Tooth Eruption: Topical and Systemic Factors that Influence the Process

**SUMMARY**

Several topical and systemic factors have been reported to influence the eruption of teeth. Some of the local lesions include eruption cysts, eruption sequestra, fibrous developmental malformations and dentigerous cysts. The systemic factors include Down’s syndrome, cleidocranial dysostosis, hypothyroidism, hypopituitarism and achondroplastic dwarfism. All these lesions and factors generally influence the eruption of the primary, as well as the permanent dentition. The purpose of this review article is to present up-to-date aspects of these conditions.

**Keywords:** Eruption cysts; Dentigerous Cysts; Down’s Syndrome; Cleidocranial Dysostosis; Hypothyroidism; Hypopituitarism; Dwarfism, achondroplastic

**Introduction**

Numerous studies have been performed to understand the process of tooth eruption better. The most common general symptoms during tooth eruption include anxiety (15%), diarrhea (13%), a combination of the two (8%), fever and increased salivation. Apart from general symptoms that end up to normal eruption of the teeth, several local and systemic factors have been reported to influence the eruption of teeth. The exact nature of the factors responsible for tooth eruption is not fully understood. It is believed that these factors influence the matrix formation and the calcification process.

The most important local conditions that influence tooth eruption are: eruption cysts, eruption sequestra, fibrous developmental malformations and dentigerous cysts. Systemic factors include Down’s syndrome, cleidocranial dysostosis, hypothyroidism, hypopituitarism and achondroplastic dwarfism.

The purpose of this review article is to present the current aspects of these conditions.

**Eruption Cysts**

Eruption cysts occur within the mucosa overlying a tooth that is about to erupt. They develop as a result of separation of the dental follicle from around a crown of an erupting tooth. They are considered soft tissue analogues of the dentigerous cysts. Lately, eruption cysts are described as a possible adverse effect of cyclosporine-A (CyA) administration during tooth eruption.

There is a gender predilection; the male to female ratio is 2:1. They usually appear in the region of the molars. Eruption cysts clinically appear as soft translucent swelling in the gingival mucosa. Their colour varies between deep blue and azure.

Surface trauma may result in a considerable amount of blood in the cystic fluid. Such lesions are sometimes referred as eruption haematomas. Their basic clinical characteristics are swelling, fluctuation and deep blue colour. Pain may appear only if the cyst is traumatized. Histologically, they are characterized by non-keratinized, squamous epithelium lining in the cystic wall. Differential diagnosis includes haematoma, amalgam tattoo, cysts and haemangioma.

The treatment of the eruption cysts is surgical and includes the excision of tissues over the crowns of the responsible teeth. In most cases, even this treatment is not necessary, because the cysts rupture and never appear again.

**Eruption Sequestrum**

The eruption sequestrum usually appears during the eruption of the first permanent molars. Intraorally, the...
lesions presents as a small hard tissue fragment, white in colour, and with bone-like hardness on the occlusal surface of the mandibular second molar that was erupting. Histopathologically, the fragments consist of necrotized cortical bone. Studies involving X-ray micro-analyzer revealed that the percentages of calcium and phosphorous (by weight) were 78.41% and 21.59%, respectively, with a calcium to phosphorous ratio of 3.63, which was higher than that seen in normal osseous tissue. Generally, the sequestra have little clinical significance as they can appear and disappear. However, they may retain plaque in close association with the newly erupting tooth. The retained eruption sequestrum may lead to pericoronitis or pit and fissure caries. In dental practice the presence of multiple developmental dental anomalies expressing simultaneous defects in different stages of tooth development should raise suspicion of possible manifestation of an underlying systemic abnormality, such as Ehlers-Danlos syndrome.

In most cases, fibrous developmental malformation manifests as enlargement of the gingiva, often correlated with the eruption of deciduous or permanent teeth. Gingival fibromatosis may be familial or idiopathic. The familial variations may occur as isolated finding or in association with hereditary syndromes, such as Zimmermann-Laband syndrome, Rutherford syndrome or multiple hamartomas.

Tagaki et al. described 6 categories of fibrous developmental malformation: (1) isolated familial gingival fibromatosis; (2) isolated idiopathic gingival fibromatosis; (3) gingival fibromatosis associated with hypertrichosis; (4) gingival fibromatosis associated with hypertrichosis and mental retardation, or epilepsy, or both; (5) gingival fibromatosis associated with mental retardation, or epilepsy, or both; (6) gingival fibromatosis associated with hereditary syndromes.

In most cases the enlargement begins before the age of 20. The gingiva is firm, normal in colour and covered by a smooth surface. Histopathologically, fibrous developmental malformations consist of poorly cellular, richly collagenous fibrous connective tissue underneath a normal or acanthotic epithelium. Mild peri-vascular chronic inflammation and small foci of dystrophic calcification may be observed.

