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Tooth abnormalities and soft tissue alterations in Misan Primary Schools

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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

يَرْفَعِ اللَّهُ الَّذِينَ آمَنُوا مِنْكُمْ وَالَّذِينَ أُوتُوا
الْعِلْمَ دَرَجَاتٍ

صَدَقَ اللَّهُ الْعَلِيِّ الْعَظِيمِ

Certification of the Supervision

I certify that this project was prepared by the fifth-year student "Zainab Salam Flih,Zahra Kadim Zaghir,Moamel Hussein Jabar " under my supervision Dentistry/University of misan in partial fulfilment of the at the College of graduation requirements for the Bachelor Degree in Dentistry .

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Abstract

Unique dental conditions in children include odontogenic cysts and tumors, hereditary dental diseases, developmental anomalies, and lesions associated with the eruption of the primary or permanent teeth. Many of these conditions have long lasting effects on the adult dentition in terms of affecting esthetics, function, and overall quality of life. Inherited dental syndromes affect the dental hard tissues specifically the enamel, dentin, and/or cementum in a generalized manner, involving both primary and permanent teeth. These conditions manifest in altered quality or quantity of the hard tissues, leading to fragility, tooth loss and dental diseases such as caries, periapical pathology, and periodontal disease. This category includes amelogenesis imperfecta, dentinogenesis imperfecta, dentin dysplasia, hypophosphatasia, and hypophosphatemia. Developmental defects such as regional odontodysplasia are defined by involvement of the primary and permanent dentition in a localized manner, identified in early childhood. This review will elaborate on the histologic findings in these selected dental conditions with a discussion on clinical and radiographic findings, as well as molecular features wherever appropriate

1.Introduction

The tooth is a specialized part of the human body, understanding the development of which is enigmatic and still challenging. The successful development of tooth depends on a complex reciprocal interaction between the dental epithelium and underlying ectomesenchyme. The interaction involves a complex series of molecular signals, receptors and transcription control systems.(1) Anomaly (Gk, anomalos; irregular) is a deviation from what is regarded as normal . Disturbance of the epithelium and mesenchymal interactions can markedly alter the normal odontogenesis leading to the developmental anomaly of teeth.(2) There are many acquired and inherited developmental abnormalities that alter the size, shape and number of teeth. Individually, they are rare but collectively they form a body of knowledge with which all dentists should be familiar.(3) abnormalities in the differentiation of the dental lamina and the toothgerms (anomalies in number, size, shape) or to abnormalities in the formation of the dental hard tissues (anomalies in structure). In some, both stages of differentiation are abnormal.More than 300 genes have been known to be expressed in teeth that are responsible for odontogenesis (4). Defects in these genes have been found to be one of the reasons for alteration of the morphology of tooth (4) The anomalies affecting the morphology of teeth comprise of talon cusp, dens invaginatus, dens evaginatus, gemination, fusion, root dilacerations, taurodontism, concrescence, and supernumerary roots. The most commonly seen anomaly related to shape is fused teeth(5).Developmental dental anomalies of permanent dentition, in comparison to their primary counterpart, can lead to both short- and long-term complications subsequently causing irreversible damages. The anomaly may involve only a single tooth or may be a component of a syndrome. These anomalies generally remain unnoticed in clinical practice, as they are rarely the chief complaint of the patient and is overcome by other common oral diseases such as dental caries or periodontal diseases.(6)

2. Review

The development of teeth is regulated by genes, but the genetic program is very sensitive to disturbances in the environment such as infection, or toxic chemicals. The causes of developmental disorders of teeth are multifactorial, involving the interaction of genetic and environmental factors. These disorders may be prenatal or postnatal in origin and may inherit or acquired. Disorders of development of teeth may be due to abnormalities in the differentiation of the dental lamina and the tooth germs, causing anomalies number, size, form of teeth and abnormalities of morph differentiation or abnormalities in the formation of the dental hard tissue resulting in disturbances in tooth structure ((abnormalities of histo differentiation)). Dental anomalies are caused by complex interactions between genetic, epigenetic and environmental factors during the long process of dental development. This process is multifactorial, multilevel, multidimensional and progressive over time.(7) These are the most severe of congenital anomalies which affect the mouth and related structures. The roof is shaped from the palate and flooring from the constructions at the floor of the mouth. Laterally, it's bounded from the cheeks. A cleft is a congenital abnormal space or gap in the upper lip, alveolus, or palate. The colloquial term for this condition is harelip. The use of this term should be discouraged due to its demeaning connotation of inferiority.(8)

