

Multidisciplinary Management of a Post-Traumatic Inflammatory Cystic Lesion in the Mandibular Anterior Region of a 12-Year-Old Child: A Case Report

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Abstract: Background: Traumatic dental injuries can lead to crown fracture, tooth mobility and pulpal necrosis and periapical pathology in children. Due to the ability for the pulp to change status after trauma, clinical and radiographic examination should be performed periodically. Case: A 12-year-old boy came in after sustaining a fall while playing, resulting in trauma to his anterior mandibular region. The patient subsequently developed pain, swelling and purulent discharge. Clinical examination showed inflammation of gums, buccal mucosa obliteration and discharge of pus from 41. There were 41 Ellis Class II fractures, 32 Ellis Class I fractures and 31 were noted to be Grade II mobile. Orthopantomography was performed showing a well-defined radiolucency extending from 31 to 42 and further evaluation was carried out in CBCT. Thirty-one and 41 were non-vital, and 32 and 42 were delayed by pulp sensibility testing. After the stabilization, 31 and 41 were treated with root canal instrumentation using 4% taper rotary instrumentation and 40 finishing file, and obturation with bioceramic sealer. Surgical enucleation of the lesion, apicoectomy and retrograde filling with Septodont mineral trioxide aggregate (MTA) were subsequently performed. Peripheral venous blood was collected in 10 mL and centrifuged for 12 minutes to prepare platelet-rich fibrin (PRF) which was applied at the surgery site. Thirty-two and 42 were followed up and became pulpal non-vitals and had root canal treatment with the same protocol. After the crown preparation of 32 and 42, definitive rehabilitation was completed with Confident zirconia crowns. Follow-up radiographs showed that the radiolucent area diminished and the radiopacity increased in the anterior mandibular area. Conclusion: The need for long-term follow-up after a traumatic dental injury is highlighted and the role of a multidisciplinary management combining endodontic, surgical, biological and restorative treatment is illustrated.

Keywords: Dental trauma, Inflammatory Cystic Lesion, Pediatric Dentistry, Root Canal treatment, Mineral Trioxide Aggregate, Platelet-rich fibrin, Bioceramic sealer, Zirconia crown

1. Introduction

Traumatic dental injuries (TDIs) occur in children and adolescents and can lead to crown fractures, periodontal injury or pulpal necrosis and periapical pathology. Using the right diagnosis, treatment planning and follow up are crucial to achieving a good outcome.¹

Pulpal necrosis can occur in traumatized teeth and the pulpal status may vary over time. Delayed or inconclusive sensibility responses may necessitate close clinical and radiographic follow-up.¹ The pulpal necrosis may lead to microbial colonization of the root canal system and to subsequent apical inflammatory disease.

If the periapical lesions are extensive, surgical treatment is recommended in addition to nonsurgical endodontics. Root-end filling is a standard surgical procedure in endodontics, and mineral trioxide aggregate (MTA) has been shown to have good biological characteristics and sealing ability for root-end fillings.^{2,3}

The use of platelet-rich fibrin (PRF) as an autologous supplement to periapical surgery has been explored; the

systematic-review evidence indicated that PRF may have a beneficial effect on periapical healing.⁴ Bioceramic sealers' physicochemical and biological properties are considered favorable for contemporary endodontics, and some experimental studies showed equivalent sealing ability when compared to epoxy-resin sealers.⁵

Definitive rehabilitation of traumatised anterior teeth should provide a functional and esthetic solution. Zirconia has become a more popular aesthetic metal-free restorative material in pediatric dentistry, and although the best evidence available for pediatric use is limited to primary teeth, there is clear increase in its use.^{6,7}

The present case reports on the sequential multi-disciplinary treatment of a post traumatic inflammatory, cystic lesion of the mandibular anterior region, with subsequent definitive treatment with zirconia crowns.

2. Case Report

A 12-year-old male fell playing and sustained trauma to the anterior mandibular region. This was followed by purulent discharge, pain and swelling. There was no reported loss of

consciousness, vomiting, headache, visual disturbance or seizures.

During extraoral examination, patients were found to have diffuse swelling and tenderness of the mandibular symphysis area. Intraorally, inflammation of the gums, vestibular obliteration and discharge of pus were observed in relation to 41. There was 41 with Ellis Class II fracture, 32 were Ellis Class I, and 31 were Ellis Grade II mobility.

An adequate panoramic radiograph showed a well-defined radiolucent lesion from 31 to 42. A CBCT examination was carried out for additional evaluation of the anterior region of the mandible. No exact CBCT measurements were available and so are not reported.

Of 42 pulps tested for vitality, 31 and 41 were non-vital in the electric and cold and heat tests respectively; 32 and 42 were delayed. Considering both the clinical signs and symptoms and the radiographic features, an inflammatory cystic lesion with pulpal involvement was diagnosed.

3. Treatment

The mandibles were splinted for the anterior teeth.

31 & 41 needed root canal treatment. After access preparation and working-length, biomechanical preparation was done by 4% taper rotary instruments and size 30 finishing file. A bioceramic sealer was used for obturation.

Due to the periapical lesion, surgical enucleation was done. Apicoectomy was then performed followed by retrograde filling with mineral trioxide aggregate (MTA; Septodont). MTA is well studied for endodontic use such as root-end filling, and has good biological and sealing properties.^{2,3}

Peripheral venous blood (10 mL) was drawn from a vein in the patient's forearm and spun in a centrifuge for 12 minutes for preparation of PRF. The resulting PRF was then inserted into the surgical defect and the surgical site was then closed.

Of those, 32 and 42 exhibited non-vital pulp responses during follow up. The two teeth were then treated with root canal using the same protocol of 4% taper rotary instrumentation with a size 30 finishing file followed by obturation with bioceramic sealer.

After endodontic treatment, crown preparation was done according to 32 and 42. Then, zirconia crowns were fitted as definitive crowns.

4. Follow-Up

Clinical and radiographic follow-up showed good healing. Postoperative radiograph revealed decreased radiolucency of the previously seen radiolucent area and more radiopaque anterior mandibular area.

The clinical course also illustrated that the pulpal deterioration was delayed in 32 and 42, even though they initially had delayed responses to sensibility testing,

highlighting the need for continued monitoring after traumatic dental injuries.¹

5. Discussion

In the present case, it illustrates how the pulpal complications after dental trauma have changed over the years. Initially non-vital 31 and 41 showed delayed sensibility responses and eventually evolved to pulpal non-vitality, while 32 and 42 showed pulpal non-vitality. The International Association of Dental Traumatology notes that the diagnosis, treatment, and posttraumatic follow-up of traumatic injuries to permanent teeth must be made with appropriate sensibility testing, but serial assessment is encouraged.¹

As the periapical lesion was extensive, it was treated with a combination of nonsurgical and surgical management. Root canal treatment and surgical enucleation and apicoectomy were performed and Septodont MTA were used for retrograde filling. MTA has been extensively studied as a root-end material and has good biological and clinical properties.^{2,3}

PRF used as an adjunct to surgical treatment. In the case, mL 10 of peripheral blood was collected and centrifuged for 12 minutes prior to PRF placement. The use of PRF as an adjunct to the treatment has been suggested in the current case, as there is some evidence that it may have beneficial effects on the aspects of periapical healing after periapical surgery, but due to differences between PRF protocols and studies, its use as an independent therapy should be considered.⁴

The endodontic treatment protocol was conducted by 4% taper rotary instrumentation with size 30 finishing file and obturation using a bioceramic sealer. The bioceramic sealers have attracted more and more attention due to their physicochemical and biological properties. There was no difference between them in sealing ability when combined with a systemic study and meta-analysis that compared them to epoxy-resin sealers under the conditions studied.⁵

An important feature of the case is the subsequent development of the non-vitality of the pulps of 32 and 42. They responded initially but not conclusive signs of pulpal health, emphasizing the need for follow-up after trauma.

During the follow up, radiographically, the radiolucent area decreased and the radiopaque area increased. The radiographic changes, while not quantitatively measured, were consistent with progressive healing, along with the clinical findings.

The tooth was prepared for crowns (32 and 42) and then rehydrated by using the Confident zirconia crowns to achieve definitive rehabilitation. The most available systematic-review evidence is related to primary teeth; hence these can only be used to support the general restorative properties of zirconia, rather than superiority in permanent mandibular incisors.

One drawback of this report is that there is no histopathological confirmation. In accordance with this, the lesion is referred to as an inflammatory cystic lesion instead

of a histopathologically verified radicular cyst. No quantitative CBCT measurements were available, either.

6. Conclusion

Long-term follow up after TDI is emphasized as well as the importance of delayed pulp sensibility responses during the initial assessment. The use of a multi-disciplinary treatment approach, including stabilization, RCT, surgical enucleation, MTA apicoectomy, and the placement of PRF combined with definitive zirconia rehabilitation yielded favourable clinical and radiographic results.

The subsequent non-vitality of the pulps of 32 and 42 highlights the need for careful monitoring of teeth with initially delayed responses before decision-making for definitive treatment. The case illustrates that a thorough evaluation of a complex post-traumatic patho-etiology can be managed sequentially by combining endodontics, surgery and restorative treatment.

Declarations

Patient consent: Written informed consent from the patient's parent/legal guardian should be obtained for publication of the clinical details and photographs.

Conflict of interest: The author declares no conflict of interest.

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Figure Legends

Figure 1. Initial extraoral and intraoral presentation following trauma.

Figure 2. Preoperative panoramic radiograph showing the mandibular anterior radiolucency.

Figure 3. CBCT evaluation of the mandibular anterior region.

Figure 4. Stabilization of the mandibular anterior teeth.

Figure 5. Root canal treatment of 31 and 41 using rotary instrumentation.

Figure 6. Obturation using a bioceramic sealer.

Figure 7. Surgical enucleation and apicoectomy of the lesion.

Figure 8. Apicectomy and Retrograde filling with MTA.

Figure 9. PRF placement at the surgical site.

Figure 10. Root canal treatment of 32 and 42 following subsequent pulpal non-vitality.



Figure 1: Initial extraoral and intraoral presentation following trauma



Extraoral Images

Mandibular Arch

Right Lateral View



Left Lateral View



Maxillary Arch

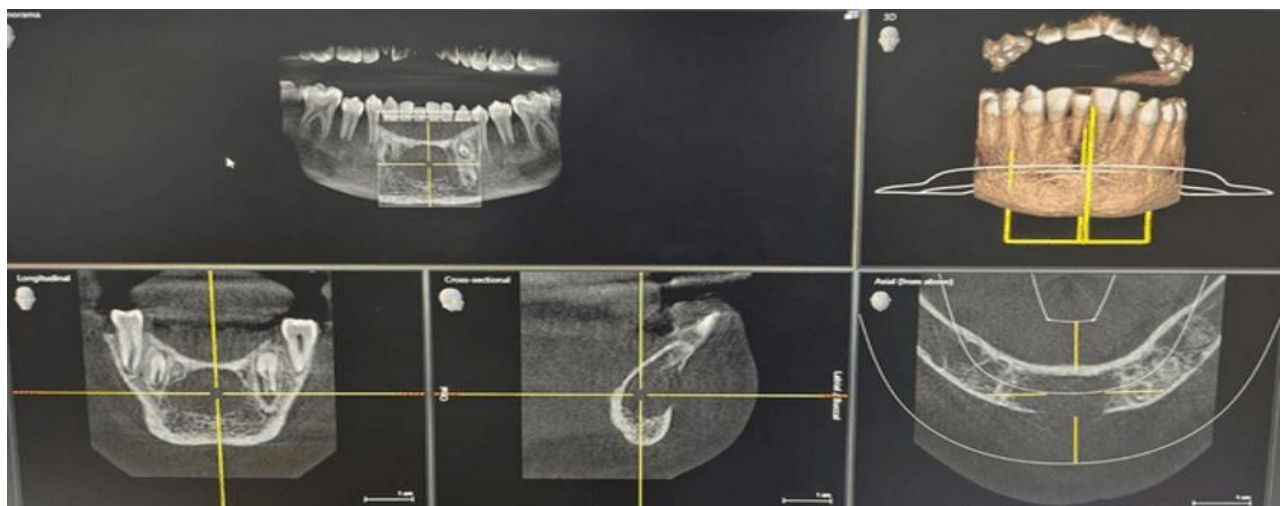


Figure 3: CBCT evaluation of the mandibular anterior region

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Figure 4: Stabilization of the mandibular anterior teeth



Figure 5: Root canal treatment of 31 and 41 using rotary instrumentation

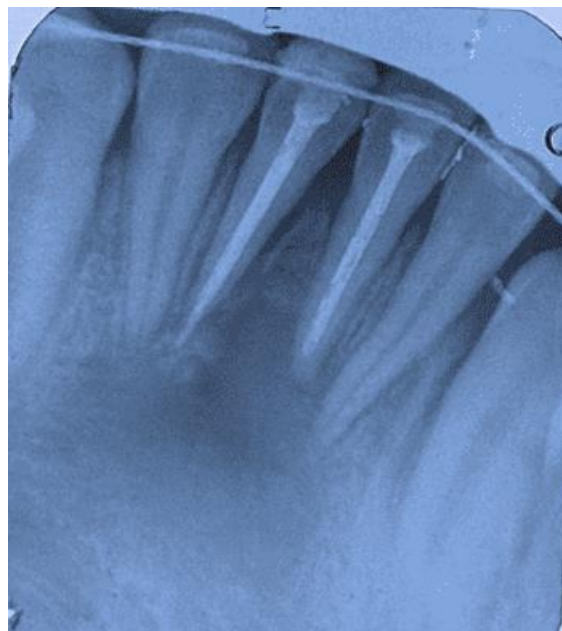


Figure 6: Obturation using a bioceramic sealer

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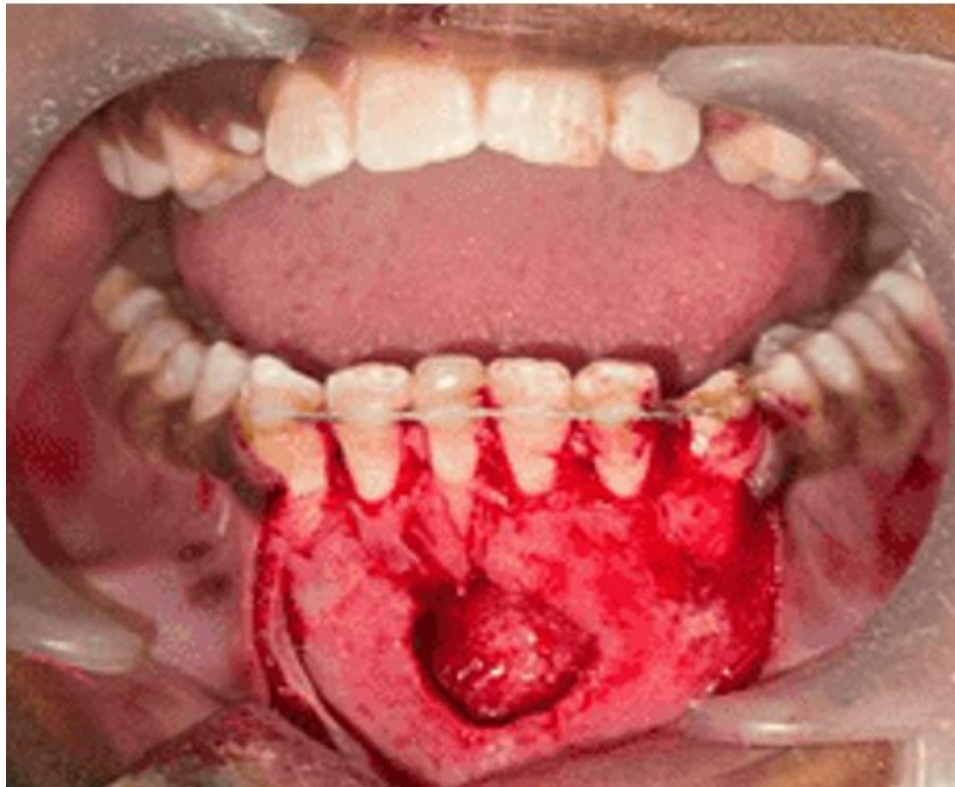


Figure 7: Surgical enucleation and apicoectomy of the lesion



Figure 8: Apicoectomy and Retrograde filling with MTA



Figure 9: PRF placement at the surgical site

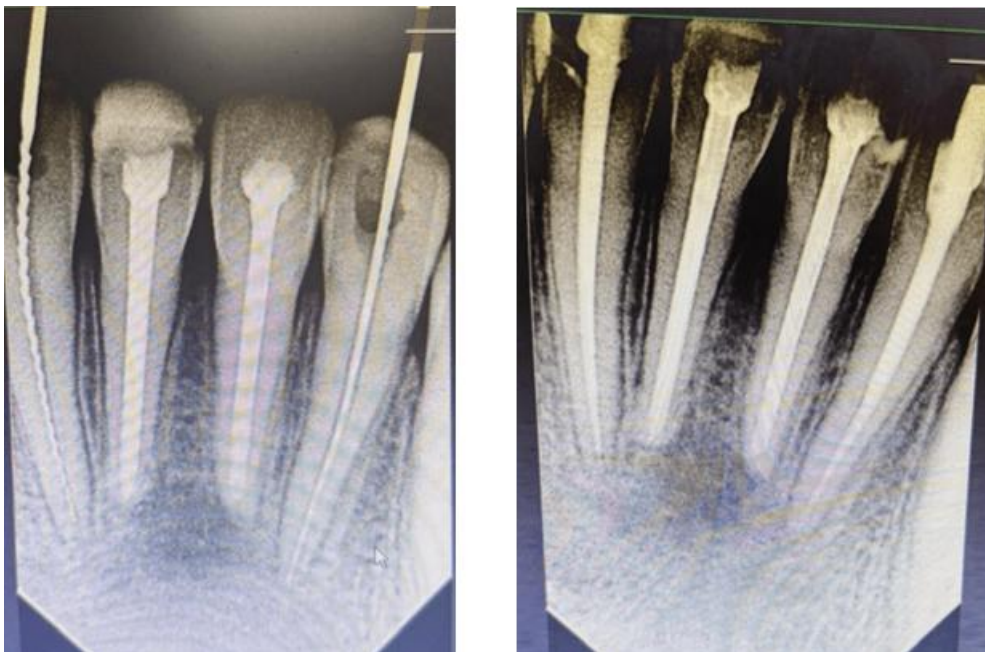


Figure 10: Root canal treatment of 32 and 42 following subsequent pulpal non-vitality



Figure 11: Definitive zirconia crowns.



Figure 12: Postoperative radiograph demonstrating reduction in radiolucency and increased radiopacity.

