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REVIEW ARTICLE

DEVELOPMENTAL ANOMALIES AFFECTING SHAPE OF TEETH

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ABSTRACT

Developmental anomalies affecting shape of teeth are common in pediatric patients visiting dental clinics. Some of them need special dental considerations and also the education of parents regarding the same, for example Talon's cusp on the palatal or lingual sides of incisors has a grove which is site for food lodgement and dental caries. So special attention must be given by parents as well as dentist towards such anomalies. This paper highlights Anomalies affecting shape of teeth.

INTRODUCTION

To err is human, but alas!, sometimes even god makes little mistakes; that we term as "**Developmental Anomalies**" Any abnormality or defect results from interference with the normal growth and differentiation of the fetus. Such defects can arise at any stage of embryonic development, vary greatly in type and severity, and are caused by a wide variety of determining factors, including genetic mutations, chromosomal aberrations, teratogenic agents, and environmental factors. It is estimated that about 25% of Mendelian disorders have craniofacial manifestations. The great majority of chromosomal disorders and several environmental disorders affect the oral cavity. The National Institute of Dental and Craniofacial Research (NIDCR) estimate that in the United States a baby is born every hour with a craniofacial defect. This paper highlights Developmental anomalies affecting shape of Teeth.

Gemination [1,2]

Geminated teeth are developmental anomalies of tooth shape that arise from an abortive attempt by a single tooth bud to divide, resulting in a bifid crown. They are found more frequently in the primary than in the permanent dentition. It is also called as schizodontism there seems to be no gender differences in occurrence. Gemination, however, is most often seen in the maxillary primary incisors and the canines.

Etiology

The etiology of geminated teeth remains unknown. Spouge in 1973 suggested that the condition may result from trauma to the developing tooth bud. Evidence from case history studies suggests that the anomaly exhibits a hereditary tendency. The mode of inheritance is probably either autosomal recessive or dominant with very little penetrance. It appears that gemination is caused by complex interactions among a variety of genetic and environmental factors.

Clinical features

Gemination is a partial cleavage of a single tooth germ resulting in 2 partially or totally separated crowns with enlarged pulp chamber and one root. With gemination, a normal number of teeth are maintained. The anomalous tooth has a large bifid crown and is usually found as an isolated trait, not associated with any syndrome.

Clinical significance

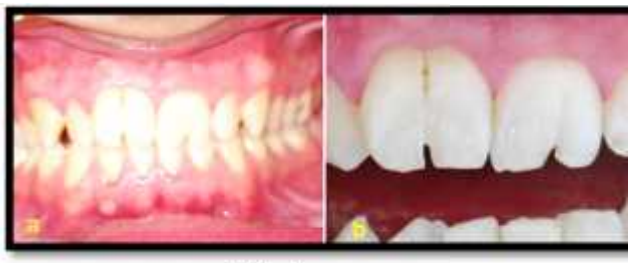
The anomaly causes tooth malalignment, spacing problems, arch asymmetry, unacceptable appearance, periodontal involvement and impedes the eruption of the adjacent tooth.
If geminated tooth is present in anterior region, then it gives unaesthetic appearance.

Treatment

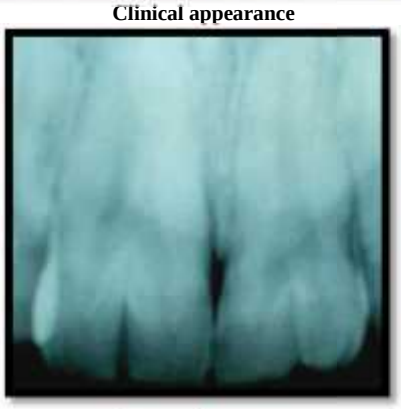
It is important to create or achieve functional and esthetic success in these cases. Several treatment methods have been

described in the literature with respect to the different types and morphological variations of geminated teeth, including endodontic, restorative, surgical and periodontal treatment.

GEMINATION



Clinical appearance



Radiographic appearance

Figure 1

Fusion [3, 4]

A fused tooth can be defined as a single enlarged and joined tooth in which tooth count reveals a missing tooth when anomalous tooth is counted as one except if tooth is fused with supernumerary tooth where the tooth count is normal. It is also called as synodontism.

Etiology

The etiology of fusion is still unknown, but the influence of pressure or physical forces producing close contact between two developing teeth has been reported as one possible cause.
Genetic predisposition and racial differences have also been reported as contributing factors. This process involves epithelial and mesenchymal germ layers resulting in irregular tooth morphology and large size.

