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Multidisciplinary Management of Radicular Cyst with Fractured Fragment Reattachment: A Clinical Case Report

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Abstract

Combined endodontic-periodontal lesions pose a considerable clinical challenge due to the close anatomical and pathological interrelationship between the pulp and periodontal structures. When such lesions fail to resolve following conventional root canal therapy, further intervention is required to address the underlying pathology and promote healing.

This report presents a case involving a persistent endodontic-periodontal lesion linked to a periapical cyst. A multidisciplinary treatment plan was implemented, incorporating apicoectomy along with guided tissue regeneration (GTR) and guided bone regeneration (GBR) utilizing a xenograft material. This integrated approach enabled effective debridement, regeneration of periapical tissues, and successful clinical recovery.

Keyword: NSRCT, GTR, GBR, Human Amniotic membrane, titanium PRF.

Introduction

Managing endodontic-periodontal lesions is often difficult due to the interconnected nature of the pulp and periodontal structures. This connection allows the exchange of infectious agents and toxic substances through anatomical pathways such as the apical foramen, lateral canals, and dentinal tubules[1] and if left untreated the devitalization of the dental pulp frequently precipitates the formation of apical periodontitis in the affected dentition.[2]

Healing outcomes following endodontic therapy are diminished by approximately 15% to 20% in cases where apical periodontitis is detected.[3] Initial management of combined endodontic-periodontal lesions typically involves nonsurgical root canal therapy (NSRCT) along with periapical debridement of the existing pathology to eliminate or control microbial infection, while guided tissue regeneration (GTR) and Guided Bone Regeneration (GBR) serves as a valuable adjunctive procedure aimed at promoting regeneration of lost hard tissues.[4]

For peri apical healing Human amniotic membrane(hAM), the innermost layer of the placenta, possesses a unique structural composition that offers several therapeutic benefits in regenerative periodontal therapy. Its anti-inflammatory, antimicrobial, anti-scarring, and low immunogenic properties, along with its ability to promote epithelialization, reduce postoperative pain, and enhance gingival biotype, make it an ideal natural biomaterial. Additionally, it provides a favorable scaffold for periodontal cell proliferation[5].

Platelet Rich Fibrin is the second generation of platelet concentrates developed by Choukroun *et al*. in the year 2001. It contains growth factors necessary for cell migration, attachment, proliferation, and differentiation that promote the healing of both hard and soft tissues, the effects of PRF on periapical surgery in terms of postoperative pain, bone density, soft and hard tissue healing, and quality of life were generally favorable

Case Presentation

A 18 year old male patient residing in Jaipur Rajasthan reported to the department of periodontology with a chief complaint of fractured tooth fragment i.r.t. 22 with a history of trauma one day back and mobility in anterior tooth region i.r.t. 21. Clinical evaluation revealed a crown fracture in tooth 22 with loss of the coronal fragment, while tooth 21 exhibited an intact fragment with grade II mobility, both teeth were tender on percussion. Endodontic treatment was initiated for teeth 21 and 22. Pulp vitality testing confirmed that both teeth were non-vital, consistent with an Ellis Class IV fracture. Radiographic assessment showed no evidence of root fracture; however, a large periapical radiolucency was observed in relation to teeth 21 and 22. There was no significant medical history. Intraorally no signs of swelling, sinus tract formation was observed. Deep periodontal pocket around the affected tooth were noted with percussion test positive i.r.t 21&22. Periapical radiographic examination showed huge radiolucency involving apical region of #21 and #22. Considering the clinical and radiographic findings, diagnosis was summarised as localized stage III grade B periodontitis with no grade modifier (radicular cyst i.r.t.22)

As a part of initial periodontal therapy complete supragingival and subgingival ultrasonic scaling and root planing was completed. Under strict isolation system root canal was initiated. Treatment plan was compiled that composed of routine root canal treatment followed by fiber post wrt 22, and metal post wrt 21, followed by fragment reattachment wrt 22. Following cleaning and

shaping, the root canals were obturated with gutta-percha and resin-based sealer using the lateral compaction technique. The gutta-percha was then partially removed, leaving the apical 5 mm of the filling to maintain a good seal and a glass-fibre-reinforced composite root canal post was placed in the canal for tooth 22.

