



Passive Re-Eruption of Immature Permanent Incisors: What Is the Prognosis? About a Case Report

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Abstract

Intrusive luxation defined as an axial displacement of a tooth into its own socket, causing a crushing of the vascular-nervous bundle as well as significant pulpal, cemental, bone and periodontal damage. It is the most severe clinical form of dental dislocation and has the worst prognosis. The therapeutic modalities depend on the importance of dislocation and on the stage of root formation. Passive repositioning or spontaneous re-eruption is reserved to the immature teeth in first intention; however, this passive method requires a regular monitoring. The purpose of this article is to report a case of an intrusive luxation of both upper permanent immature central incisors which re-erupted within 3 weeks.

Subject Areas

Dentistry

Keywords

Intrusive Luxation, Immature Permanent Teeth, Spontaneous Re-Eruption

1. Introduction

Intrusion is one of the most serious traumas, and constitutes a real pedodontic emergency, because of their specificity and their repercussions.

This clinical form corresponds to the displacement of the tooth in an apical direction, causing a crushing of the vascular-nervous bundle and important cementum and periodontal lesions. It may be accompanied by a fracture of the al-

veolar bone [1].

Intrusion of permanent teeth usually occurs in children aged 6 - 12 years old [2]. In children, immature permanent teeth are more prone to tooth displacement than fractures, due to their dento-periodontal specificities (ligamentous laxity, alveolar bone is sparse and resilient and bone cortices are thin, desmodontal spaces are wide and roots are short in the process of building) [3].

This type of luxation is rare, comprising 0.3% - 1.9% of the traumas affecting permanent teeth. Traumatic intrusion often affects a single tooth, especially the upper central incisors [4].

This clinical form requires the clinician to make a precise diagnosis and to reflect on the situation in order to opt for a therapy oriented towards the favorable evolution of the dento-alveolar structures concerned and towards the harmony of the growth of the maxilla [5] [6].

Basically, three different treatment options have been proposed to deal with traumatically intruded teeth [7]:

- 1) Spontaneous re-emergence under regular supervision.
- 2) Orthodontic repositioning.
- 3) Immediate surgical repositioning.

The most significant factors reported for the outcome are type of treatment, degree of root development and degree of intrusion. There is, however, no consensus about the optimal treatment to minimize the occurrence of complications [8].

This care report describes the management of an intrusive luxation of both upper permanent immature central incisors which consisted of spontaneous re-emergence under regular supervision. Clinical and radiographic follow-up showed the absence of symptoms and complications, as well as continued root edification.

2. Clinical Observation

A 7-year-old child, B.A., in good general health, was received at the Pedodontics-Prevention Department at the CCTD in Rabat for treatment after a dental trauma.

According to the parents, the child was the victim of a fall during a sports session at school. The post-traumatic delay was 48 hours.

The mother reports that the 2 upper central incisors have become shorter.

This child was not unconscious; and his immunization schedule was up to date, especially for tetanus.

On exo-buccal examination (**Figure 1**), the presence of an upper lip laceration was revealed. Examination of the oral opening showed no limitation, no deflection or deviation of the path.

Palpation of the bony margins showed no particular sign of bone fracture or condylar displacement.

On endo-buccal examination (**Figure 2**), we noted:



Figure 1. Exobuccal view: A laceration of the upper lip.



Figure 2. Intraoral view: A laceration on the inner side of the upper lip, vestibular gingival swelling with an intrusion dislocation of the 11 and 21.

- A laceration on the inner side of the upper lip;
- Inflammation with vestibular gingival swelling, confined to the area of the traumatized teeth;
- A sulcular bleed ;
- The 11, 21 were short and mobile. On percussion of the 11, 21 a metallic sound was found which is the pathognomonic sign of an intrusion dislocation;
- Absence of alveolar fracture, on palpation, in the anterior region of the maxilla and mandible;
- The absence of traumatic lesions on the other teeth (no fracture, displacement or mobility).

Retro alveolar radiographs showed that the 11 and the 21 were immature

(Nolla's stage 8 classification) with no associated root or bone fractures (**Figure 3**). In addition, there was no damage to adjacent teeth or surrounding anatomical structures.

Upon clinical and radiographic examination, the diagnosis of intrusion was retained.

The management of our case consisted on saline solution mouth wash and gentle cleanse of the wounds. We then decided to abstain: we chose to wait for the spontaneous (passive) re-eruption.

Medical prescription consisted of antibiotics based on amoxicillin, a first level analgesic (paracetamol). The use of a soft toothbrush and the application of an antiseptic were recommended, as well as a soft diet for 2 weeks.

An initial medical certificate was given to the parents.

Clinical and radiographic follow-up was instituted to observe the passive re-eruption of the 11, 21 over several weeks and to monitor pulpal vitality and continued root building.

The child was called in 3 weeks after the initial consultation for a clinical (**Figure 4**) and radiographic (**Figure 5**) check-up. Wound healing, decreased inflammation and vestibular swelling were noted; The 11 and the 21 had begun to erode and 2/3 of their crowns were visible.

After three months, all crowns of 11 and 21 were visible (**Figure 6**).

The clinical examination of the traumatized teeth showed 6 months and then at one year:

The absence of residual mobility on 21, a positive response to the pulp sensitivity test, and axial and transverse percussion were negative (**Figure 7**).

