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RESEARCH ARTICLE

STICKY BONE FOR TREATMENT OF AN ADVANCED ENDODONTIC-PERIODONTAL LESION: A CASE REPORT

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ABSTRACT

An endo-perio lesion has been one of the prevalent issues affiliated with the tooth. The cutaneous involvement of pulpal and inflammatory periodontal pathology can perplex the diagnosis and treatment planning. The present case report shows the synergic effect of endodontic, periodontal, and esthetic therapy. The treatment includes root canal therapy and open flap debridement followed by the placement of “sticky bone” graft and guided tissue regeneration membrane over the osseous defect site. After 6 months, a coronally advanced procedure with connective tissue graft placement was performed to improve esthetics. The patient was followed up for 1 year. Clinically, there was a reduction in probing pocket depth, increase in attach gingiva, and improvement in gingival biotype. Radiographically, there was a significant amount of bone fill was observed. Hence, the coactive effect of various regenerative materials with root canal sealing had significantly improved both clinical and radiographic features of the endo-perio lesion.

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INTRODUCTION

Dental and medical practice often requires an interdisciplinary approach integrating the knowledge, skills and experience of all the disciplines of dentistry, medicine and its associated fields into comprehensive treatment to maximize results. To increase patient benefits, an interdisciplinary approach has become essential.² Periodontics is not practiced in isolation, as frequently many patients have multiple dental needs or medical health issues that require management. Understanding the interaction between endodontics and periodontics is of crucial importance to the clinician ‘as there are often challenges in the diagnosis, treatment and prognosis of combined endodontic and periodontal diseases. Etiologic factors, such as microorganisms, as well as contributing factors, including trauma, root resorptions, perforations, cracks and dental malformations, play an important role in the development and progression of lesions resulting from combined endodontic periodontal diseases.

Despite this, the treatment and prognosis of such lesions vary and depend on the etiology, pathogenesis and a correct diagnosis of each specific condition. For differential diagnostic and treatment purposes the “endo-perio lesions” are best classified as endodontic, periodontal or combined diseases. These include: 1) Primary endodontic diseases 2) primary periodontal diseases and 3) combined diseases. The combined disease include: 1) primary endodontic disease with secondary periodontal involvement; 2) Primary periodontal disease with secondary endodontic involvement; and 3) true combined disease. Periodontic-endodontic lesions are convoluted in nature, but have diverse pathogenesis. Treatment decision-making and prognosis confide primarily on the diagnosis of definitive disease. To have the ace prognosis, the clinician needs an interdisciplinary approach, to perform either endodontic and periodontal therapy alone or in the combination of both.¹ Various treatment modalities have been proposed earlier for the treatment of endo-perio involvement including open flap debridement, root resection and retrograde filling, where healing is by scar.

Since this is not ideal, newer approaches such as regenerative procedures like guided tissue regeneration (GTR), bone grafts and growth factors that aim to restore lost tissue have been introduced.³ Predictable regeneration requires use of barrier membranes and bone grafts of various types. Endogenous regenerative technology is an attempt at in situ periodontal regeneration using patient-derived growth factors (GFs), fibrin scaffolds, and platelet concentrates to assist recruitment of progenitor/stem cells from neighbouring tissues. Choukroun's platelet-rich fibrin (PRF) involves the production of a leukocyte and PRF clot by simple natural coagulation process without biochemical modification of the collected blood.² Platelets contain platelet-derived Growth Factor, transforming GF β -1, and vascular endothelial GF (VEGF). These growth factors stimulate cell proliferation, matrix remodelling, and angiogenesis.⁴ Previous evidence suggests that PRF can be used for the management of furcation defects, intra-bony defects, socket augmentation procedures, sinus lift procedures. Use of PRF membrane results in greater gingival thickness and can be used for root coverage procedures. Along the same line, this case report was done to evaluate the effect of PRF in bone graft (sticky-bone) and connective tissue graft for the regeneration of an endo-perio lesion.

Case History

A 42-year-old male patient reported to the Department of Periodontics, Dayananda Sagar College of Dental Sciences, Bangalore, with a chief complaint of shaking teeth in his upper right front tooth region for 1 month. The patient was systemically healthy. On intraoral clinical examination revealed, supra-erupted 11 soft, edematous marginal and attached gingiva, bleeding on probing, Miller's Class III recession, Grade II mobility, and periodontal pocket of 9 mm on the mesiolabial aspect. Intraoral radiographic examination showed an interdental bone loss until apical one-third and widening of periodontal ligament space relation to the same [Fig 1]. The electric pulp vitality test found to be negative. The case was diagnosed as Grade C Endodontic periodontal lesion in periodontitis patient, according to 2017 classification with a "poor" periodontal prognosis. Therefore, the extraction of 21 was advised, as patient was not willing for the extraction of 21, an attempt was made to prolong the prognosis of the tooth.

