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The Last Resort: Endodontic and Surgical Management of Traumatized and Root Canal Failed Teeth

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Abstract

Apicoectomy is considered as an anticipated treatment option to salvage a tooth with periapical pathology unresolved by conservative root canal treatment protocol. This paper presents case series of 10 cases with complicated periapical pathologies treated with apicoectomy and root end treatment with Iodoform.

This case series presents the management of periapical lesions through root canal treatment/re-treatment, followed by enucleation of the bony lesion. These surgeries were performed on failed root canal cases and traumatic injury cases where non-surgical management was unsuccessful. Seven instances involved the use of iodoform, whilst two cases did not. In one case, a combination of iodoform and MTA was used for apexification. Follow-up examinations were conducted for 9 patients, revealing satisfactory bone healing and no clinical symptoms, indicating a positive prognosis for the teeth after periapical surgery.

Keywords: Apicoectomy, Endodontology, Iodoform, Oral Tissue, Root Canal System

Introduction

Traumatic injuries to oral tissues is one of the communal forms of injuries associated with pain, physical and psychological influences.[1] Dental traumatic injuries

occur in school-going children commonly afflicting anterior region of mouth.[2] Tooth injury is concomitant with the interruption of pulpal blood circulation leading to non-vitality of the pulp which in future may develop into endodontic infection.[3]

The aim of conventional root canal therapy is to eradicate bacteria from the root canal system. We are dealing with the continuous development of instrument systems for the preparation of root canal space, reviews of the composition and sequence of use of irrigating solutions, and evolving research on the materials for filling the tooth's root canal system.

Unfortunately, Endodontic therapy may have unfavourable outcomes for reasons not necessarily dependent on the operator. The presence of anatomical anomalies, an isthmus, additional canals, or obliteration of the canal system may obstruct proper root canal treatment. [4]

Indications for apical surgery have been updated in the past by the ESE (European Society of Endodontology, 2006) and it includes the following:

1. Radiological findings of apical periodontitis and/or symptoms associated with an obstructed canal (the obstruction proved not to be removable, displacement did not seem feasible or the risk of damage was high).
2. Extruded material with clinical or radiological findings of apical periodontitis and/or symptoms continuing over a prolonged period.
3. Persisting or emerging disease following root-canal treatment when root canal re-treatment is inappropriate.
4. Perforation of the root or the floor of the pulp chamber and where it is impossible to treat from within the pulp cavity

Our case series presents the successful treatment of trauma-induced periapical and failed root canal induced periapical lesions of teeth by apicoectomy with three different retrograde fillings.

Case Descriptions

Case 1

A 31-year-old patient presented with the chief complaint of mild pain in right upper front tooth region for past 1 month. The patient gave history of bump into the door 10 years prior. Clinical examination revealed discoloration of the maxillary right lateral incisor. Radiographic examination revealed periapical radiolucency with a diameter of 8 x 8 mm in relation to 11,12. After radiographic and clinical assessment, a provisional diagnosis of periapical abscess was made.

On the scheduled day of surgery, tooth no. 12 was first endodontically treated and over obturated with gutta percha. The overextended gutta-percha served as an identification marker for root end resection procedure. Local anesthesia was achieved by administering 2% lignocaine with adrenaline as infraorbital nerve block and incisive too. A crevicular incision followed by two releasing incisions were made to raise a full thickness mucoperiosteal flap, revealing a bony defect containing pus and granulation tissue. The bony window was extended, and complete debridement of the affected area was accomplished using curettes and electrocautery. Irrigation was performed with a mixture of povidone-iodine solution and 6% hydrogen peroxide solution.

Iodoform paste was placed in the defective bone area to promote healing. Closure was achieved using 3-0 vicryl sutures, and restoration of the tooth was completed subsequently. The patient was recalled for suture removal after 10 days. After an additional 3-month follow-up, radiographic examination showed evidence of bone formation, and the patient remained asymptomatic clinically.

Case 2

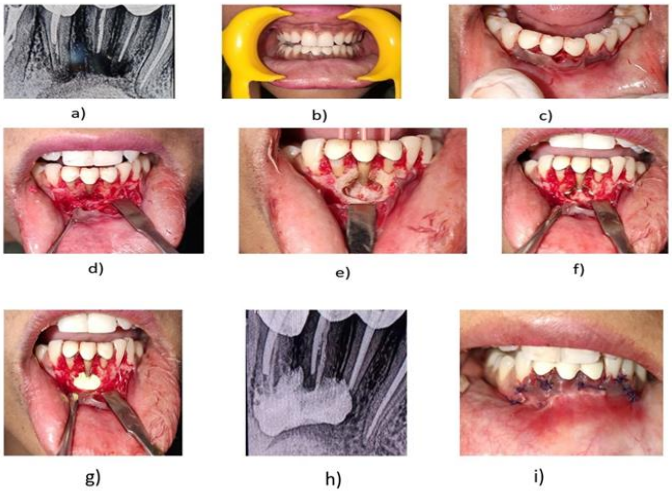
A 26-year-old female patient presented to outpatient department with persistent pain in her right lower central and lateral incisors. Patient gave history of root canal treatment 4 months back at some hospital in the same region.

Preoperative intraoral periapical radiographs (IOPA) were taken, and a plan was formulated for retreatment of the tooth, followed by removal of the periapical lesion.

Under aseptic conditions, the teeth were accessed through the crowns, and the existing gutta-percha was removed. A crevicular incision was made, followed by relieving incisions, and a full-thickness mucoperiosteal flap was raised, revealing bony defect. Granulation tissue was removed, and the area was irrigated with a solution of povidone-iodine and 6% hydrogen peroxide.

