Prognosis of a Mandibular Incisor With Apical and Periodontal Lesion: An 18-month Follow-up

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ABSTRACT

Oral habits that are performed daily, can be a factor in the progression of periodontal and/or endodontic diseases. The purpose of this clinical report was to describe the treatment of a wide periodontal lesion and 18-month follow-up of a 13-year-old male patient's permanent mandibular central incisor that was traumatized due to chronic pencil biting. The lesion was curreted surgically while the compromised mandibular central incisor was endodontically and periodontally treated. The interdisciplinary approach showed a successful clinical outcome, as the survival of the infected tooth and the recovery of the soft tissues and the alveolar bone could have been achieved.
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Traumatic injuries to young permanent teeth are common, affecting 30% of children.[1] Trauma to the teeth and alveolar bone may involve the pulp and the periodontal ligament. Both tissues can be influenced directly or indirectly.[2] The trauma can be caused by habits—particularly practiced by children—including nail-biting, snuff holding[3], unappropriate flossing, seed cracking, and pencil biting.

Dental trauma is often associated with disruption of the pulp blood supply, leading to necrosis. Infection may be immediate or delayed. Less severe trauma may result in hyperaemia, oedema, haemorrhage, or ischemia.[4] The pulp may show various responses, including dystrophic calcification, internal resorption, and pulpitis that may evolve into partial or total pulp necrosis—particularly in young patients with delayed treatment after dental trauma.[5]

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Circulatory breakdown may cause tissue necrosis and anaerobic conditions for the growth of opportunistic micro-organisms. Abscesses, granulomas, and apical cysts develop in response to the intracanal antigenic content, mediated by immunopathologic mechanisms.[6] Treatment of traumatic dental injuries varies, depending on the type of injury, and will determine pulpal and periodontal ligament healing prognosis.[7] An appropriate treatment plan following dental trauma is important for a successful clinical outcome.

Efficiently neutralizing micro-organisms, removing byoproducts of micro-organism cells, and preventing reinfection are prerequisities for treating periapical pathosis. The greatest impact may, therefore, be achieved by effective biomechanical preparation and calcium hydroxide dressing, which promotes antisepsis of the root canal system and mineralized tissue formation in the apical region.[8,9]

The presence of a cystic periapical lesion and granuloma before root filling is a factor that may compromise the outcome of root canal treatment.[10] Extensive periapical lesions may not always heal[8] and surgery or even extraction may be necessary to allow the lesion to heal.

The authors of previous reports suggested that periapical curretage should be used routinely to arrive at a diagnosis rather than merely be used as a last resort for retention of the involved tooth.[11] A periosteal covering for bone is necessary to achieve optimal healing and diminish postsurgical pain. Therefore, the periosteum must be lifted together with the covering mucosa. The total extent of the lesion may be determined by working the curette with a sweeping motion along the bone at the lesion's periphery.[12]

The purpose of this case report was to describe an endodontic-surgical treatment approach for the treatment of a periradiculer lesion of permanent mandibular central incisors which have occurred due to trauma during pencil biting.

CASE DESCRIPTION

A 13-year-old boy presented with complaint of swelling of the mandibular anterior region. His medical and dental history revealed trauma due to pencil biting, which initially emerged 1 year prior. The patient expressed occasionally occuring pain and intraoral swelling in the mandibular anterior region. Erythema of the periodontal tissues of mandibular right and left central incisors was observed in the clinical examinations (Figure 1). Also, the mandibular left central incisor exhibited grade 2 mobility, whereas the mandibular right central incisor exhibited grade 3 mobility. A moderate sensitivity to the palpation and percussion of both incisors was noted.

Periapical and panoramic radiographs were taken. A severe radiolucent lesion with regular borders was seen along apical and lateral root surfaces of both central incisors (Figure 2). A pulp vitality test revealed the nonvitality of both teeth. Local probing depths around both incisors were not more than 2 mm.

The lesion was expanded so that the extraction of both teeth and surgical removal of the lesion have been considered as a treatment option. When the age and positive cooperation of the patient were considered, however, an attempt to preserve the teeth via endodontic treatment and surgical exision of the lesion was determined to be an appropriate approach in terms of conservation.