During the surgical phase, local anaesthesia was administered at the operating site using 2% lignocaine containing 1:100,000 adrenaline. A crevicular incision was made, and a full-thickness mucoperiosteal flap was elevated. Upon reflection, purulent discharge was observed at the root apex, and the buccal cortical plate appeared perforated, consistent with periapical pathology. Osteotomy was performed using a round surgical bur mounted on a slow-speed handpiece under continuous sterile saline irrigation. Granulation tissue was meticulously curetted, preserved in 10% formalin, and submitted for histopathological evaluation. Following thorough degranulation and curettage, the site was irrigated sequentially with povidone-iodine and sterile saline. An apicoectomy was performed on the root of tooth #22, and the resected root end was sealed with a retrograde filling of mineral trioxide aggregate (ProRoot® MTA, Dentsply Sirona, Canada). Root planing was completed to ensure decontamination of the exposed surfaces. The osseous defect was grafted with mineralized freeze-dried bone allograft combined with titanium-prepared platelet-rich fibrin (t-PRF) as a scaffold and subsequently covered with a resorbable amniotic membrane (Tata Memorial Tissue Bank, Mumbai). The flap was repositioned and secured with 5-0 Vicryl absorbable sutures. A dual-cure luting system and a glass-fibre-reinforced composite root canal post were sequentially placed according to the manufacturer's instructions. A trough was created in the centre of the original crown fragment, and both the intact coronal portion of the tooth and the original crown fragment were etched with 37% phosphoric acid gel for 20 s, rinsed for 20 s and dried. Flowable composite resin was applied at the intact coronal portion of the tooth and the original crown fragment. Following this, the original fragment was accurately placed and photo polymerised for 40 s. For 21 metal post was used.

Under antibiotics and analgesic coverage postoperative instructions were provided with 0.12% chlorhexidine mouthrinse twice daily for 14 days. The patient was scheduled for follow-up and re-evaluation after 7 days,1 month 3 months and 6 months.

Figure 1: Pre-operative photograph (frontal view)

Figure 2: Pre-operative photograph (lateral view)

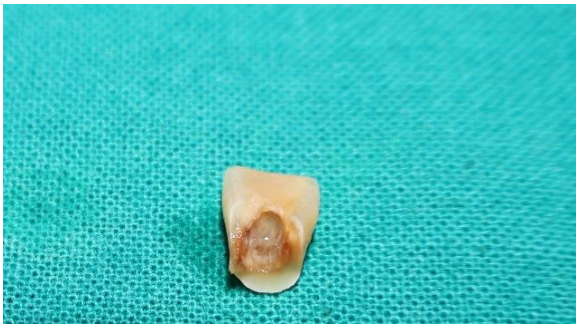

Figure 3: Fractured tooth fragment i.r.t. 22

Figure 4: Periapical surgical procedure of tooth #22(full thickness flap elevation with defect exposed.

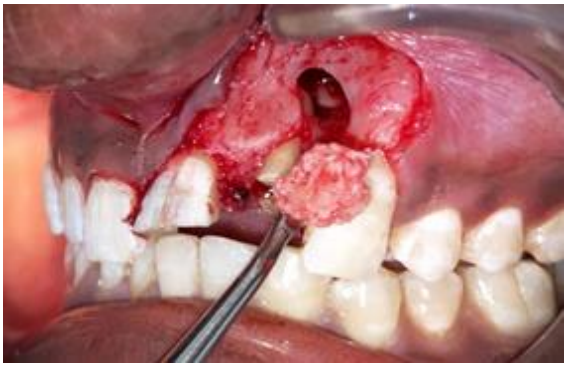

Figure 5: Complete debridement along with bone graft placement in combination with t-prf

Figure 6: 1month post-operative (frontal view)

Figure 7(a):6month post-operative (frontal view)

Figure 7(b):6month post-operative (lateral view)

Figure 8: Initial periapical radiograph with periapical lesion i.r.t #21 and #22

Figure 9: 6 months post-operative follow up

Discussion

Teeth presenting with necrosed pulp root and asymptomatic periapical lesions frequently harbor obligate anaerobic bacteria within the root canal system.

Notably, these teeth may still exhibit intact coronal restorations. Multiple investigations have demonstrated that persistent endodontic infections and treatment failures are often associated with factors such as extraradicular biofilm formation, vertical root fractures, procedural mishaps like perforations, remnants of necrotic pulp tissue, fractured instruments, concurrent periodontal disease, overextension or underfilling of obturation materials, uninstrumented or unfilled canals, and compromised coronal seals following treatment completion[6].

