



Conservative Management of Post-Traumatic Periapical Lesions with Successful Esthetic Rehabilitation: A Case Report

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Abstract

Traumatic dental injuries often result in pulpal necrosis and periapical pathology, especially when treatment is delayed. The present case report explains the conservative management of a 35-year-old female presenting with discolored and symptomatic maxillary anterior teeth following childhood trauma. Clinical and radiographic evaluation revealed non-vital teeth with extensive periapical lesions. Nonsurgical endodontic therapy was performed with sequential intracanal disinfection using triple antibiotic paste and calcium hydroxide-iodoform dressing, followed by obturation and post-endodontic restorative rehabilitation. Serial radiographs and cone-beam computed tomography demonstrated progressive lesion regression, with significant healing achieved at 6 months and near-complete resolution at 20 months. The patient remained asymptomatic and was rehabilitated with zirconia crowns to restore esthetics and function. This case highlights that large periapical lesions can be magnificently managed through nonsurgical endodontic treatment alone, emphasizing the importance of meticulous disinfection protocols and long-term follow-up for predictable outcomes.

Keywords: Dental Traumatic Injuries; Injury; Nonsurgical Endodontic Management

Introduction

Traumatic dental injuries (TDI) represent a substantial public health burden with considerable implications for function, esthetics, and psychosocial well-being. In India, the pooled prevalence is reported to be approximately 13%, affecting both pediatric and adult populations [1]. Children are predominantly affected by falls, sports-related trauma, and playground accidents, whereas adults sustain injuries mainly through road traffic accidents, sports, and interpersonal violence [2]. Although uncomplicated crown fractures are frequent, a substantial proportion of cases progress to pulpal necrosis when treatment is delayed. Late presentation is a

common feature, with many reporting symptoms months to years after injury, which can predispose them to sequelae such as tooth discoloration, root resorption, and periapical pathology.

The primary goal of management is to eliminate infection, preserve or restore tooth function, and maintain esthetics. In cases involving multiple non-vital teeth with associated periapical pathology, non-surgical endodontic therapy is often the first-line treatment, as it enables thorough disinfection and obturation of the root canal system without the need for surgical intervention [3]. Alternative approaches include surgical endodontic treatment

(apicoectomy) when non-surgical therapy fails or periapical lesions persist, vital pulp therapy in cases of partial pulp vitality, tooth extraction with prosthetic replacement for teeth with poor prognosis, and regenerative endodontic procedures primarily in immature teeth to promote continued root development [3,4]. Adjunctive procedures such as internal bleaching or restorative interventions may also be required to address post-traumatic discoloration and restore esthetics [5]. The choice of treatment should consider the vitality and structural integrity of teeth, the extent of periapical involvement, and patient-specific factors, with non-surgical endodontic therapy often preferred to achieve predictable functional and esthetic outcomes.

Case Report

A 35-year-old female, Annapoorna, presented to the Department of Conservative Dentistry and Endodontics with a chief complaint of pain and discoloration of the maxillary anterior teeth of one month's duration. Her past dental history revealed a traumatic injury to the teeth during childhood, for which no treatment was sought at the time, as there were no presenting symptoms. The patient had no significant medical history. The report has been prepared in accordance with the CARE (for Case Reports) guidelines for case reports.

Clinical examination revealed discoloration of the maxillary central and lateral incisors [Figure 1a]. The associated tooth was positive for tenderness on percussion. The adjacent gingiva showed normal probing depth, and the tooth exhibited no mobility. Pulp vitality test (Roeko Endo Frost cold spray) showed no response in teeth #11, #21, and #22, while #23 exhibited a delayed response. Radiographic examination revealed a radiolucent lesion involving #11, #21, #22, and the mesial aspect of #23 [Figure 1b and c]. Preoperative cone-beam computed tomography (CBCT) (Genoray Papaya 3D^{plus}) demonstrated a well-defined radiolucent lesion involving the periapical regions of teeth #21 and #22, with extension towards the mesial aspect of #23. The sagittal section showed the lesion measuring approximately 16.29 mm in the anteroposterior dimension and 12.81 mm in the superoinferior dimension [Figure

1d]. The axial section further confirmed its cross-sectional spread, with dimensions of 14.57mm [Figure 1e].

A diagnosis of pulpal necrosis with symptomatic apical periodontitis in #11 due to trauma, chronic periapical abscess associated with #21 and #22, and partial pulpal necrosis with #23 was established. The treatment plan included nonsurgical endodontic management of teeth #11, #21, #22, and #23, aimed at eliminating the intracanal infection and promoting periapical healing. Patient was regularly followed-up and after confirmation of lesion regression, post-endodontic restorative rehabilitation with composite build-up and full-coverage zirconia crowns was planned to restore esthetics and function. The diagnosis and the plan of treatment were explained to the patient, and informed consent was obtained.

