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(CASE REPORT)

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Various delayed tooth eruption in children, management and outcome: A case series

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Abstract

It is estimated that 4.3% of patients experience delayed eruption of permanent teeth due to local causes. Mandibular second premolars were the most frequent permanent teeth associated with delayed eruption, followed by maxillary canines, and maxillary central incisors. While rare, unerupted permanent teeth should be treated promptly to avoid potential impacts on future function, esthetics, confidence, mental health, and pronunciation. For this reason, parents often seek dental examinations and treatment for their children. Delayed tooth eruption (DTE) can also affect treatment planning and orthodontic timing. This report presents three cases of unerupted teeth. All cases were treated with a simple excision of overlying tissue to expose the crown using either a scalpel or electrocautery. Two of three lesion diagnosis was confirmed by Histopathology anatomy (HPA). In all cases, the involved teeth spontaneously erupted immediately following treatment, providing good aesthetics. However, one case experienced complications due to allergies during the wound healing process. In conclusion, proper diagnosis and treatment of DTE, including consideration of developmental disturbance factors, can help ensure normal eruption patterns and satisfactory aesthetic results.

Keywords: Delayed Tooth Eruption (DTE); Simple excision; Children; Human and health; Case report

1. Introduction

Tooth eruption refers to the physiological process as developing teeth emerge through the alveolar bone, soft tissue, and mucosa and enter the oral cavity. It is eventually coming into occlusion and playing a crucial role in mastication. This age-specific process, which entails the orderly sequence of primary tooth eruption, followed by its exfoliation and permanent tooth eruption, represents a major developmental milestone in children [1,2]. Tooth eruption is a physiological process, the timing and pattern of which can be influenced by both local and systemic factors. When the timing of tooth eruption deviates from the norm in certain races, ethnicities, and genders, it can result in Delayed tooth eruption (DTE) [3]. Systemic factors that cause DTE are usually associated with specific systemic conditions including malnutrition, endocrine disorders, and genetic disorders such as Down Syndrome, Cleidocranial dysplasia, Gardner syndrome [1,3,4].

DTE may caused by local factors, such as physical barriers that may obstruct the path of eruption, leading to a time delay between the exfoliation of primary teeth and the eruption of permanent teeth [4]. DTE is a major concern for patients and parents, due to its impact on aesthetics, phonetics, and function. Patients with DTE frequently demand for treatment due to low self-esteem rather than pain or discomfort [3,4]. DTE can be identified and requires intervention if (1) The contralateral tooth has erupted more than six months ago, (2) There is a deviation from the normal eruption sequence, or (3) If it affects the upper incisors, the lower incisors has lasted for more than one year [5,6].

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Three case reports associated with delayed eruption of maxillary incisor and mandibular premolar with individual treatment plans are presented. Unfortunately, wound healing process in one of the cases was hampered due to contact allergy with the prescribed topical gel.

2. Description of case

2.1. Case 1

The mother of a 7-year and 8-month-old girl complained that her daughter's maxillary right central incisor had not erupted while the contralateral teeth had erupted more than seven months ago. The patient had no history of trauma in the maxillary anterior region, but she lost her upper right central deciduous incisor early due to caries. The parents and the patient were concerned about the unfavorable aesthetics caused by the unerupted teeth. The patient was in good health, and there was no previous history of severe illness. During the clinical examination, it was found that the patient was edentulous on the upper right central incisor and had upper right lateral deciduous incisor (#52) gangrene radix. There was slightly swelling and no redness in the area. A periapical radiograph was performed to support the clinical examination, revealing that the tooth's crown had come out of the alveolar ridge, root appeared developed by 2/3 and ruled out any aberration. The dentist had diagnosed the tooth with DTE due to the thick mucosa. The dentist decided to perform a simple excision using electrocautery on the overlying mucosa of the upper right central incisor together with #52 extraction. The patient was prescribed oral NSAIDs and topical anti-inflammatory gel after the treatment, given three times a day.

Due to the COVID-19 pandemic, the follow-up was conducted remotely on the fifth day after treatment, with parents instructed to submit photos of their children's teeth. Based on the photo provided, it appears that the wound has healed and teeth were starting to erupt spontaneously. The patient was able to attend an in-person examination on the fifteenth day following treatment, where it was discovered that the tooth had erupted significantly and caught up with the contralateral tooth (Figure 1). Overall, both the patients and parents expressed satisfaction with the results of the aesthetic treatment.

