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CASE REPORT

Surgical Management of Immature Permanent Tooth using Bioceramics

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ABSTRACT

Periapical surgery involves the surgical management of a tooth with periapical lesion that cannot be resolved by conventional endodontic treatment. Its objective is to promote tissue regeneration by removal of the periapical pathologic tissue and by exclusion of any irritants within the physical confines of the affected root. In this article, bioceramics has been successfully used in the management of nonvital immature teeth. This article presents a clinical case report where an apicoectomy was successfully performed after conventional endodontic treatment and retrograde filling was done using bioceramics, followed by bone graft at the denuded buccal root surface of #11 in a 19-year-old male patient in order to promote healing and regeneration of periodontal tissues.

Keywords: Apicoectomy, Bioceramics, Root canal treatment.

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INTRODUCTION

Traumatic injuries to the anterior teeth are one of the most common unanticipated events that cause pain, disfigurement, and esthetic problems. Periapical pathology could be the fate of untreated or unsatisfactorily treated traumatically injured teeth. Surgical endodontics is a reliable method for the treatment of teeth with periapical lesions that do not respond to conventional root canal treatment. The goal of a periapical surgery is to gain access to the affected area, evaluate the root circumference and root canal anatomy, and place a biocompatible seal in the form of root end filling that stimulates the regeneration of periapical hard and soft tissues. The prognosis depends on several factors such as different surgical procedures and materials, clinical and radiographic evaluation, systemic conditions, local factors, such as involved teeth and their anatomy, previous treatment and its quality. Various studies have shown that bioceramics is an excellent material for use in apexification, as a root end filling material for immature permanent teeth, as a pulp capping and pulpotomy agent, and for repair of perforations. Besides these uses, bioceramics has also emerged as a reliable bioactive material with extended applications in endodontics that include the obturation of the root canal space. In the light of the stated facts, we present a case report demonstrating a successful surgical management of a large periapical lesion in a tooth (#11) with open apex in a 19-year-old male patient followed by bone graft placement at the denuded buccal root surface intended for periodontal healing and regeneration, subsequent full-coverage restoration by porcelain fused to metal (PFM) crown for esthetic rehabilitation.

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CASE REPORT

A 19-year-old male patient reported to the Department of Conservative Dentistry and Endodontics, DJ Dental College, Ghaziabad, with the chief complaint of fractured tooth in the front region of the upper jaw since 1 month. The patient gave a history of trauma to the upper front teeth 6 to 7 years ago. The medical history was noncontributory. Clinical examination revealed fractured #11. Radiographic examination revealed incomplete root formation with wide open apex (approximately 3 mm) and blunderbuss canal along with periapical radiolucency with respect to #11 (Figs 1 and 2).

A provisional diagnosis of Ellis class IV fracture with inadequately filled canals was made in relation to #11. The treatment plan included gross debridement and disinfection of root canal, followed by apicoectomy and subsequent sealing of the root end with mineral trioxide aggregate and placement of bone graft to treat the bone defect. In the first appointment, access opening was done in relation to #11 and the canal was cleaned with minimal instrumentation to avoid further weakening of the root. Copious irrigation was performed. After thorough cleaning and drying, the root canal was sealed

Fig. 1: Preoperative photograph

with an intracanal medicament of calcium hydroxide and iodoform (Metapex) for disinfection. The patient was recalled after 7 days for reevaluation and complete blood investigation. In the next appointment, root canal was performed and after a period of 1 week, apicoectomy was performed in relation to #11.

After administration of local anesthesia, a full-thickness mucoperiosteal flap was raised, extending from distal aspect of #11 to distal aspect of #21 using Bard Parker (B.P) blade size #15 and periosteal elevator (SS White, Lakewood New Jersey) (Fig. 3).

A window was created at the defect area by localization of the root end using radiograph. Apical curettage was performed for the removal of granulation tissue. Resection of the root was carried out as close to 90° to the long axis of the tooth as possible to reduce the number of exposed dentinal tubules and to ensure access to all the apical anatomy. About 3 mm of root end was resected with a rotating bur (using saline or water coolant), thus eliminating the majority of anatomical and/or iatrogenic anomalies in the apical third. The length of root resection must be individually determined to provide an adequate depth for the root-end filling. Surgical site was irrigated using normal saline. The surface of the root was smooth and there were no cracks in the root, the small round bur or an inverted cone bur in an angled micro-handpiece was used for preparing the retrocavity, and the least amount of gutta-percha disturbance were produced. This retrocavity had a depth of 3 mm and followed the original path of the root canal. Then the bioceramic material (Angelus, Londrina. PR Brazil) was compacted into the cavity to ensure a dense fill. There was no excess material on the resected root face. The bone graft (Nova Bone) (Fig. 3) was then placed over the bony defect in order to fill the defect and promote healing. The flap was then repositioned and approximated with moderated digital pressure and moist gauze and then sutured. Postoperatively, antibiotics and analgesics were prescribed to the patient along with 0.12% chlorhexidene mouth rinse for maintenance of oral hygiene. The patient was recalled after 7 days for removal of sutures and treatment evaluation. Radiographic evaluation on the recall visit revealed continued healing of the periapical lesion with successful closure of the bony defect. Patient was then recalled after 10 days and prosthetic rehabilitation was done with porcelain fused to metal (PFM) crown (Figs 4A to C). On 1-year follow-up, radiographic examination revealed periradicular bone formation (Figs 4A to C).

