Abnormalities of the Teeth

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Abnormalities of teeth

- Environmental alterations
- Developmental alterations

Environmental alterations

- Effects on tooth structure development
  - Localized
  - Systemic
- Postdevelopmental structure loss
- Discoloration of teeth
- Localized disturbances of eruption

Local factors associated with enamel defects

- Trauma
- Local infection
- Irradiation
Enamel hypoplasia

Enamel hypocalcification

Systemic factors associated with enamel defects
- Infections
- Medications
- Inherited diseases
- Metabolic disorders
- Malnutrition
- Birth-related trauma

Enamel hypoplasia
Fluorosis

Postdevelopmental tooth loss
- Tooth wear
  - Attrition
    - Caused by tooth to tooth contact
  - Abrasion
    - Caused by external agent
  - Erosion
    - Caused by chemical process
- Internal resorption
- External resorption

Attrition
Erosion-Bulemia

Internal resorption

Internal resorption

External resorption
External resorption

Environmental discoloration
- Extrinsic
  - Bacteria
  - Iron
  - Tobacco
  - Food and beverage
  - Restorative materials
  - Medications

Iron stain

Environmental discoloration
- Intrinsic
  - Erythropoietic porphyria
  - Hyperbilirubinemia
  - Trauma
  - Medications
Erythropoietic porphyria

- Autosomal recessive disorder of porphyrin metabolism that results in increased synthesis and excretion of porphyrins
- Diffuse discoloration of dentition results
- Teeth appear red-brown and exhibit a red fluorescence when exposed to UV light
- Protoporphyrin present in enamel and dentin of deciduous teeth so discoloration worse
- Only dentin of permanent teeth affected

Hyperbilirubinemia

- Excess levels of bilirubin in blood
- Bilirubin can accumulate in interstitial fluid, mucosa, skin and developing teeth
- Causes include:
  - Erythroblastosis fetalis
    - A hemolytic anemia of newborns secondary to blood incompatibility
  - Biliary atresia
    - A sclerosing process of the biliary tree
  - Premature birth
  - Internal hemorrhage
Trauma

Tetracycline stain

Tetracycline stain

Fluorosis
Localized disturbances of eruption

- Ankylosis
- Natal teeth

Ankylosis

- Cessation of eruption after emergence occurring from an anatomic fusion of tooth cementum or dentin to alveolar bone
- Etiology unknown-trauma, local change of metabolism, thermal irritation, and genetic predisposition have been suggested
- Can occur at any age but is clinically most evident when it develops during first two decades of life
- Peak prevalence- 8-9 years of age

- Reported prevalence of clinically detectable ankylosis- 1.5% to 9%
- Primary molars are most commonly involved teeth with most cases in mandible
- Radiographic findings
- Sound on percussion
- Treatment considerations
Ankylosis

Natal teeth
- Usually prematurely erupted primary teeth
- Present at birth
- Prevalence: 1 in 2000
- Neonatal teeth erupt within first month
- 85% are lower incisors, 11% maxillary incisors
- Treatment
### Developmental alterations

- **Number**
- **Size**
- **Shape**
- **Structure**

### Hypodontia

- Common dental anomaly
- 3.5%-8% (excluding third molars)
- Female predominance about 1.5:1
- Uncommon in primary dentition (<1%)
- About 20-23% of population missing third molars
- After third molars, second premolars and laterals most frequent

### Syndromes associated with hypodontia

- Ectodermal dysplasia
- Chondroectodermal dysplasia (Ellis-van Creveld)
- Incontinentia pigmenti
- Progeria
- Down
- Hallermann-Streiff
- Rieger
- Crouzons
- Albright hereditary osteodystrophy
Hyperdontia

- Prevalence of supernumerary teeth is about 1%-3% (higher rate in Asians)
- Single tooth hyperdontia represent 75%-85% of cases
- More common in permanent dentition
- Almost 90% in maxilla
- Maxillary incisor region most common site then 4th molars, premolars and canines
- If multiples, usually in mandibular premolar region

