

Lateral Luxation Management in Young Permanent Teeth: An Effort to Prevent Pulp and Periodontal Pathologies

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ABSTRACT

Introduction: Lateral luxation is one of the dentoalveolar injuries in children with 11% incidence among young permanent teeth. Tooth repositioning as soon as possible is needed to stabilize the tooth in the actual anatomical condition, restore esthetic, and function as well as preventing pulp or periodontal pathologies. **Case Report:** An 8-year-old girl came with complaints of wobbling of two upper left front teeth due to accidentally hitting the fence while playing. **Case Management:** Digital pressure was used to reposition the lateral luxated teeth, which were then stabilized with a fiber splint and monitored every week for two weeks. **Discussion:** Management of lateral luxation with repositioning and fixation gives good results. The results of treatment control showed that there was no wobble, good occlusion, function, and aesthetics. **Conclusion:** Management of lateral luxation with exposed apex using digitation repositioned and fiber splint is recommended as an attempt to prevent pulp and periodontal pathology for immature permanent teeth. This method provide fast procedures, good aesthetics, function, and patient comfort. However long term observation is required to confirm the success rate.

Keywords: fixation; repositioning of a lateral luxation; trauma.

INTRODUCTION

Trauma can be defined as damage or injury that is usually caused by physical action by breaking the normal continuity of a structure [1]. Dental trauma is a damage affecting the hard tissues of the teeth and/or periodontium due to mechanical reasons. Dental trauma is an important public health problem, due to its high prevalence, especially among children and teenager [2]. Prevalence of dental trauma that occurs in children aged 8-12 years increased due to an increase in their physical activity. Several most frequent trauma causes are an accident on the playground, cycling, skateboarding, or sports such as martial arts, soccer, basketball, and rollerblading [3].

Lateral luxation is one of the dentoalveolar traumas in children. Incidence of lateral luxation is 11% of injuries to immature permanent teeth. Lateral luxation is a change in position of teeth that occur due to tooth movement in a direction other than axial. Periodontal ligament widening or alveolar bone fractures may occur. In most cases, partially lateral luxated tooth crown, that resulting dislocation to palatal or lingual is also usually associated with fracture of the vestibular portion of the socket wall. Tooth displacement due to lateral luxation can be seen by visual inspection [4].

The given recommendation in some literature for management of lateral luxation is by repositioning as soon as possible to stabilize the tooth in the correct anatomical

position with digitization pressure, to restore esthetics and function and prevent pulpal or periodontal pathology [5,6].

Given that there are only a few literatures reporting cases of lateral luxation of immature permanent teeth, the aim of this study was to report the management of immature permanent teeth lateral luxation with exposed apex as an attempt to prevent pulp and periodontal pathology.

CASE REPORT

An 8-year-old girl to the Airlangga University Hospital came with complaints of wobbling of 2 upper left teeth due to accidentally hitting the fence while playing. Patients referred to hospital by general dentist. The patient was prescribed antibiotics (amoxicillin) and painkillers (paracetamol). Paracetamol was prescribed for pain management. Amoxicillin was prescribed to be used for 5 days, because the child fell in the playground, areas that may be contaminated. However, the patient still feels pain and discomfort.

Intraoral examination, the soft tissue showed ulcerated on the gingiva around #21 22, oval shaped with a diameter of 4 mm, yellowish white color, indistinct borders, surrounded by reddish areas, and pain (Figure 3a). There was class two mobility on #21 22 according to Miller's classification.

On visual inspection, #22 was partially erupted, and there was a lateral luxation on #21, where the crown displaced more palatally (Figure 3b). Ellis classification of class 2 fracture was seen on #31 with fracture on 1/3 of the crown, enamel, dentin without involving the pulp (Figure 3c).

Radiographs shows normal TMJ structure, #21 22 there was widening of the periodontal ligament and the apical end of the root that has not completely closed, #31 fracture of 1/3 of the crown (Figure 2).



FIGURE 1: extraoral view



FIGURE 2: panoramic radiograph showed the widening of the periodontal ligament on #21 22