The endodontic access cavities of both teeth were established, and the working lengths were determined radiographically with a size 15 K-file. The root canals were biomechanically prepared to size 40 K-files with a step-back technique and irrigated with 5.25% NaoCl following each file. After drying with sterile paper points, an interappointment dressing of calcium hydroxide (Merck KGaA, Darmstadt, Germany) was sealed in the canals with Coltosol F as a coronal temporary filling. Although the root canal of the mandibular left central incisor seemed to be uncompromised, intensive exudation was observed in the root canal of the mandibular right central incisor in the following sequences.

The root canal of the mandibular left central incisor was observed to be asymptomatic and was obturated with AH plus (Maillefer, Dentsplay, Switzerland) and gutta-percha cones (Diadent, Mr. Lee Chang Lok, Paris, France) using a lateral condensation technique (Figure 3). The tooth was finally restored with a restorative composite material (Grandio, Voco, Cuxhaven, Germany). All endodontic procedures were performed with the use of a rubber-dam. Extraction of the mandibular right central incisor was chosen as the favorable option based on the persistent purulent exsudation and grade 3 mobility. After a 15-day follow-up period, surgery was planned, including the extraction of the mandibular right incisor and the excision of the lesion.

A sulcular incision from the mandibular right lateral incisor to the left lateral incisor with vertical incisions was made to reach the compromised site. The mandibular right central incisor was extracted, and the lesion extending to the left central incisor was removed.

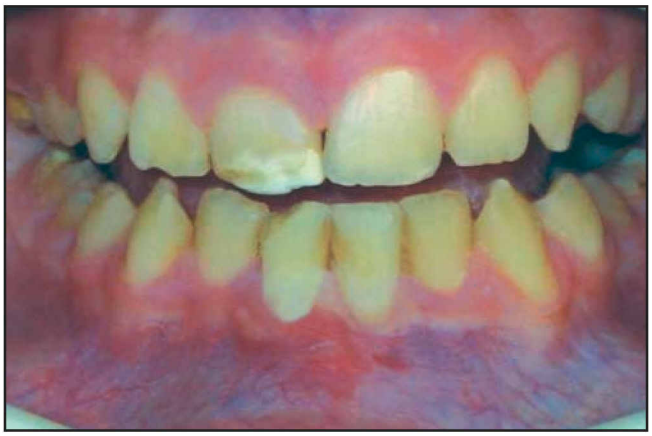

Figure 1. Pre-treatment intraoral view.

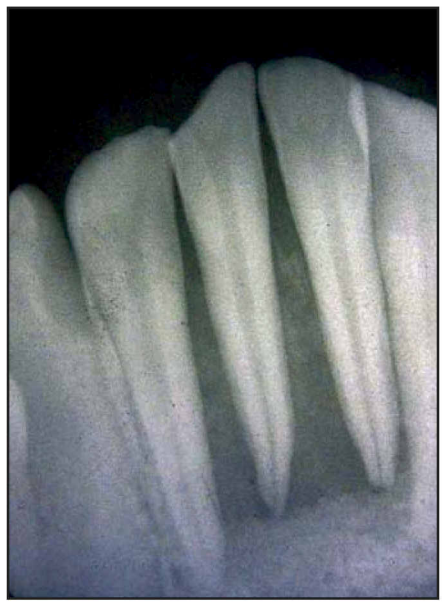

Figure 2. Pre-treatment periapical radiograph.

The apical and lateral root surfaces of the mandibular right central incisor were currated with gracey curettes, and root planning was performed. The infected tissues on the bone surfaces were currated with surgical and gracey curretes. The surgery site was washed with sterile saline solution after the complete removal of the lesion and infected periodontal tissues was ensured. Although the lesion had extensive borders, the surgery site was not grafted and no membrane material was used (Figure 4).

After placing the sutures to adapt the wound margins, the patient was put on 6-month follow-up examinations. A removable provisional restoration was fabricated to prevent the orthodontic displacement of adjacent and antagonist teeth and maintain esthetics (Figure 5). Orthodontic closure of the edentulous area was offered to the patient, who declined to be orthodontically treated, however. This was due for financial reasons and concerns regarding his appearance. The mandibular left central incisor was splinted to the adjacent teeth with a restorative composite resin for 1 month.