Syndromes associated with hyperdontia

- Cleidocranial dysplasia
- Oral-Facial-Digital
- Craniometaphyseal dysplasia
- Apert

Hyperdontia

Mesiodens
Developmental alterations
- Size
  - Microdontia
  - Macrodontia

Microdontia
- Teeth are smaller than usual
- Relative microdontia = macrognathia
- Diffuse true microdontia is uncommon but may occur in Down syndrome and pituitary dwarfism
- Prevalence of isolated microdontia is between 1% and 8%
- Maxillary lateral incisor most frequently affected

Microdont- peg lateral
Microdontia

Macrodontia

- Teeth are larger than usual
- Relative macrodontia = micrognathia
- Diffuse involvement very rare
- Has been noted in association with pituitary gigantism and hemifacial hyperplasia

Macrodontia

Developmental alterations

- Shape
  - Gemination
  - Fusion
  - Concrescence
  - Talon cusp
  - Dens evaginatus
  - Dens invaginatus
  - Taurodontism
  - Dilaceration
Double teeth
- Gemination and fusion
  - May have very similar clinical appearance
  - Higher frequency in anterior and maxillary regions
  - Rate is about 0.1% in permanent dentition and 0.5% in deciduous
  - Bilateral cases more infrequent
  - Etiology unknown but trauma has been suggested
  - Treatment considerations

Gemination
- Single joined or enlarged tooth in which tooth count is normal when anomalous tooth is counted as one
- Result from single tooth bud????
Gemination:

Fusion:
- Single joined or enlarged tooth in which tooth count reveals missing tooth when anomalous tooth is counted as one
- Union of two separate tooth buds?

Fusion:

Fusion:
Fusion

Concrescence

- Union of two adjacent teeth by cementum alone
- May occur before or after eruption
- Seen most commonly posterior and maxillary regions
- Etiology believed to be trauma or overcrowding
- Treatment considerations

Concrescence

- Well-delineated additional cusp on the surface of an anterior tooth and extends 1/2 the distance from CEJ to incisal edge
- Vast majority on lingual surface
- Prevalence studies vary from <1% to 8%
- 3/4 found in permanent dentition, most commonly maxillary lateral then central
- In deciduous dentition, maxillary central most common site
- Has been associated with other dental anomalies
- Treatment considerations
Talon cusp

Dens evaginatus
- Also known as a central tubercle
- A cusplike elevation located in the central groove
- Typically occurs in permanent mandibular premolars
- Usually bilateral
- Rare in whites with higher prevalence in Asians, native Americans and Alaskans
- Treatment considerations

Dens evaginatus
- Dens in dente
- Deep surface invagination of crown that is lined by enamel
- Represents an accentuation of the lingual pit
- Depth varies
- Prevalence studies vary from <1% to 10%
- Lateral incisors most commonly affected
- Bilateral involvement common
- Treatment considerations
Dens invaginatus

Taurodontism
- Enlargement of the body and pulp chamber of a multirooted tooth with apical displacement of the pulpal floor
- More commonly seen in permanent dentition
- Prevalence is highly variable
  - 2%-3% in U.S.
  - Much higher in Eskimos and Middle Eastern populations
- Increased frequency in patients with CL and/or CP, Down, Klinefelter, ectodermal dysplasia, trich-dento-osseous

Taurodontism

Dilaceration
- Abnormal angulation or bend in the root
- Thought to be related to trauma during root development
- Permanent maxillary incisors most commonly affected followed by mandibular incisors
- Rare in primary dentition
- Treatment depends on severity
Dilaceration

Amelogenesis imperfecta

- A heterogeneous group of hereditary disorders that demonstrate developmental alterations in the structure of enamel in the absence of a systemic disorder
- Many subtypes
- Numerous patterns of inheritance
- Wide variety of clinical manifestations
- Frequency varies between 1:718 and 1:14,000
- Both dentitions involved

