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A Case Report of Management of Intruded Mandibular Incisors in a Young Child with Epilepsy

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ABSTRACT

The most common dental trauma during early childhood is intrusive luxation, which results in the displacement of the tooth into its alveolus. It is a severe form of dental trauma that can cause damage to the periodontal ligament, pulp, and alveolar bone. The International Association of Dental Traumatology recommends either extraction or spontaneous re-eruption of the intruded primary tooth, depending on the severity of the intrusion. This case report provides a brief insight into the management of intruded mandibular primary incisors caused by an epileptic attack in a 4-year-old boy diagnosed with refractory spastic cerebral palsy. After 6 weeks of the traumatic incident, spontaneous eruption of the intruded teeth was observed. However, the teeth were found to be mobile after 9 months of clinical and radiographic monitoring, necessitating extraction. Conservative management including waiting for spontaneous eruption with close monitoring is a treatment option for intrusive primary teeth in young children.

INTRODUCTION

Epilepsy is a brain disorder characterized by a physical reaction to immediate excessive electrical discharges in the nerve cells and manifests as recurrent epileptic seizures with permanent predisposing factors (Symonds et al., 2017). An epileptic seizure is a result of temporary dysfunction of the brain due to an abnormal excessive or synchronous neuronal activity from the cortical neuron (Symonds et al., 2017). For industrialized countries, the prevalence of epilepsy among children is 3.2 to 5.5 per 1000, and for emergent nations, the reported prevalence is 3.6 to 44 per 1000, thus making it one of the three most common neurological diseases (Christensen et al., 2023). Studies have shown that epileptic individuals are prone to suffer more accidents compared to healthy individuals (Christensen et al., 2023; Karceski, 2018).

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The fact that seizures occur without forewarning, this exposes a person with epilepsy to the risk of injury (Karceski, 2018). These injuries also can be influenced by some associated factors such as the type, frequency of seizure, and gender (Yeung et al., 2019). Traumatic injuries involving the head, face, soft tissues, and teeth are an example of such injuries commonly observed in epileptic individuals (Adewole et al., 2011). This trauma can result in fracture, displacement, or injury of the teeth. The most frequent orofacial consequences of epileptic seizures in children may include intrusion (Moreira Falci et al., 2019).

Intrusive luxation has been defined as the dislocation of a tooth in an axial direction into the alveolar bone (Day et al., 2020). Intrusion injuries commonly occur in the primary dentition and account for 4% to 22% of harm to the anterior primary teeth (Day et al., 2020). Traumatic injuries in the primary teeth are mainly related to poor motor coordination and are sometimes due to the child's inability to evaluate the risks of injury (Flores & Onetto; 2019). The predominant cause includes falls, such as falling from baby carriages, falling downstairs, or falling against hard objects, and is mainly indoor injuries (Shah, 2020). Also, child abuse is highly associated with head and teeth injuries (Shah, 2020).

Because of their anterior position in the dental arch, intrusive luxation mostly occurs in the maxillary central incisors (Reddy et al., 2019). Coronal discoloration, pulp canal obliteration, pulpal necrosis, internal resorption, pathological root resorption, or lack of re-eruption due to ankylosis are the sequelae of an intruded primary tooth (Camfield & Camfield; 2015). Due to the anatomic proximity of the developing permanent tooth germ to the primary root apex, an intruded primary tooth can cause developmental disturbances to the successor's tooth (Reddy et al., 2019; Camfield & Camfield; 2015). This paper presents the management of intruded mandibular primary incisors following an episode of seizures in a 4-year-old patient with epilepsy.

CASE DESCRIPTION

A 4-year-old boy was brought to a pediatric dental specialist at the Faculty of Dentistry, Universiti XX, two days after suffering dental trauma. The chief complaint was bleeding with a blackish deposit on the lower anterior region and a lower front tooth appeared to be missing. The medical history revealed that he was blind and diagnosed with refractory spastic epilepsy secondary to Cytomegavirus infection. He was diagnosed with epilepsy when he was 6 months old. He has seizure attacks approximately six to ten times for a few seconds a day and is on medication of Clobazin tablet. The predisposing factors for seizure attacks are fever and flashing light. He was under a follow-up at the pediatric neurology department at a public hospital biannually a year. There were no signs of head injury or trauma to other parts of the body. The patient's tetanus immunization was completed. The father claimed there is no history of tooth-related trauma due to seizures previously.