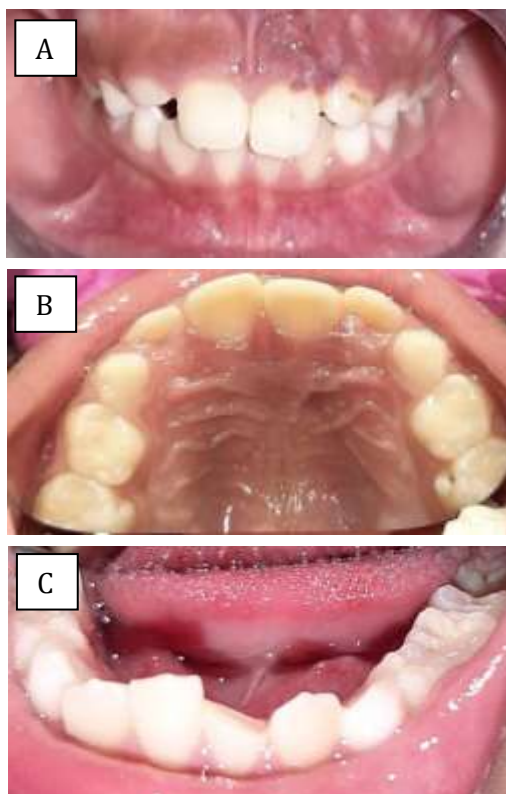


FIGURE 3: intraoral view. A. redness and ulceration of the gingiva around #21 22, B. lateral luxation on #21 palatally direction, C. fracture on 1/3 of the crown #31

CASE MANAGEMENT

Considering that previous emergency treatment has been carried out by general dentist, on the first visit we focus on the management of immature permanent teeth lateral luxation with exposed apex as an attempt to prevent pulp and periodontal pathology. The lateral luxated of #21 was repositioned and fixed using a fiber splint.

Asepsis and local infiltration anesthesia were done in buccal area of #21-22. Subsequently, the lateral luxated tooth #21 were repositioned with digitation pressure. Digitation pressure was used to positioning the lateral luxated tooth into an actual anatomic position, which then fixed with a fiber splint on the palatal. Fiber splint (fiber-strands plasma etched Biodental) was prepared along he palatal surface of #11 21 22 63. The palatal surfaces were etched, rinsed, and dried, followed by bonding and light cure polymerization. Fiber was placed on the palatal #11 21 22 63 which had been bonded, flowable composite (3M ESPE Filtek Z350XT Flowable Restorative) was applied on it and then polymerized with light cure. Using the articulation paper, check articulation (Figure 4a).

On tooth #31, which fractured 1/3 of the crown so that a thin layer of dentin remained pulp capping was performed (Figure 4b). In the ulcerated soft tissue treated by performed debriding and prescribed alloclair gel. Furthermore, in this case, follow-up was carried out every week for 2 weeks. Parents were instructed to maintain patient’s oral hygiene and underlined regarding the importance of the next appointment for the case follow up. Education about eating pattern in order to avoid further trauma to the affected tooth, and how to clean the traumatized area with a soft brush or cotton swab was also given both to parents and patient.

At the second visit, there was no complaint subjectively. The loose fiber splint on tooth #63 due to accidentally eating hard food was re-attached (Figure 5). Gingiva around #21-22 normal. There was class one mobility on #22 according to Miller’s classification. Tooth #22 was still mobile, reattached splinting was performed. After 2 weeks, radiographs showed normality of the soft and hard tissues without pulp and periodontal pathology, the periodontal ligament was seen in normal condition (Figure 6). At the third visit, the position of fiber splint was still good, then the splinting was removed, and intraoral examination showed #21 22 no mobility, positive vitality with cold spray test. After pulp capping, a composite filling restoration was placed on tooth #31 (Figure 7). After that, every two months for a year, follow up to see how the traumatized teeth are doing. To prove that the process of closing the apex of a traumatized tooth is continuing, an X-ray examination is required.

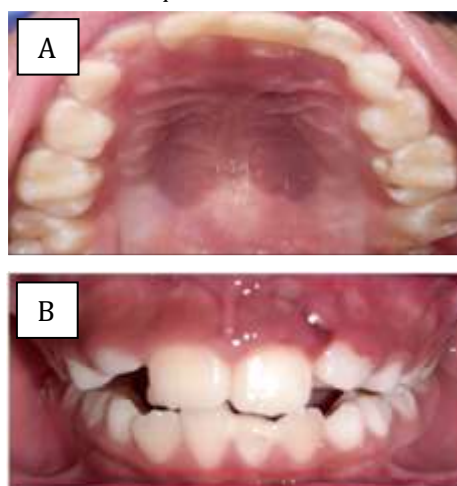


FIGURE 4: 1st visit. A. flexible splint made with resin composite and fiber onto the palatal surface of #11 21 22 63. B. pulp capping of the tooth #31

