

A New Regenerative Approach In The Treatment Of Osseous Defects Communicating With Surface Mucosa For Combined Lesions: A Rare Case Report

Abstract

When a periapical bone defect communicates with the surface mucosal defect, the etiology can be either endodontic or periodontal. Patient with non-vital tooth with bone loss and gingival mucosal defect have traditionally been located with various grafts but particularly after root conditioning our case has shown promising results for new attachment procedure. This article emphasises on an Interdisciplinary approach for the management of endodontic-periodontal lesions. It also presents a case that demonstrates the successful treatment of teeth that appear to be hopelessly diseased and promotion of new connective tissue attachment.

Key Words

alveolar bone, endodontically treated teeth, connective tissue graft, root conditioning, comprehensive approach

Introduction

The tooth, its pulp and its supporting structures must be viewed as a biologic unit. The inter-relationship among these structure influences each other during health, function and diseases.

The indications for endo-perio combined treatment procedures are multiple. It can be said that any lesion after performing endodontic treatment results in irreversible reactions in the attachment apparatus and requires periodontic treatment. Similarly the lesion after periodontal treatment results in irreversible reaction in pulp tissue also requires endodontic treatment.

To overcome the further bone loss various surgical techniques have been developed in the past. The prognosis of an affected tooth can also be improved by increasing bone support by bone grafting and guided tissue regeneration.^{[1],[2]} but connective tissue graft along with demineralized freeze dried bone graft particularly after Root Conditioning to treat such defect has recently gained attention with promising clinical and histological results.^{[3],[4]}

Fenestrations and dehiscences occur in the alveolar bone, being more considered normal variations with regard to presence of the teeth, than pathologic conditions. The criteria for their identification belong to Davies RM et al.^{[5],[6]} Dehiscence is a lack of cortical bone at the level of a

dental root, at least 4 mm apical to the margin of the inter-proximal bone; fenestration is a localized defect of the alveolar bone plate that exposes the root surface, usually the apical or the middle third, that does not involve the alveolar margin. Traditional textbooks of anatomy lack information on dehiscences and fenestrations, whereas these are important anatomic entities when related to periodontal surgery, affecting 20% of the teeth, more commonly placed on the anterior, than on the posterior region of the jaws.^[7]

While dehiscences are evident due to gingival recession, fenestrations usually remain undepicted because the root is covered by gingiva or mucosa. Maybe this is the reason why dehiscences are considered more frequent than fenestrations. The potential of developing alveolar fenestrations must be taken into account when planning and performing periodontal surgical procedures, as their presence may complicate the outcome during the healing process.^[8] A particular and rarely encountered phenomenon is when an apical fenestration is accompanied by a mucosal fenestration. In this situation, the root apex perforates both the alveolar bone plate and its overlying soft tissue, being exposed to the oral environment. Peacock ME et al appreciate that mucosal fenestration "may be more common than

¹ Viniti Goel

² Arvind Arora

³ Ashutosh Nirola

⁴ Madhu Gupta

¹ Senior Lecturer, Dept. Of Periodontics & Implantology
Luxmi Bai Dental College

² Professor, Dept. Of Conservative And Endodontics
Bhojia Dental College Nalagarh Himachal Pradesh

³ Principal - Professor & HOD

⁴ Professor, Dept. Of Periodontics And Implantology
Luxmibai Institute Of Dental Sciences

Address For Correspondence:

Dr. Viniti Goel

2314, Medident Clinic, 38 C Chandigarh,

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has been reported, as lack of symptoms may inhibit patient awareness.^[9]

The objective of this case report is to describe a treatment modality used to manage an apical alveolar and mucosal fenestration present on the endo-periodontal lesion of a root canal treated left maxillary lateral incisor with root conditioning, bone graft and a connective tissue graft to enhance new attachment.

Case Report

A 25-year-old male presented to the department of Periodontics with aesthetic concerns about tooth 22. Oral examination revealed a 5 mm horizontal probing depth [Figure 1] in the apical third from the labial aspect of root of tooth 22 that perforated the buccal cortical plate and adjacent mucosa,



Figure 1 Showing The Extent Of Bone And Mucosal Defect

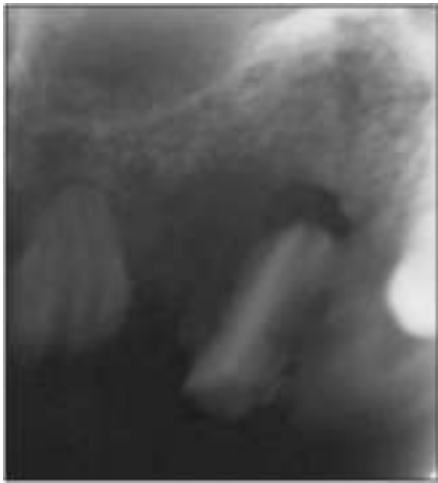


Figure 2 Pre Operative Radiograph



Figure 3 Incision



Figure 4 Reflection



Figure 5 Debridement

therefore being exposed to the oral environment with discoloured crown and root of the same tooth [Figure 1]. Preoperative radiograph and photographs were taken [Figure 1 & 2]. Intra oral periapical radiograph [I.O.P.A] showed massive bone loss in relation to endodontically treated non vital lateral

incisor. The patient had undergone root canal treatment 4 months ago. No pathologic signs were evident through facial inspection and radiographically.