Amelogenesis imperfecta

- Formation of enamel a multistep process
  - Formation of enamel matrix
  - Mineralization of matrix
  - Maturation of matrix
- Hereditary defects of enamel formation usually classified as:
  - Hypoplastic
  - Hypocalcified
  - Hypomaturative

Witkop classification

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Amelogenesis imperfecta

- Hypoplastic
  - Teeth erupt with insufficient amounts of enamel
  - Amount of enamel varies greatly
  - Enamel present is mineralized appropriately and contrasts well with dentin on radiographs
  - Teeth may have abnormal shape and open contacts
  - Open bite may be present

AI-Hypoplastic smooth

AI-Hypoplastic pitted
Amelogenesis imperfecta

- Hypocalcified
  - Proper amount of enamel matrix is formed but it doesn’t mineralize properly
  - Teeth shaped normally upon eruption but enamel is soft and easily lost
  - Enamel yellow-brown upon eruption but quickly becomes brown to black
  - Accumulate calculus
  - Enamel and dentin have similar density on radiographs
Amelogenesis imperfecta
- Hypomaturative
  - Enamel matrix is laid down properly and begins to mineralize but there is a defect in maturation of enamel’s crystal structure
  - Affected teeth normal in shape
  - Mottled appearance-white, brown or yellow
  - Enamel soft and chips away from dentin
  - Enamel has similar radiodensity to dentin

Dentinogenesis imperfecta
- Hereditary developmental disturbance of dentin
- Autosomal dominant
- Also known as hereditary opalescent dentin
- Shields classification
- Prevalence is about 1:8000
  - Most cases in whites of English or French ancestry from communities near English Channel

AI-Hypomaturative

AI-Hypomaturative, snowcapped
Dentinogenesis imperfecta

- All teeth in both dentitions affected
- Deciduous teeth affected most severely followed by permanent incisors and first molars
- Yellow-brown to blue-gray translucent, opalescent appearance
- Enamel frequently separates easily from dentin
- Once exposed, dentin exhibits rapid attrition
- Bulbous crowns with cervical constriction
- Thin roots
- Early obliteration of pulp chambers and root canals
Dentinogenesis imperfecta

Dentin dysplasia
- Rare autosomal-dominant condition that affects dentin
- Prevalence about 1:100,000

Dentinogenesis imperfecta

Dentin dysplasia
- Type I
  - Radicular type or ‘rootless teeth’
  - Roots short and pulps almost obliterated
  - Periapical radiolucencies
  - More common type
  - Enamel and coronal dentin are normal
  - Wide variation in root formation because dentinal disorganization may occur at different stages of tooth development
  - Color is normal in both dentitions
  - Radiographically, deciduous teeth more severely affected
Dentin dysplasia

- Type II
  - Coronal type
  - Root length normal in both dentitions
  - Primary teeth
    - Clinically resemble dentinogenesis imperfecta
    - Radiographically have similar appearance to Type I
  - Permanent teeth
    - Normal coloration
    - Pulp chambers enlarged with apical extension-thistle-tube-shaped or flame-shaped

Dentin dysplasia type II

Regional odontodysplasia

- 'Ghost teeth'
- Localized, non-hereditary developmental abnormality of teeth with extensive adverse effects on formation of enamel, dentin and pulp
- Occurs in region or quadrant
- Etiology unknown
- Occurs in both dentitions and if present in primary dentition, permanent teeth in area usually affected
- Maxillary predominance: 2.5:1
- Many affected teeth fail to erupt
- Erupted teeth have small irregular yellow-brown crowns
- Short roots, enlarged pulp and open apical foramina
Regional odontodysplasia

References
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  - Neville, Damm, Allen and Bouquot
- Oral Pathology-Clinical Pathologic Correlations
  - Regezi, Scuibba and Jordan
Thank you!