Treatment is required only if the lesion annoys the patient. Surgical removal is the treatment of choice.

Inflammatory Dentigerous Cysts

Inflammatory dentigerous cysts are the most common type of developmental odontogenic cysts and mostly they are found in the mixed dentition. They are usually single and they are located in the posterior mandible. They are associated with the roots of non-vital deciduous teeth and the crown of their unerupted permanent successors. The cysts are not painful except in the case of secondary infection, or unless their size has created a pathological fracture.

There are 2 leading theories about the formation of dentigerous cysts. The first begins with fluid accumulation between the reduced enamel epithelium and the crown of the tooth. The other theory begins with a breakdown of the stellate reticulum, which forms a fluid between the inner and outer enamel epithelium.

Radiographically, the tooth may be displaced: it is not surprising to see teeth displaced to the condylar neck, the nasal floor or high in the maxillary sinus approaching the orbit. Histologically, they are composed of a thin connective tissue wall lining the lumen. The epithelium is usually parakeratinized or orthokeratinized. Rete peg formation is usually absent and an inflammatory cell infiltration of the connective tissue is common. In about 50% of cases, dentigerous cysts can cause resorption of the adjacent unerupted teeth.

Treatment of choice is the extraction of the infected deciduous tooth and continuous drainage of the cyst. Simultaneous with the eruption of the permanent tooth, ossification of the bony defect can take place. The reparatory process is completed in 1-2 years. Marsupialization is less ideal; it runs the risk of damaging developing teeth or neurovascular bundles during the enucleation.

Down’s Syndrome

Down’s syndrome (trisomy 21) is one of the congenital pathologic conditions in which delayed eruption of the teeth is frequently observed. Various studies in children with Down’s syndrome have shown that delayed tooth eruption is common, but sporadic. The eruption usually follows an abnormal sequence and some of the deciduous teeth may be retained until the age of 15 years. The eruption abnormalities are associated with retardation in the growth of maxilla and mandible. A reduction of the anterior skull base and protrusion of lower incisors is often observed, which is related to a tendency to anterior cross-bite and, to a lesser extent, to diminished overbite.
Cleidocranial Dysplasia

Cleidocranial dysplasia is a hereditary disorder characterized by abnormal clavicles, delayed fusion of the bones in the skull, extra teeth and short stature. Other bones, such as the ribs, pelvis and bones of the hands and feet may also be affected. Most patients with cleidocranial dysplasia do not have significant physical or mental disability33.

The development of the dentition is delayed and may reach the age of 15 years. Oral radiographs usually show many unerupted and supernumerary permanent teeth. Even after extraction of the deciduous or supernumerary tooth, eruption of the permanent dentition may be delayed without the proper orthodontic intervention34.

Hypothyroidism

Undetected and untreated congenital hypothyroidism is a rare condition that leads to mental deficiency and dwarfism. This pathologic entity is known as cretinism. The head of these patients is disproportionately large. They are obese and their extremities are abnormally short. The dentition of the child with cretinism is delayed in all stages, including the primary and the permanent dentition. Due to the small size of the jaws teeth are usually crowded. The tongue is large and often causes anterior open bite and malocclusion. Delayed eruption of the permanent dentition may also be observed in juvenile hypothyroidism (acquired hypothyroidism), which usually occurs between 6 and 12 years of age. Because juvenile hypothyroidisms appears after the period of rapid growth, its orofacial manifestations are more mild compared to congenital hypothyroidism35.

Hypopituitarism

Hypopituitarism in children leads to nanism. Characteristic orofacial features are the maldevelopment of the face, the defective development of jaws and the delayed eruption of teeth. Cases of long delays of the absorption of primary teeth roots have been reported, which results in the delay of permanent teeth eruption36. This delay usually lasts 1-3 months for the teeth that erupt during the first decade, and 3 to 10 years for the teeth that erupt during the second decade of life. Another frequent finding is the absence of germs of the third mandibular molars37.

Frohlich’s syndrome, or lipogenetic dystrophy, is usually caused by neoplasms of the pituitary region and often results in hypopituitarism. The dental findings of the syndrome include delayed eruption of the teeth.

Hutchinson-Gilford disease or progeria is caused by anterior pituitary lobe malfunction. Delayed eruption of the teeth is also included in the clinical findings of this disease.

Achondroplastic Dwarfism

Achondroplastic dwarfism is the most common type of dwarfism and is clinically manifested with a characteristic appearance. There are short muscular extremities, brachycephalus, and bowed legs. The oral manifestations include retruded maxilla, disparity in the size of the jaws resulting in malocclusion, and delayed eruption of the teeth38.

References


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