

Periodontal Regenerative Therapy in Deep Intrabony Defects Associated with Maxillary Central Incisors Using Cortico-Cancellous Block Allograft with Chorion Membrane: A Case Report

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Abstract

Teeth with severely compromised periodontal status often present a challenge regarding their long term maintenance and most clinicians consider such teeth as either having a questionable or a hopeless prognosis. However, recent advances in research have made periodontal regeneration in a clinical veracity rather than a theoretical hypothesis. Conventional periodontal regenerative therapy to reconstruct intra-bony defects includes particulate osseous substitute grafts of autogenous, allogeneic, alloplastic, or xenogeneic origin combined with barrier membranes. Yet, in some clinical scenarios where the intra-bony defects are not contained it is difficult to use particulate grafts in combination with membranes. Consequently, block grafts can be indicated in such clinical scenarios. Block grafts possess strength and rigidity to allow its fixation in the recipient site. In the present case report, the treatment protocol included resolution of inflammation and the long term retention and maintenance of periodontal compromised, pathologic migrated maxillary central incisors associated with intra-bony defects using freeze-dried cortico-cancellous block allograft in combination with chorionic membrane.

Introduction

Periodontal diseases are one of the main causes of tooth loss worldwide. Teeth with progressive attachment loss associated with deep pockets and intra bony defects are classified by most authors as either having a questionable or hopeless prognosis. The goal of periodontal therapy is to maintain the natural dentition in a healthy state and the morphologic and functional regeneration of lost supporting periodontal tissues. However, conventional regenerative approaches might not be adequate for such teeth with advanced bone destruction, and extraction remains the only choice. The anticipated prognosis of any tooth influences the treatment planning; thus, extraction of hopeless teeth is based on the assumption that its retention might result in continuous loss of supporting alveolar bone for the hopeless teeth and the teeth juxtaposed with them.

In the past, various approaches such as intentional re-implantation alone or in combination with enamel matrix derivative and bone grafts and combined perio-regenerative-orthodontic protocol have been tried to maintain teeth with advanced periodontal destruction^[1,2]. However, these approaches achieve little or no regeneration of the supporting bone. Thus, due to inadequate bone support the long term maintenance of teeth following such treatment approaches remains questionable.

Increasing evidence indicates that periodontal regeneration can lead to long-term retention of teeth with advanced periodontal destruction. Modern periodontology has shown that teeth with severe bone loss can be retained and kept healthy within a strict program of periodontal therapy and supportive periodontal care^[3]. Conventional peri-

Received date: April 21, 2018
Accepted date: December 04, 2018
Published date: December 10, 2018

Citation: Kathiwale, S., et al. Periodontal Regenerative Therapy in Deep Intrabony Defects Associated with Maxillary Central Incisors Using Cortico-Cancellous Block Allograft with Chorion Membrane: A Case Report. (2018) J Dent Oral Care 4(2): 47- 51.

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odontal regenerative therapy to reconstruct intra-bony defects includes particulate osseous substitute grafts of autogenous, allogeneic, alloplastic, or xenogeneic origin combined with barrier membranes. But, deep intra-bony angular defects do not provide a natural retention to contain the particulate grafting material. Consequently; block grafts can be indicated in such clinical scenarios. Block grafts possess strength and rigidity to allow its fixation in the recipient site.

Thus, the purpose of this case report was to clinically evaluate the regenerative potential of a freeze-dried cortico-cancellous block allograft combined with chorionic membrane as barrier to retain and maintain periodontally compromised teeth. The creeping substitution of block graft, along with the ability to stabilize and maintain a relatively large space for regeneration to occur, may make it a useful alternative to conventional particulate grafts and their potential complications.

Case report

A 32-year-old female reported to take opinion regarding her mobile maxillary central incisors for which she was advised extraction; but, since the patient was unwilling for extraction she was referred to the Department of Periodontics at the KLE V.K. Institute of Dental Sciences, Belagavi, India.