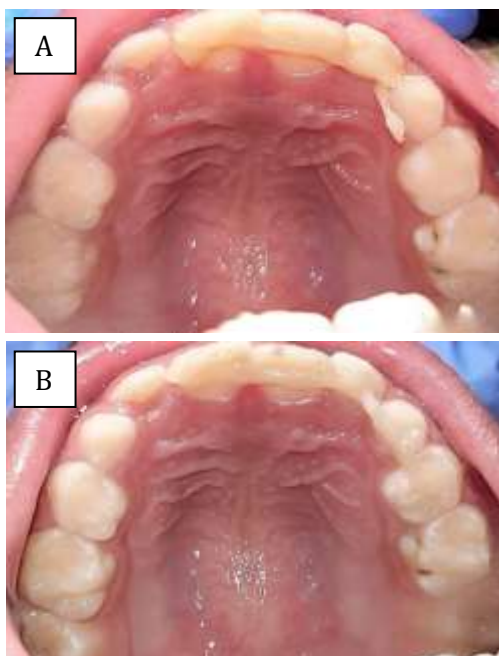


FIGURE 5: 2nd visit (D+7). a. fiber splint on palatal #63 was loose, b. re-attached splint on #11 21 22 63 64



FIGURE 6: radiographic image (D+14) indicating no pulp and periodontal pathologies.

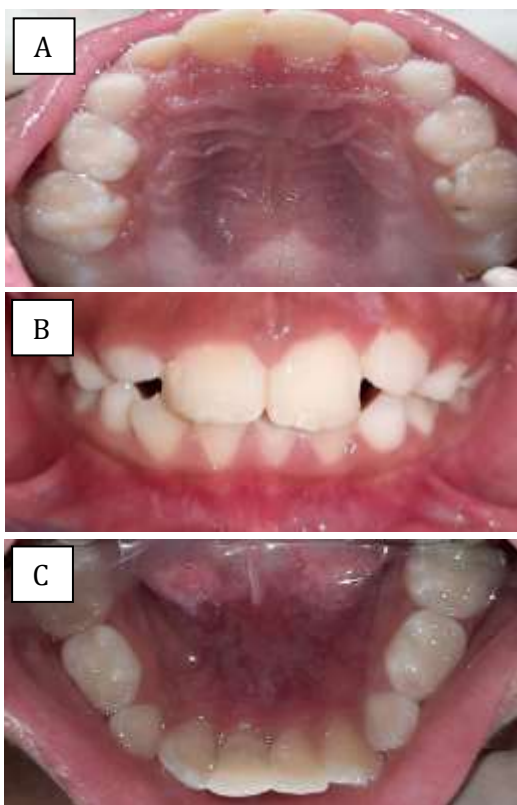


FIGURE 7: 3rd visit (D+14). A. clinical aspect after removal of the splint, B. gingiva around #21 22 normal, C. composite restoration on tooth #31 post pulp capping

DISCUSSION

Dentoalveolar trauma is common trauma, especially in children and teenager during teeth and face development [7]. It can occur in both primary and permanent teeth. Trauma to periodontal supporting tissues (tooth luxation and avulsion) are more common in primary and immature permanent tooth, whereas trauma to hard tissues (crown, root, and crown-root fractures) has been more frequent in permanent teeth.

The lateral luxation case in this patient involved the maxillary left central incisor. The maxillary incisors are the teeth most commonly affected by dentoalveolar trauma with an incidence of about 90%. This is related to the anatomical position of the maxilla arch. Some literature mentions lateral luxation treatment, if there is a minimal or absent occlusal disturbance, the tooth should be allowed to reposition itself spontaneously. Spontaneous repositioning usually occurs within 1-2 months. But if there is a severe displacement and the patient feels discomfort and pain, teeth can be repositioned slowly. If it become unstable, fixation can be done using flexible splinting attached to an uninjured tooth [5].

Splint is one of many options used to stabilize teeth due to excessive trauma. Splinting can function to distribute occlusal force, aids healing by reducing forces on the periodontal tissues [9]. Use of splints as an attempt to stabilize teeth enough to be considered in reducing patient discomfort [10]. In this case where there is displacement, tooth mobility and the patient feel uncomfortable and pain, repositioning and fixation were carried out with a flexible splint.

Displaced and lateral luxated teeth can cause pulp damage and periodontitis [6]. However, immature permanent teeth have healing capacity post major traumatic injury and the prognosis is good even with late repositioning [11]. However, delaying treatment can make adequate tooth reposition difficult because of the presence of blood clots within the alveolar socket. Thus, immediate repositioning is possible resolve problems faster and cheaper, achieve dentoalveolar trauma care goals: to restore occlusal function, reestablish aesthetics, and optimizing tooth development, jaw growth and surrounding soft tissue [7]. Reposition as soon as possible with digitation pressure to stabilize the tooth in the correct anatomical position, is the ideal lateral luxation case management in this case. Since when trauma happen neurovascular bundle displacement and periodontal ligament destruction may occur, resulting in post-traumatic healing that involve revascularization/reinnervation of the pulp and reorganization/restoration of the periodontal ligament. In immature permanent teeth showing immature root development, repair can occur through development, both in vessels in the new pulp chamber or anastomoses of vessels in the apical region [6]. Stabilization or fixation of the traumatized tooth with abutments on healthy adjacent teeth is considered the best choice to support teeth in the right position and function because it allows the exposure of the traumatized tooth to the physiological forces present in oral environment. In addition, fixation also reduces or avoids pain, offer comfort to the patient, and protect the tooth from traumatic forces during the healing process [12].

