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A SEQUENTIAL APPROACH IN THE MANAGEMENT OF COMBINED ENDO PERIO LESION

Dental Science

Dr. Missriya* PG Student, Department Of Periodontics, AJ Institute Of Dental Sciences, Mangalore *Corresponding Author

Dr. Nandini Manjunath HOD and Professor, Department Of Periodontics, AJ Institute Of Dental Sciences, Mangalore

Dr. Arya Ashok PG Student, Department Of Periodontics, AJ. Institute Of Dental Sciences, Mangalore

ABSTRACT

Endodontic-periodontal lesions present challenges to the clinician as far as diagnosis and prognosis of the involved teeth are concerned. Treatment and prognosis of endodontic-periodontal diseases vary and depend on the cause and the correct diagnosis of each specific condition. The success of management of a combined periodontal and endodontic lesion depends on the elimination of both of the disease processes. Systematic examination combined with relevant investigations always provide a correct direction toward optimum treatment plan. This article presents the clinical effectiveness of platelet rich fibrin (PRF) in the treatment of a deep intra bony defect associated with an endo-perio lesion.

KEYWORDS

INTRODUCTION:

The endodontium and periodontium are closely related and diseases of one tissue may lead to the involvement of the other, which makes it difficult to diagnose. It is of vital importance to make a correct diagnosis for providing an appropriate treatment 1. The relationship between the pulp and the periodontium was first described by Simring and Goldberg in 1964. This term has been used extensively to categorize disease of either periodontal or endodontic etiology, with or without secondary involvement of the other. This could be misleading for any such lesion, regardless of its primary etiology [2].

Cross infection between the root canal and the periodontal ligament occurs via the anatomical and non-physiological pathways. Anatomical pathways include apical foramen, lateral canals, accessory canals, dentinal tubules and palato-gingival grooves while iatrogenic root canal perforations and vertical root fractures are the non-physiological pathways. These pathways determine the spread of infection[3,4].

The most important among the anatomical pathways are vascular pathways such as the apical foramen and the lateral canals and tubular pathways.

Apical Foramen: The apical foramen is the principal and most direct route of communication between the periodontium and the pulp. Although periodontal disease has been shown to have a cumulative damaging effect on the pulp tissue, total disintegration of the pulp is only a certainty if bacterial plaque involves the main apical foramen, compromising the vascular supply. Following necrosis of the pulp, various bacterial products like enzymes, metabolites, antigens etc. reach the periodontium through the apical foramen, initiating and perpetuating an inflammatory response there. This results in the destruction of periodontal tissue fibers and resorption of the adjacent alveolar bone. External resorption of the cementum can also occur concurrently[5].

Lateral canals: As the root develops, ectomesenchymal channels get incorporated, either due to dentine formation around existing blood vessels or breaks in the continuity of the Hertwigs root sheath, to become lateral or accessory canals6 . Lateral canals normally harbor connective tissue and vessels which connect the circulating system of the pulp with that of the periodontal ligament. In some instances, the lateral or accessory canal is obliterated by calcification, but patent communications of varying sizes (10-250µm) may remain in many cases. The majority of the accessory canals are found in the apical part of the root and lateral canals in the molar furcation Bender et al., stated that periodontal endodontic problems were much more frequent in the molars than in the anterior teeth because of the greater number of accessory canals present in the molars. The percentage of lateral canals in the furcation is 46% in first molars and 50 to 60% in any multirooted teeth region7. The ideal treatment of periodontal pocket formation associated with untreated accessory root canals is total debridement and total obturation of the root canal system[8]

Tubular pathways: These comprise dentinal tubules which contain the odontoblastic process that extends from the odontoblast at the pulpal dentin border to the dentinoenamel junction or the cement-dentinal junction. Passage of microorganisms between the pulp and periodontal tissues is possible through these tubules, when the dentinal tubules are exposed in areas of denuded cementum[5].

