable membrane in the treatment of compromised alveolar ridge deficiencies.

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1. Introduction

When planning the replacement of an extracted tooth, one that is missing because of trauma, or one missing congenitally, by conventional or implant retained prostheses, consideration must be given to the alveolar ridge form in the edentulous area. This is important in terms of aesthetic considerations and to provide sufficient bone volume. Labial ridge deficiency after tooth loss is almost inevitable in the anterior maxilla and the ridge architecture may need to be re-established if a satisfactory result is to be created. Guided bone regeneration (GBR) is a well proven and widely used technique for local defect regeneration prior to, or simultaneously with, implant–prosthetic rehabilitation.[1,2] It involves the use of a physical barrier to exclude soft tissue cells, maintain space and stabilise the wound.[3] Non-resorbable expanded polytetrafluoroethylene membranes (e-PTFE) have been used extensively since the 1980s for GBR.[1,4] However, this material has exhibited various shortcomings like frequent exposure of the membranes, need for an additional surgery, and the exposure of the newly regenerated bone to resorptive conditions after removal of membrane. To overcome these drawbacks, resorbable collagen membranes were introduced which are advantageous, as they permit one-step surgical placement, are well accepted by host and have a reasonably good manipulative consistency.[5] These membranes, however, possess less robust space-maintaining properties than their e-PTFE prototypes.[5] To fortify a potential regenerative space, a bioabsorbable membrane requires placement of an underlying adjunct graft such as autografts, allografts and xenografts or alloplasts.[1,2,6] Bone graft substitutes like hydroxyapatite (HA) have been developed as alternatives to autologous or allogeneic bone grafts and literature is replete with studies documenting its regenerative potential.[7,8] This case report describes the potential of particulate HA and collagen membrane to correct alveolar ridge defect combined with resin-bonded prosthesis to achieve esthetics and health.

2. Case report

A 27-year-old female reported to the Department of Periodontology, F.O.D.S, C.S.M. Medical University for oral prophylaxis and replacement of missing upper central incisor. The patient had a non-contributory medical history however, dental history revealed trauma to the right maxillary central incisor that led to its extraction 9 months back. A thorough clinical and radiographic examination showed a Seibert's Class III defect,[9] with pronounced deficiency in faciopalatal width and little loss of ridge height, in the edentulous region (Fig. 1A and B). Informed consent was obtained from the patient.

3. Surgical procedure

The surgical procedure was performed under strict aseptic conditions. Local anaesthesia was administered and horizontal incision was made on the palatal side, 2 mm from the mid crest, continuing with the intrasulcular incision at the adjoining teeth. Vertical releasing incisions were made at distobuccal line angles of teeth adjacent to edentulous area to elevate a full thickness mucoperiosteal flap. The width of the ridge was narrow and the buccal aspect showed great deformity (Fig. 2A). The defect area on the buccal side was grafted with HA (G Bone) and collagen membrane (PerioCOL, Type I collagen of fish origin) was shaped to completely cover the bone graft in a saddle-like manner (Fig. 2B and C). Flaps were sutured with a combination of horizontal mattress and simple interrupted sutures using 4–0 silk suture (Fig. 2D) and periodontal pack was placed. Post-surgically, the patient was placed on amoxicillin 500 mg tid and analgesic (diclofenac and paracetamol) bid for 5 days, instructed to use 0.2% chlorhexidine mouthwash twice a day for a month and avoid brushing to the surgical site. Periodontal pack and sutures were removed after 14 days and routine oral hygiene practises were resumed. Patient was recalled for professional tooth cleaning once a week for the first month and once a month for the period of 6 months. Neither subgingival instrumentation nor probing was performed during this period. The healing period of 6 months was complication free with neither tissue inflammation or graft rejection. After 6 months, periapical

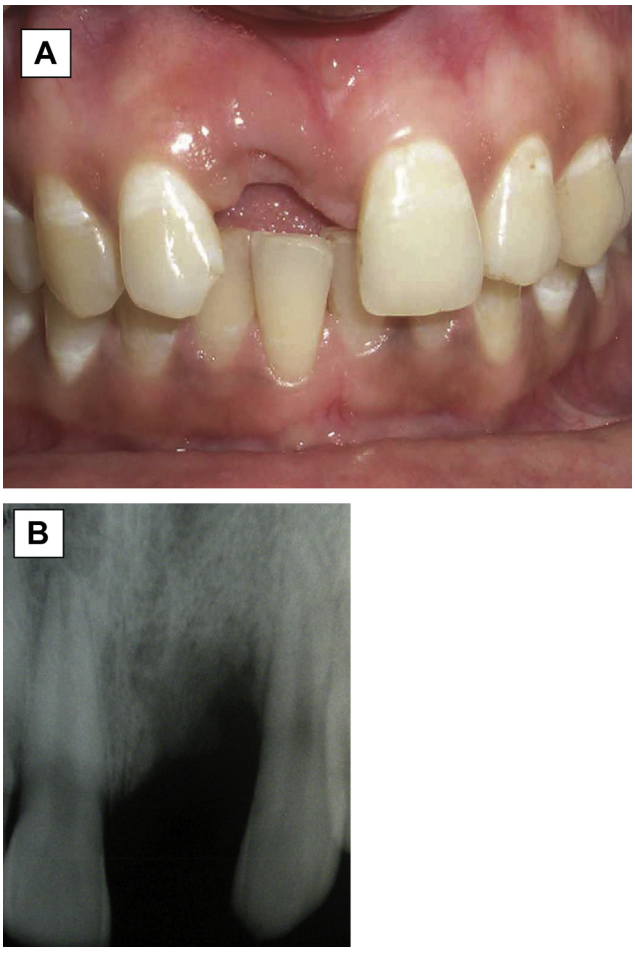

Fig. 1 – Pre-operative (A) buccal view showing missing right central incisor and related alveolar deficiency and (B) periapical radiograph revealing resorbed alveolar ridge.