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Case Study

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SURGICAL MANAGEMENT OF NONHEALING PERIAPICAL LESION USING NOVEL PLATELET RICH FIBRIN AND BONE GRAFT

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ABSTRACT

The surgical management of nonhealing periapical lesions poses a significant challenge in endodontics. This report presents a case where conventional endodontic treatment failed to resolve a periapical lesion, necessitating surgical intervention. The treatment involved root canal therapy followed by periradicularsurgery and the use of platelet-rich fibrin (PRF) and bone grafting for tissue regeneration. PRF, a second-generation platelet concentrate, offers advantages in promoting wound healing and tissue regeneration. The integration of PRF and bone grafting demonstrated promising results in facilitating tissue regeneration and bone healing. This combined approach presents a viable therapeutic option for challenging periapical lesions, potentially enhancing clinical outcomes. Further research is needed to validate the long-term efficacy and broader applicability of this treatment approach.

KEYWORDS: *Periapical lesion, Endodontic surgery, Platelet rich fibrin, Bone grafts.*

INTRODUCTION

Dental trauma presents a diverse array of manifestations and characteristics, reflecting the varied patterns of injury that can affect the gingiva, dental hard tissues, pulp, periodontium, and alveolar bone.[1] A periapical lesion arises as a consequence of endodontic infection, where the interaction between microbial agents and the host's defense mechanisms at the junction ofthe necrotic root canal and periodontal tissues leads to inflammation and the breakdown of mineralized tissues.[2] Reconstituting bone defects in the periapical region presents a significant challenge for endodontists, particularly in cases involving substantial bony defects or through-and-through lesions. Surgical intervention is not typically the initial approach, but rather considered when conventional endodontic treatment fails, and its necessity is contingent uponthe size of the lesion.[3] Following the removal of periapical lesions, intra-oral bony defects exhibit a propensity for self-regeneration.[4] Nevertheless, the efficacy of this healing process can be impeded by several factors, including the lesion's size, the presence of bony walls, and the local healing environment.[5] When complete bone healing is challenged, especially in cases where defects surpass 15mm in their widest dimension, the utilization of regenerative materials such as bone grafts and barrier membranes becomes essential to facilitate optimal bone regeneration.[5,6,7] Previous research has indicated the targeted delivery of growth factors and plasma derivatives to stimulate bone regeneration and promote soft tissue healing.[5-8] Additionally, compoundsincluding bone morphogenic proteins (BMPs), platelet-derived growth factor (PDGF), Platelet-rich plasma (PRP), enamel matrix proteins (EMD), and Platelet-rich fibrin (PRF) have been employed to augment the healing and regeneration of bony defects.[8,9]

Platelet-rich fibrin (PRF) stands as a second-generation platelet concentrate, pioneered by Choukroun et al. in France in 2001.[9] It comprises fibrin membranes densely packed with platelets, growth factors, and a fibrin network intertwined with platelets, leukocytes, cytokines, and stem cells.[9] PRF exhibits substantial potential for gradually releasing platelet-derived growth factor (PDGF) over a period of at least one week and up to approximately four weeks.[9] Its appeal lies in its accessibility, cost-effectiveness, and compatibility with other regenerativematerials like bone grafts.[10] PRF finds application across diverse surgical and clinical domains, including plastic surgery, dermatology, periodontology, and regenerative endodontics, owing to its remarkable capacity for promoting wound healing.[11]

In Present case report surgical management of nonhealing

periapical lesion with bone graft and PRF is described.

CASE REPORT

A 23-year-old female patient reported to the department of conservative dentistry and Endodontics with the chief complaint of discoloured tooth in the upper anterior region of jaw. The patient was asymptomatic. The patient reported a history of trauma in upper anterior teethwhich had occurred more than 10 years back.

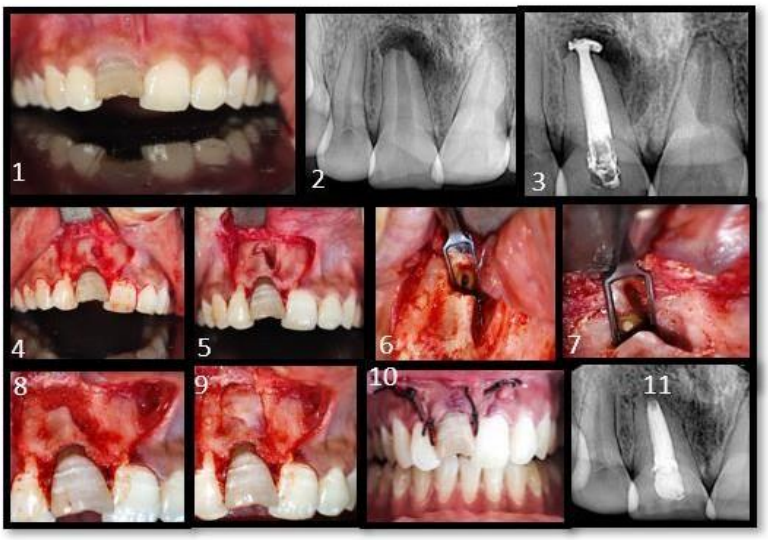
Clinical examination revealed discoloration with 11. No swelling was seen in the region. Sensitivity to percussion was absent with 11. No mobility was observed with this tooth. Pulp sensitivity tests revealed that 11 was nonvital. Periodontal pockets were absent and noabnormality was detected in the periodontium. Preoperative intraoral periapical radiograph of 11 was taken. It revealed the presence of well-circumscribed periapical radiolucency (3 cm × 2 cm in size) involving 11 and open apex with.11 Treatment plan was to for conventional nonsurgical root canal treatment followed by MTA apexification and full coverage crown.