Non-physiological pathways :These include iatrogenic root canal perforations. Improper manipulation of endodontic instruments can also lead to perforation of the root. The second group of artificial pathways between periodontal and pulpal tissues are vertical root fractures, caused by trauma which occurs in both vital and nonvital teeth. The incidence of root fractures is more in the roots that are filled with lateral condensation technique and the teeth restored with intracanal posts[5].

Endo-perio lesions are classified by Simon et al into following groups:
Type I -Primary endodontic lesion,
Type II- Primary endodontic lesion with secondary periodontal involvement,
Type III-Primary periodontal lesion,
Type IV- Primary periodontal lesion with secondary endodontic involvement,
Type V -True combined lesions 9.

Among these, the management of true combined lesion with severe destruction of periodontal ligaments and the formation of intrabony defects, has always been a difficult challenge. Weine in 1982 classified endo-perio lesions into 4 types based on clinical presentation of cases.

Type I- Primary endodontic lesions mimicking periodontal diseases
Type II- Endodontic lesion in a periodontally involved tooth
Type III- Primary periodontal lesion requiring endodontic treatment for healing
Type IV- Primary periodontal lesion secondarily involving pulp[10]

Regeneration has emerged as one of the goals of therapy and various regenerative procedures including guided tissue regeneration and bone grafts have been investigated for the management of bony defects11. In the field of regeneration, endogenous regenerative technology (ERT) has found its place as it can initiate latent self-repair mechanisms in patients and promote the host's innate capacity for regeneration12. Platelet-rich fibrin (PRF) is the most widely used ERT. It was first described by Choukroun et al. in 2001 in France. It has been referred to as a second generation platelet concentrate because the natural concentrate is produced without any anticoagulants or gelifying agents13. Therefore, the purpose of this case report is to describe the efficacy of PRF in the treatment of a deep intra bony defect

associated with an endo-perio lesion.

CASE REPORT

A 43-year-old female patient reported to the Department of Periodontology complaining of pain in the lower right back tooth region since one month. On intra-oral examination, deep proximal caries was present with respect to mandibular right first molar (46) .It was tender on palpation and percussion along with deep periodontal pocket measuring 9 mm distally. Electric pulp testing was done to assess for tooth vitality, which confirmed that the tooth was non-vital. An intra-oral periapical radiograph was taken which showed deep intrabony defect on the distal aspect of the tooth [Figure 1]. Based on the above findings, a diagnosis of symptomatic irreversible pulpitis with apical periodontitis was made. Endodontic treatment was planned first as the tooth was non-vital followed by periodontal regenerative therapy using PRF and bone graft for the treatment of deep intrabony defect.

PROCEDURE

Endodontic treatment was taken up first.With an EndoZ bur ,an access cavity was made and the canals were located .Tentative working length was found with an apex locater and the working length was confirmed using a radiograph. Cleaning and shaping of the root canals was done using a step back technique.17% EDTA, saline and 2.5%sodium hypochlorite irrigation was done during each instrumentation change. After the canal preparation, a radiograph was taken to confirm the master cone gutta percha.(MB,ML #25/.O2,Distal #30/.02) (figure 2). Obturation was done using a lateral condensation technique.An access restoration was done using composite (figure 3). At the end of second month, it was observed that there was no change in the soft tissue measurements (figure 4). Therefore, periodontal regenerative surgery using PRF and bone graft was planned.

PRF PREPARATION

For preparation of PRF, 5 ml of whole blood was drawn intravenously from the forearm (antecubital vein) of patient using an 18-gauge needle and collected in sterile plastic vaccutube without adding any anticoagulants. Immediately, the tube was centrifuged (Remi Model,R 8C) under 2400 revolutions per minute (RPM) for 12 minutes. This resulted in separation of whole blood into three layers (figure 5):

1. Top-most layer consisting of a cellular straw-colored fluid - Platelet Poor Plasma (PPP),
2. A middle layer containing PRF clot, and
3. A lower layer rich in Red Blood Cells.