Clinical features

Teeth are joined by the dentine; pulp chambers and canals may be linked or separated depending on the developmental stage when the union occurs. This anatomic irregularity occurs more often in the deciduous than in the permanent dentition. Fusion can occur between teeth of the same dentition or mixed dentitions, and between normal and supernumerary teeth

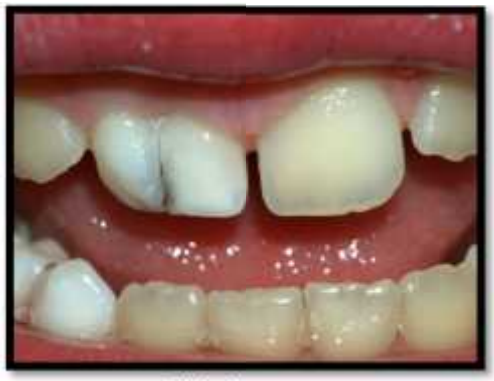
Clinical significance

In the anterior region this anomaly also causes an unpleasant aesthetic tooth shape due to the irregular morphology. Presence of fissures or grooves at the union between fused teeth predisposes it to caries and periodontal disease.

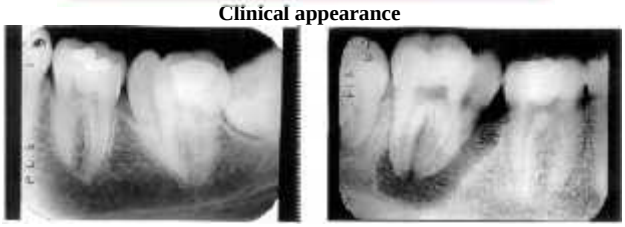
Treatment

Fused teeth usually present asymptomatically. Hence careful monitoring of the condition is recommended. everal treatment methods have been described in the literature with respect to the different types and morphological variations of fused teeth, including endodontic, restorative, surgical and periodontal treatment

FUSION



Clinical appearance



Radiographic appearance

Figure 2

Concrescence [5, 6]

Concrescence represents a rare developmental anomaly in which two fully formed teeth are joined along the root surfaces by cementum.

Etiology

The exact etiology of concrescence has not yet been explained, many authorities suspect that space restriction during development, local trauma, excessive occlusal force, or local infection after development play an important role

Clinical Features

Concrescence is a twinning anomaly involving the union of two teeth by cementum only It may involve either primary or secondary teeth. Concrescence is most frequently noted in maxillary molars, especially a third molar and a supernumerary tooth. Concrescence may occur during root formation or after the radicular phase of development is complete. If the condition occurs during development, it is called true concrescence; if it occurs later, it is acquired concrescence.
The cardinal radiologic sign of concrescence is close proximity of adjacent teeth with no detectable intervening periodontal ligament space shadow.

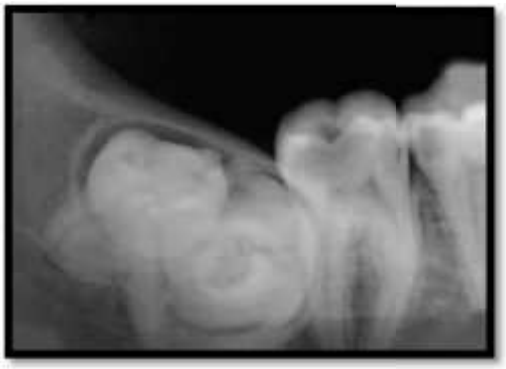
Clinical Significance

When developmental, it might be associated with failed eruption of one or more teeth.

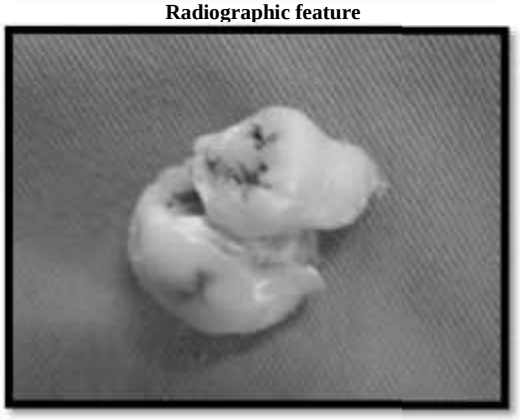
Treatment

If the union does not affect aesthetics or cause eruption pathologies, no treatment is required. Selective shaping (coronoplasty) with or without placement of full crowns can be used. Some cases exhibit pulpal or coronal anatomic features that prevent reshaping and require surgical removal with prosthetic replacement.

CONCRESCENCE



Radiographic feature



Post operative specimen

Figure 3

Dilaceration [7, 8]

The term "dilaceration" is applied to teeth which have the long axis of either the whole or part of the root formed at an angle to the crown

Etiology

These deformities to the permanent tooth may be the result of trauma to the primary tooth during the development of its permanent successor because of which the position of calcified portion of the tooth is changed and remainder of the tooth is formed at an angulation.

