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RESEARCH ARTICLE

ENDOGENOUS REGENERATIVE TECHNOLOGY – AN ENDO-PERIO SAVIOUR?

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ABSTRACT

The fact that the periodontium is anatomically interrelated with the dental pulp by virtue of apical foramina and lateral canals creates pathways for exchange of noxious agents between the two tissue compartments when either or both of the tissues are diseased. Proper diagnosis of the various disorders affecting the periodontium and the pulp is important to exclude unnecessary and even detrimental treatment. This is a clinical case report of an enododontic-periodontic lesion in relation to upper left central incisor. Root canal treatment had been done with the respected tooth, but the lesion showed no sign of healing resulting in draining sinus and increasing pocket depth. Radiographic examination revealed extension of inflammation into periodontal space. Periodontal flap surgery was performed and a 10mm defect was found and filled with bone graft mixed with platelet rich fibrin (prf). Patient was reviewed for six months which showed uneventful healing, no recurrence of the lesion and significant bonefill in the region.

INTRODUCTION

Pulpal and periodontal problems are responsible for more than 50% of tooth mortality today. The relationship between periodontal and pulpal disease was first described by Simring and Goldberg in 1964. Etiology behind both the pulpal and periodontal lesions is usually bacterial infection, but still a controversy exists over the direction of spread of the disease. A lesion involving both periodontal and pulpal tissues can be of primary endodontic, primary periodontal or stem from separate origins (meaning that both the endodontic lesion and the marginal periodontal lesion have developed independently). Tracing the accurate origin and progression of disease often cannot be made. (Jan Lindhe *et al.,* 2005) Reconstitution of the lost periodontal structures and defects due to endo perio lesion lesions is necessary for maintaining continued function. A wide array of graft materials have been applied and evaluated clinically, including autogenous bone grafts, allografts and alloplasts have been utilised, of which, osseous grafting and Guided tissue regeneration are most documented. (Sangeetha and Victor 2011) There is a renewed search to enhance healing and increase the volume of regenerative bone. Thus, signalling molecules like growth factors capable of stimulating cellular events has received great attention with regard to periodontal regeneration. (Michael Toffler *et al.,* 2009) One such modality which is very much in the limelight today is Platelet Rich Fibrin (PRF), an autologous healing biomaterial, incorporating leukocytes, platelets and a wide range of key healing proteins within the dense fibrin matrix. (Huber *et al.,* 2008)

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Endogeneous Regenrative Technology (ERT) defined as stimulation of the latent self-repair mechanisms in patients by harnessing the host's innate capacity, thus aiming at accelerated regeneration; is one such method which utilizes both bone grafting methods along with the body's signaling molecules. Hence, this article shows the effectiveness of ERT as a regenerative modality for an endo perio lesion utilizing PRF along with a hydroxyapatite regenerative material.

Case report

A 36 year old male patient reported to the Department of Periodontology with the complaint of pain in upper left central and lateral incisor region since 2 months. There was no relevant medical history. On examination, the gingiva in the upper front tooth region was red, inflammed, soft and oedematous. There was generalised bleeding on probing. On probing, no pockets or mobility were found with the same region but the patient gave a history of root canal treatment of left upper central incisor one year back. The patient was advised routine blood investigations, and intraoral periapical radiographs of the associated areas were taken The radiographs of left upper central incisor revealed a periapical radiolucency but the obturation was found to be satisfactory (Fig 1) Thus it was decided to do an apical curettage which was done in the same region by the Department of Conservative Dentistry and Endodontics. The patient returned a month later with a draining sinus in the same region. (Fig 2). On sinus tracking, the gutta-percha point was found to lead to the periodontal space of the upper left central incisor. (Fig 4). On further examination, a deep periodontal pocket was found on the palatal aspect of the upper left central incisor. (Fig 3). Thus the lesion was

diagnosed to be a primary endo, secondary perio lesion. The patient was scheduled for flap surgery. The procedure was explained to the patient and the consent was obtained for the same.

Fig. 1.

Fig. 1.

Fig. 1.

Fig. 4.

After administration of local anaesthetic - lignocaine hydrochloride with 1:80000, a conventional full thickness mucoperiosteal flap was raised in the region of upper left central and lateral incisor. On reflection, a deep intrabony defect of 10mm depth was seen. The area was thoroughly degranulated and root planning was done (Fig 5). A GTR membrane (periocol - GTR) was then secured to the flap in the area of the defect (Fig 6). Following this, PRF was prepared following the protocol developed by Choukroun *et al.* (2009) Jan Lindhe *et al.* (2005) 10 ml intravenous blood was collected and transferred into a tube without anticoagulant and immediately centrifuged at 3000 rpm (400g) for 10 minutes. Fibrin clot formed was separated. A stable fibrin was obtained by squeezing plasma out of the PRF clot. The vertical defect then received PRF mixed with hydroxyapatite bone graft material (Cerabone) (Fig 7).

Fig. 5.

Fig. 6.

Fig. 7.

