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Case Report

Overcoming the challenges of a complex dentoalveolar trauma: A case report

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Abstract

Background: Dentoalveolar injuries, caused by external forces impacting the dental arch, frequently result in tooth luxation or alveolar fractures, presenting significant clinical challenges. Proper management is essential to ensure functional and aesthetic recovery.

Observation: This report highlights the case of a 38-year-old female patient, referred to the Oral Surgery department three weeks after a traumatic maxillofacial injury. Clinical and radiographic evaluations identified a mandibular alveolar fracture with extrusion of teeth 31, 32, 33, alongside luxation of teeth 21 and 22. Emergency management included repositioning the luxated maxillary teeth and applying a semi-rigid splint. The mandibular fracture was stabilized using an Erich arch bar. Despite the delay in treatment, the six-month follow-up revealed substantial bone healing and successful reintegration of the affected teeth, demonstrating a positive clinical outcome.

Conclusion: The successful resolution of complex dentoalveolar injuries underscores the importance of accurate diagnosis, meticulous examination, and adherence to established treatment protocols. Prompt and appropriate intervention, paired with regular follow-up, is vital for optimal functional and aesthetic outcomes in patients with such injuries.

Keywords: Tooth injury, Tooth luxation, Mandibular fracture, Treatment delay.

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1. Introduction

Dentoalveolar injuries are local ruptures of hard-tissue continuity in dental and alveolar structures caused by the violent action of an external agent on the dental arch.^{1,2} They are responsible for a variety of lesions affecting the teeth, periodontium (gingiva, periodontal ligament and alveolus) and surrounding soft tissues ; resulting in partial or total luxation of a tooth or group of teeth or even alveolar fractures.^{3,4}

Dentoalveolar traumas are a significant cause of morbidity and may prove to be a challenge for practioners when it comes to its management.⁵ They require accurate diagnosis, proper emergency management and appropriate treatment with rigorous follow-up which influences the prognosis of the injury.⁶

Delayed treatment of dentoalveolar trauma is an area where data is limited. It is crucial to understand how such delays can influence clinical outcomes. Which comes to the

aim of this case report, that is to describe the clinical and radiographic results of delayed treatment of a complex dentoalveolar trauma, highlighting the factors that contributed to the success of this treatment.

2. Case Presentation

A 38-year-old female patient reported to the department of oral medicine and oral surgery 3 weeks after a traumatic maxillofacial injury. Patient gave a history of traffic accident for which she has been hospitalized due to a shoulder fracture; which explained the delay of visit. The patient was in excellent health with no remarkable past medical history.

The clinical and radiographic examinations revealed:

1. Gingival laceration involving the left interior region of the mandibulae,
2. Discreet sulcular bleeding on the 21, and 22;
3. Extrusive luxation of tooth 21;
4. Lateral luxation of 22;
5. Alveolar block fracture including 31, 32, 33;

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6. Extrusive luxation of 33. (Figure 1, Figure 2)



Figure 1: An initial frontal view of a multiple dentoalveolar trauma



Figure 2: Panoramic radiograph showing an enlargement of the desmodontal apical space of 31, 32, 33, 21 and 22; and a fracture line at the apices of 31, 32 and 33

The management strategy involved, a bidigital fracture reduction of the alveolar block at the mandible, repositioning of 31, 32 and 33, and rigid fixation using arch bar and circumdental wires. (Figure 3)



Figure 3: Alveolar fracture reduction and rigid fixation

As for the maxilla, teeth 21 and 22 were gently repositioned. A semirigid, round 0.5 mm orthodontic wire splint was bonded to the teeth between canines using acid-etch composites. (Figure 4, Figure 5)



Figure 4: Dental repositioning and splinting with composite resin and orthodontic wire

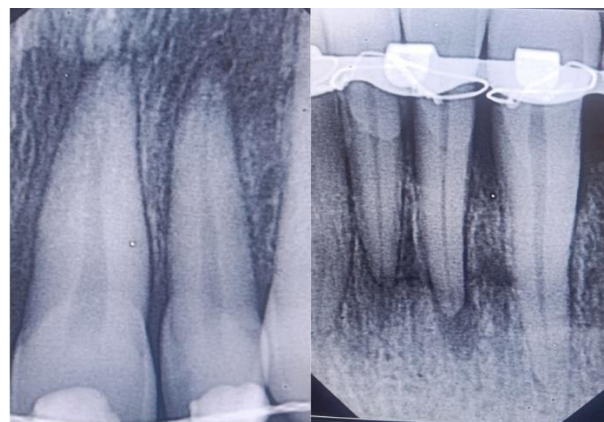


Figure 5: Control periapical radiograph after maxillary splinting and mandibular rigid fixation

The prescription included the following: Antibiotics (1 gram of Amoxicillin, 2 times a day orally, for 7 days), Corticoids (Prednisolone, 60 mg per day, for 3 days), Analgesics (1 gram of Paracetamol every 6 hours, for 3 days) and a 0.12% Chlorhexidine mouth wash (oral rinsing 3 times a day for 7 days) were prescribed; Additionally, instructions on diet and oral hygiene were provided.

Soft-tissue healing was observed after one week. Pulp vitality testing after one week was negative, leading to endodontic canal treatment using calcium hydroxide for a month followed by permanent canal filling using Gutta-percha.