2.1 The anomalies of teeth

classified based on:

1. Number of teeth.
2. Size of teeth.
3. Shape of teeth.
4. Eruption time of teeth.

2.1.1.The anomalies realated to teeth

Each jaw is designed to hold only a specific number of teeth at a particular age.The primary teeth are 20 in number and permanent are 32.Now we shall discuss the anomaly/abnormality in the number of teeth

2.1.1.a Hypodontia (Congenitally Missing Teeth)

Is the developmental absence one or more primary or secondary teeth. The occurrence of congenitally missing teeth may be single or multiple, unilateral or bilateral and in one or both the jaws (9) Hypodontia is classified based on severity: (10)

- . Mild hypodontia: one or two missing teeth
- . Moderate hypodontia: three to six missing teeth
- . Severe hypodontia/oligodontia: more than six missing teeth
- . Anodontia complete absence of teeth in one or both dentitions fig



The Aetiology of Hypodontia

is varied and that genetic, epigenetic and environmental factors may be contributory factors. As with other conditions, the causes of missing teeth can be classified into general and local. The general category includes cases where there is a genetic cause, particularly syndromes such as Down syndrome, cleft lip and palate and ectodermal dysplasia. Local factors that result in hypodontia include early irradiation of tooth germ hormonal and metabolic influences, trauma, osteomyelitis and unintended removal of a tooth germ during the extraction of a primary tooth (11)

2.1.1.b Supernumerary teeth

Supernumerary teeth are defined as those in addition to the normal series of deciduous or permanent dentition. They may occur anywhere in the mouth. They may appear as a single tooth or multiple teeth, unilaterally or bilaterally, erupted or impacted and in mandible/maxilla or both the jaws. The prevalence of supernumerary teeth varies between 0.1 and 3.8% and is more common in the permanent dentition (12). The incidence is considerably higher in the maxillary incisor region followed by maxillary third molar and mandibular molar, premolar, canine and lateral incisors (13)



Depending on their positioning in the dental arch, they are classified as follows

1. parapremolar additional tooth in premolar region
2. Distal to regular molars
3. Area of lateral incisors In primary teeth, the morphology of the supernumerary teeth is usually similar to teeth or conical but it has 4 common shapes in permanent teeth.(14)

- 1.conical small/peg shaped tooth with normal root
- 2.tuberculate barrel shaped crown with rudimentary root, often paired
- 3.supplemental: duplication of tooth in the normal series (mostly in deciduous dentition and in permanent maxillary lateral incisor and mandibular premolar)
- 4.odontome: no regular shape, disorganized diffuse mass of dental tissue

Aetiology of Supernumerary Teeth:

occurrence due to hyperactive dental lamina (15). And due to a combination of genetic and environmental factors (16). Generally, multiple supernumerary teeth are associated with diseases or syndromes.(17)

2.1.2. Anomalies in the size of teeth.

2.1.2.a Microdontia

Microdontia is used to describe teeth which are smaller than normal i.e. outside the usual limits of variation [18]. The most frequently affected teeth are maxillary lateral incisor and third molars



1. Generalized microdontia: All teeth are smaller in size compared to normal tooth size, it is a rare anomaly and occurs due to pituitary dwarfism

2. Relative generalized microdontia: The teeth are smaller or normal in size but the jaw is comparatively larger, which makes the teeth appear relatively small. The reason for this condition could be related to genetic variation, if the morphology of teeth is inherited from one parent and jaw size from the other

3. Single tooth microdontia: A single tooth in the whole arch which is smaller in size compared to the rest of the teeth. Example is peg shaped lateral which is smaller in size than normal

Etiology of Microdontia

Proportional microdontism is generally associated with dwarfism due to hypofunction of the pituitary gland. Small teeth in normal or large jaws may be due to cross inheritance (19). This abnormality is frequently inherited and occurs especially in the weakest teeth, the maxillary second incisors (20)

2.1.2.b. Macrodonia

refers to the teeth that are larger than normal (21).It has been classified as true generalized macrodonia – this condition in which all the teeth are larger than normal has been associated with pituitary gigantism, but is extremely rare
Relative generalized macrodonia – In this normal or slightly larger than normal teeth are present in small jaws, the disparity in size giving the illusion of macrodonia, macrodonia of single teeth – It is relatively uncommon (22,23)



