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Developmental Enamel Defects of Primary Teeth: A Review

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Abstract- Developmental enamel defects of primary dentition result from effect of various systemic problems during pre and early post natal periods. These defects also act as virtual memory of early developmental stresses/events. Primary tooth hypoplasias are risk factors for occurrence of other dental deformities. Multiplicity and severity of the lesions make treatment procedures complex. Establishment of Dental home as early as pregnancy can be done for preventing the deleterious effects of the disease. The author is of opinion that pediatric dentists especially should be aware of this condition because 1) These children are more likely to visit dental service at a younger age because the condition presents early in childhood, 2) Severe morbidity leading to handicapped dentition at early age, 3) complexity of disease as well as its treatment.

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Developmental Enamel Defects of Primary Teeth: A Review

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Abstract- Developmental enamel defects of primary dentition result from effect of various systemic problems during pre and early post natal periods. These defects also act as virtual memory of early developmental stresses/events. Primary tooth hypoplasias are risk factors for occurrence of other dental deformities. Multiplicity and severity of the lesions make treatment procedures complex. Establishment of Dental home as early as pregnancy can be done for preventing the deleterious effects of the disease. The author is of opinion that pediatric dentists especially should be aware of this condition because 1) These children are more likely to visit dental service at a younger age because the condition presents early in childhood, 2) Severe morbidity leading to handicapped dentition at early age, 3) complexity of disease as well as its treatment.

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I. INTRODUCTION

Enamel formation or amelogenesis is an orchestrated genetic mechanism but is prone to environmental disturbances. Enamel defects once produced during development cannot undergo further repair. Formation of primary tooth enamel occurs during prenatal and early post natal periods. Hence, developmental defects of enamel act as a repository or storehouse of information regarding environmental insult received.^{1,2} They can help in detection of effect of systemic insults and their timing.³

Developmental defects of enamel are described in literature by different ways; based on clinical presentation (ex. deciduous hypoplasia), teeth affected (ex. primary molar hypoplasia), causative agent (hyperbilirubinemic staining of primary teeth), histopathology of the defect (primary enamel hypoplasia) and several others are used.⁴

It is seen that preterm birth is associated with hypoplasia in primary teeth. With increase in the survival of preterm babies due to better pre/ante natal care, number of diagnosed cases with enamel hypoplasias

has increased off late.⁵ Primary tooth hypoplasia is risk factors for occurrence of several dental deformities like increased amount of caries, esthetic deformities, and faster attrition of teeth leading to loss of vertical dimension. Primary tooth hypoplasia has also been shown as a marker for developmental defects in permanent teeth.

The author is of opinion that pediatric dentists especially should be aware of this condition because 1) These children are more likely to visit dental service at a younger age because the condition presents early in childhood, 2) Severe morbidity leading to handicapped dentition at early age, 3) complexity of disease as well as its treatment. Hence an attempt is done to appraise the present knowledge regarding the condition and present 2 cases.

II. ETIO-PATHOGENESIS

Several causative factors and risk factors are proposed to cause or enhance primary enamel defects. Some of these are- systemic factors like nutrition, hypoglycemia, hypocalcaemia, low birth weight (<1.0 Kg), metabolic disorders such as hyperbilirubinemia, metabolic bone disease, respiratory distress, cardiac disease (patent ductus arteriosus), sepsis, necrotizing enterocolitis and neurological disorders are implicated. The non-specific appearance of enamel defects make diagnosis of type of aetiological factor difficult.^{6,7,8,9} and local factors like trauma to tooth buds caused by the laryngoscope blade during endotracheal intubation is implicated.⁵ There is association between enamel defects and shorter period of breast feeding, early introduction of bottle feeding and greater caries activity;¹⁰ there is correlation between low socioeconomic county and children with low height and weight for age and primary enamel defects.¹¹

Lunt and Law (1974) proposed a chart concerning calcification of primary teeth. This chart is routinely used to estimate the ontogenetic timing and duration of the insult.¹² Neonatal lines are also used as a reference planes to estimate the approximate timing of an insult relative to the position of the defect.¹³