On clinical examination, oral hygiene of the patient was poor. Patient had generalized reddish pink gingivae and rolled out gingival margins with blunting of interdental papillae indicative of chronically inflamed tissue with generalized probing depths ranging from 5 to 9 mm on all aspects. Maxillary right and left central incisors were grade II and grade III mobile^[4] respectively. The maxillary right central incisor exhibited probing depth of 7 mm on all the aspects with 9mm probing depth on the mesial side. The maxillary left central incisor presented Miller's class I gingival recession and probing depths of 9 mm on the mesio-labial, mid-labial, and mesio-lingual and mid lingual sides^[5]. There was bleeding on probing and a 3-mm diastema between left and the right central incisor due to extrusion and pathological migration of left incisor. Maxillary central incisors showed excessive contact with the mandibular incisors at occlusion. Maxillary central incisors also exhibited Grade III fremitus.

Radiographic examination showed approximately 20-25 % of bone presence with intra bony defect, widening of the periodontal ligament space and a radiolucent area surrounding the mesial aspects of the roots of the maxillary central incisors, indicative of vertical bone loss (Figure-1a).

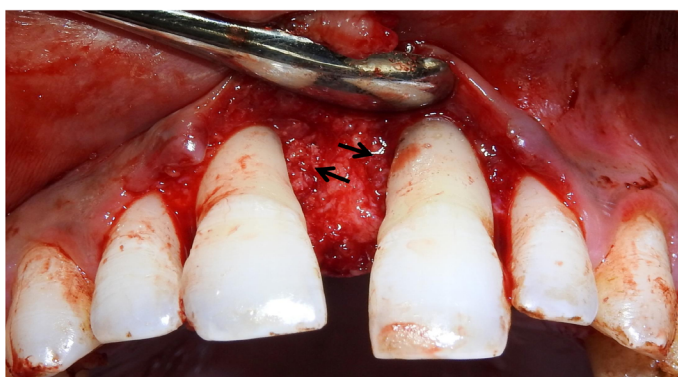


Figure 1a: Preoperative radiograph showing defect on mesial aspect of maxillary right central incisor.

Bacterial plaque was considered to be the primary etiology for the attachment and bone loss on the maxillary central incisors. Occlusal trauma and Tooth mal-positioning were considered contributing factors for that site.

Presurgical phase: Oral hygiene instructions and modifications in the patient's plaque control methods were given, and full-mouth debridement protocol included ultrasonic scaling and root planning along with sub gingival irrigation with 5% povidone iodine solution. Since the patient insisted on retaining the left maxillary central incisor, root canal treatment was performed. Occlusal adjustments were performed to relieve the pre-maturities at the site and temporary composite fiber splint was placed to stabilize the mobile teeth. Patient was followed up for six weeks after initial phase I therapy and a regenerative periodontal surgery were planned once the inflammatory changes had subsided.

Surgical phase: After clinical and radiological evaluation a papilla preservation flap was planned. Subsequently, after anaesthetizing the surgical site, intra-sulcular incision was performed on all teeth from the maxillary left lateral incisor to the right lateral incisor. The inter-proximal papilla between the central incisors was preserved using the papilla preservation technique (Figure-1a). The defect was thoroughly debrided for the inflamed granulation tissue followed by root planning and irrigation (Figure-1b).

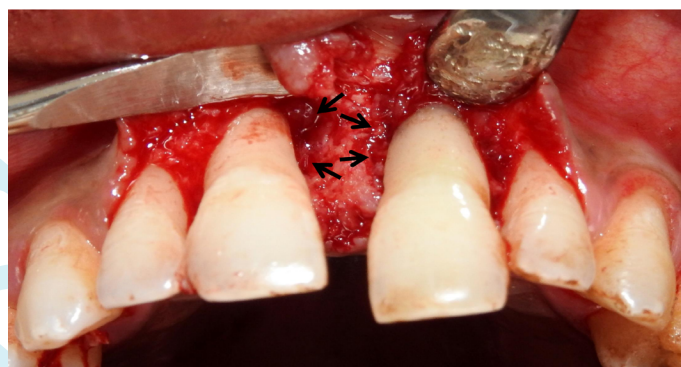


Figure 1b: Block graft contoured and placed in the defect contacting the recipient site on 3 sides.