Etiology of Macrodonia

Proportional Macrodonia is usually caused by hyperpituitarism which increases the length of the long bones and teeth. Disproportional dental Macrodonia, on the otherhand, is suggestive of cross inheritance - large teeth from one parent, small jaws and skeleton from the other(24). Hyde (1938) mentioned that size is markedly influenced by heredity and that the inheritance of large teeth is a dominant character (25)

2.1.3. Anomalies in the Shape of teeth:

2.1.3.a. Dens evaginatus:

Is a rare dental anomaly involving an extra cusp or tubercle that protrudes from the occlusal surface of the affected tooth (26). Also called as Occlusal Tuberculated Premolar, cong's Premolar, vaginated Odontome and Occlusal Enamel Pearl. Prevalence of Dens Evaginatus is between 1% and 4% (27).

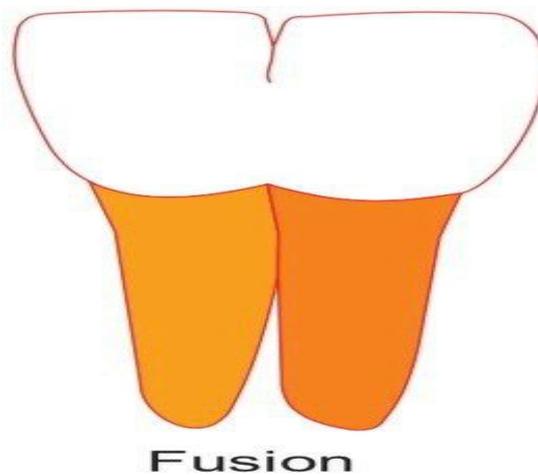


Etiology of Dens evaginatus

It is the result of an abnormal proliferation of the inner enamel epithelium into the stellate reticulum of the enamel organ (26). Lau (1955) described it as an odontoma of the axial core type. The family involvement and the association of the talon cusp with other dental abnormalities suggest that genetics may be a major causative factor (28). However, sporadic occurrences of this abnormality probably are induced by trauma or other localized insults affecting the tooth germ

2.1.3.b. Fusion

In 1963 Tannenbaum and Alling defined fusion as a union of two separate tooth buds at some stage in their development. Depending on the stage they are united, one tooth may have only one pulp chamber as a gemination, or there may be two pulp chambers, with union only of the dentin (29)



Etiology of fusion

Fusion arises through the union of two normally separated tooth germs (Duncum 1987) (30). Greth (1936) suggested that fused teeth are produced by some physical action, perhaps special pressure forcing young tooth germs into contact, causing necrosis of the intervening tissue and giving the enamel organ and the dental papilla an opportunity to unite. If this occurs very early, the crowns may fuse. At a later stage fusion would affect the roots only because the crowns have been separately developed (25)

2.1.3.c. Gemination

In 1963 Tannenbaum and Alling, defined gemination as the formation of the equivalent of two teeth from the same follicle, with evidence of an attempt for the teeth to be completely separate, indicated clinically by a groove or depression which could delineate two teeth. The prevalence of geminated teeth ranges from 0.5% - 2.5% (31)



Etiology of Gemination

Geminated teeth are produced by abnormal odontogeny. Colyer (1926) was the first to show an irregular epithelial invagination in the enamel organ which seemed to be an attempt to divide it and form two teeth. The result is a bifid crown with confluent roots and root canals

2.1.3.d. Dilaceration

is defined as an angular position between the two parts of a tooth (32,33) . This is due to an abnormality in the formation of the tooth whereby the calcified part is displaced in relation to the uncalcified part (33). when a deciduous tooth is driven apically into the jaw, a displacement of or injury to the germ of the permanent successor may occur; either an angle between the crown and the root or a disturbance in the formation of the hard dental tissues may result.



