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# Management of Peri-Apical Defect Caused by an Endo-Perio Lesion Using Bone Graft with and Without Concentrated Growth Factor – A Case Series

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# ABSTRACT

#### **KEYWORDS**

Peri-apical defect, CGF (Concentrated growth factor), Osseograft, Peri-apical surgery Periodontal and endodontic structures are related to one another. In a clinical sense, this association facilitates the dissemination of infection, leading to the characteristic presentation of endo-perio lesions. These lesions frequently show no symptoms for extended periods of time before experiencing acute pain and/or inflammatory signs. It can be difficult to differentiate between endodontic and periodontal problems, but getting the diagnosis right is essential to getting the right treatment. This case report highlights the utilization of a new autologous platelet concentrate, concentrated growth factor (CGF), in conjunction with an osseograft in a surgical endodontic procedure. This combination aims to promote a rapid and successful recovery of the periapical region affected by extensive lesions. The incorporation of an osseograft along with CGF offers several advantages, particularly in the formation of sticky bone, enhancing the overall efficacy of the procedure. This article includes case series of endo -perio lesion with post operative follow up radiographs which reveals healing of the hard and soft tissue lesions that proves to attain the repair and regeneration at a faster rate in substantial periapical lesions .

# 1. Introduction

The involvement of periodontal disease and pulp disease in the same tooth has been identified as a characteristic of endo-perio lesions. A secondary infection or the collapse of periodontal tissue may result from pulp tissue infection. Conversely, inflammatory alterations in pulp tissue may be brought on by or made worse by severe periodontal disease. Treatment of endo-perio lesions can be challenging, particularly in cases where there is a significant loss of osseous structure and periodontal attachment<sup>(1).</sup>

#### CLASSIFICATION OF ENDO – PERIO LESIONS:

The periodontal – endodontic lesions have received several classifications, among which is the classification of Simon et al., separating lesions involving both periodontal and pulpal tissues into the following groups:

- 1) Primary endodontic lesions
- 2) Primary endodontic lesions with secondary periodontal involvement
- 3) Primary periodontal lesions
- 4) Primary periodontal lesions with secondary endodontic involvement
- 5) True combined lesions <sup>(2).</sup>

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Periapical lesions often leads to periapical bone defect and those defects can be treated by curettage.

# **Causes of Endo-Perio Lesions:**

Anatomically, the connection between periodontal tissue and the endodontic system occurs through the apical foramina and lateral canals. When the periodontal socket extends deeply beyond the apical third of the tooth, it allows a connection through the apical foramen. Lateral canals, being distributed along the root surface, provide a more accessible pathway for microorganisms to move between tissues compared to apical foramina. These canals facilitate better vascular exchange, allowing for the transfer of nutrients, inflammation by products, and bacteria. Both pulpal and periodontal tissues share a mesodermal origin, establishing an anatomical bond.

Functionally, an endodontic infection can discharge through the periodontal ligament, worsening periodontal disease by increasing pocket depth. It can also lead to destruction of periodontal tissue in the apical region, potentially migrating upwards to the gingival margin, termed retrograde periodontitis. This is distinct from marginal periodontitis, which progresses from the gingival margin towards the apical region. Conversely, microorganisms and irritants can enter the endodontic system through dentinal tubules after gradual loss of periodontal attachment. Similar live pathogens are encountered in both endodontic and periodontal diseases, contributing to the common etiology of endodontic - periodontal lesions <sup>(3)</sup>

# **Diagnosis of Endo- Perio Lesions:**

Understanding the pathophysiology, as well as the clinical and radiographic symptoms of endo-perio lesions, is helpful for successful treatment of these diseases.1. Different tests aid in differentiating between periodontal and endodontic disease:

1) Vitality test: A tooth is usually vital in situations of periodontal disease but non-vital in endodontic disease.

2) Calculus and plaque: While they may be present in endodontic disease, these conditions are not the main cause of the illness; in periodontal disease, however, they are.

3) Pocket/probing depth: A single, narrow pocket may appear in endodontic disease; widespread periodontal

pockets, which are placed relatively wide and coronally, may appear in periodontal disease <sup>(1).</sup>

# **CASE REPORT -1**

# **Examination:**

A 27 years old female patient named Mrs. Pattu came to the department of periodontics with the complaint of pain occasionally arises in upper front teeth region for past one month and she had a history of root canal treatment done in 21 and 22. Intraoral examination , mild pain on palpation was present in the apical region of 21 and 22. No mobility seen in 21 and 22, discoloration seen in 22.