Before access cavity preparation, the patient's oral cavity was disinfected using 2% chlorhexidine solution. Local anesthesia was provided with 2% lignocaine containing 1:200,000 adrenaline, following which the access cavity was established in teeth #11, #21, #22, and #23 using a long-neck round diamond bur (MANI DIA BURS). Continuous purulent exudate was observed from the canals of #21 and #22. Initial biomechanical preparation was performed using the crown-down technique using the ProTaper Gold rotary system (Dentsply Sirona) powered by an X-Smart electric motor and endodontic handpiece, and an open dressing was placed in #21 and #22 due to continuous weeping from the canals, while a closed dressing was given for #11 and #23. At the subsequent appointment, triple antibiotic paste (ciprofloxacin, metronidazole, and minocycline in a 1:1:1 ratio) was placed as an intracanal medicament in all four teeth, and a closed dressing was provided.

After one week, obturation was done in teeth #11 and #23, and for the teeth #21 and #22, absorbent paper points were used to dry the canals, and calcium hydroxide with iodoform paste (Metapex, META BIOMED) was placed [Figure 1f]. Follow-up visits were scheduled every two weeks, during which the Metapex dressing was replaced, continuing this regimen for six months. Serial radio-

graphs and CBCT imaging at each visit showed progressive resolution of the periapical pathology. Once satisfactory healing was confirmed based on radiographic [Figure 1g] and CBCT examinations

at the 6th month [Figure 1h and 1i], obturation of teeth #21 and #22 was completed using the lateral condensation technique, followed by composite post-endodontic restorations (IVOCLAR VIVADENT) [Figure 1j].

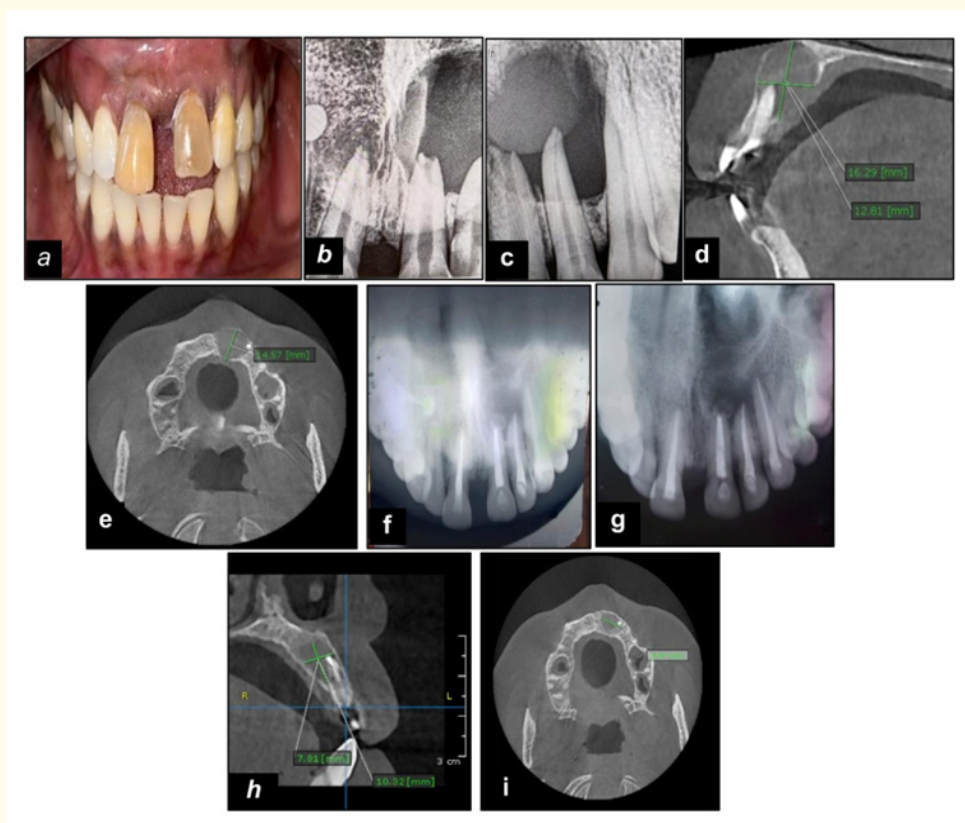


Figure 1: (a, b, and c) Pre-operative clinical and radiographic findings; (d,e) CBCT sagittal and axial sections; (f) Metapex as intracanal medicament; (g) 6 months radiograph findings; (h and i) CBCT findings at 6 month follow-up - sagittal and axial sections.

At the 12-month follow-up, the sagittal section showed the lesion measuring approximately 4.85 X 3.91 mm, while the axial section revealed 8.74 X 6.28 mm, respectively [Figure 2a and b]. Radiographic examination also revealed a reduction in lesion size [Figure 2c]. Crown preparations were carried out for teeth #13 and #12 (vital) along with #11, #21, #22, and #23 [Figure 2d]. Provisional crowns were placed for 2 weeks [Figure 2e], after which

definitive zirconia crowns were delivered, achieving satisfactory esthetic and functional rehabilitation [Figure 2f].

At the 20th-month follow-up, the patient was free of symptoms, and radiographic examination revealed a significant decrease in the periapical lesion [Figure 2g and h]. CBCT examination revealed lesion measurement was 1.52 X 2.66 mm and 6.91 X 3.46 mm, respectively [Figure 2i and 2j].

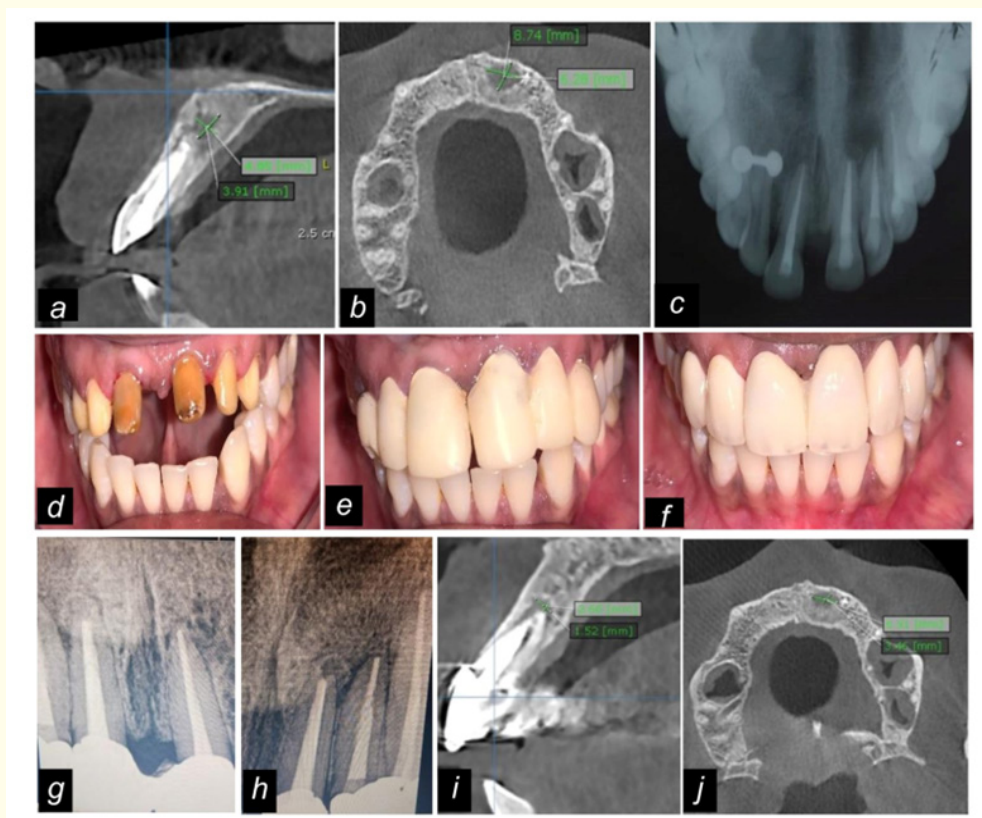


Figure 2: (a and b) 1-year CBCT findings – sagittal and axial sections; (c) Radiograph 1-year; (d) crown preparation; (e) provisional restoration; (f) Zirconia crowns; (g and h) Radiograph 20th month; (i and j) 20th month CBCT findings – sagittal and axial sections.

Discussion

Teeth that have suffered TDI may become discolored due to the injury itself or subsequent treatment. Such discoloration can affect an individual's self-esteem, perceived physical attractiveness, and social interactions. The color change in a traumatized tooth reflects the underlying pathological processes, wherein pulp necrosis can cause a grey discoloration as a result of red blood cell breakdown and remaining pulp tissue penetrating the dentinal tubules. Severe damage, compromised blood supply to the supporting structures, and infections can disrupt the normal healing process, often leading to increased osteoclastic activity. Among the potential late complications, apical periodontitis or periapical lesions are particularly concerning for patients and pose a clinical challenge for dentists [6].