Figure 1 Case 1: (a) initial intraoral photo, #11 unerupted; (b) periapical photo, #11 had penetrated the alveolar bone without any evidence of aberration; (c) 5 days follow-up, #11 erupted with good healing; (d) 15 days follow-up, #11 was half erupted

2.2. Case 2

A 9-year-old boy felt ashamed since his upper front teeth had not yet emerged. He was referred from a small town health center. There was no prior trauma, notable illness, or allergy history regarding the patient and parent. According to the clinical findings, both upper central incisor and upper left lateral incisor teeth are covered by swollen gingiva in the

shape of a bluish-red dome. The upper right lateral incisor teeth were well erupted. Radiographic examinations were carried out to see if there was an abnormality of the tooth root or its eruption path. The dentist decided to do a simple excision using electrocautery. After treatment, the patient was given oral NSAIDs and topical anti-inflammatory gel, applied three times a day. It was challenging for the patient to come to the hospital for a follow-up, because of travel restrictions during the COVID-19 pandemic. Telemedicine was carried out and until day 9, the patient's parents complained that the wound had not healed. Then, the patient was directed to make an appointment with the dentist the day after so that further examination could be carried out. On examination, it was found that the appearance of crusts on the upper lip and the wound treatment had not healed. The dentist then decided to stop application of topical anti-inflammatory gel and replaced it with topical corticosteroid gel, two to three times a day. Six days later, the wounds on the lip and gingiva were well healed and the appearance was pleasing because the teeth had erupted without being covered by the gingiva (Figure 2).

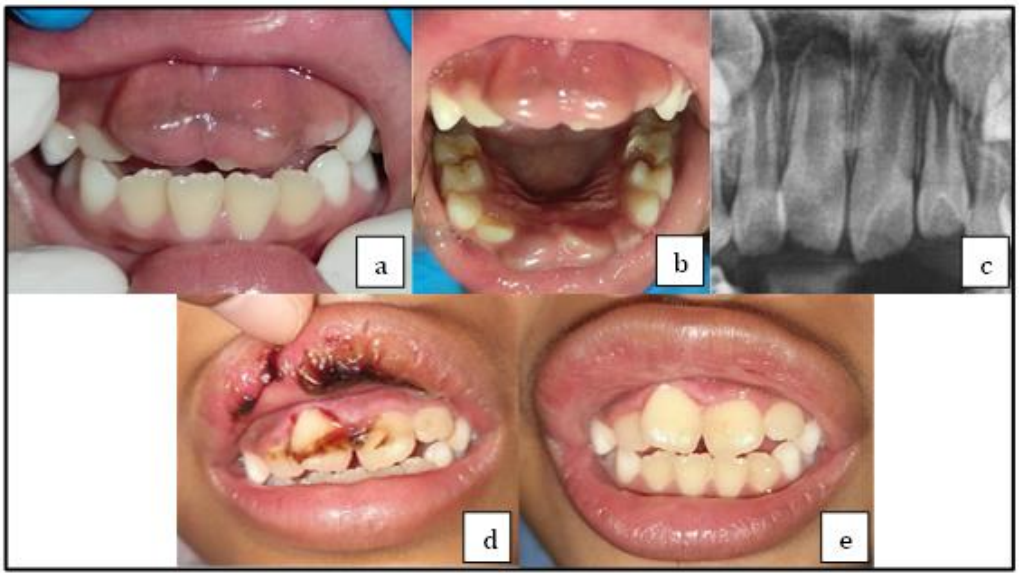

Figure 2 Case 2: (a) (b) initial intraoral photo, #11 #21 #22 covered by swollen gingiva in the shape of a bluish-red dome; (c) radiographic photo, #11 #21 #22 had penetrated the alveolar bone without any evidence of aberration; (d) 10 days follow-up, crusting on the upper lip and gingiva and the wound had not healed; (e) 16 days follow-up, the wound had completely healed and #11 #21 #22 are visible, providing good aesthetics.

2.3. Case 3

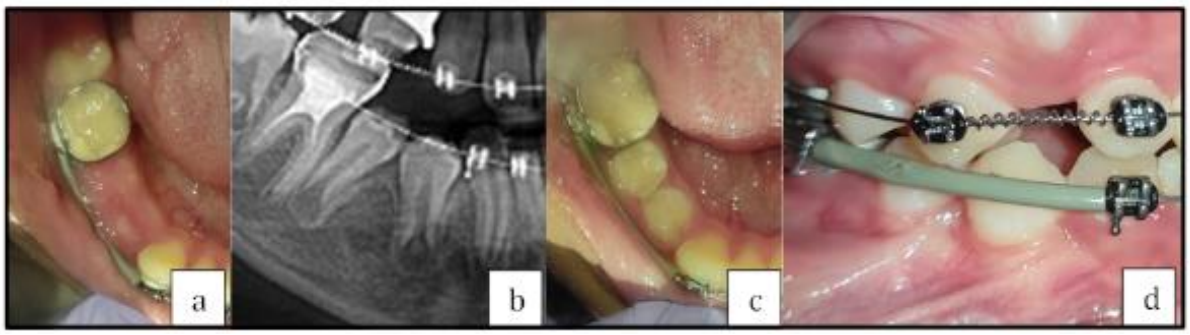

Figure 3 Case 3: (a) initial intraoral photo, #44 #45 unerupted; (b) radiographic photo, #44 #45 had penetrated the alveolar bone without any evidence of aberration; (c) 3 days follow-up, #44 #45 erupted with good healing; (d) 3 months follow-up, #44 #45 has fully erupted

