

Unusual Early Eruption of Permanent Teeth in a Young Child: A Case Study on Pediatric Dental Development

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Abstract: ***Background:** Tooth eruption is a complex, multi - factorial process influenced by local and systemic factors. Precocious eruption of permanent teeth is rare and requires careful assessment. **Case Description:** This case report describes a rare instance of precocious eruption of permanent mandibular central incisors and first molars in a 4.5 - year - old girl. The child reported with pain in the lower left back tooth region and on clinical examination, it was found that mandibular first permanent molar is erupting while her dental age suggested this as accelerated development. **Discussion:** The radiographic analysis reveals that the erupting 31, 36, 41 and 46 teeth were in NOLLA's developmental stage 8 suggesting that 2/3rd of the root development, indicating early eruption. Despite a normal serum Thyroid Stimulating Hormone (TSH) level and no other significant health issues, the child's underweight status did not correlate with the expected patterns of dental development. Despite the absence of systemic or thyroid - related abnormalities, the case highlights an atypical pattern of early tooth eruption. This may have implications for cognitive development, growth, and pediatric dental management. **Conclusion:** This case emphasizes the need to monitor such occurrences in pediatric dentistry, as early tooth eruption may have implications for cognitive development and overall growth.*

Keywords: Tooth Eruption, Permanent Teeth, Pediatric Dentistry, Endocrine Disorders, Genetic Disorders, Cognitive Development, Child Development, Hyperthyroidism.

1. Introduction

Tooth eruption is defined as the gradual movement of a tooth from its development site within the alveolar bone to its functional occlusal position in the oral cavity. ^[1]

It is hypothesized that tooth eruption relies on the availability of space in the eruption pathway, pressure from below, and the adaptability of the periodontal membrane. ^[2] Various factors like dental follicle, bone remodeling, root formation, hydrostatic pressure can influence the mechanism of tooth eruption. Although, various tooth eruption theories states that almost all the nearby tissues were involved in tooth eruption, none of them can directly account for the tooth eruption. Hence, eruption is a multifactorial mechanism where a series of simultaneous and organized events are responsible for it to occur. Precocious or advanced dentition is a term used to define the early eruption of permanent teeth. It has been reported that this can occur due to local factors like trauma and systemic factors such as diabetes mellitus, hypothyroidism, congenital adrenal hyperplasia, precocious puberty, hemifacial hypertrophy, chondroectodermal dysplasia, osteogenesis imperfecta and in syndromes such as sturge - weber syndrome, soto syndrome and turner syndrome. ^[3] The normal eruption period for the mandibular permanent central incisors is between the ages of 6 - 7 years for which the root completion will occur by the age of 9 - 10 years ^[4] and that of mandibular first permanent molar is between 5.5 and 7 years of age, with root closure occurring at 9 to 10 years. In this case report we will discuss a very rare case of early

eruption of a permanent mandibular right and left central incisor and first molar in a 4.5 - year - old girl.

2. Case Report

A four and half - year - old girl (fig 1) walked into the Department of Pediatric and Preventive Dentistry with normal gait and is moderately built, well nourished, well oriented, alert and responsive with a chief complaint of pain in lower left back tooth region for the past 1 week. On taking the prenatal history, the child was born as full - term baby with birth weight of 2.5 kg. Family history revealed that her parents were apparently healthy and had non - consanguineous marriage. On general examination, patient weighs 20 kg with the height of 126 cm and BMI score is about 12.6, suggestive of being underweight. On assessment of vitals, the temperature was 97.7 F, the pulse rate was 72 bpm, the respiratory rate was 14 breaths per minute, the blood pressure was 110/70 mm Hg and the oxygen saturation level was at 92%. Extraoral examination shows, facial form was apparently symmetrical with no other abnormalities. On intraoral examination, no soft tissue abnormalities were noted and on hard tissue examination mixed dentition with the following set of teeth were present. (Table 1)

Table 1: Dentition of the patient

55	54	53	52	51	61	62	63	64	65		
46	85	84	83	82	41	31	72	73	74	75	36

All the primary teeth present in the oral cavity were intact and the mandibular permanent central incisor (31 and 41) were at the erupting stage with the incisal third of the tooth erupted and mandibular first permanent molar (36 and 46) were at the erupting stage with the occlusal third of the tooth erupted. There were signs of inflammation due to gingival overgrowth covering the erupting tooth. There was no history of extraction of any of the teeth. Hence, a diagnosis of “accelerated tooth eruption” was made and a panoramic radiograph was initially recommended to validate the clinical diagnosis. OPG findings revealed erupting 31, 36, 41 and 46 teeth in NOLLA’s developmental stages 8 of root

development (2/3 of the root completed) (Figure 4) at an early age of four and half years.