Etiology of Dilaceration

The germs of the permanent incisors are initially situated lingual to the apices of the deciduous teeth. their further development, the germs gradually get nearer to the resorbing roots of the deciduous teeth. If the already calcified part of the germ is displaced, in relation to the unclarified part, by trauma, the result may be dilacerations or circular hypoplasia.(34)

2.2.The anomalies of soft tissue

Cleft lip : The failure of fusion of the frontonasal and maxillary processes, resulting in a cleft of varying extent through the lip, alveolus, and nasal floor (an incomplete cleft does not extend through the nasal floor, while a complete cleft implies lack of connection between the alar base and the medial labial element).[35]

Cleft palate : The failure of fusion of the palatal shelves of the maxillary processes, resulting in a cleft of the hard and/or soft palates.[35] Clefts arise during the fourth developmental stage. Exactly where they appear is determined by locations at which fusion of various facial processes failed to occur, this in turn is influenced by the time in embryologic life when some interference with development occurred.[36]



Etiology of cleft lip and palate

is complex and thought to involve genetic influences with variable interactions from environmental factors

A. Genetic: Genetic cause includes

(1)

Syndromic: Here cleft is associated with other malformation. Usually it is due to a single gene (monogenic or Mendelian) disorder

(2)

Non-syndromic: Here the cleft is mostly an isolated feature and occurs in the vast majority of individuals having a cleft lip or palate

B. Non-genetic factors: Besides genetic factor environmental factors also play a very important role in etiology of CL/P.[38]

various environmental factors includes

a) Smoking: The relationship between maternal smoking and CLP is not strong, but it is significant. Several studies have consistently yielded a relative risk of about 1.3–1.5

b) Alcohol use: Heavy maternal drinking, apart from causing fetal alcohol syndrome, also increases the risk of CLP. Munger et al. (1996) showed that maternal drinking increased the risk for CLP by 1.5–4.7 times in a dose-dependent

c) Others: Environmental factor includes maternal diseases, stress during pregnancy chemical exposure.[37] Decreased blood supply in nasomaxillary region.[39] increased maternal and parental age are also said to increase risk of cleft lip with and without palate while higher parental age has been associated with cleft palate only.[40](41)

Dental problems in cleft lip and palate

1. Natal and neonatal teeth: Presence of neonatal teeth does not appear to influence primary or secondary dentition in clefts. Most natal teeth among clefts are located in the lateral margin of the premaxillary and maxillary segments unlike in non-cleft neonates.[44,43)
2. Microdontia Small teeth (microdents) frequently are found with CL/P. This is usually more common in cases where lateral incisors are not missing
3. Taurodontism : has been reported to be associated with certain syndromes and dental developmental disorders (Cichon and Pack, 1985).[43)
4. Ectopic eruption: Clefts also contribute to the ectopic eruption of primary lateral incisors which may erupt palatally adjacent to or within the cleft side while permanent canine on side of alveolar clefts may erupt palatally. Delayed eruption of permanent incisors may be seen.[44,43)
5. Enamel hypoplasia: Enamel hypoplasia was found to occur more frequently in CL/P
6. Delayed tooth maturation: Several growth factors are of major importance during craniofacial development, and these factors may be overexpressed or underexpressed when a cleft defect occurs.

Other associated conditions

1. Speech difficulties Due to the dysfunction of m. levator veli palatini muscle phonation are affected. Retardation of consonant sound (p, b, t, d, k, g) is most common findings. Abnormal nasal resonance and difficulty in articulation are another characteristic feature in most individuals with cleft lip and palate.[42,45)

2. Ear infection: Due to improper function of m. tensor veli palatini muscle, which opens the Eustachian tube, otitis media is observed in these patients

3. Feeding problems: A child with a cleft palate can have difficulty sucking through a regular nipple due to the gap in the roof of the mouth. An infant's ability to suck is related to two factors: the ability of the external lips to perform the necessary sucking movements and the ability of the palate to allow the necessary build-up of pressure inside the mouth so that foodstuff can be propelled into the mouth

3.Discussion

During the period of writing the research, we visited many schools and under the (الوجدان, الانعام, المختار, روضه اطفال العماره), kindergartens, including supervision of (Dr. Majeed Hussein), to view and learn about cases and congenital malformations within the oral cavity, which includes hard tissues and soft tissues, which relate to the subject of our research on the city of Maysan . We examined approximately 600 students of both sexes (females and males) for ages ranging from 5-12, and from this number we found many cases related to deformities of the teeth and adjacent tissues, which were included through percentages, where the percentage of cases that included a number of people who have a cleft palate are 0.8% or slightly higher compared to the number of people who have a cleft lip. There are some rare cases where they have extra anterior teeth, as well as hereditary loss of some teeth, including the incisors, or deformation of the lateral incisors.

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