Platelet Rich Fibrin in the management of Perio-Endo Lesion – A Case report
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Introduction:
The tooth, the pulp tissue within it and its supporting structures should be viewed as one biological unit. The interrelationship of these structures influences each other during health, function, and disease. The periodontium and pulp have embryonic, anatomic and functional interrelationship. Dental papilla and follicle form embryologically from ectomesenchymal cell proliferation, and they are the precursors of the periodontium and the pulp respectively and they give rise to anatomical connections, which remain throughout life. As the root develops, ectomesenchymal channels get incorporated, either due to dentine formation around existing blood vessels or breaks in the continuity of the Hertwig epithelial root sheath, to become accessory or lateral canals. The majority of accessory canals and lateral canals are found in the apical part of the root and molar furcation regions respectively. The exposure of dentinal tubules to the periodontium due to the absence of overlying cementum creates communication between pulp and periodontium. The pathological agents pass between the periodontium and pulp through these pathways, thereby creating the perio-endo lesion.

The possibility that periodontal disease might be related to, or cause, pulpal disease was first reported by Colyerl and Cahn, who described structures that are currently termed lateral canals. Cahn stated: “It does not require a wide stretch of the imagination to see how easily an infective process might spread from without inwards, rapidly involving the pulp, especially in teeth having these side canals.”

According to Simon et al., an endo-perio lesion can be classified into five types:
1. The primary endodontic lesion,
2. The primary periodontal lesion,
3. A primary endodontic lesion with secondary periodontal involvement,
4. A primary periodontal lesion with secondary endodontic involvement, and
5. True combined lesion.

The goals of periodontal therapy include:
1. The arrest of periodontal disease progression and also,
2. The regeneration of vital structures lost due to disease.
Several treatment modalities have been investigated for the management of bony defects like open flap debridement, bio-modification of the root surface, and various regenerative procedures, including guided tissue regeneration and bone grafts. However, to overcome the prevailing healing limitation in the Perio-endo lesion, the principles of tissue engineering have been started using a purified growth factor to stimulate the patient’s own cells toward a regenerative response.

Platelets and growth factors enriched Platelet-rich fibrin (PRF) promotes periapical tissue regeneration and healing. This case report presents an attempt to evaluate the healing kinetics of the combination of PRF and xenograft (G-graft) in the treatment of perio-endo lesions.

Case report

A 23-year-old female patient reported to the Department of Periodontics with a chief complaint of pain in the lower left back tooth region for 1 month. The medical history was non-contributory. On clinical examination, there was inflammation of the marginal and interdental gingiva, pus discharge and, probing depth of 10 mm in relation to 36 (Figure: 3), by using hot and cold tests pulp sensitivity testing was performed in which the tooth gave a negative response indicating it to be non-vital. Radiographic examination revealed a severe bone loss in the furcation region (Figure: 4), diagnosed as a primary periodontal lesion with secondary endodontic involvement. The initial phase of periodontal treatment comprised drainage of the abscess, and scaling and root planing, also antibiotics (amoxicillin 500mg, 3 times a day for 5 days) and analgesics (Diclomol 50mg 3times a day for 3 days) were prescribed. Initially, root canal therapy was performed. And the regenerative surgical procedure was planned for the treatment of furcation defect using Platelet-rich fibrin and xenograft as the regenerative material (Figure: 5, 6, 7, 8). After a follow-up period of 9 months, the probing depth reduced from 10 to 4mm and radiographically there was considerable bone formation (Figure:10).

PRF preparation:

For the preparation of PRF, 5 ml of whole blood was drawn intravenously from the forearm (antecubital vein) of patient using a 21-gauge needle and collected in sterile plastic vacutube without adding any anticoagulants. Immediately, the tube was centrifuged (Remi model, Mumbai, Maharashtra, India) under 3000 revolutions per minute (RPM) for 10 minutes. This resulted in separation of whole blood into three layers: 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 glass slab to squeeze out fluid which resulted in a membrane.
Figure 1: Centrifuge

Figure 3: Pre-operative view

Figure 4: Pre-operative radiograph

Figure 5: Intraoperative view

Figure 6: PRF preparation
Discussion:

Perio-endo lesions develop either by periodontal destruction combining apically with an existing periapical lesion or an endodontic lesion combining with an existing periodontal lesion. Seltzer et al. concluded that an established endodontic lesion could progress through the main or accessory canals to produce a periodontal breakdown. A more controversial hypothesis has also been suggested, which is the spread of infection from a periodontal pocket into the root canal system itself. The diagnosis and prognosis of the tooth having endo-perio lesions present a challenge to the clinicians. Correct diagnosis is important to determine the treatment and also long-term prognosis. However, treating a complex endo-perio lesion is still one of the most common challenges in today’s clinical practice.

The simultaneous existence of endodontic and periodontium tissue destruction can complicate the diagnosis and subsequently affect the prognosis of the involved teeth. This highlights the importance of following a critical diagnosis strategy to ensure a correct treatment plan. It also requires a thorough understanding of the wound healing process involving both complex tissues.

Treatment of perio-endo lesion requires both endodontic treatment and periodontal regenerative treatment. The treatment strategy is to first focus on debridement and disinfection of the root canal system followed by an observational period. The goal of 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.

Platelet rich fibrin is a regenerative material that was first developed by Choukroun et al., in 2001. It belongs to the new generation of platelet concentrates which is in the form of a platelet gel, prepared from autologous blood and is used to deliver growth factors in high concentration to the site of a bone defect, offering several other advantages including promoting wound healing, bone growth, maturation, graft stabilization, wound sealing, and hemostasis. It consists of a polymerized fibrin matrix, which is incorporated with platelets, leukocytes, cytokines, and circulating stem cells. The intrinsic incorporation of cytokines within the fibrin mesh allows for their progressive release over time (7-10 days) as the network of fibrin disintegrates.

According to Simonpieria et al., the advantages of using this platelet and immune concentrate includes: First, the fibrin clot plays an important mechanical role, with the PRF membrane
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, as the fibrin matrix gets resorbed it gradually releases the platelet cytokines [Platelet-Derived Growth Factor (PDGF), Transforming Growth Factor (TGF), and Insulin-Like Growth Factor-1 (IGF-1)], 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 an inflammatory and infectious phenomenon within the grafted material.\textsuperscript{16, 17}

Conclusion:

Perio-endodental lesion has a complex pathogenesis and requires great skill to identify and treat it. Hence, a better treatment plan leads to better results and cooperation between different disciplines that include Periodontology and Endodontics is required to effectively treat the lesion.

References:


