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Surgical management of periapical lesion with prf and bio dentine - A case report

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Abstract

This case report is about management of a persistent periapical lesion, even after bio-mechanical preparation of root canal in upper right central incisor. Apicectomy was planned to eliminate the periapical infection and simultaneous placement of bio dentine and PRF after which obturation was done after 2 weeks and patient was kept under observation. Following 1-year, satisfactory results were obtained.

Keywords: apicectomy, periapical infection, enucleation, biopsy, retrograde filling, PRF, xenograft, bio dentine

Introduction

Apical surgery is often a last resort to maintain an endodontically treated tooth with a persistent periapical lesion.[1] Apicectomy or root-end resection is the removal of the root tip and the periapical infected tissue of an tooth with periapical infection.

It's the best option to undertake when orthograde treatment is not viable. Apical surgery helps to maintain the integrity, function and esthetics of the relevant teeth and their roots when conservative treatment approach becomes futile.[2,3]

The primary goal of surgical approach is to debride all the necrotic tissues from the root canal and to seal the root end, bringing down the retrograde spread of infection in the peri radicular tissues, thereby providing an environment which will enhance normal periodontal apparatus regeneration.

A bacteria tight closure without any microleakage at the apical end is achieved with aid of a retrograde filling material. Moreover proper periapical debridement will favour removal of extra radicular infection, foreign material or cystic tissue.[4]

The properties of the ideal root end filling material are as follows: bio compatibility, promotion of tissue regene ration without causing inflammation, ease of handling, low solubility in tissue fluids, bonding to dental tissue, non-absorbability, dimensional stability, radiopacity and no staining of surrounding tissue. [13]

Regeneration is the restoration of the lost hard and soft tissues to rejuvenate its structure and function. This newly evolved abstraction combines various aspects of medicine, molecular biology, tissue engineering and biomaterials which are all aimed to repair, regenerate, or replace lost tissues.[5,6]

Platelets being a rich source of growth factors play a very important role in both hemostasis and wound healing. As these growth factors are mainly seen in blood plasma and platelets, platelet aggregates have been immensely used in dental and medical fields to hasten tissue repair and regeneration.

A new concept of fabricating growth factors-enriched bone graft matrix using autologous fibrin glue has been demonstrated since 2010.[7]

it provides stabilization of bone graft in the defect, and therefore, accelerates tissue healing and minimizes bone loss during healing period.

The treatment success depends on accurate diagnosis, the correct technique, the follow up and patient's post operative main tenance. The treatment outcome of apical surgery depends on periodic recall visits and radio graphic evaluation. In this case report we will be discussing about apicectomy.

Case report

A 19-year-old male patient was referred to department of endodontics for pain in the upper right front tooth region. In the review of his medical history, the patient did not mention any kind of health problem and reported no history of allergies nor use of any medication.

On the examination it was noted a discolouration with Ellie's class 1 fracture on the tooth 11(fig 1) and tender ness on palpation irt 11 and 12.

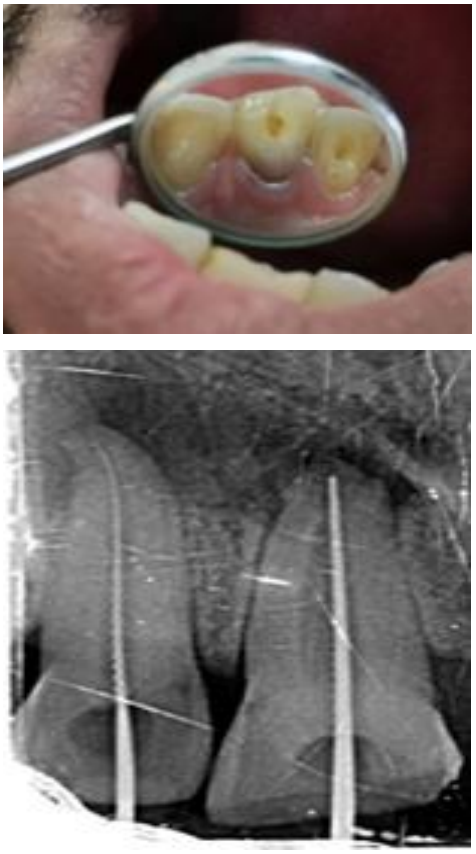


Figure 1:

On elicitation of the patient's history, he had a sports trauma 10 years back. Radio graphic examination revealed a periapical radiolucency of diameter 1-1.5cm involving the apices of both 11 and 12. Vitality test gave a negative response irt both 11 and 12. Patient was informed about the treatment plan and informed consent were taken.

On the same visit Access cavity was prepared irt 11 and 12 using high speed round bur and endo access bur. Pus drainage from the canal was noted irt 11. working length was determined using 15k file in relation to 12 and 40k file in relation to 11 (fig 2). cleaning and shaping with copious irrigation was done. Closed temporary dressing and anti-biotics where prescribed on the first visit.

Figure 2:

Figure 3:

Patient came on the next day with complain of severe pain irt 11, temporary restoration was removed and pus drainage was visualized again from the canal irt 11. Canals were irrigated with CHX and saline, kept on open dressing and patient was asked to continue with the medications. On the 3rd visit the canal was still weeping with a gingival abscess noted irt 11

The patient was referred to department of periodontics for opinion regarding periapical surgery in relation to 11. The gingival abscess was treated by draining it. Using no 15-size blade a small incision was given on the most prominent site of the abscess and drained using digital pressure.

Then using curettes the site was completely debrided and irrigated using betadine saline.

Patient was adviced for an occlusal radio graph to analyse the palatal extensions of the periapical radio lucency. There was a ill-defined periapical rarefaction noted at the apical end of 11 and extending to the lateral ends of 12 interdentally (fig 4)

Figure 4:

A decision to undergo surgical management of the lesion was taken irt 11 and 12, patient was explained and taken consent for the same. Prior to surgery, haematological investigations were carried out and patient was prescribed with Antibiotics a day before surgery.

Tooth number 12 was obturated and Tooth number 11 temporary gutta percha was kept in the canal short of the apex by 3mm as the canal was still weeping ,1 hr prior to the surgery (fig 5)

Figure 5:

Surgical Intervention

After mouth preparation with povidine iodine rinse and swab, local anesthesia (2% lidocaine with 1: 100,000 epinephrine) was administered.

Flap design

according to von Arx and Salviet.al , a split thick ness semilunar incision using no 15 size blade was given away from the frenum and extending into the vestibule in the region of 11-12.

Following releasing incisions were given and a semilunar shaped flap was reflected. This surgical app roach prevents over exposure of bone.

Visualization and osteotomy

once the flap was reflected, a breach in the buccal bone was visualized. Using a round carbide bur under constant irrigation for cooling was used to enlarge bony defect to the buccal widow to gain access to the periapical lesion and root end of the tooth with defect. Using cumins scaler, haemostat forceps and Castroviejo scissors the periapical cystic lesion measuring 9mm × 6 mm was removed along with its lining and was sent for histopathological investigation.