# Investigations:

Radiographic analysis indicated a clear delineated periapical radiolucency in 21 and 22. Discontinuity in lamina dura was also seen in 21 and 22 region.

# Diagnosis:

Based on the aforementioned findings, the diagnosis reached is an endo-perio lesion with primary endodontic and secondary periodontic involvement.

# **Treatment planning:**

An integrate application of endodontic therapy followed by a surgical approach should be planned. Patient should be informed about the procedure and consent should be taken from the patient for the treatment procedure. Patient should undergo blood investigations to eliminate any bleeding disorders. Complete blood analysis and coagulation studies must be normal to carry out the procedure. The patient's general health and wellbeing should be well and should be approved by the 'ASA' physical status classification system.

# **Endodontic therapy:**

Endodontic retreatment was carried out first in 21 and 22. Local aesthesia was administered using 2% lidocaine. Rubber dam isolation done in the region of 21 and 22. Infected root canal filling was removed. Working length determination done again using a electronic apex locator and a radiograph was taken for confirmation. Cleaning and shaping of canals was done in 21 and 22 using hand files and rotary file system with alternating irrigation was done using 3% sodium hypochlorite. Obturation was done in 21 and 22 using guttapercha and AH plus sealer. Cold lateral compaction technique was followed.

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Radiographs were taken to check the integrity of the obturation done in 21 and 22.

#### **Periodontal therapy:**

Periodontal therapy was planned in 21 and 22. Local anaesthetic agent was injected in the region of 21 and 22. 2% lignocaine with adrenaline in ratio of (1:80000) was used. Crevicular incision was placed initially, which is followed by elevating full thickness mucoperiostel flap in the buccal side of 21 and 22. Once the flap elevation was done, complete debridement of the infected lesion was curetted with Gracey curette. Once curettage is over,

proper isolation of area was done with proper haemostatic control and osseograft (xenogeneic bone graft material) was taken to the area and placed as incremental layer, simultaneously condensation was done. 3.0 silk suture material was used to place simple interrupted sutures to secure the flap and periodontal COE- PAK dressing is placed. This dressing should be removed after one week. Antibiotics (Amoxicillin, metronidazole), Analgesics (Aceclofenac) prescribed for the patients for 5 days. One year follow up was done. Appreciable reduction of resorption was seen.

#### **CASE REPORT – 1**



Figure -1(A) Preoperative labial aspect

Figure-1(B) preoperative palatal aspect



Figure -1(C). preoperative radiograph

Figure-1(D) Intra-operative picture revealing bone defect after flap elevation



Figure-1(E) placement of bone graft

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Figure -1(F) Immediate post operative picture after the placement of sutures



Figure-1(G) One month post operative radiograph

# CASE REPORT -2

#### **Examination:**

A patient named Ms. Suguna 23 years old, female came to our college with a chief complaint of forwardly placed upper front teeth and wants to correct it. Intraoral examination reveals patient had gingival recession (palatal aspect) in 11, tender on percussion was present in 12, upper and lower anterior spacing, On examining the intraoral periapical radiograph revealed a periapical radiolucency of about 1 cm in 11 and 12 region.

#### **Investigations:**

#### IOPA:

On examining the intraoral periapical radiograph revealed a periapical radiolucency of about 1cm in 11 and 12 region.

#### **Treatment plan:**

Root canal treatment was planned for 12.

Periapical surgery with bone graft and concentrated growth factor in relation to 11 and 12.

#### **Endodontic therapy:**

Endodontic retreatment was carried out first in 11 and 12. Local aesthesia was administered. 2% lignocaine with adrenaline in ratio of (1:80000) was used. Rubber dam isolation done in the region of 11 and 12. Access opening done in 11and 21.Working length determination done using a electronic apex locator and a radiograph was taken for confirmation. Cleaning and shaping of canals was done in 11 and 12 using hand files and rotary file system with alternating irrigation was done using 3% sodium hypochlorite. Obturation was done in 11 and 12 using guttapercha and AH plus sealer. Cold lateral compaction technique was followed. Radiographs were taken to check the integrity of the obturation done in 11 and 12.