A sterile tweezer was inserted into the test tube to remove the PRF clot which is jelly like consistency. The PRF gel was pressed between the sterile dry gauze to squeeze out fluid which resulted in a membrane (figure 6).

SURGICAL PROCEDURE

The surgical site was anesthetized using 2% lidocaine with 1:1,00000 epinephrine. A full thickness muco-periosteal flap was reflected at the buccal aspect following intra-sulcular incision. Grade I furcation involvement and infrabony defect was noted w.r.t. 46 (figure 7). The defect was thoroughly debrided. Xenograft and PRF membrane was placed into the bony defect to the level of surrounding bony walls, taking care not to overfill (figure 8). The mucoperiosteal flap was replaced and primary soft tissue closure of the flap was achieved by means of non-resorbable black silk (3-0) suture (figure 9).

The sutures were removed 10 days after surgery (figure 10)and patient was advised to use chlorhexidine mouth wash after 48 hrs of surgery. Patient was put on regular recall at 1,2,3 and 6 months. The post-op radiograph shows bone fill in the furcation defect as shown in (figure 11

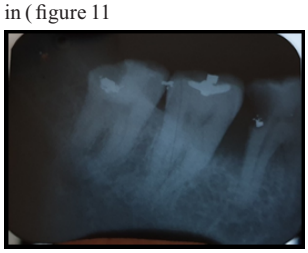
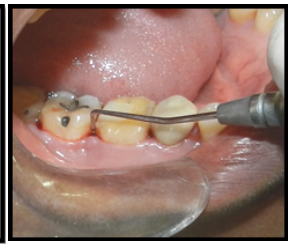


Figure 1

Figure 2

Figure 3



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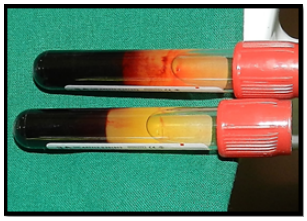

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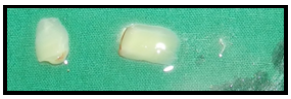