Inter-disciplinary approach was taken for treatment of the patient. First phase-I therapy was done. Scaling and root planning (SRP) was done for improvement of the overall gingival health in the department of periodontics.

Surgical Procedure

The surgical protocol included a routine medical history followed by blood investigations. Surgical treatment was performed only when the patient achieved an O'Leary's plaque control record compliance level^[10] of 10% or less and 0% in the area to be treated.

A full thickness flap was elevated giving an intra clevicular incision [Figure 3] on the labial aspect of the 22. Two releasing incisions were made at a line angle of distal of central and canine in an oblique direction over the mucogingival junction, so that a large pedical was preserved raising a full thickness flap [Figure 4]. The root surface was debrided to obtain a smooth surface [Figure 5]. Root conditioning was done with 125/mL Tetracycline hydrochloride solution for 3 minutes. The Site was flushed with sterile saline solution [Figure 6].

At the donar site, a connective tissue autograft was dissected with a No. 11 blade [Figure 7] and care was taken to obtain a uniform thickness of 1.5 mm-2 mm. The donar site was sutured closed after securing the donor tissue to the recipient site.

On the recipient site the bony cavity was filled with DMDB graft and the connective tissue graft packed as a second layer [Figure 8]. Simultaneous approximation of the flap and SECT graft was done. The graft was immobilized in such a fashion to cover the exposed root surface and the surrounding margin of the bony dehiscence. Without creating tension the mucoperiosteal flap was secured coronally closing the mucosal defect and rest of the flap with a 3-0 black silk suture [Figure 9]. Special care was taken not to displace or compress the surgical site. Then periodontal dressing was applied [Figure 10]. Analgesics [Ibuprofen 400 mg + paracetamol 325 mg twice a day], Antibiotics [Amoxycillin 500 mg thrice a day] was prescribed for 8 days and 0.12% Chlorhexidine gluconate mouthwash twice a day and was continued till 2 weeks. Sutures were



Figure 6 Root Conditioning

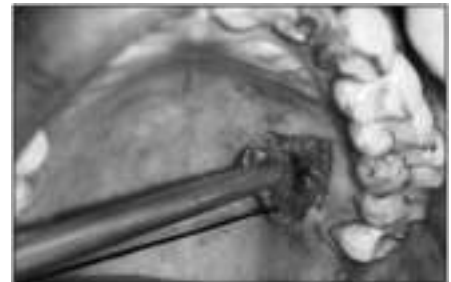


Figure 7 Connective Tissue Graft From The Palate



Figure 8 Bone Graft And Connective Tissue Graft Placement



Figure 9 Approximation, Suturing



Figure 10 Periodontal Pack Placed

removed 7 days after surgery [Figure 11]. The surgical site was inspected for mucosal coverage and teeth were polished with saline. Healing signs could be seen in the form of overlying newly formed tissues on the previously exposed defect along with surface sloughing. No probing was done at the time of suture

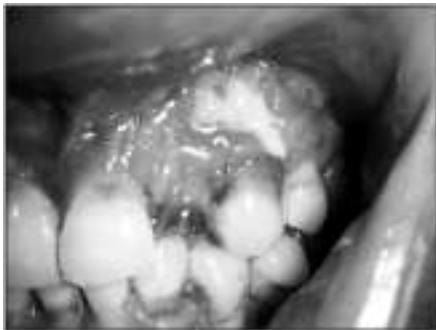


Figure 11, 1 Weekpost Operative Showing Overlying Surface Healing



Figure 12, 3 Months,Post Operative



Figure 13, 6 Months Post Operative

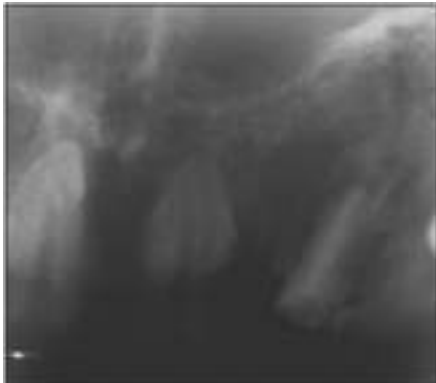


Figure 14, 6 Month Post Operative Radiograph

removal. The defect had a firm tissue, resistant to probing forces, covering the previously exposed root surface 3 months post-operatively [Figure 12]. Healing was evaluated clinically and radiographically. Clinically, the patient

was assessed for edema, postoperative pain, signs of infection, untoward reaction, and wound dehiscence.