Routine follow-ups revealed no dental or alveolar mobility, and percussion testing was asymptomatic, indicating promising outcomes. The maxillary splint was removed after 4 weeks, and the mandibular splint after 8 weeks. Clinical and radiographic evaluations at 25 days, 3 months, and 6 months showed excellent periodontal and bone healing. (Figure 6, Figure 7)

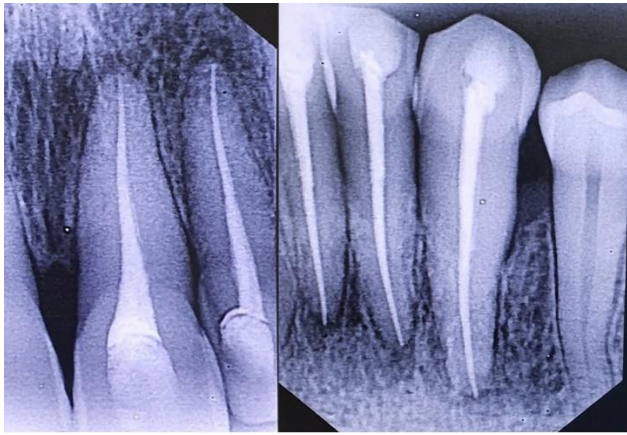


Figure 6: Control periapical radiograph 3 months after root canal treatment



Figure 7: 6 months follow-up

3. Discussion

According to the 2020 guidelines of the *IADT* for the management of traumatic dental injuries, the use of short-term, passive and flexible splints is most beneficial for luxated teeth. Physiological stabilization can be provided with 0.4 mm thick wire-composite splints.⁷

On the other hand, in situations involving alveolar bone fractures, the treatment consists of manually repositioning the affected teeth to restore proper arch alignment, followed by the application of a rigid splint for 6 to 8 weeks.^{2,7,8}

Regarding pulp vitality, it may survive after trauma, but early endodontic treatment is generally recommended for fully developed teeth that have suffered severe luxation. It is advised to use calcium hydroxide as an intracanal medicament, applied 1-2 weeks after the trauma and left in place for up to 1 month before completing the root canal filling.

This approach is considered to be the best way to ensure that the repositioned tooth remains correctly aligned, supports initial healing, and provides comfort and controlled functionality.^{7,9}

However, complications are bound to occur following dentoalveolar injuries either weeks, months or even years after. In case of dental luxations, Kallel et al. assess that extrusions are mostly responsible of external root resorption

which was seen after 4 weeks, after 3 months, and after 6 months with an equal occurrence frequency. As for lateral luxation, the complications observed were necrosis after 4 weeks and external root resorption after 3 months with 8.33% for each.¹⁰ And according to Dale et al., complications related to alveolar bone fractures include the development of pulp necrosis in the affected teeth (75%), root resorption (11%), and loss of marginal bone support (13%).²

Moreover, complications can also arise from poor management.⁹ Incomplete fracture repositioning, mobility of the fragments after treatment and wider horizontal fracture displacement (>2 mm) increase the risk of infection-related resorption (2.5–7.2%), ankylosis related resorption (2.1–33%), marginal bone loss (2.4–16.7%) and tooth loss (4–7.8%; estimated 5- or 10- year risk). These complications are more common in mature teeth than in immature teeth.¹¹

Complications are much more likely to develop when fracture reduction and splinting are delayed beyond 1 hour from the time of injury.² Furthermore, a study confirms the longer the delay in the consultation, the higher the likelihood of complications to occur. Patients presented at 1 to 3 days after the injury, developed ankylosis at 3 months, replacement resorption at 3 months, surface resorption at 4 weeks, and external root resorption at 4 weeks or at 3 months. Patients who sought treatment more than 3 days after the injury, subsequently developed external root resorption at 4 weeks, 3 months, or 6 months.¹⁰

These complications may result in tooth loss which can have significant psychological repercussions, particularly when the anterior teeth are affected.¹²

The clinical outcome observed in our case showed indeed necrosis of the luxated teeth which was treated with calcium hydroxide. The latter was used as an intracanal medication for a month, to reduce bacterial infection and enhance periapical healing. Nevertheless, despite a delay of three weeks, no other complication was noted and complete bone healing was obtained.

Our results are consistent with those of Serra-Pastor et al., that showed positive short and long-term follow-up with no signs of root resorption or ankylosis of the damaged teeth after delayed treatment of severe dentoalveolar trauma.¹³

Successful treatment can be attributed to the use of precise repositioning and reduction technique and adequate immobilization. Also following the *IADT* recommendations, endodontic treatment should be initiated as soon as possible to avoid more complications.⁷

Patient's favorable general condition and the compliance with post-operative recommendations benefit as well the outcome of the treatment.

4. Conclusion

In conclusion, although delayed treatment of dentoalveolar trauma presents challenges, this case study demonstrates that favorable outcomes can be achieved with appropriate treatment protocols. These findings encourage further research and the optimization of clinical practices for managing these complex cases.

5. Clinical Significance

Emergency treatment should always be attempted despite the delay and complexity of the trauma.

6. Conflict of Interest

The authors confirm that this article content has no conflict of interest.

7. Acknowledgements

Declared none.

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