The International Association of Dental Traumatology (IADT) recommends this type of splinting which is flexible for mild cases of dental mobility and is used for short durations (Figure 8). Flexible splint with minimal mobility to assist functional reorientation of the periodontal ligament.

The advantage is that it does not require laboratory procedures, does not cause food retention, minimal soft tissue trauma, painless insertion, fast procedure, good esthetics, can be removed relatively easily [13]. Longer splinting time and rigid splinting type increased risk of healing complications. Therefore, flexible splinting for shorter periods are more effective where the mechanical stimulus provided by light movement thus support the revascularization process and are able to prevent dental ankylosis and maintain the vitality of the teeth Hertwig's epithelial root sheath, which is important in developing roots [14]. Ideal splint period for the case of lateral luxation is 2-4 weeks [13]. The splinting in this case is made of fiber splint and resin composites to stabilize traumatic tooth displacements, as is done in this case, it has the advantage of using materials commonly available in dental clinics, fast procedure, good aesthetics, function, patient comfort and painless procedure which is highly recommended in pediatric patients. Also leads to satisfactory results because of its characteristics it reduces the risk of complications such as ankylosis, root resorption, and obliteration pulp [6].

The primary complications associated with dental trauma are resorption and ankylosis. The absence of vital periodontal ligament in a substantial area of the root surface can increase resorption of cementum and dentin by means of osteoclasts from adjacent bone marrow. Which the dentin is reabsorbed and replaced by alveolar bone by osteoblasts. Incisor ankylosis permanent in children and teenager can result in unavoidable premature loss from dental trauma [15]. In some cases of lateral luxation of permanent teeth with closed apices, pulp necrosis can be a common healing complication. Because cases of lateral luxation usually present with involvement of bone fractures, presence of local ischemia due to rupture of pulp neurovascular supply.

Table 1. Current IADT recommendations for splinting time and type for various types of injuries

| Type of injury | Splinting time | Splinting type |
|--------------------------------|----------------|-------------------|
| Subluxation | 2 weeks | Flexible splint |
| Extrusive luxation | 2 weeks | Flexible splint |
| Lateral luxation | 4 weeks | Flexible splint |
| Intrusive luxation | 4 weeks | Flexible splint |
| Root fracture | 4 weeks | Flexible splint |
| Root fracture (cervical 1/3) | 4 months | Flexible splint |
| Avulsion | 2 weeks | Flexible splint |
| Avulsion. Dry time >60 minutes | 4 weeks | Flexible splint |
| Alveolar fracture | 4 weeks | No recommendation |

| Type of Injury | Splinting Time |
|------------------------------|----------------|
| Subluxation | 2 weeks |
| Extrusive luxation | 2 weeks |
| Avulsion | 2 weeks |
| Lateral luxation | 2 weeks |
| Intrusion | 4 weeks |
| Root fracture (middle 1/3) | 4 weeks |
| Alveolar fracture | 4 weeks |
| Root fracture (cervical 1/3) | 4 months |

FIGURE 8: Current IADT recommendation for splinting time and type for various types of injuries

At follow-up, the teeth demonstrated pulp vitality by cold spray test. Clinical and radiographic examination shows soft/hard tissue normal without pulpal/periodontal abnormalities. Given the fact that when trauma occurs, the patient only 8 years old, where the root closure of the involved tooth is not yet complete, so that will be followed up every 2 months for a year to monitor the teeth involved in trauma.

Each control required a radiographic examination to prove continuity process of the apex closure of a traumatized tooth. In teeth with lateral luxation, the condition of the pulp should also be constantly monitored, and if the pulp becomes necrotic, root canal treatment indicated [16,17].

CONCLUSION

Management of lateral luxation with exposed apex using digitation repositioned and fiber splint is recommended as an attempt to prevent pulp and periodontal pathology for immature permanent teeth. This method provides fast procedures, good aesthetics, function, and patient comfort. However long-term observation is required to confirm the success rate. Based on the clinical cases reported here, it can be concluded that although lateral luxation associated with young permanent teeth prompt treatment is likely to yield a good prognosis, with minor complications.

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