After complete debridement, the length, width and depth of the defects were measured with the help of a sterile divider. These measurements were used to contour the block allograft (Cortico-cancellous bone block, Tata Memorial Tissue Bank, Mumbai) of appropriate size (2 x 2 x 6 mm) using micro motor diamond bur. Perforations were drilled into recipient bone surgical site, to induce the bleeding. The prepared graft was rinsed with sterile saline solution and placed into defect site (Figure-1c). Particulate graft material was used to fill the space between the block graft and the recipient site. A customized template was prepared with a tin foil for the desired length and width to adapt over the block graft at the defect site extending 2-3 mm facially and apically and 2 mm mesio-distally. This tin foil was used to contour the chorion membrane which was subsequently used as a barrier to stabilize the block graft. The Chorion membrane of appropriate size was placed on block allograft to cover the defect completely on all the sides (Figure-1d). The periodon-

tal flaps were adapted on the surgical site and sutured without any exposure of the chorion membrane (Figure-1e). The temporary composite splint was then removed and teeth were re-splinted after intruding the left maxillary central incisor within the limits of the bony socket. Intrusion and splinting were done to immobilize the central incisors and assist healing. Lastly, a periodontal pack was placed at the surgical site extending two teeth on either side.

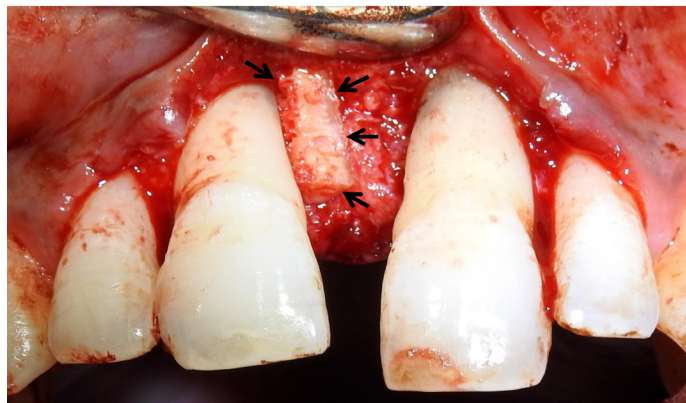


Figure 1c: Chorion Membrane placed covering the bone graft and the defect; extending 2-3 mm facially and apically and 2 mm mesio-distally.

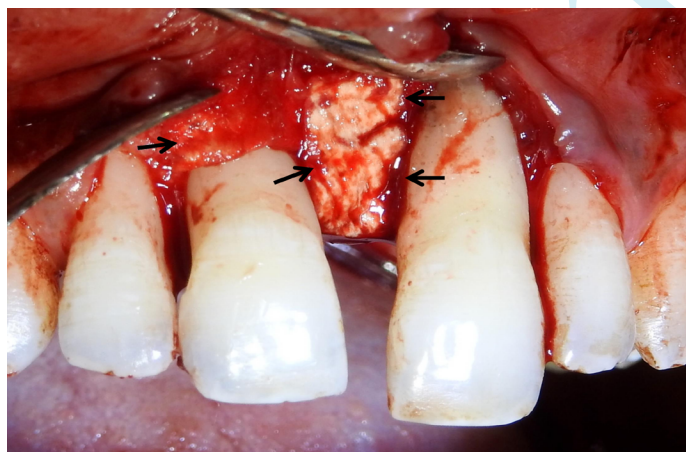


Figure 1d: Flaps sutured using interrupted sutures.



Figure 1e: 1 week post-operative pictures.

Maintenance program: Patient received antibiotics (amoxicillin and metronidazole) for 5 days and analgesics for 3 days. The patient was instructed for good oral hygiene maintenance sup-

ported with Chlorhexidine mouthwash 0.12 % for 4 weeks. Recall appointment was scheduled after 7 days for suture removal. Patient was placed on monthly maintenance therapy to evaluate the oral hygiene maintenance.