The general physical examination of the patient demonstrated a normal curve of male children's growth chart with a weight of 11 kg and a height of 92 cm. After two days post-trauma, the patient was accompanied by the parents to have an oral examination. Natural light was used during the dental examination. As he was uncooperative and apprehensive during the dental examination, he was seated on his father's lap and his face was held by his mother. The extraoral examination revealed swollen upper and lower lips with no other signs of injury such as skin discoloration. The face and head appeared symmetrical. No abnormalities were detected when the facial bones and the mandible were palpated. Intraoral examination showed that the bleeding was associated with blood clots surrounding the gingival sulcus covering the mandibular central incisors and the teeth were submerged in the alveolar bone away from the line of the occlusion (Fig. 1) as a grade II intrusion. The teeth were not mobile but were tender to palpation and percussion. It was slightly labially inclined as seen clinically (Fig 2A and 2B). This implies that the intruded teeth were displaced away from the permanent tooth germ. No signs of alveolar fracture were detected by gentle digital palpation of the mucosa in the traumatized area. The occlusion appeared normal, and the rest of the teeth showed no caries or abnormalities. The intraoral periapical radiograph of the mandibular anterior region taken on the second day post-trauma showed the presence of intruded mandibular incisors and appeared

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foreshortened on the radiographic image (Fig 3). Clinically, teeth 71 and 81 were still intruded after 4 weeks post-trauma. Spontaneous re-eruption was anticipated during subsequent visits after 6 weeks. The parents were also instructed to maintain good oral hygiene by brushing with a soft brush after each meal and to follow a soft diet for 10 to 14 days. Clinical examinations were undertaken periodically at 1 week, 6 weeks, and 6 months to rule out any mobility, ankylosis, and periapical pathosis in both intruded teeth 71 and 81. During the 6 months of follow-up, clinically, the intruded teeth 71 and 81 already erupted at the same level with the occlusion and look well-aligned with other teeth over the arch (Fig 4), but with a significant degree of mobility. Radiographically, approximately 90% of the tooth had re-erupted with the presence of apical radiolucency around the roots of teeth 71 and 81. At this time, however, due to the presence of grade III mobility of 71 and 81, dental extraction under topical anesthesia was performed to prevent risks of aspiration. The patient was called after a year (Fig 5) and planned to call once a year in the future to monitor the eruption of the permanent teeth, dental development, and oral health of the patient, as well as to determine any further consequences of dental trauma to the permanent tooth buds. Written consent was obtained from the father to agree to dental treatment and the use of the records and photographs for publication purposes.

DISCUSSION

Dental trauma is a common consequence of epileptic seizures (Moreira Falci et al., 2019). Unlike individuals with no neurological disorders, studies reported that patients with epilepsy exhibited a moderately higher risk of illnesses and accidents (Christensen et al., 2023; Symonds et al., 2017). The risk will further increase in the presence of other factors such as high seizure frequency, lack of a prolonged seizure-free interval, comorbid attention deficit disorder, or cognitive handicap (Moreira Falci et al., 2019). This is because epileptic patients, both adults and children, are unable to control sudden bodily movements or activate their protective reflexes, and the lack of an aura causes injuries to the head and neck area (Moreira Falci et al., 2019). Additionally, the risk of seizure-related injury increased by a sudden loss of consciousness and falling (Yeung et al., 2019; Adewole et al., 2011). Predisposing factors to traumatic dental injuries, as in generally healthy subjects, are increased overjet with protruding anterior teeth and insufficient lip closure (Moreira Falci et al., 2019; Adewole et al., 2011).