There was a slight alteration noted in the periapical radiolucency; however, the fundamental nature of the lesion remained unchanged. Patient was recalled after 21 days. After 21 days follow up rvg was taken. There was no change in periapical radiolucency after 21days. Irrigation activation was done with endovac and Metapex was replaced again. Patient was recalled after 1 month for follow up. After 1 month again follow up RVG was taken. There was a subtle alteration noted in the periapical radiolucency; however, the fundamental nature of the lesion remained unchanged. Patient was explained about that if leasion remain unchanged evenafter third round of intracanal medicament then surgically it would be treated, after one monthfollow up again RVG was taken but no change was seen hence treatment was drift from nonsurgical endodontic treatment to surgical treatment.

The treatment plan was changed to completing root canal therapy of teeth 11 followed by periradicular surgery for with subsequent regeneration of the residual bony defect using plateletrich fibrin. Following the standard protocol for root canal treatment, endodontic treatment was done prior the periradicular surgery. Surgery was done 2 days after completion of root canal treatment. The patient was prepared for surgery by routine cleaning and draping and anaesthesia was achieved with infiltration of 2% Lidocaine hydrochloride (Alphacaine 100 DFL). A 3-sided mucoperiosteal full thickness flap was raised, exposing a large bony windowand the cystic pathology at the apex of the tooth. The perforated bone was widened using a round bur on slow straight drill under saline to gain full access to the pathology. Root was resected at 0-degree bevel. The root preparation was done to 3mm deep, gutta percha root canalfilling was condensed and the root end was restored with biodentin(septodent). PRF was prepared using the Choukroun's technique. Bony defect was filled with bone graft (perioglass) and The PRF clot was then packed into the defect to completely fill the bony crypt. The flap was repositioned and sutured in place with 3-0 vicryl. Postoperative radiograph was taken and instructions given. The patient was reviewed post-surgery for pain, (measured using Visual Analogue Scale (VAS)) and swelling after 24 hours and one-week post-surgery during whichsutures were removed.

DISCUSSION

The primary objective of periapical surgery is to achieve reliable regeneration of periapical tissues, encompassing the comprehensive restoration of osseous defects. Insufficient bone healing occurs when connective tissue infiltrates the bone space, impeding osteogenesis. To counteract this, bone grafts are employed to occupy the bony space, particularly in instances of sizable bony defects. This early osseous healing facilitates subsequent orthodontic and prosthodontic interventions with supporting evidence.[12] Various methodologies yield these effects, encompassing the utilization of bone substitutes, barrier membranes, growth factors, or a blend of these agents and materials. Apical surgery may confront several compromised clinical scenarios, comprising large apical (cystic) lesions, through and through ("tunnel") lesions, and apicomarginal lesions.[13,14,15] In substantial periapical lesions, the healing of periapical wounds necessitates the enlistment and specialization of progenitor cells/stem cells into osteoblasts, cementoblasts, and periodontal ligament cells. Andreason and Rud posited that when the osseous defect surpasses a certain size threshold, osseous regeneration within the wound may be impeded, leading to the healing of the defect through fibrous connective tissue repair.[16] Various approaches to bone regeneration have been contemplated for addressing bony defects resulting from periapical pathology. These methods comprise the utilization of bone grafts, autografts, allografts, as well as other regenerative materials and scaffolds such as Platelet Rich Plasma.[10,16,17] Platelet-rich fibrin (PRF) constitutes an autologous fibrin matrix, harboring a substantial quantity of platelets and cytokines that are inherently embedded within it. Over a span of 7 to 11 days, these components undergo progressive release as the fibrin network gradually disintegrates.[9] In the current case report, Biodentine was employed as the retrograde filling material. Its primary clinical advantage lies in its rapid setting time, typicallybetween 12 and 15 minutes. This expeditious setting process contrasts with the considerably longer setting time of MTA, which can take up to 170 minutes. A shorter setting time reducesthe risk of partial material loss and alterations to the interface during subsequent procedural steps such as cleaning and rinsing the crypt.[18]



1.Preoperative clinical photograph 2. Radiograph 3. 3 months after metapex placement no regression in lesion is seen on radiographs 4. mucoperiosteal flap raised 5. osseous defect 6. retrograde preparation 7. retrograde filling with biodentine 8. bonegraft placed 9.PRF placed 10. sutures taken 11. postoperative radiograph

CONCLUSION

The utilization of a combined approach involving platelet-rich fibrin (PRF) and bone grafting demonstrates promising results in the management of nonhealing periapical lesions. This case highlights the effectiveness of PRF in facilitating tissue regeneration and bone healing, complemented by the use of biodentine for retrograde filling.

The integration of PRF and bone grafting presents a viable therapeutic option for addressing challenging periapical lesions, offering potential for enhanced clinical outcomes. Further research is warranted to validate the long-term efficacy and applicability of this treatment approach in broader clinical settings.

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