Figure 6

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Figure 8

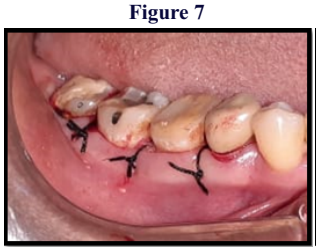


Figure 9

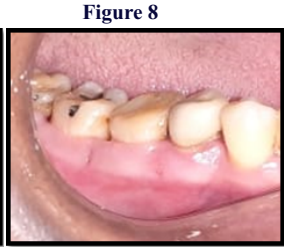


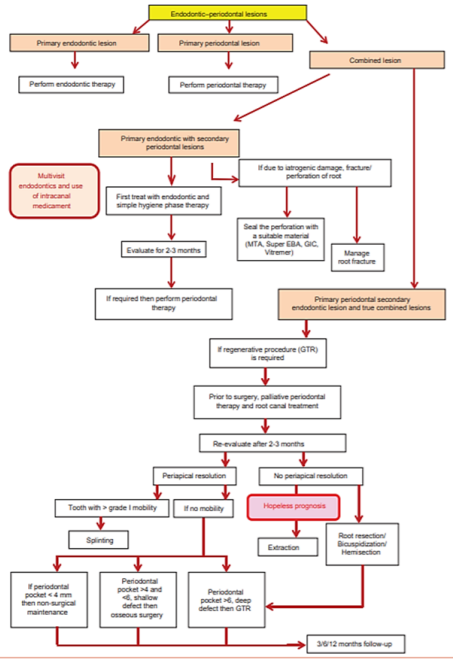
Figure 10

Figure 11

DISCUSSION

The management of endodontic-periodontal combined lesion requires thorough understanding of wound healing process involving both endodontic and periodontal complex14. Treatment decision-making and prognosis depend primarily on the diagnosis of the specific endodontic and/or periodontal disease (table 1)15. The prognosis of a true-combined perio-endo lesion is often poor or even hopeless, especially when periodontal lesions are chronic with extensive loss of attachment16. In most cases, periapical healing may be anticipated following successful endodontic treatment. The periodontal tissues, however, may not respond well to treatment and will depend on the severity of the combined disease. The application of guided tissue regeneration (GTR) in periapical surgery has seen an increase in recent years based on favourable outcomes reported in periodontal applications. GTR in combined lesions has been described in numerous case reports, which generally result in clinical improvement17. El-sharkawy et al18 conducted studies to understand about the regenerative potential of PRF and suggested that the administration of growth factors may be combined with tissue regeneration techniques in the repair of intrabony defects, furcations, and cyst cavities.

Table 1 : Management Plan Of Endo-perio Lesions



Platelet rich fibrin (PRF) was first used in 2001 by Choukroun et al19,specifically in oral and maxillofacial surgery, and currently considered as a new generation of platelet concentrate. It belongs to the new generation of platelet concentrates which is in the form of a platelet gel. It is prepared from autologous blood and deliver growth factors in high concentration to the site of a bone defect. It promotes wound healing, bone growth, maturation, graft stabilization, wound sealing, and hemostasis[20].

PRF has been shown to be superior over traditionally prepared platelet-rich plasma (PRP). Its advantages include ease of preparation and lack of biochemical handling of blood. PRF consists of an autologous leukocyte-platelet-rich fibrin matrix and composed of a tetramolecular structure with cytokines, platelets and stem cells. It acts as a biodegradable scaffold that favors the development of microvascularization and is able to guide epithelial cell migration to its surface21. Dohan et al22 stated that PRF has immunological and antibacterial properties, may lead to leukocyte degranulation, and has some cytokines that may induce angiogenesis and pro/anti-inflammatory reactions. As the network of fibrin disintegrates, cytokines within the fibrin mesh allows for their progressive release over time (7-10 days)20. According to Simonpieria et al19, PRF mainly offers the following advantages. First, the fibrin clot with the PRF membrane plays an important mechanical role in maintaining and protecting the grafted biomaterials and PRF fragments serving as biological connectors between bone particles. Second, the integration of this fibrin network into the regenerative site facilitates cellular migration, particularly for the endothelial cells necessary for neoangiogenesis, vascularization, and survival of the graft. Third, the platelet cytokines, transforming growth factor (TGF), and insulin-like growth factor-1 (IGF-1) are released gradually as the fibrin matrix gets resorbed, thus creating a perpetual process of healing. Lastly, the presence of leukocytes and cytokines in the fibrin network can play a significant role in the self-regulation of inflammatory and infectious phenomenon within the grafted material.

In this case, following endodontic treatment the periodontal lesion did reduce to an extent on radiographic evaluation after 1 month but did not subside completely. The treatment strategy was to first focus on the debridement and disinfection of the root canal system followed by an observation period. The goal of the periodontal surgery is to remove all necrotic tissues from the surgical site and facilitate the regeneration of hard and soft tissue along with the formation of new attachment apparatus. The necessity of periodontal surgical therapy most likely was because the periodontal bone loss was more advanced and less likely to resolve after non surgical therapy. The use of bone graft in ERT has also been proven to have potential regenerative properties that helps to achieve the goal of periodontal regeneration[23]. The result of this combined technique was quite impressive from the clinical and radiographic findings, resulting in a significant reduction of probing depth and increase in bone fill.

CONCLUSION

Although traditional nonsurgical periodontal therapy and regular endodontic therapy can be predictably used to arrest mild to moderate defects, it might be inadequate for the treatment of disease characterized by deep pockets or wide circumferential apical defects. Treatment strategies used in this case report suggests that combined endodontic-periodontal lesions can be successfully managed with regenerative procedures.

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