Treatment Plan: In this case report, the treatment for endo-perio lesion was planned with an interdisciplinary approach involving both endodontist and a periodontist. The treatment protocol was explained and a written consent was obtained from the patient. Routine blood investigations were advised and the reports acquired were within normal limits. Phase I periodontal therapy with Scaling and root planing was performed by a periodontist followed by the RCT by an endodontist. After completion of RCT, the patient was kept on maintenance phase. Three months after completion of root canal treatment, periodontal surgical therapy was planned in relation to 11 by periodontist with an attempt to regenerate bone using sticky bone. Patient was advised to use presurgical mouth rinse using 0.2% Chlorhexidine mouthwash for 60s before the surgery. After the administration of local anesthesia (2% lignocaine with 1:80000 adrenaline), a full thickness mucoperiosteal flap was raised using papilla preservation flap design from the distal aspect of 12 till the distal of 11 and two vertical relieving incisions were given (Fig 2 and 3). Thorough debridement and degranulation with curettes were done.

To prepare the sticky bone, injectable platelet-rich fibrin (i-PRF) was prepared with 10 ml of venous blood from the patient's right antecubital vein. The collected blood was injected into the i-PRF tube. The blood was then centrifuged at 2700 rpm for 2 minutes. After centrifugation, the blood was separated into two fractions. The bottom layer fraction consisted of red blood cells. The top light yellow-colored liquid layer (i-PRF) consisted of plasma, platelets, and coagulation factors still in uncoagulated form which was aspirated by keeping the tip of the syringe just above the junction of the two layers and the injectable PRF was obtained, it was mixed with G-bone graft. After approximately 10 min, the mixture becomes a cohesive mass with a putty-like consistency called "sticky bone." This sticky bone was then grafted to fill the osseous bony defects surrounding the tooth (Fig 4). The flap was then repositioned and approximated with digital pressure and gauze before suturing. The flap was approximated with passive closure with simple interrupted Mersilk 4-0 suture material. Antibiotics, analgesics and 0.2% chlorhexidine mouthwash were prescribed. The patient was recalled after 10 days for suture removal. Satisfactory healing was noted.

After 6 months of surgery, the treated tooth showed Miller's Class III gingival recession. Hence, root coverage procedure with sub-epithelial connective tissue graft was planned. On the day of surgery, the surgical area was prepared and adequately anesthetized using 2% lignocaine HCL containing 1:80,000 epinephrine by giving block and infiltration anesthesia. After obtaining adequate anesthesia, two vertically divergent incisions (i.e. one mesial and one distal, immediately adjacent to the defect) extending beyond the MGJ were made on the buccal aspect of the involved tooth. The sulcular incision was then placed up to the end of vertical incision. Care was taken to see that the papilla was intact. The flap was elevated by sharp dissection with no. 15 scalpel blade to raise a combined full-partial thickness flap to the level of the MGJ. The flap was extended well beyond the mucogingival junction so that it exhibited no tension when pulled coronally beyond the CEJ. A measurement of the approximate length and width of the graft required was taken and obtained from the palate by Bruno's technique (Fig 5&6). After its removal from the palate, the CTG was placed on the saline-soaked gauze while the palatal wound was closed with interrupted sutures. CTG was secured in position to cover the defect 3 mm apically over the adjacent alveolar crest and 1mm coronal to the CEJ and then sutured with 5-0 vicryl sutures. Then the overlying full-partial thickness flap was positioned over the CTG with very little tension using sling, suspensory sutures into the mesial and distal papillae, covering as much of the CTG as possible (Fig 7). Periodontal dressings Coe-Pak were placed on recipient and donor sites. Postoperative antibiotics, analgesics and mouthwash were prescribed, postoperative instructions were given and were recalled after 9 days for suture removal.

RESULTS

Pre-surgically recession depth (from gingival margin to CEJ) was 4 mm. After 1 month of periodontal plastic surgery, 3mm of coverage (75%) was achieved with this approach. On evaluation of clinical parameters on 6-month follow-up, probing depth reduction and clinical attachment gain was noted and intraoral periapical radiographs revealed increased radiopacity in periapical area and bone fill seen on the

mesiolabial aspect of 11, suggestive of repair/regeneration. The patient is kept under maintenance therapy.