The patients was apparently healthy as stated by her parents and was referred to Pediatrician for further investigations of serum thyroid stimulating hormone (TSH) level which measured 0.89 $\mu\text{IU/mL}$ (within the normal range of 0.670–4.16 $\mu\text{IU/mL}$), indicating no abnormalities. To assess the correlation between accelerated molar eruption and intelligence, an IQ test was conducted, showing a score of 92 to 108, indicating average intelligence.



Figure 1: A healthy four and half year-old female



Figure 2: Occlusal view: Maxillary arch



Figure 3: Occlusal view: mandibular arch



Figure 4: OPG

3. Discussion

Tooth eruption is a multi - factorial process with various theories offering different perspectives. ^[1, 2, 3] In this case, the eruption of 31, 36, 41, and 46 teeth was noted intraorally and radio graph shows Nolla stage 8 (with 2/3 of the root completed) supporting the root elongation theory. ^[4]

During the early mixed dentition period, eruption of the first permanent molars and primary incisors occurs. ^[5, 6] In this case, 71 and 81 teeth exfoliated naturally, followed by early eruption of 31 and 41 teeth. Although the child's dental age is 6 years, the chronological age is only 4.5 years indicating early tooth eruption. Permanent teeth generally erupt between ages 6 to 7 years but, the OPG findings in this case reveal 31, 36, 41, and 46 teeth were at Nolla stage 8 (2/3 root formation) at age of 4.5 years.

Disturbances in tooth eruption timing, whether early eruption or delayed eruption may signal health issues or altered craniofacial development. Factors linked to early eruption include genetic disorders, endocrine disturbances (e. g., hyperpituitarism, hyperthyroidism), preterm birth, obesity, and malnutrition. ^[7]

Genetic disorders affecting tooth eruption fall into two categories: those impacting enamel formation (e. g., amelogenesis imperfecta, Hurler's syndrome) and those disrupting osteoclastic activity (e. g., Cleidocranial dysplasia, osteopetrosis). ^[8] Studies suggest genetic factors influence tooth development more than tooth eruption. ^[9, 10]

In this case, there was no family history of any related conditions.

Endocrine disturbances, like hyperthyroidism (common in children, especially females), can accelerate eruption. ^[11, 12] In this case, the child's TSH level was 0.89 μ IU/mL which was within the normal range, there by ruling out no abnormalities.

Studies show that the permanent teeth erupt earlier in girls due to earlier maturation. ^[13, 14, 15] This case involving a 4.5 - year - old girl, correlates with these findings.

Preterm birth may influence early tooth eruption. ^[16, 17, 18] In the present case, the child was born full - term with a healthy birth weight of 2.5 kg and no developmental issues.

Research indicates that obese children experience dental development 1.2 to 1.5 years earlier than those with normal BMI. ^[19] However, in this case, the child had a BMI of 12.6 (underweight), showing a negative correlation with early tooth eruption.

Studies show early eruption of molars and incisors in children with childhood malnutrition, but in this case, we lack details on their nutritional status at that time. ^[15] and now the child is being moderately built and moderately nourished.

Accelerated molar eruption may influence cognitive development. ^[20] The IQ test in this case showed average intelligence (92 - 108) which does not correlates that early eruption child does not have high intelligence.

Management

As the early erupted mandibular permanent central incisors (31, 41) and first permanent molar (36, 46) had a normal morphology and position in the lower arch without crowding. The patient's growth and occlusal development will be monitored at key stages over the next 10 years.

4. Conclusion

All the findings in this patient were rare and makes this case unique. In this, the patient had no associated medical history or any syndromes triggering for the marked early development and eruption of dentition. Hence, this case surfaces to be an "Idiopathic phenomenon".

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