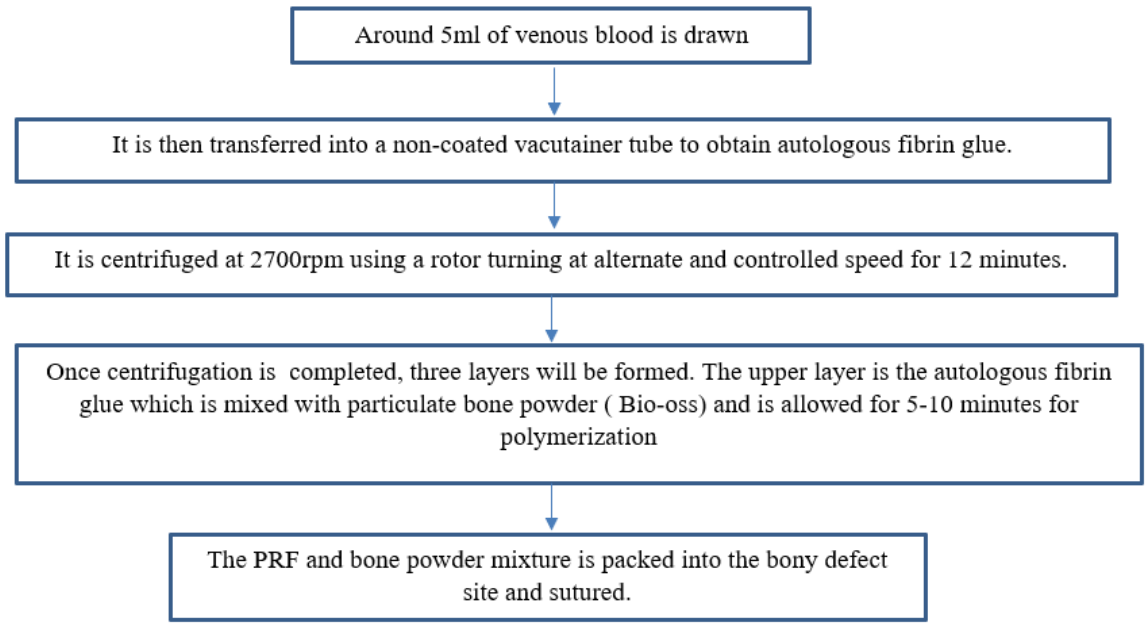
Root Resection

A straight fissure carbide bur was bevelled perpendicular to the long axis of each root (11.12) and used to cut the 3 mm of the apex.

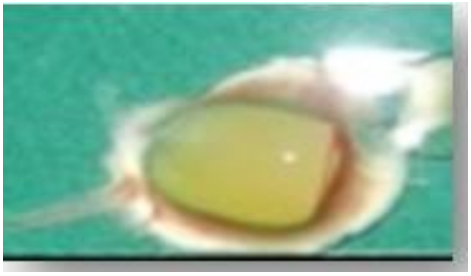
The retrograde cavity was prepared and was then filled with retrograde filling material. The material of choice for retrograde filling was bio dentine. It was placed into the prepared apex with messing gun and hand plugger to assure dense filling and minimal voids.PRF mixed with xenograft was packed into the bony defect to induce bone formation once the retrograde filling material dried.

Preparation of PRF

Around 5ml of venous blood is drawn, it is then transferred into a non-coated vacutainer tube to obtain auto logo us fibrin glue. It is centrifuged at 2700rpm using a rotor turning at alternate and controlled speed for 12 minutes. Once centrifugation is completed, three layers will be formed. The upper layer is the autologous fibrin glue which is mixed with particulate bone powder (Bio-oss) and is allowed to set for 5-10 minutes to form PRF block.



Flow Chart 1: Preparation of sticky bone[10.]



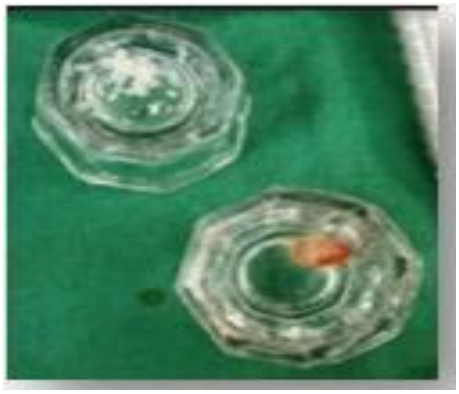


Figure 6: PRF mixed with bone powder (xenograft)

The surgical site was irrigated with saline for complete debridement of hemostatic agent, retrograde filling material, and debris, which may hinder the process of healing. Following single interrupted vicryl sutures were given. (Fig 8)

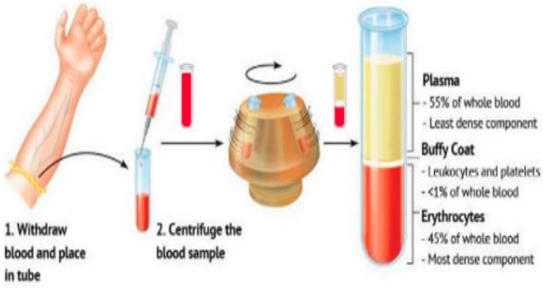


Figure 7:

Figure 8: surgical procedure and placement of bio dentine on the resected root

Post surgical considerations

Patient was advised to continue with the analgesics and antibiotics for five days. He was recalled after five days to see for the surgical site maintenance and to check on the patient's wellbeing. After 14 days the suture was removed and the surgical area had healed with no signs of scarring, following there was no signs of pain or discomfort and obturation was completed in relation to 11using lateral condensation. (Figure 8)

Figure 9:

Figure 10:

Patient was examined clinically and radiographically at intervals immediately after periapical surgery, 1 month later, 3 months later and 1 year (fig 9)

Discussion

Endodontic surgery entails the excision of damaged periapical tissue in order to create the perfect conditions for tissue health, regeneration, and the formation of new tooth structural support.[14]

A leaky apical seal that allows the egress of bacteria and their by-products is the main cause of periapical lesions. Only the effect of the leaking is removed by peri radicular curettage of the damaged periapical tissue. Therefore, if the root end is not resected, it is possible that the peri radicular lesion will return after being removed. A 3- mm root-end amputation eliminates all lateral canals and apical ramifications, reducing the likelihood of reinfection and failure [14]

An ideal retrograde material should be non-absorbable, non-corrosive, non-cytotoxic, not affected by moisture, dimension ally stable, bio compatible, anti-bacterial, radiopaque, cost-effective, easily manipulated, adhesive to dentinal walls, create a tight seal, and induce cenogenesis [15]

In this case, bio dentine was chosen as a retrograde filling material because of its ideal properties like easy handling, moisture deprived nature, bio compactivity, superior sealing ability.

Bio dentine™ is similar to MTA in its basic composition. it contains tricalcium silicate, calcium carbonate, and dicalcium silicate, the principal components of MTA. The liquid consists of calcium chloride in aqueous solution with mixture of poly car boxy late calcium chloride was added to improve the setting time, strength and handling properties. [13]

Bone graft enriched with growth factors using auto logo us fibrin glue has been revealed since 2010.It stabilizes the bone graft in the defect present, minimizing bone loss during the healing phase. The autologous fibrin glue (Platelet rich fibrin, PRF) has emerged as an excellent natural scaffold because of its biodegradable and bio compatible properties and the initial stability it provides to the graft materials.[11,12] It enhances cell migration into the site of repair and releases growth factors for a long period, contributing to healing and tissue recovery. Study conducted by del Fabbro et al., Who suggested that use of platelet concentrates is related to lower levels of pain, swelling, and other symptoms.

Bio-Oss—a deproteinized bovine bone, a xenograft has been used in dentistry for bone augmentation procedures due to its good osteo conductive and osteo inductive properties.[8,9] It has high success rate, is biocompatible and is able to induce a physiological bone remodelling, with disposition and significant bone gain. The com bined effect of PRF and Bio-oss, results in better healing and bone regeneration.

A study done by M. DOMINIAK et al, Bone density after the use of xenogenic material containing platelet rich plasma was closest to that of natural bone when compared with resorbable collagen membrane and only xenogenic bovine material [17]

The patient was re-evaluated on 5thday, 7th day, 14th day ,1 month, 2 months and after 1 year. Following 14 days, there were absence of symptoms such as pain, swelling, and the normal function of the tooth was preserved. The patient was completely satisfied with the treatment. From a practical point of view as mentioned by (Zuolo et al., 2000), Only the combination of clinical and radio graphic healing criteria is accepted today to determine the outcome of apical surgery. Hence patient has to be kept under observation for 2 years to see for the radio graphical changes.

Conclusion

This case report shows that apicectomy procedure can be used as a predictable treatment option to save the tooth which has been affected by periapical lesions and couldn't be saved using conventional endodontic thera py. Moreover, adjunct use of PRF as an autologous graft material can enhance faster healing. Hence apicectomy can be considered as a standard procedure for preserving the anatomic -functional importance of the tooth.

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