Fig 1. Pre-operative radiograph



Fig 2. Incision



Fig 3. Full thickness flap elevated



Fig 4. Sticky bone (Liquid PRF + bone graft) placed



Fig 6. Graft is stabilized at recipient site



Fig 7. Sutures placed



Fig 8. Before and After

DISCUSSION

The present case report is the surgical technique that was designed for bone regeneration and root coverage in tooth diagnosed with endo-perio lesion. Treating a complex endodontic periodontal lesion is still one of the most common challenges in today's clinical practice. The simultaneous existence of endodontium and periodontium tissue destruction can complicate the diagnosis and subsequently affect the prognosis of the involved teeth. Treatment of endo-perio lesion requires both endodontic treatment and periodontal regenerative treatment. Thus, successful bone fill using sticky bone and root coverage using connective tissue graft was the objective of this case. Sticky bone is biologically solidified bone graft in which the particulate bone grafts are entrapped in fibrin network. It is a stable, coherent mass which can be easily handled with a cotton plier.⁵ Fibrin networks entrap the platelet and leukocytes to release growth factors, thus accelerating bone regeneration and soft tissue formation.⁵ The bone graft with fibrin, platelets, and leukocytes provides high osteoblastic activity, i.e., osteoinduction and maturation. Furthermore, sticky bone is more economical and easy procedure.¹ Sticky bone has been evaluated for its efficacy in various periodontal procedures such as, vertical/horizontal ridge defects, ridge preservation, furcation defects, sinus lift procedures and peri-implant defects.

The report by Atia WM, 2018 showed that sticky bone enhanced the new bone formation and increased the quality of bone.⁷ Sticky bone has shown better clinical and radiographic outcomes than open flap debridement in the treatment of intrabony defects in chronic periodontitis in a study by Dsa E, 2020. In this case report, sticky bone was made using i-PRF and G-graft. There are a number of alloplastic bone graft substitutes based on hydroxyapatite and beta-tricalcium phosphate which are available either as porous or dense granules of various sizes and are analogous to the natural mineral found in human bone. They have osteoconductive properties, biocompatible, economical and can be easily sterilized. Hydroxyapatite materials demonstrate a low solubility, and thus are thought of as resorbable bone graft materials. Collagen when used in conjugation with other osteoconductive carriers like hydroxyapatite, it acts as an osteoinductive material. G-Graft is, made of natural low crystalline hydroxyapatite with collagen, both derived from natural sources i.e. bovine origin. It is available in form of granules, dowels and blocks. Calcium hydroxyapatite in highly crystalline form is used to make G-Bone modified hydroxyapatite granules and blocks. The body absorbs this form very slowly. It is derived from Bovine Bone which is sintered at +500 Celsius and this high temperature leaves only pure inorganic structure and thus removes the risk of transmission of any disease.⁶ Wahl DA et al, 2006, proposed that, the composite of Hydroxyapatite & Collagen (G-Graft) may lead to earlier bone regeneration & greater density of the mature bone. Panday V, 2015, demonstrated that G-Graft has a definite regenerative potential and can be used in bony defects to enhance the bone healing and indicates that the defects treated with G-Graft attain more density initially and enhances bone healing in early stage. Araujo M et al, 2008 also found de novo hard tissue formation after 3 months, particularly in the cortical region of the extraction site using of hydroxyapatite/collagen composite on healing of an extraction socket of dogs. The present result compares well with the results reported by Rishi Raj, 2020, using Sticky bone for the management of endo-perio lesion.¹ In that surgery, sticky bone followed by GTR membrane was used followed by connective tissue graft to cover Miller Class II recession.

The periodontal plastic surgery for the root coverage procedure was performed using sub-epithelial connective tissue graft. The subepithelial connective tissue graft (CTG) is the gold standard for root coverage treatments, improving the percentage of root coverage, complete root coverage, tissue thickness, and the amount of keratinized tissue in the operated area compared to other treatment options.⁸ The advantage of connective tissue graft is that it provides a good blood supply to the graft and, therefore, has a very good predictability of success and it provides gingival color match and esthetics, As advocated in different techniques, patient's palatal mucosa served as a source of CTG in the present study. Bruno's technique with two incisions was used because this technique provides better visibility and less postoperative pain and discomfort. The root coverage obtained with this procedure improved the esthetics and met the expectations and demands of the patient. According to recent randomized controlled trial by Maluta et al, 2021, connective tissue graft presents high root coverage in Miller's Class I and II multiple gingival recessions. Results from study by Nart J et al, in 2012, showed that 42.8 percent of Class III defects achieved complete root coverage with SCTG and coronally advanced flap⁹ which is in accordance to this report. The present method is a valid surgical approach which can be used for management of bone defect seen in endo-perio lesion.

CONCLUSION

Endo-perio lesion needs an interdisciplinary approach to treat it. A correct diagnosis, treatment and ulterior follow up such cases are vital. This case report provides encouraging results in the form of clinical and radiologic improvements and met patients esthetic demands. Hence, the advent and use of sticky bone for regeneration of endo-perio lesion represents a novel approach.

However, a long term follow up of such cases is required and the effect should be confirmed with randomized controlled clinical trials.

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GLOSSARY OF ABBREVIATIONS

CEJ	CEMENTO-ENAMEL JUNCTION
CTG	CONNECTIVE TISSUE GRAFT
GTR	GUIDED TISSUE REGENERATION
GFs	GROWTH FACTORS
i-PRF	INJECTABLE PLATELET RICH FIBRIN
PRF	PLATELET RICH FIBRIN
RCT	ROOT CANAL TREATMENT
VEGF	VASCULAR ENDOTHELIAL GROWTH FACTOR

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