Clinical Features

The term dilaceraton refers to an angulation or sharp bend or curve in the root or crown of the formed tooth.
The curve or the bend can be anywhere along the lenth of the tooth, sometimes at the cervical portion, at other times midway along the root or even just at the apex of the root depending on the extent of root formed at the time of injury.

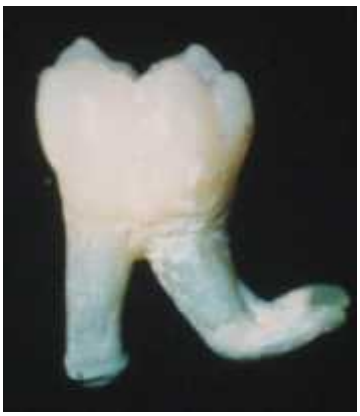
Clinical Significance

Dilacerated teeth frequently present difficult problems at the time of extraction.

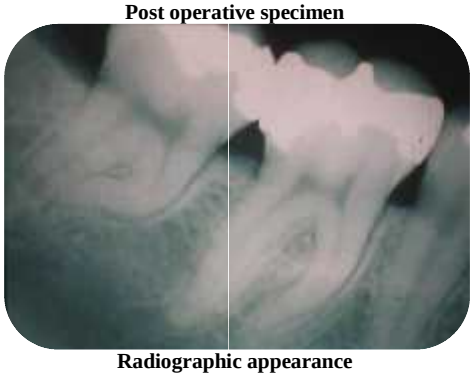
Treatment

It is advisable to keep patients under observation after trauma and consult an orthodontist at an early stage in case of non eruption of teeth. The reason for this is that early extraction and orthodontic closure of the diastema may be preferred to ligation and movement.

DILACERATIONS



Post operative specimen



Radiographic appearance

Figure 4

Taurodontism [9, 10]

It is an aberration of teeth that lacks the constriction at the level of the CEJ characterized by elongated pulp chambers and apical displacement of bifurcation or trifurcation of the roots, giving it a rectangular ‘bull’ shape.

Etiology

It is diverse commonly attributed to the failure of invagination of the epithelial root sheath sufficiently early to form the cynodont. Autosomal transmission of the trait has also been observed. Reichart and Quast had reported a case of taurodontism in which a long term Osteomyelitis occurred during periods of tooth formation, interfered with dental development and resulted in Taurodontism.

Clinical features

Witkop defined Taurodontism as “teeth with large pulp chambers in which the bifurcation or trifurcation are displaced apically, so that the chamber has greater apico-occlusal height than in normal teeth and lacks the constriction at the level of cemento-enamel junction (CEJ). The distance from the trifurcation or bifurcation of the root to the CEJ is greater than the occluso-cervical distance” It can occur alone limited to one or more teeth or it can be associated with various syndromes like Down’s syndrome, Klinefelter’s syndrome, etc. It may be unilateral or bilateral and affects permanent teeth more frequently than primary teeth. In 1928 Shaw classified it as Hypo, Meso or Hyper Taurodontism based on degree of apical displacement of pulpal floor.

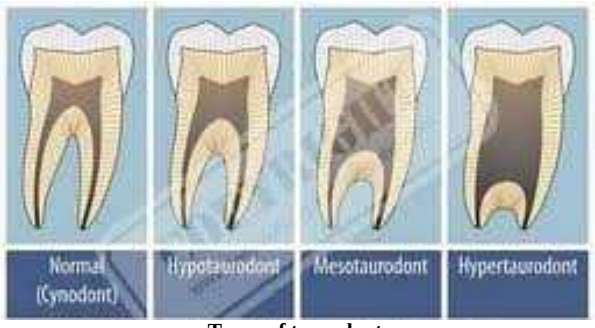
Clinical significance

If carious involvement occurs, endodontic treatment and obturation is difficult.

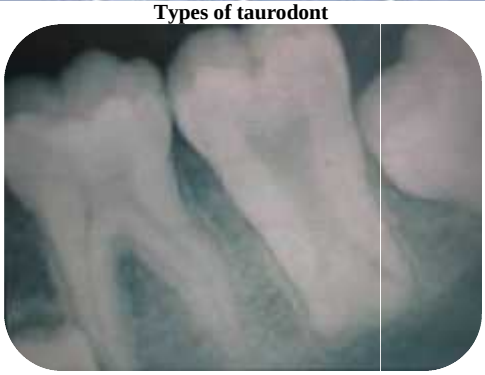
Treatment

If the tooth is asymptomatic no treatment is required.

TAURODONTISM



Types of taurodont



Radiographic appearance

Figure 5

Talon's Cusp[11]

The talon cusp, or dens evaginatus of anterior teeth, is a relatively rare developmental anomaly characterized by the presence of an accessory cusplike structure projecting from the cingulum area or cemento enamel junction of the maxillary or mandibular anterior teeth in both the primary and permanent dentition.