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#### **Periodontal therapy:**

Periodontal therapy was planned in 11 and 12. Local anaesthetic agent was injected in the region of 11 and 12. 2% lignocaine with adrenaline in ratio of (1:80000) was used. Crevicular incision was placed initially, which is followed by elevating full thickness mucoperiostel flap in the buccal side of 11 and 12. Once the flap elevation was done, complete debridement of the infected lesion was curetted with Gracey curette. Once curettage is over, proper isolation of area was done with proper haemostatic control and osseograft (xenogeneic bone graft material) was taken to the area and placed as incremental layer, simultaneously condensation was done. Following that CGF is placed. CGF was prepared in a pre- programmed device. 3.0 silk suture material was used to place simple interrupted sutures to secure the flap and periodontal COE- PAK dressing is placed . This dressing should be removed after one week. Antibiotics (Amoxicillin, metronidazole), Analgesics (Aceclofenac) prescribed for the patients for 5 days. One year follow up was done. Appreciable reduction of resorption was seen in the region of 11 and 12 on radiographs.

#### **CASE REPORT - 2**



Figure -2(A) preoperative labial aspect Figure -2(B) Preoperative palatal aspect



**Figure –2(C)** preoperative radiograph

Figure- 2(D) Intra-operative – periapical defect seen



Figure-2(E) preparation of CGF

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Figure-2(G) Defect filled with CGF along with bone graft



**Figure – 2**(H). Immediate post operative

# 2. Discussion:

These series of case report stress the use of bone grafts and also the combination of bone grafts along with concentration growth factor as a biomaterial which helps to attain a appreciable level of repair and regeneration following surgery of periapical region. When CGF was prepared from Medifuge, the fibrin rich blocks which are formed were found to have numerous growth factors<sup>(4)</sup>

CGF is an autologous platelet concentrate with high levels of growth factors, particularly Transforming Growth Factor-Beta 1 (TGF- $\beta$ 1) and Vasoendothelial Growth Factor (VEGF). TGF- $\beta$ 1 appears to play a role in bone morphogenic protein expression, matrix metalloproteinase inhibition, and modulation of endothelial cell behavior, potentially leading to increased blood vessel permeability. This suggests a complex interplay of factors contributing to various biological effects <sup>(5,6)</sup>.

The goal of the periapical surgical procedures is to remove all the necrotic tissue from the periapical area to completely seal the pulp canal system to facilitate the regeneration of hard and soft tissues which includes the formation of new attachment apparatus.



In the current case, the employed Osseograft, a demineralized dried xenograft, demonstrates both osteoinductive and osteoconductive characteristics. The bone graft, with particle sizes ranging from 125 to 1000  $\mu$ m, exhibits heightened osteogenic potential. Following a brief 2-minute centrifugation, autologous fibrin glue is produced. When combined with particulate bone powder and allowed to polymerize for 5–10 minutes, this results in the formation of adhesive bone with the unique ability to remain anchored to the interconnected fibrin matrix.

In summary, the current case report highlights outstanding outcomes in periapical healing, likely attributable to the incorporation of a dynamic combination of CGF and bone grafts, resulting in the formation of sticky bone. This approach seems to facilitate a swift and effective repair and regenerative process<sup>(7)</sup>. CGF shows higher tensile strength, more growth factors, higher viscosity and higher adhesive strength than early generation platelet concentrates like PRF (platelet rich fibrin)<sup>(8-10)</sup>.

# 3. Conclusion:

Primary pulp lesions coupled with secondary periodontal defects typically resolve through

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conventional root canal treatment (RCT). However, there are instances where even successful endodontic therapy may lead to incomplete healing at the periradicular region, necessitating additional periodontal therapy. This combined endodontic-periodontic lesion requires both endodontic and periodontal interventions for comprehensive elimination of the source. Lesions like periapical granuloma, leaving a detectable bony defect, may require bone graft materials to prevent fibrous tissue formation post-therapy. CGF serves as a barrier membrane, expediting soft tissue healing, and can be combined with bone graft to enhance new bone formation. Overall, a regenerative approach emerges as an affordable and valuable treatment strategy in managing such diseases from a multidisciplinary perspective.

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