Fig. 2: Preoperative radiograph

DISCUSSION

Apicoectomy is a surgical procedure that involves the excision of pathological periapical tissue from the root surface (including apical accessory canals) and sealing the canals against pathological agents, thereby aiding in tissue regeneration and creation of new structural support to the tooth. It is the principal modality available to manage large nonhealing periapical lesions that cannot be treated with conventional root canal treatment alone. Harty et al (1970) found that the success rate of 1,016 cases of apicoectomy was 90%.[1] Oginni and Olusile concluded

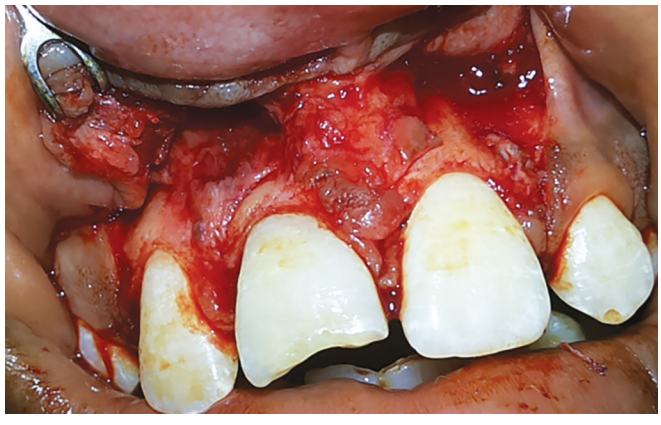
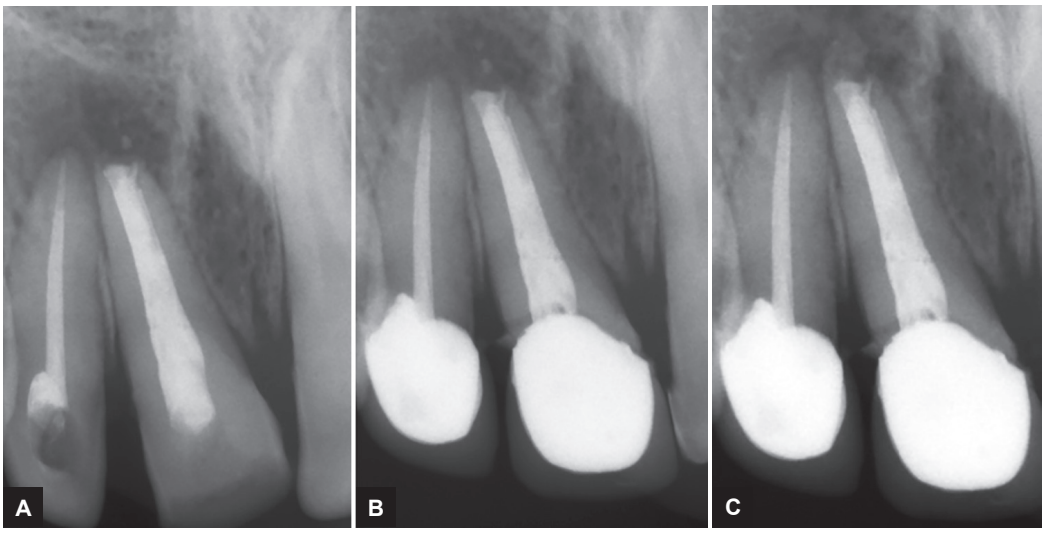


Fig. 3: Flap raised



Figs 4A to C: Follow-up after 7 days, 3 months, and 1 year

that the success rate of apicoectomy of anterior teeth was 71.9%. Peterson and Gutmann reported a success rate of 64%. The reason for this great variation may be the lack of agreement on a definition of success and failure of surgery, the difference in the expertise of those who perform the operations, and the decision to operate or not to operate on teeth with unfavorable prognosis. Various cements have been used as root-end filling materials. The choice of material to be used is governed by handling properties, biocompatibility, apical seal, and long-term clinical success. Bioceramics has been investigated and used as a root-end filling material since its introduction. It appears to be superior to other root-end filling materials with respect to biocompatibility, biochemically mediated strong bonding osteogenesis, microbial leakage, marginal adaptation, solubility, and compressive strength. However, the disadvantages of this material are its high cost and difficult handling. Therefore, care must be exercised not to wash off the material after placement. A challenging problem in periapical surgery remains the loss of buccal bone with partial or complete root exposure (apicomarginal lesions). It has been shown that healing outcome in periapical surgery is related to the condition of buccal bone plate 16, 17. Epithelial down growth along the denuded buccal root surface is a major negative factor preventing successful healing in such cases. Hence, regenerative techniques, such as placement of bone grafts can be used as an adjunct to the endodontic surgeries. Application of regenerative techniques in teeth with apicomarginal lesions might further expand the field of periradicular surgery. In this case, we performed apicoectomy in maxillary right central incisor followed by bioceramics filling. Postoperatively, the tooth remained asymptomatic. Prosthetic rehabilitation and esthetic correction are important to maintain the longevity of treated tooth in oral cavity and also to boost the self-confidence of the patient by restoring the tooth in form as well as in function. To this effect, prosthetic rehabilitation of the tooth was performed using PFM crown.

CONCLUSION

This case report shows that routine endodontic therapy followed by surgical intervention with the placement of biocompatible root-end filling material, such as bioceramics for management of chronic large periapical lesions. Moreover, the application of bioceramics as an obturating material introduces the practitioners to an alternative treatment strategy that might improve the healing outcomes in patients with complex endodontic conditions.

REFERENCE

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