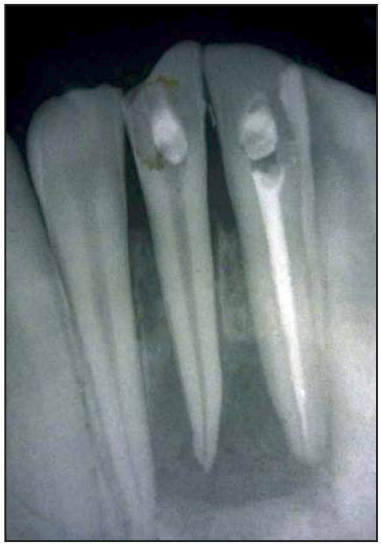

Figure 3. Periapical radiograph after endodontic treatment.

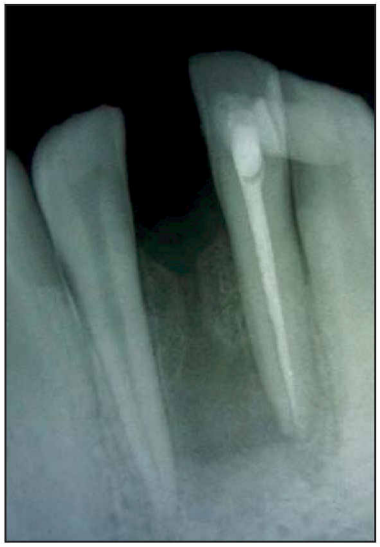

Figure 4. Periapical radiograph after tooth extraction.

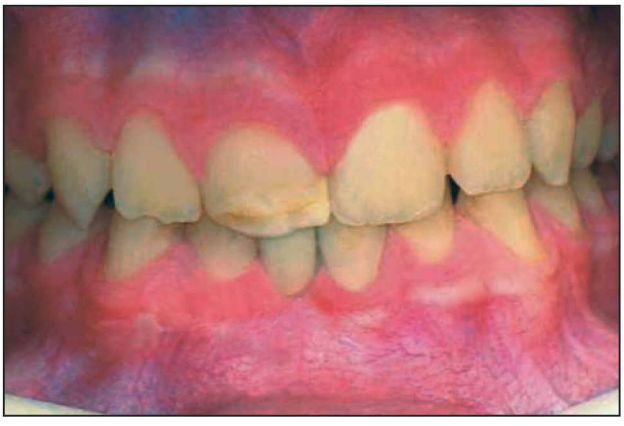

Figure 5. Post-treatment intraoral frontal view.

To determine the clinical status of the mandibular left incisor, probing depth was measured and plaque index, gingival index, and tooth mobility grade scores were recorded (Table 1) in clinical and radiographic follow-ups at baseline at 6, 12, and18 months. The gradual healing and regeneration around the apical and lateral incisor of the root of the mandibular left central incisor have been achieved and observed in the periapical radiographs (Figures 6 and 7).

DISCUSSION

The endodontic and surgical treatment of 2 traumatized mandibular central incisors of a 12-year-old patient was described in this case report. In spite of efforts to preserve his affected teeth, the mobility and persistent purulent exsudate from the root canal of the mandibular right central incisor resulted in extraction of the tooth.

The endodontic and surgical approaches provided the survival of the compromised mandibular left central incisor. Careful removal of the infected tissues from the root surface of the tooth with currettes without apicectomy exhibited a successful clinical outcome, which is thought to positively affect not only the function, phonation, and esthetics but also the psychology of the young patient. The further definitive restoration of the edentulous area may be accomplished by orthodontic rehabilitation or an implant in case of existence of adequate bone. Fabrication of an adhesive restoration can also be a conservative treatment alternative to a fixed partial denture when abutment teeth would be prepared.

Pulp necrosis is often seen in young patients with delayed or no treatment after dental trauma.[5] This may give the impression that all dental injuries require acute treatment. In fact, all recent textbooks on dental traumatology consider dental injuries an emergency where acute dental assistance is needed.[7] Therefore, the large lesion in the anterior mandible of the present patient can be attributed to the delayed dental treatment of the chronic trauma. The missing teeth could have been endodontically and surgically treated in case of immediate assistance.