Follow-up: At 12 months follow-up, maxillary right and left central incisors showed decrease in mobility which was less than grade I. Pocket probing depths around these teeth had reduced considerably. The probing depths of the central incisors were 3.0 mm on the mesio-, mid-, and disto- palatal and labial sides. There were marked positive radiographic changes and widening of the periodontal ligament space had reduced significantly. At 12 months radiovisiography showed approximately 65-70% of bone fill with the resolution of the intra-bony defect (Figure-1f).



Figure 1f: 12 months post-operative picture.

Discussion

The surgical technique described in the present study aims to present the combined use of allogeneic block bone grafts with chorion membrane for the treatment of deep intra-bony defects associated tooth mobility and pathologic migration.

Among bone grafting materials, autogenous bone is still considered the gold standard^[6]. Intraoral sites such as the mandibular symphysis and mandibular ramus have been used as a source for either cortical or cortico-cancellous blocks grafts, whereas extra oral donor sites commonly used include the iliac crest and the head of the tibia. The disadvantages of harvesting bone from these donor sites are the necessity for a secondary surgical site, risk of vascular and neurologic injury, and postoperative morbidity. Allograft is one alternate source of bone grafting material that may be used to avoid most of the above-mentioned drawbacks. These materials have been successfully used alone in Guided Bone Regeneration (GBR) procedures to expand small volumes of autogenous bone or used in combination with xenografts or alloplasts^[7,8]. Additional advantages include a ready availability of large volumes of material, extremely low antigenic potential, flawless safety record in dentistry (Figure-1g).



Figure 1g: Postoperative radiograph showing defect fill.

In the present case, chorion membrane supported the block graft and acted as a barrier membrane between the gingival epithelium and hard tissue to promote the periodontal ligament cells to form progenitor cells that can regenerate new tissues. Chorion membrane has been used in regenerative techniques because of its ability to enhance wound healing, serve as a scaffold for cell proliferation and differentiation, reduce scarring and inflammation and its antimicrobial properties^[9]. An additional advantage of GTR procedures using bio-absorbable chorion membrane is that this technique does not require a second surgical procedure to retrieve the membrane. Furthermore, the chorionic membrane a fetal membrane is biomaterial that can be easily obtained, processed and transported. In the present case, the chorion membrane was sufficiently adapted at the site on both buccal and lingual aspects keeping it continuous at the interdental area. Hence chorion membrane served a dual purpose for regeneration and supported the block graft at the surgical site. The membrane placed quickly became pliable, as it was hydrated with blood, and closely adapted to the contours of the underlying surface. Also, the presence of high concentrations of laminin and laminin-5 throughout the barrier is responsible for its high affinity for binding gingival epithelial cells and contributes to better adaptation of the membrane to the root surface^[10]. As epithelial cells quickly migrate across the CM barrier, they form a seal over the underlying bone graft and do not migrate apically into the defect^[10]. The membrane (Chorion) in the present case did not need to be fixed into place using sutures or tacks as Chorion membrane does not shrivel and remains un-displaced in relation to the overlying flap. Collectively, chorion membrane's unique biologic and physical attributes reduce the complexity of suturing and placement of barriers, minimizing the chances of post-operative complications^[11].

The deep intra-bony angular defects around periodontal compromised teeth do not provide a natural retention to contain the conventionally used particulate grafting material. Thus, block grafts in combination with Chorion membrane to support and contain the graft can be recommended in periodontally compromised cases.

Conclusion

A patient presenting teeth with mobility, pathologic tooth migration, and severe alveolar bone loss (contained defect) and hopeless periodontal prognosis was treated successfully with the

combined use of freeze-dried cortico-cancellous block allograft and Chorion membrane. The patient was very pleased with the outcomes of the treatment protocol which resulted in the increased functional retention of the maxillary central incisors. However she was advised correction of spacing with maxillary anterior teeth by means of orthodontic treatment. As the patient was non-compliant she failed to maintain adequate oral hygiene and receive further treatment. Within the limitations of the present case report, this protocol might offer a relatively prompt regenerative and less expensive technique with definitive clinical solution for maintaining periodontally compromised teeth.

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Short title

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