Several factors make detection of developmental defects difficult; they are- masking of defects by saliva, dental plaque, and use of improper lighting. Additionally confounding effects of post-eruptive alterations such as dental caries, attrition, and traumatic loss of tooth structure can impair the detection of

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developmental enamel defects. Absence of population specific chronological charts regarding primary enamel formation can limit diagnosis.¹⁴

III. CLINICAL FEATURES

Manifestation of primary teeth hypoplasia range from simple demarcated opacity to diffuse opacity to complete absence of enamel. The characteristic of opacities are that the lesions are multiple, symmetric and chronologic.^{15,16}

A child may even present with early childhood caries at the time of first dental visit. In such conditions, it is difficult to see signs of developmental defects which would have preceded caries (developmental defects usually affects several teeth and are easily prone to caries). The clinical manifestations vary with respect to etiological agent (type, amount and duration) and tooth factor (time of calcification and metabolic activity).¹⁷

Prevalence: Needleman in his study found enamel defects did not vary with race, gender, side of mouth or individual tooth types.¹⁸

Systemic problems: Enamel defects in primary teeth can also give clues concerning general systemic pathologies. It can help clinicians ascertaining the role of systemic defects and the environmental factors. Few studies include- Herman & Mc Donald found association between time of occurrence of primary enamel defects and brain injuries in which etiology could not be clearly determined. Cohen & Diner observed enamel defects occurred with greater frequency in children with low intelligence quotient and high incidence of neurological deficits. Oliver & Owings showed association between primary enamel defects and severe renal disease.^{19,20,21}

Dental problems: Clinical significance of enamel hypoplasia include poor esthetics, tooth sensitivity, malocclusion and predisposition to dental caries.²² Enamel defects in primary dentition are a risk factor for presence of enamel defects in the permanent dentition.^{23,24}

Developmental enamel defects such as hypoplasia have been speculated to increase the risk of dental caries in the affected teeth.²⁵ Hypocalcified teeth have higher porosity and can increase dental plaque retention. It shows greater solubility.²⁶ Surfaces with enamel defects have wrinkled surfaces causing greater biofilm adherence and leading to accumulation of higher number of *Streptococcus mutans*.²⁷

Several indices are published to record developmental defects clinically, Developmental Defects of Enamel is the commonly used index.^{12,28,29}

IV. PREVENTION & INTERCEPTION

Prevention of developmental defects in primary tooth is easier said than done; because most of the lesions happen during pre natal and early post natal

periods. For this the roles of allied prenatal and postnatal health care professionals play a more significant role than dental care. Lone way of preventing is by reducing the number of associated risk factors. In this context establishment of Dental home as early as pregnancy can be of little hope.

Interception of the deleterious effects of primary tooth hypoplasia is the only course. Interception should begin as soon as the diagnosis is made. Constant supervision of the child can help clinician render appropriate care as each tooth erupts into oral cavity. Tooth regenerative agents like fluoride & calcium phosphate agents can prevent further breakdown and halt the carious process. Diet counseling and establishment of good oral hygiene procedure is done to decrease caries activity. Acrylic jigs or custom made bite blocks can be given to prevent effects of attrition in case of very soft enamel.

V. TREATMENT

Multiplicity and severity of the lesions make treatment procedures complex. Treatment is aimed to maintain teeth in healthy state as much as possible until permanent teeth erupt into oral cavity. Esthetic solutions for anterior teeth include use of adhesive restorations; and in case of very soft teeth, use of polycarbonate crowns and celluloid strip crowns are recommended. Posterior teeth can be protected using stainless steel crowns.^{30,31,32} Pulp therapy is performed in indicated teeth. In case of nonrestorable teeth extraction is performed followed by placement of space maintainer.

VI. LEARNING POINTS

- Problems associated with primary enamel hypoplasia include poor esthetics, tooth sensitivity, malocclusion and predisposition to dental caries.
- Primary enamel defects such as hypoplasia have been speculated to increase the risk of dental caries in the affected teeth. In such conditions there is Severe- Early Childhood Caries category of caries causing burden on patient, parent & dentist in treating them.
- Prevention primary tooth hypoplasia is easier said than done; because most of the lesions happen during pre natal and early post natal periods.

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