A 12-year-old boy who was undergoing fixed orthodontic treatment had never his lower right first and second premolars erupt even though there was enough space for them to erupt and the contralateral tooth had erupted. There was an early loss of predecessor teeth due to caries. The crowns of the teeth were palpable under gingival tissue. On

radiographic examination, it was discovered that the teeth had penetrated the alveolar crest and two-thirds of the root had developed. The teeth had been observed for six months, hoping it would erupt spontaneously. After six months, the teeth had not erupted then it was decided to undergo excision using a scalpel over the soft tissue covering until entire occlusal teeth was exposed without orthodontic traction. Following treatment, oral NSAIDs and topical anti-inflammatory gel were prescribed. Three days later, the healing wound had healed well. Three months later, significant changes in tooth eruption were observed (Figure 3).

3. Discussion

The cause and process of DTE (Delayed Tooth Eruption) is still a topic of debate. If a tooth emerges into the mouth at a period that differs noticeably from the standards based on the person's sex and ethnic origin, tooth eruption is deemed to have been delayed [1,2]. In all three cases mentioned above, the cause was a local factor. In the first and third cases, DTE was caused by a physical obstacle in the form of a thick fibrous gingiva in the eruption pathway. Eruption pathway obstruction prevented the tooth from erupting. This can be explained by the premature loss of primary teeth, which causes abnormal changes in the connective tissue above the permanent teeth [7,8,9,10]. This premature loss is often the result of untreated caries spreading and teeth was extracted prematurely. On HPA (Histopathological) examination, the appearance of connective tissue was obtained. In the second case, DTE was caused by a physical obstacle in the form of an eruption cyst, which was confirmed by the results of the HPA examination. An eruption cyst is similar to a dentigerous cyst, but it has penetrated the alveolar bone and therefore not visible on radiographic examination [11,12].

Table 1 Summary of the three cases

	Case 1	**Case 2**	**Case 3**
Gender	Girl	Boy	Boy
Age	7-year and 8-month-old	9-year-old	12-year and 5 month-old
Location	#11	#11, #21, #22	#44, #45
History of Trauma	no	no	no
Premature Loss	yes	no	yes
Allergy	no	yes (prescribed topical anti-inflammatory gel)	no
Technique	electrocauter	electrocauter	scalpel
Recovery Time	5 days	16 days	3 days
Medicament	Oral NSAIDs; topical anti-inflammatory gel	Oral NSAIDs; topical anti-inflammatory gel	Oral NSAIDs; topical anti-inflammatory gel
Causa	Fibrotic Gingiva	Eruption Cyst	Fibrotic Gingiva

First of all, observation is the preferred approach for addressing DTE. However, if no improvement is observed, surgical intervention may be deemed appropriate [7]. In most cases, eruption cysts do not necessitate treatment and tend to resolve on their own. However, if they cause discomfort, bleeding, infection, or aesthetic concerns, surgical intervention becomes necessary [13]. Treatment for DTE involves surgical excision of the tissue covering the affected tooth crown. Excision was performed using electrocautery in cases 1 and 2 as the patient was young and tended to be overly fearful. In case 3, the patient was older and could receive treatment without any anxiety. Moreover, due to limited facilities during treatment, excision was carried out manually using a scalpel. Electrocautery has several advantages over manual excision, such as shorter treatment duration, minimal blood loss, and minimal post-operative pain, making it more comfortable for patients, especially those who are younger or have excessive fear [14].

These three case studies demonstrate successful retrieval of unerupted teeth, with the added advantages of restoring normal tooth function and eruption patterns. Patients and parents alike expressed satisfaction with the treatment outcomes, which also improved the aesthetic appearance of their teeth and escalated self-confidence. In case three, excision was necessary to expose the teeth crowns and support fixed orthodontic treatment. The involved teeth are able to be immediately incorporated into the orthodontic treatment plan since they can immediately fit into the arch at the same height as the adjacent teeth. However, allergic contact stomatitis to a topical gel delayed the healing process in another case. Wound healing generally involves four phases - hemostasis and coagulation, inflammation, cell

proliferation, and wound remodeling and maturation - with the first two phases are lasting about five days [15]. Persistent inflammation, as in cases of allergic contact, can disrupt this timeline [16], but once resolved, the wound can heal well and provide excellent aesthetic results. Table 1 shows the summary of the three cases.

4. Conclusion

There are various clinical appearances and causes of DTE. That is important to determine the treatment planning. Proper management will ensure normal eruption patterns and satisfactory aesthetic results.

Compliance with ethical standards

Acknowledgement

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Disclosure of conflict of interest

The authors declare that there is no conflict of interest regarding the publication of this document.

Statement of informed consent

Informed consent was obtained from patient included in the study.

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