The prognosis of dental trauma is influenced more by the timely and proper management of the acute phase than by any other factor. Endodontic therapy is generally not required for teeth with uncomplicated crown fractures, unless subsequent pulp necrosis and infection occur following the trauma. The non-surgical endodontic management of extensive periapical lesions is guided by four key principles: (a) providing drainage in the presence of an abscess and establishing access to the root canal, (b) eliminating causative factors such as necrotic pulp, toxins, and inflammatory mediators, (c) disinfecting the site, reducing inflammation, and restoring a neutral pH, and (d) sustaining this infection- and inflammation-free condition with proper sealing [7].

Non-surgical endodontic treatment was chosen in this case as it offers a conservative yet effective approach for the management of large periapical lesions. When optimal disinfection, thorough obturation, and a well-sealed coronal restoration are achieved, healing occurs through apoptosis of osteoclasts and subsequent activation of osteoblasts, leading to bone regeneration. This process gradually restores the periapical region, with reduction of radiolucency and reappearance of normal trabecular patterns. Unlike surgical procedures, this approach does not require highly specialized skills and can be effectively performed by general practitioners. Moreover, surgical intervention is generally reserved for cases where non-surgical management or retreatment fails to induce healing [8]. Studies, such as those by Sjörgen., *et al.* have shown that although healing of large lesions may take longer, favorable outcomes are achievable with patience and careful monitoring [9]. Therefore, compared to alternatives, non-surgical endodontic therapy provides a superior, biologically sound, and tooth-preserving treatment option”.

Intracanal medicaments play a vital role as adjuncts to endodontic therapy, with antibiotics demonstrating significant effectiveness in improving treatment outcomes. Since a single antibiotic is often inadequate to completely eradicate the diverse microbial flora, a combination approach known as Triple Antibiotic Paste (TAP) is preferred. This formulation provides broad-spectrum activity against both aerobic and anaerobic organisms, including gram-positive and gram-negative species, thereby creating favorable conditions for periapical healing. TAP assists in thorough disinfection of the canal, neutralizing tissue remnants, and minimizing the risk of microbial recolonization or leakage from dressings. Furthermore, the synergistic action of three antibiotics reduces the likelihood of resistance development [10]. Considering these advantages, TAP was selected as the intracanal medicament in the present patient.

In the present case, Metapex was chosen as the interappointment dressing because of its proven biological and antimicrobial properties. It contains calcium hydroxide, iodoform, and silicone oil, each contributing to favorable healing outcomes. Calcium hy-

droxide provides a strong antimicrobial effect, promotes apexogenesis, and apical closure. The elevated pH helps in neutralizing endotoxins produced by anaerobic microorganisms, while the released hydroxyl ions stimulate tissue enzymes like alkaline phosphatase, which play a vital role in root formation. Iodoform releases free iodine, which destroys residual microorganisms by protein precipitation and enzyme oxidation. Additionally, iodoform improves radiopacity, aiding in follow-up and radiographic assessment. Silicone oil serves as a vehicle that lubricates the canal walls, ensures uniform coating, and maintains the sustained release and activity of calcium hydroxide within the canal [11].

In the present case, following the treatment, progressive healing of the lesion was achieved within three months of repeated disinfection and dressing, and by the 6th month, obturation was done. Follow-up evaluations conducted at 3, 6, 9, 12, and 20 months demonstrated positive clinical and radiographic results, indicating the effectiveness of the treatment. Torabinejad., *et al.* compared the clinical and radiographic outcomes of non-surgical retreatment of teeth with apical periodontitis to those treated with endodontic surgery, and concluded that although endodontic surgery presents a more favorable initial success rate, non-surgical treatment yields a more promising long-term outcome [12]. Also, several authors have demonstrated the long-term success and biological healing in non-surgical endodontic treatments [13-15].

Conclusion

The present case demonstrates that nonsurgical endodontic therapy, when combined with effective intracanal disinfection and long-term follow-up, can achieve predictable healing of extensive periapical lesions associated with traumatized teeth. Progressive radiographic resolution and successful functional and esthetic rehabilitation confirmed the efficacy of a conservative approach without the need for surgical intervention. This highlights the importance of meticulous case selection, patient compliance, and regular monitoring in achieving favorable outcomes in complex cases of traumatic dental injury.

Acknowledgements

Nil.

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