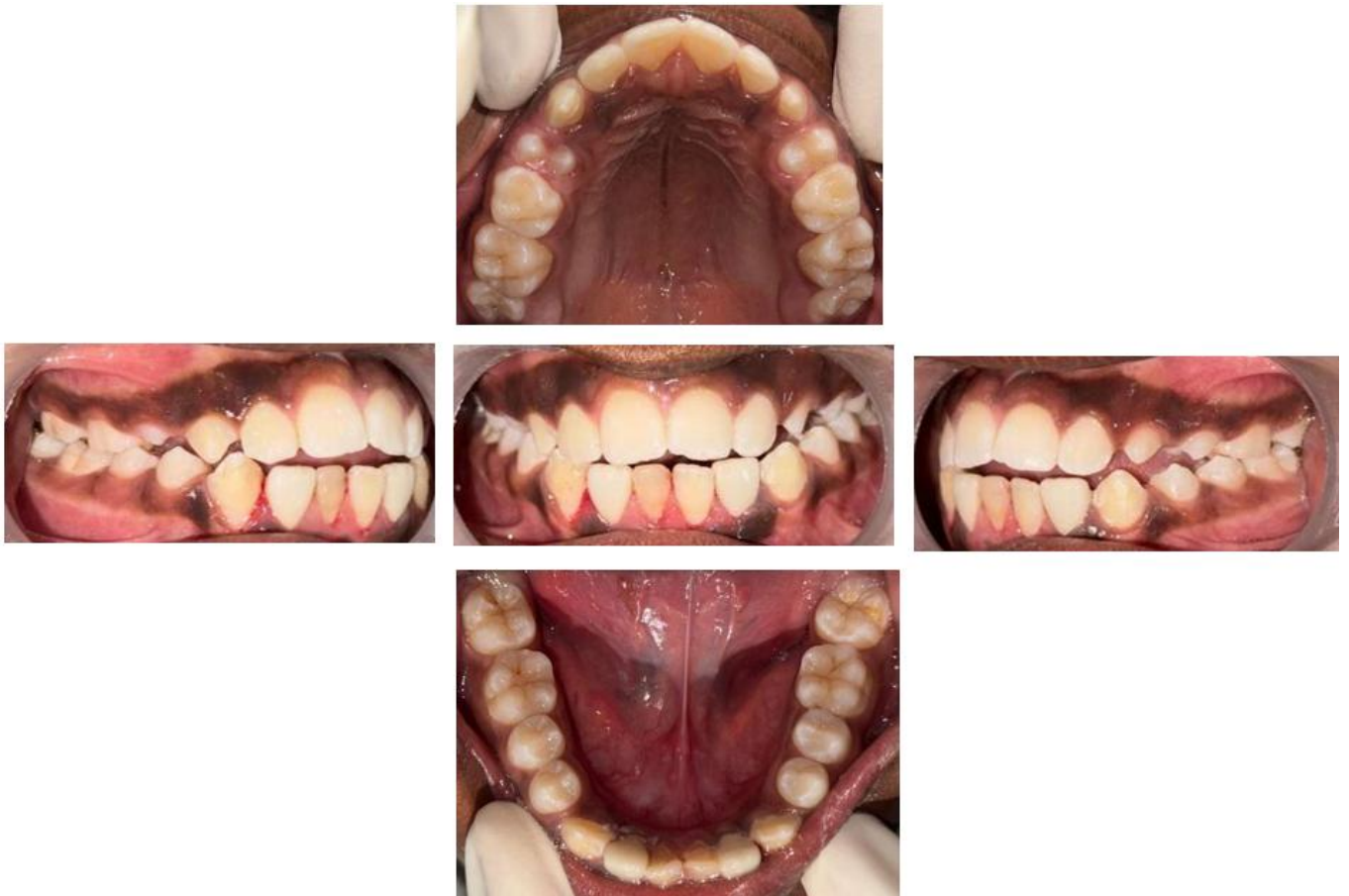


Figure 12: Postoperative clinical images