Etiology

The etiology of talon cusp is not well understood, but appears to have both genetic and environmental components. It may occur as a result of outward folding of inner enamel epithelial cells and transient focal hyperplasia of the peripheral cells of mesenchymal dental papilla.

Clinical features

The anomalous structure is composed of normal enamel and dentin and either has varying extensions of pulp tissue into it or is devoid of a pulp horn. In its typical shape, the anomaly resembles an eagle's talon, but it could also present as pyramidal, conical or teat-like. It appears to be more prevalent in patients with Rubinstein-Taybi syndrome, Mohr syndrome, Sturge-Weber syndrome, incontinentia pigmenti achromians and Ellis-van Creveld syndrome. The affected (taloned) teeth in the permanent dentition have been found in the maxilla, with the lateral incisors being the most frequently involved followed by the central incisors and the canines.

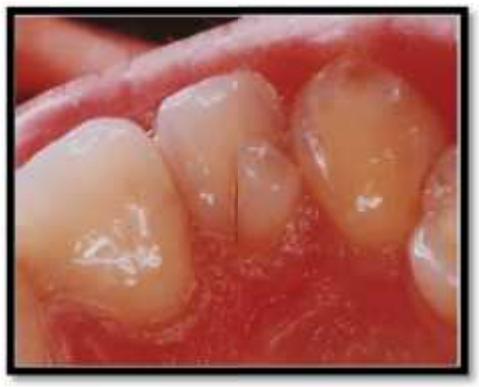
Clinical significance

Large talon cusps may cause clinical problems including occlusal interference, displacement of the affected tooth, irritation of the tongue during speech and mastication, carious lesion in the developmental grooves that delineate the cusp, pulpal necrosis, periapical pathosis, attrition of the opposing tooth and periodontal problems due to excessive occlusal forces.

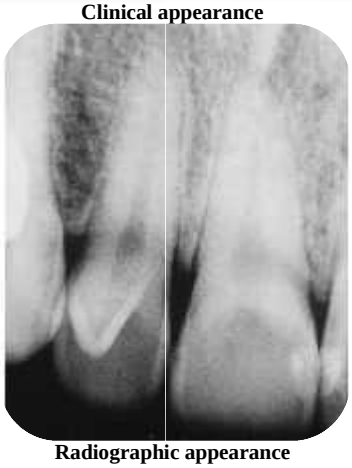
Treatment

The treatment of talon cusp involves careful clinical judgment and review of whether the cusp contains or is devoid of a pulp horn. Removal of the cusp would inevitably lead to pulp exposure that would require endodontic treatment.

TALON'S CUSP



Clinical appearance



Radiographic appearance

Figure 6

Supernumerary Roots[12]

Teeth that are normally single rooted, particularly mandibular bicuspids and cuspids, often have two roots.

Etiology

Etiology of this anomaly is unknown; an ingrowth of the tissue from Hertwig's epithelial root sheath has been suggested as possible cause. Double rooted teeth are generally believed to be a result of enhanced expressivity of the gene initiating differential growth of Hertwig's epithelial root sheath.

Clinical Features

The developmental anomaly is not uncommon and may involve any tooth. Both maxillary and mandibular molars, particularly third molars also may exhibit one or more supernumerary roots.

Clinical Significance

This unusual anatomy may lead to endodontic and extraction complications, as well as problems in permanent tooth eruption.

Treatment

This anomaly does not require any treatment. It should be kept in mind during endodontic therapy that the number of root canals may exceed the number of roots.

SUPERNUMERARY ROOTS

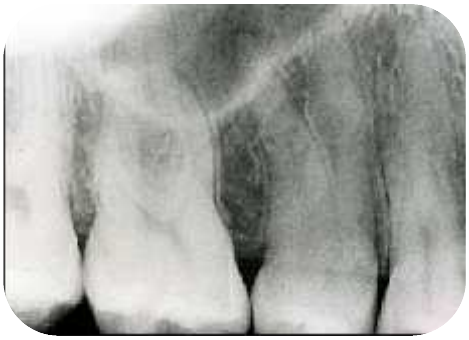


Figure 7

Summary

Formation of the face and oral cavity is complex in nature and involves the development of multiple tissue processes that must merge and fuse in a highly orchestrated fashion. There are many developmental disorders affecting the head and neck region. Some of the developmental disorders develop during intrauterine development and are manifested at the time of birth. Certain other disorders manifest at the later date. Developmental disorders should be managed as early as possible. So the careful clinical and radiographic evaluation of these conditions is essential so as to provide the best treatment modality for these patients and to prevent further complications in head and neck region due to the same. These developmental disorders also have impact on esthetics thereby affecting psychosocial behavior of the patient; hence the patients should also be managed on psychological basis.

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