In this case, the treatment strategy involved addressing the persistent infection through endodontic retreatment in conjunction with surgical intervention, recognizing that orthograde retreatment alone was unlikely to resolve the periapical pathology. Apical surgery (apicoectomy) entails the surgical resection of the apical segment of the root, with placement of a retrograde filling material combined with guided tissue regeneration (GTR) and guided bone regeneration (GBR) techniques to achieve a hermetic seal at the root apex while promoting the restoration of lost osseous and soft tissues. These regenerative procedures rely on the use of barrier membranes that create a secluded environment, thereby preventing rapid proliferation of epithelial cells and allowing osteogenic and periodontal ligament-derived cells to repopulate the defect area. This selective cell repopulation forms the basis of new attachment formation and bone regeneration[7,8]

Unlike traditional PRF prepared in glass tubes, titanium PRF is produced in titanium tubes, which are thought to promote a denser fibrin architecture and more sustained release of growth factors. The biologically active matrix contains platelets and leukocytes embedded within a fibrin network, offering a reservoir of signaling molecules such as platelet-derived growth factor, transforming growth factor-beta, and vascular endothelial growth factor[9,10]. These mediators are essential for angiogenesis, fibroblast migration, and new tissue formation. The three-dimensional structure of t-PRF not only stabilizes the grafted area but also contributes to improved wound healing and maturation of regenerative tissue[11].

The amniotic membrane has gained considerable attention as a natural barrier material in GTR and GBR procedures. Composed of a collagen-rich stroma and a basement membrane, the amniotic membrane provides an environment favorable to cell proliferation and differentiation[12]. It exhibits anti-inflammatory and antimicrobial properties and serves as a bioactive scaffold that supports soft tissue healing[13]. Its resorbable nature eliminates the need for a second surgery for removal, simplifying postoperative management. Additionally, its flexibility and highly thin nature enable close adaptation to defect contours, which helps achieve effective sealing of the regenerative site[14]

The presence of microbial biofilms and bacterial aggregates in the periapical region is considered a significant contributing factor in the persistence of chronic inflammatory lesions. Additionally, trauma-induced crown fractures that remain untreated can progress to the development of radicular cysts over time. Nonsurgical endodontic retreatment remains the preferred initial approach, as it aims to thoroughly debride and disinfect the canal system and establish an effective apical seal.

In the present clinical scenario, nonsurgical retreatment was first undertaken to eliminate intracanal infection and restore canal obturation. However, given the prolonged duration of the lesion and the persistence of a substantial periapical radiolucency, surgical management was deemed necessary. Therefore, periapical surgery was

performed in combination with GTR and GBR procedures. The principal objectives of this approach were to excise pathologic periapical tissues, seal the apical extent of the canal system using biocompatible materials, and create an environment conductive to regeneration of the periodontal apparatus, including new bone formation and reestablishment of functional attachment.

Routine disinfection of the canal and combining t-PRF with the amniotic membrane may yield additive or synergistic effects in regenerative therapy. t-PRF primarily acts as a biologically active scaffold and a sustained delivery system for growth factors, while the amniotic membrane functions as an occlusive barrier and a natural source of cytokines that modulate inflammation and enhance epithelialization[15]. When used together, these biomaterials can improve early wound stability, promote vascularization, and facilitate the regeneration of both hard and soft tissues[16]

Several clinical reports and pilot studies suggest that the integration of platelet concentrates with membranes of biological origin can improve clinical outcomes in intrabony defects and periapical lesions. Reported benefits include greater clinical attachment gain, more predictable bone fill, and improved soft tissue contours compared to conventional treatment[17,18].So this case report proves that a combined interdisciplinary approach can provide complete benefit when done with proper planning However, large randomized controlled trials and long-term follow-up data are still limited, and further research is necessary to standardize protocols, determine ideal combinations, and validate their clinical superiority.

Conclusion

Traditionally, endodontic-periodontal lesions unresponsive to initial therapeutic interventions have been assigned a questionable prognosis, frequently resulting in tooth extraction. The present case report illustrates that a combined surgical approach incorporating mineralized freeze-dried bone allograft combined with titanium-prepared platelet-rich fibrin with amniotic membrane may represent an effective modality for the management of Ellis class IV fracture with persistent periapical cystic lesions refractory to conventional treatment**.**