Results

Preoperative [Figure 1, 2] and post-operative [Figure 13] radiograph and photograph [Figure 14] were taken after 6 months of surgery. Six months after the intervention the mucosa was completely healed and the region was in perfectly good shape. Periapical radiograph revealed remodeling of the apical area [Figure 14]. Thereafter every six months radiographic evaluation was recommended.

Discussion

The goal of this treatment was regeneration of attachment apparatus like bone and periodontal ligament to restore complete health of the teeth. In this case Tetracycline was the drug of choice for root conditioning because of its effectiveness against suspected causative microflora, antienzymatic properties, and its high degree of substantivity when applied topically to root surfaces, Osteoinductive Demineralized Bioresorbable Bone Matrix Xenograft [Type I collagen] Granules were used and to cover the bone graft a connective tissue graft was obtained from the palate.

Demineralization of root surfaces during periodontal therapy has been performed to enhance regeneration of the lost periodontal attachment apparatus and a number of agents have been proposed for the demineralization procedure, including phosphoric acid, EDTA, citric acid, and tetracycline.^[11] Tetracycline has a low pH in concentrated solution, acts as a calcium chelator, and its application results in enamel and root surface demineralization. It bonds directly to the demineralized surface.^[12]

In addition to their immediate antibiotic effects, topically applied tetracycline are adsorbed to and released from dental hard tissue in an active form, they have anti enzymatic effects, which may retard collagen breakdown and bone resorption and they enhance fibroblast adhesion and growth.^[13]

Collagen seems to be more promising for its physical and biological properties^{[14],[15]}. This may be largely due to collagen's biologic activities such as (1) being physically absorbable through enzymatic degradation, (2) the chemotactic ability to promote primary wound coverage and reduce the

incidence of bacterial contamination, and (3) the haemostatic capacity to facilitate initial clot formation and wound stability, hence type I collagen is an appropriate biomaterial to be used in the maintenance of space between the root surface and overlying connective tissue graft. This space is necessary to provide a channel for the migration of progenitor cells towards and onto the detoxified root surface hence differentiation of cementoblast, formation of new cementum and periodontal ligament is desired.^[16]

The SECT (Subepithelial connective tissue) graft is a sort of hybrid procedure that combines the pedicle flap with the connective tissue graft and enjoys the benefits of both. Pedicle flaps alone, such as the coronally advanced flap, frequently suffer from retraction and muscle pull.^{[17], [18], [19], [20], [21], [22]} The connective tissue graft serves two purposes. Firstly, gingival thickening and root coverage, and secondly, it may act as a biological barrier to prevent epithelial migration, allowing cells with regenerative capacity to repopulate the defect area in a similar fashion to a collagen-based membrane^[21]. Compromised results may be obtained in case; autogenous graft collapses into the defect thereby reducing space. The collapse may be prevented by implantation of biomaterial into the defect to support the connective tissue so that it preserves its original position. Encouraging results were achieved when demineralized bone matrix xeno-graft was added to create a much needed tissue regeneration.^[23]

In this study we used bone graft material which consisted of (type I collagen) demineralized bone matrix xenograft that has been used in both animal and human studies to determine its osteoinductivity. It has specific bone stimulatory activity. It is specially prepared from bovine cortical bone samples resulting in non-immunogenic flowable particles of approximately 250 micron size. It is a bone inductive, sterile, bioabsorbable and moldable bone graft material. Incorporation, encapsulation, resorption, and mixed response is the host response, Incorporation is the ability of the graft to allow for cellular infiltration, neovascularization, and collagen deposition. Encapsulation occurs, when the graft is surrounded by connective tissue. Resorption occurs when grafts are replaced by connective tissue at varying

rates. A mixed response occurs in grafts perforated to allow for incorporation through the graft openings, combined with encapsulation around the remaining material.^[24] In the present case, demineralized (xenograft) along with free mucosal autograft was used to achieve bone fill with root coverage. The term bone fill is used purposefully instead of new attachment (new bone, new cementum, new periodontal ligament and new connective tissue) because only histological examination will confirm, whether new attachment has occurred or not. Wherever the gingival biotype is thin or there is a lack of keratinised tissue. The connective tissue graft prevents the flap margin displacement by wound stabilisation, covers the area and limits the risk of post-operative complications by increasing the soft-tissue thickness above the bone substitute.^[25] However subepithelial connective tissue graft with a coronally advanced flap is considered to be the gold standard grafting procedure.^[26]

Conclusion

The presented approach is a technique-sensitive procedure. Treatment of a complicated case particularly when collagen bone grafts are used for base therapy with connective tissue graft use, they help not only new attachment formation but also causes root coverage. Furthermore, the additions of demineralized xenograft showed a tendency toward improving the percentage of root coverage and reduce the mucosal defect shrinkage, definitely enhancing the periapical regeneration.

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