The prevalence of injuries in the head region during epileptic seizures is about 47 to 63% of which 90% involve the skin and mucous membranes traumas (Yeung et al., 2019). Meanwhile, fractures within the hard tissues of the tooth, especially incisors and canines, occur in 12 to 38.5%, avulsion of the tooth in 6 to 7.6%, and luxation in about 5% in all patients (Moreira Falci et al., 2019). Literature has shown that the anterior primary incisors are highly susceptible to traumatic dental injuries such as intrusion (Day et al., 2020). This can be attributed to the presence of large bone marrow spaces resulting in the resiliency of the alveolar bone surrounding the primary teeth (Day et al., 2020; Flores & Onetto; 2019). Furthermore, the short, resorbing roots and the high crown-root ratio of the primary teeth offer less resistance to intrusive displacement (Flores & Onetto; 2019). Intrusion is considered to have the poorest prognosis of all dental traumas because it significantly damages the periodontal ligament, pulp, or alveolar bone (Shah, 2020; Flores & Onetto; 2019).

The degree of intrusion can be divided into 3 grades (Diab & elBadrawy; 2000), Grade I characterize mild partial intrusion in which more than 50% of the crown is visible, Grade II represents moderate partial intrusion in which less than 50% of the crown is visible while Grade III signifies severe or complete intrusion of the crown. In the present case report, the patient manifested with Grade I intrusion (Diab & elBadrawy; 2000) in which there is a mild partial intrusion with more than 50% of the crown are visible. Clinically, the tooth appears submerged in the alveolar bone away from the normal line of the occlusion (E Silva et al., 2022; Colak et al., 2019). On certain occasions, the tooth may appear completely intruded and invisible as a result of a blood clot or gingival edema surrounding the incisal edge as presented in this case. This concerns the parent or clinician who might think that the tooth is lost. Apart from that, clinical findings such as swelling of the upper lip, subcutaneous hematoma adjacent to the nostrils and in the maxillary

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anterior vestibule and projected labial bone plate confirmed by palpation establish the fact that the roots of intruded primary incisor are displaced labially (Colak et al., 2019; Diab & elBadrawy; 2000).

When the tooth is partially intruded, the orientation of the displacement can be assessed. A labial crown orientation indicates a lingual intrusion of the root toward the permanent tooth germ (Diab & elBadrawy 2000). In the case presented here, the tooth was intruded through the labial of the mandibular ridge and the root was displaced away from the permanent tooth germ. A radiograph will confirm the presence of the tooth and determine the position of the intruded tooth (Day et al., 2020; Flores & Onetto; 2019). In a periapical radiograph, if the tooth appears foreshortened compared to non-injured antemere, then one can assume labial displacement of the root with minimal risk to the permanent tooth bud and vice versa (Diab & elBadrawy; 2000; Flores & Onetto; 2019).

Thus, the direction and severity of the intrusion and the absence of an alveolar bone fracture determined the management (Day et al., 2020; Flores & Onetto; 2019). The decision to immediately extract or observe for spontaneous re-eruption of the intruded primary anterior teeth depends chiefly on the relationship of its roots in relation to the permanent successor or adjacent buccal cortical plate (Flores & Onetto; 2019). Furthermore, the close relationship between the apex of the injured primary tooth and the underlying permanent tooth germ must be kept in mind. As the intruded tooth was displaced away from the follicle of a permanent tooth, the tooth should be considered to be left in place for spontaneous repositioning and re-eruption (Shah, 2020; Flores & Onetto; 2019). Spontaneous re-eruption can take up to 6 or 12 months as reported by Day et al. (2020) (Day et al., 2020). Interestingly, the rate of eruption of the intruded teeth in the present case appeared faster, which is 6 weeks post-injury.

During re-eruption, there is a risk of acute inflammation around the displaced tooth (Diab & elBadrawy; 2000). If the apex is displaced through the permanent tooth germ, tooth extraction is recommended by IADT 2020 to avoid complications to the permanent successor (Day et al., 2020). Also, it is essential to advise both the parent and the child with a thumb habit or swallowing disorder that may apply force and thus avoid the intruded tooth from re-erupting (Diab & elBadrawy; 2000; Colak et al., 2019). In this case, no abnormal habit was observed.

Reports on sequelae from intrusions of the primary dentition are varied in the literature. The prognosis of teeth that have been intruded is generally guarded including pulp survival, coronal discoloration, pulp necrosis, pulp canal obliteration, or internal resorption (E Silva et al., 2022; Altun et al., 2009). The sequelae are dependent on the severity of the luxation injury and the stage of root development (Altun et al., 2009). Recommended clinical follow-up is at approximately one week, 6 to 8 weeks, 6 months (with radiographs), one year (with radiographs), and annually until exfoliation (Day et al., 2020). After several reviews, in this study, intruded teeth presented with a significant degree of mobility after 9 months of follow-up, hence extraction was indicated as it interferes with eating and to avoid the risk of aspiration.