Obstructed canals, extruded root filling material, failed root canal treatment, and lesions after traumatic injuries were attributed as indications for periradicular surgery.[13-15] Patient's finances, treatment time, and psychological issues should also be counted as possible indications for periradicular surgery, as presented in a previous report.[13] Periradicular curettage, apicoectomy, and root resection can be used in periapical surgery to achieve a successful outcome.[13,15]

It was suggested that endodontic treatment should be completed with the surgical debridement of the pathology.[16] For many years, whenever surgical endodontic

Table 1. Descriptive Data Regarding Clinical Parameters of the Mandibular Left Incisor for 18 Months Follow-up

Month	Plaque index	Probing depth	Gingival index	Tooth mobility grade
1 (before treatment)	1.55	1.9	1.29	2
6	.38	1.3	1.01	1
12	.45	1.7	.75	1
18	.52	1.7	.32	1

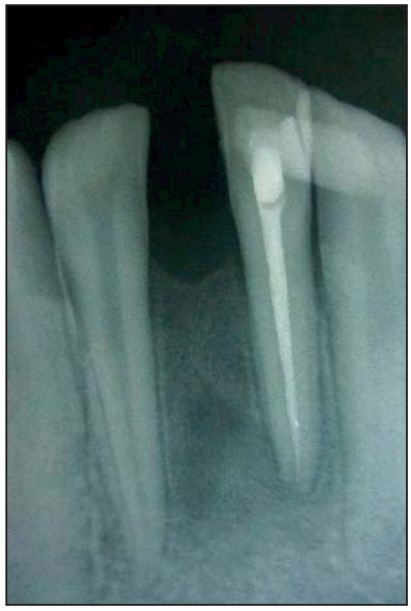

Figure 6. Periapical radiograph in the 6th month follow-up.

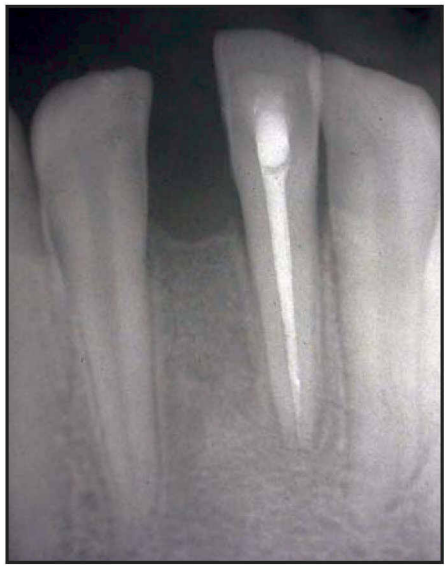

Figure 7. Periapical radiograph in the 18th month follow-up.

therapy was performed, an apicoectomy was advocated. The rationale for such a procedure was the belief that the apical portion retained necrotic cementum, which would delay healing, and was the location of unfilled and uncleansed lateral canals that would perpetuate the inflamed condition. This attitude is no longer considered valid. Most of the necrotic cementum may be removed during apical surgery with a periodontal curette without cutting off segments of the root. If the crown-to-root ratio reaches an undesirable point after root portions are removed, root conservations must be observed.

Successful cases are routinely reported with no reduction of tooth length.[12] Although it was reported that a successful treatment outcome could be achieved after the debridement of the pathology,[16,17] Mc Allister et al.[18] stated that the debridement of the defects could still include bacteria, which may lead to another pathology following treatment. Therefore, it was recommended that antibiotic treatment may be continued following surgical debridement.[18]

In the present case, following endodontic treatment, surgery was performed—including debridement of the periapical tissues and bony defect without apical resection. Amoxicillin was also prescribed immediately after surgical therapy (500 mg tablets 3 times a day for 1 week).

The use of grafts or membranes has not been involved in the patient's surgical procedures. A large, bony defect has appeared after surgical procedures. Guided bone regeneration (GBR) technique was not considered due to insufficient keratinized mucosa and shallow vestibular depth of the patient. When the third-month control radiographs were evaluated, significant bone formation was seen and after waiting 3 more months before membrane application and GBR procedures were deemed to be suitable. Consequently, the complete bone formation in the defect without the GBR procedures can be attributed to the patient's age, the bone's healing potential, and the attentively elevated periosteum which served as a natural membrane. Additionally, the successful endodontic treatment is thought to have help prevent the lesion's recurrence. When the bone formation observed in the follow-up radiographs are considered, this surgical approach may be encouraged for similar cases.

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