References

1. Zehnder M, Gold SI, Hasselgren G. Pathologic interactions in pulpal and periodontal tissues. JClinPeriodontol.2002;29:663–671.
2. Trope M. Treatment of the immature tooth with a non-vital pulp and apical periodontitis. Dent. Clin. N. Am. 2010; 54:313-324
3. Ng YL, Mann V, Gulabivala K. A prospective study of the factors affecting outcomes of nonsurgical root canal treatment: Part 1: Periapical health. Int. Endod. J. 2011; 44:583-609.
4. Del Fabbro M, Corbella S, Sequeira-Byron P, et al. Endodontic procedures for retreatment of periapical lesions. Cochrane Database SystRev. 2016;10:CD005511.
5. Law E J, Taib H, Berahim Z (August 09, 2022) Amniotic Membrane: An Approach to Periodontal Regeneration. Cureus 14(8): e27832. DOI: 10.7759/cureus.27832
6. Yamaguchi M, Noiri Y, Itoh Y et al., “Factors that cause endodontic failures in general practices in Japan,” BMC Oral Health 2018;18(1):70-75.
7. Nyman S, Lindhe J, Karring T, Rylander H. New attachment following surgical treatment of human periodontal disease. J Clin Periodontol. 1982 Jul;9(4):290-6.

8. Wang HL, Carroll MJ. Guided bone regeneration using bone grafts and collagen membranes. Quintessence Int. 2001 Jul-Aug;32(7):504-15. PMID: 11495562.
9. Tunalı M, Özdemir H, Küçükodacı Z, Akman S, Yaprak E, Toker H, Fıratlı E. A novel platelet concentrates: titanium-prepared platelet-rich fibrin. Biomed Res Int. 2014; 2014:209548. doi: 10.1155/2014/209548. Epub 2014 Jan 21. PMID: 24563860; PMCID: PMC3915853.
10. Dohan Ehrenfest DM, Rasmusson L, Albrektsson T. Classification of platelet concentrates: from pure platelet-rich plasma (P-PRP) to leucocyte- and platelet-rich fibrin (L-PRF). Trends Biotechnol. 2009 Mar;27(3):158-67.
11. Choukroun J, Diss A, Simonpieri A, Girard MO, Schoeffler C, Dohan SL, Dohan AJ, Mouhyi J, Dohan DM. Platelet-rich fibrin (PRF): a second-generation platelet concentrates. Part IV: clinical effects on tissue healing. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2006 Mar;101(3):e56-60.
12. Koob TJ, Lim JJ, Massee M, Zabek N, Denozière G. Properties of dehydrated human amnion/chorion composite grafts: Implications for wound repair and soft tissue regeneration. J Biomed Mater Res B Appl Biomater. 2014 Aug;102(6):1353-62. doi: 10.1002/jbm.b.33141. Epub 2014 Mar 25. PMID: 24664953.
13. Dua HS, Gomes JA, King AJ, Maharajan VS. The amniotic membrane in ophthalmology. Surv Ophthalmol. 2004 Jan-Feb;49(1):51-77. doi: 10.1016/j.survophthal.2003.10.004. PMID: 14711440.
14. Kothiwale SV, Anuroopa P, Gajiwala AL. A clinical and radiological evaluation of DFDBA with amniotic membrane versus bovine derived xenograft with amniotic membrane in human periodontal grade II furcation defects. Cell Tissue Bank. 2009 Nov;10(4):317-26. doi: 10.1007/s10561-009-9126-3. Epub 2009 Mar 10. PMID: 19277899.
15. Pradeep AR, Bajaj P, Rao NS, Agarwal E, Naik SB. Platelet-Rich Fibrin Combined With a Porous Hydroxyapatite Graft for the Treatment of 3-Wall Intrabony Defects in Chronic Periodontitis: A Randomized Controlled Clinical Trial. J Periodontol. 2017 Dec;88(12):1288-1296.
16. Johri, S., Verma, P., Tikku, A. P., Bains,R., & Kohli, N. (2022). Effect of amniotic membrane and platelet-rich fibrin membrane on bone healing post endodontic surgery: An ultrasonographic, randomized controlled study. Journal of Tissue Engineering and Regenerative Medicine, 1-15.
17. Lekovic V, Milinkovic I, Aleksic Z, Jankovic S, Stankovic P, Kenney EB, Camargo PM. Platelet-rich fibrin and bovine porous bone mineral vs. platelet-rich fibrin in the treatment of intrabony periodontal defects. J Periodontal Res. 2012 Aug;47(4):409-17. doi: 10.1111/j.1600-0765.2011.01446.x. Epub 2011 Nov 29. PMID: 22126591.
18. Shah, Rucha; Sowmya, N. K.; Mehta, D. S.. Amnion membrane for coverage of gingival recession: A novel application. Contemporary Clinical Dentistry 5(3):p 293-295, Jul–Sep 2014. | DOI: 10.4103/0976-237X.137900.