It is known that the consequences of dental traumatic injuries may directly or indirectly influence the quality of life of the affected subjects, causing functional, aesthetic, psychological, and social problems (E Silva et al., 2022; Altun et al., 2009). Besides, due to the tendency to have traumatic dental injuries, patients with epilepsy should have well-planned and organized dental care. In certain situations, protective measures such as using mouthguards are necessary to prevent traumatic dental injuries (Gurunathan et al., 2016). The parent and caregiver should be provided with sufficient knowledge and educational materials to minimize the risk of seizure-related injuries (Gurunathan et al., 2016). Thus, a specially designed dental intervention for this group of patients should be provided.

CONCLUSION

Patients with epilepsy who are disabled are more vulnerable to traumatic dental injuries, including, intrusion, and in the absence of signs of damage to the permanent tooth bud, it is permissible for the primary

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teeth to spontaneously re-erupt. However, if the degree of mobility is too severe, extraction is indicated. Child's age, the severity of the injury, the direction of the intrusion, the fracture of the alveolar bone, and the interval between the incident of trauma and dental care all have an impact on how well the treatment goes.

Fig. 1. Image taken on the day of the dental trauma showing the intruded teeth covered by the blood clot

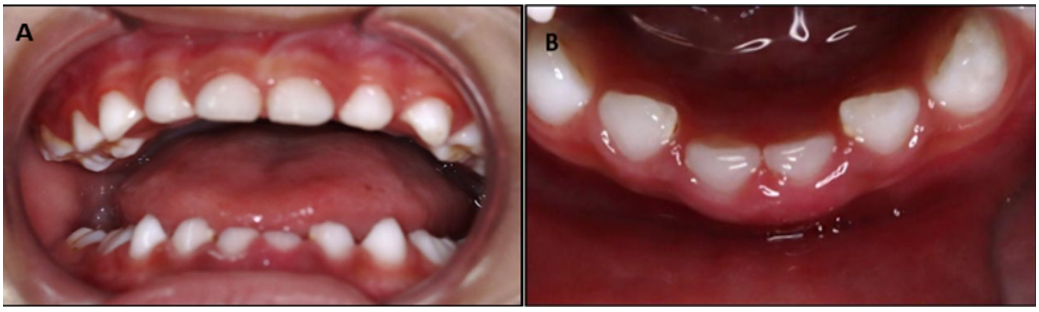

Fig. 2. (A) Frontal view of the intruded teeth 71 and 81; (B) Close image of the short clinical crown of teeth 71 and 81

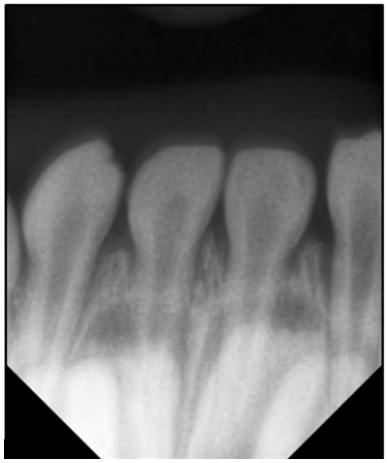

Fig. 3. Periapical radiograph of intruded teeth 71 and 81

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Fig. 4. After 6 months, the intruded teeth 71 and 81 spontaneously erupted

Fig. 5. After one year, the extraction sites of teeth 71 and 81 have healed

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CONFLICT OF INTEREST STATEMENT

The authors agree that this research was conducted in the absence of any self-benefits, commercial or financial conflicts and declare the absence of conflicting interests with the funders.

AUTHORS' CONTRIBUTIONS

Dayang Fadzlina Abang Ibrahim, the first author, conceived, wrote, revised the article and provided the data for the case report and submitted the revised manuscript. Siti Hajar Hamzah, the second author, conceptualised the central research idea and provided the theoretical framework. Alaa Sabah Hussein, a corresponding author, provided logistic support, anchored the review and revisions, and approved the article submission. All authors have critically reviewed the case report and are responsible for the content and the manuscript.

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