The root canal was re-obturated and apexification was performed using mineral trioxide aggregate (MTA). The bony defect was filled with a mixture of calcium hydroxide and iodoform paste. The flap was closed using 3-0 vicryl sutures, and the teeth were restored.

Tablet Zerodol P (BID×3 days) was prescribed as an analgesic. Antibiotics were not recommended since the infection rate following endodontic surgery is lower. Oral hygiene procedures were instructed such as careful brushing and flossing (to begin after 24 hours). Proper nutrition and fluids were advised along with chlorhexidine rinse twice a day. A subsequent 3-month follow-up confirmed complete resolution of symptoms, indicating a successful outcome of the treatment. The patient's pain and discomfort were alleviated, and the periapical lesion was effectively managed.



Case 3

A 12-year-old male patient presented to the dental clinic with a chief complaint of pain and swelling in the upper front region of mouth. The patient reported history of a road traffic accident, 2 years back resulting in Ellis Class 2 fractures in both maxillary central incisors. Pulp vitality testing with Endo Frost revealed negative response for both maxillary central incisors and the right lateral incisor. Consequently, root canal treatment (RCT) followed by curettage of the lesion was planned.

Under aseptic conditions and local anesthesia, access opening and chemomechanical preparation was performed. A full mucoperiosteal flap was reflected, revealing a bone defect, which was subsequently curetted and treated with electrocautery. Complete obturation of the tooth was achieved with gutta-percha. The bony cavity was filled with an iodoform and saline mixture. Closure was achieved using 3-0 vicryl sutures. At 10-day follow-up appointment, the patient reported no pain or symptoms. After a 3-month follow-up, radiographic examination revealed evidence of bone formation, and the patient remained asymptomatic clinically.

Case 4

A 45-year-old female patient presented to the department with a chief complaint of persistent pain in her lower left anterior tooth. Despite multiple attempts at root canal treatment, she did not experience any relief. Intraoral periapical radiographs (IOPA) were taken, revealing a large radiopacity at the periapical area of the left mandibular canine, suggestive of a root end material.

Based on the clinical findings, a treatment plan was formulated, which included re-root canal treatment and enucleation of the periapical lesion. The treatment procedure commenced with access opening and biomechanical preparation of the tooth under aseptic conditions. A flap was then reflected, and complete curettage of the lesion was performed along with cauterization. Following this, the canal was obturated, ensuring an apical seal.

After obturation, the flap was sutured back with Vicryl 3-0 sutures, and the tooth was restored. The patient was recalled for follow-up appointments at 10 days, 1 month, and 3 months to monitor the healing progress and address any concerns.

The treatment outcome was evaluated during the follow-up appointments to determine the success of the re-root canal treatment and enucleation of the periapical lesion.

Discussion

According to Fehlberg and Bittencourt[12], the aim of the apicoectomy is to eliminate bacteria and areas of imperfection in the Parendodontic surgery: A) Curettage, B) Gutta-percha removal and root canal preparation; C) Apical preparation with ultrasonic device; D) Apical gutta-percha cone adaptation. Thus, apicoectomy provides airtight seal and facilitates access to the root canal. It is recommended to remove three or more millimeters of depth from the root apex to obtain a safe and effective closure of the region and to have enough space for adequate curettage of the root surface and bone cavity[12].

The option for the trapezoid incision on the papilla (Neuman & Novak) is justified because of the large lesion and a triangular incision could make difficult to access and remove the lesion.

According to Bramante and Berbert, a trapezoid incision on the papilla has the following advantages: excellent access to surgical field, visualization of all root length, and it is very difficult that this incision type is over the surgical cavity.[13]

Numerous materials have been recommended for root-end obturation, and many studies have attempted to identify an ideal material; however, an ideal material has not been found.

The different retrograde materials used as retrograde cavity fillings were calcium hydroxide with iodoform, MTA and calcium hydroxide with iodoform and

iodoform with saline respectively. Mineral trioxide aggregate is known as a successful root-end filling material because of its exceptional sealing capability and ability to stimulate osteoblast activity.[11]

The success of apicoectomy is dependent on diverse factors and is corroborated during follow up through clinical and radiographic evaluations. As put into view by Weine, Indications for apical surgery are as follows:

1. Severe vertical bone loss encompassing only one root of multi-rooted teeth.
2. Through and through furcation involvement.
3. Unfavourable closeness of roots of adjacent teeth.
4. Precluding adequate hygiene maintenance in proximal areas.
5. Severe root exposure due to dehiscence.[10]

Moreover, this present clinical case is in agreement with the studies of Friedman [14] and Guimarães et al. [15], in which endodontic surgery should only be instituted after all possibilities of conventional endodontic treatment have been tried.

The examinations noted an absence of symptoms such as pain, swelling, trismus and the normal function of the tooth was preserved. No sensory loss was reported by the patient. X-rays taken immediately postoperatively showed the IRM in place.

In spite of using three different retrograde systems of restorations with varied bone augmentation techniques, all the cases showed successful outcome.

It was concluded that all the three techniques are favourable for osseous healing and can be a saviour for tooth with hopeless prognosis. It aids in periodontal structures regeneration after periapical surgery.

Conclusion

Apicoectomy is the standardized radical pulp therapy procedure used where periapical lesions do not heal with conservative root canal procedures. Even if periapical lesions persist for a long time after interventions, the association of multiple procedures, including conventional and surgical ones, should be considered to enable the maintenance of the tooth in the oral cavity.

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