Interrupted sutures were placed using 4-0 silk sutures and periodontal dressing was given. The patient received postoperative instructions and was prescribed post operative antibiotics and analgesics which included amoxicillin 500mg every 6 hours for 5 days and aceclofenac 100 mg every 12 hours for 3 days. Then, 1 week postoperatively, the dressing and sutures were removed and saline irrigation was done. The

patient was periodically recalled at 1 month, 3 months and 6 months; intraoral periapical radiographs of the treated area were taken (Fig 8,9,10). On examination of the upper left central incisors, there was satisfactory healing and without any post-operative complications. There was significant reduction in probing depth. The radiographs taken at 1, 3 and 6 months interval, showed areas of significant radiographic bone fill.

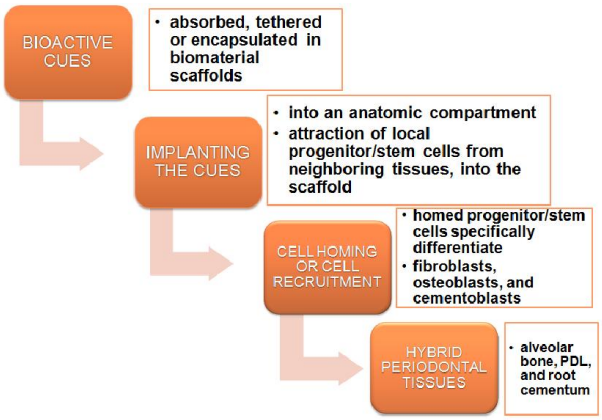
Fig. 8.

Fig. 9.

Fig. 10.

DISCUSSION

Reconstructive dental surgeons are constantly looking for quick healing process to maximize predictability as well as the volume of regenerated bone. (Huber *et al.,* 2008) ERT in Periodontics applies the patient's own regenerative 'tools', i.e. patient-derived growth factors and fibrin scaffolds, sometimes in association with commercialized products, to create a material niche in an injured site where the progenitor/stem cells from neighboring tissues can be recruited for in situ periodontal regeneration (Fa-Ming Chen *et al.,* 2010). It offers advantages like avoiding ex vivo culture of autologous cells and exploitation of patient's endogenous resources (Fa-Ming Chen *et al.,* 2010). In this case, ERT was used successfully as a treatment modality for periodontal regeneration.



Principle behind ERT in periodontics

Platelet-rich fibrin, first described and developed in France by Choukroun *et al.* (2009) is a second generation platelet concentrate widely used to accelerate soft and hard tissue healing. Literature and clinical experience seem to indicate that PRF improves early wound closure, maturation of bone grafts, and the final aesthetic result of the peri-implant and periodontal soft tissues. Its advantages include ease of preparation, application, minimal expense, and lack of biochemical modification. (Gupta and Amit Porwal 2011)

A randomised controlled clinical trial where autologous PRF was used in the treatment of 3- walled intrabony defects in chronic Periodontitis showed improved clinical and radiological parameters. (Shruthi *et al.,* 2012) In another study, PRF was used as the sole grafting material and was found to be an effective modality of regenerative treatment for periodontal intrabony defects with regard to clinical and radiologic parameters. (Yu-Cho *et al.,* 2011) Another study evaluated platelet-rich fibrin and bovine porous bone mineral in comparison to platelet-rich fibrin alone in the treatment of intrabony periodontal defects. Both were found to reduce pocket depth, improve clinical attachment levels and defect fill.[12] PRF was used in this case and the observations were in accordance with all the previous studies with respect to the treatment of intra-bony defects, the results of meta analysis support the following conclusion: bone grafts increase bone level, reduce bone loss, increase clinical attachment level, and reduce probing pocket depths when compared to open flap debridement procedures. (Reynolds *et al.,* 2003)

Cerabone is a hydroxyapatite based allograft material. It has a macro, micro and nano structured surface, which combined with its interconnected pore system, acts as a guidance for fluids, nutrients, blood vessels, proteins, growth factors, bone-

and stem cells. While the nano/macro structure provides the base for the immediate uptake of fluids and nutrients, the micro pores ensure fast capillary action, resulting into a very rapid blood uptake. The combination of interconnected macro pores with high surface roughness assures the accelerated penetration of blood vessels, cells and proteins into the cerabone particles rapidly from the inside for a highly effective bone regeneration. Hydroxyapatite ceramic bonds to bone and stimulates osteoconduction. Future studies in this area are certainly needed to better understand how these materials work histologically. (Huber *et al.,* 2008)

Clinical studies evaluating hydroxyapatite ceramic have reported improvement of clinical parmeters comparable to Autogenous Bone Graft in the Treatment of Two- and Three-wall Intrabony Periodontal Defects. (Nader Abolfazli *et al.,* 2008) Similar clinical results have also been reported after the use of hydroxyapatite ceramic allograft for Sinus Lift Augmentation and ridge augmentation. (Ziv Mazor *et al.,* ?) Significant bone fill for Implants placed into the augmented sockets 6 months post augmentation was also observed which was also seen in the follow up of our case. In the present case, both PRF and bone graft (Cerabone) was combined and tried as an ERT protocol in the treatment of an endo-perio lesion and there was a satisfactory and significant bone fill and improved clinical parameters in the tooth treated with this combination

Conclusion

The combined use of bio ceramic - platelet-rich fibrin, enables tissue augmentation, facilitates periodontal regenration and helps in establishing a functional periodontium and improving esthetics and thus The interplay and optimization of bio ceramics and PRF can be used as an effective ERT protocol

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