- Clinical examination of the teeth adjacent and antagonistic to 11, 21 was unremarkable.

- The control radiograph: continuation of root building with no sign of complications at 11 and 21 (**Figure 8**).



Figure 3. The dislocated teeth were immature (Nolla's stage 8 classification) with no associated root or bone fracture.



Figure 4. Clinical control at 3 weeks showed wound healing.



Figure 5. Radiographic control at 3 weeks: the 11 and 21 had begun their erosion and 2/3 of their crowns were visible.



Figure 6. Clinical control at 3 months, all crowns of 11 and 21 were visible.



Figure 7. Radiographic control at 3 months: no complications.



Figure 8. Radiographic control at 6 months: continuation of root building with no sign of complications at the 11 and 21.

3. Discussion

Intrusive luxation or impaction of permanent teeth is the most severe form of tooth movement [9]. The neurovascular system of the tooth and the periodontal ligament suffer from considerable damage. Pulp inflammation, which is frequent, generates root obliteration. The periodontal fibers are dilated and/or crushed, resulting in ankylosis or replacement resorptions. Indeed the trouble in treatment choice results in taking these two complications under consideration. Luxative intrusion is difficult to diagnose, especially in mixed dentition, when differential diagnosis between intrusion and delayed eruption is hard to make. Clinical and x-ray examination should then be used to avoid iatrogenic treatment [10] [11].

The practitioner should measure the degree of impaction by assessing the distance from the free edge of the impacted tooth to the marginal gingiva or the distance from the free edge of the traumatized tooth to the free edge of the adjacent tooth [12]. This measurement is taken at each reassessment; if the tooth does not return to its physiological position within 3 to 4 weeks, other solutions are considered.

Immature permanent teeth have a high potential for eruption and pulpal/periodontal repair, so it is recommended to wait for spontaneous re-eruption: passive repositioning, in cases of displacements less than 7 mm for immature teeth [13].

Given the absence of infectious risk in our patient, his young age, and considering the immaturity of the teeth (Nolla stage 8) and the degree of intrusion < 7mm, it was decided not to actively reposition, and to wait for spontaneous (or passive) re-eruption.

Each follow-up session consisted of a pulpal sensibility test, percussion test and radiological examination to check the root development.

Orthodontic traction is indicated in the absence of tooth displacement within 3 to 4 weeks after the accident [14] [15] [16] or in the presence of more severe displacement (greater than 7 mm).

The main uncertainty is the timing of the orthodontic procedure [17]. Increasing the waiting time seems to increase the risk of ankylosis [18]. Few studies compare the efficacy between immediate or delayed orthodontic repositioning [19]. Medeiros *et al.* [20] compared the two methods. They found no difference between immediate (within 7 weeks post-injury) or delayed (after 3 months) extrusion. Nevertheless, the extrusion time was shorter for immediate extrusion (on average 12 weeks, compared with 86.75 weeks). In the former group, teeth were repositioned seven times faster. In addition, 53.8% of the severely impinged teeth that received immediate repositioning had fewer complications (root resorption or ankylosis).

Surgical traction may be considered in case of failure of orthodontic traction or immediately in case of a significant displacement (greater than 7 mm) [21].

It can be considered when the time between the trauma and the consultation is long. Some authors advocate surgical repositioning as a first-line treatment [22]. They argue that this therapy removes bacteria contaminating the buried coronal surface and releases apical compression, thereby reducing osteoclast activity. The tooth is dislocated with a forceps, taking care not to further damage the periodontal ligament, and repositioned relative to the adjacent and contralateral teeth.

The gum is adapted and sutured to the neck of the repositioned tooth. A retainer is left in place for 4 to 8 weeks [23].

A recent systematic review [7] showed that following traumatic intrusion treated without active repositioning (according to the spontaneous re-eruption option), teeth with incomplete root growth still have the best prognosis with respect to the following criteria:

1) Occurrence of marginal bone defects

2) Pulpal alterations [24]. A study of 140 traumatically intruded teeth reached the same conclusion and favored the option of spontaneous re-eruption of actively growing root teeth [7]. It is thought that the additional trauma caused by active repositioning (surgical or orthodontic) probably negatively influences pulpal vitality, marginal bone healing, and prevention of root resorption [9] [21].

In our case, passive re-eruption was initiated from the third post-traumatic week, clinical and radiographic follow-up showed a favorable evolution of the traumatized teeth.

The prognosis of this type of trauma will depend mainly on three factors: the stage of root development, the degree of impaction and the age of the patient [23].

4. Conclusions

Intrusive luxation of permanent teeth is one of the most complicated and controversial dental injuries; therefore, a thorough knowledge of the stages of root canal development and the appropriate treatment options in immature teeth is very important for successful outcomes.

Based on the clinical case study, this overview shows that intruded teeth with incomplete root growth have the least post-traumatic complications during the healing process if active treatment is foregone, pending spontaneous re-eruption. Therefore, the main criteria for choosing the therapeutic procedure to be implemented are the stage of development or root edification, and the degree of intrusion. In case of spontaneous re-eruption, close clinical and radiological follow-ups are necessary to evaluate eruption and further root growth as well as for the early detection of root resorption and pulp necrosis.

Conflicts of Interest

The authors declare no conflicts of interest.

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