Abnormalities of the Teeth

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Abnomalities of teeth

- Environmental alterations
- Developmental alterations

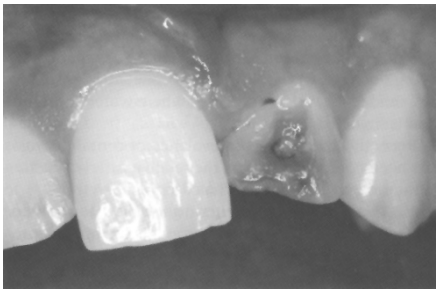
Environmental alterations

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

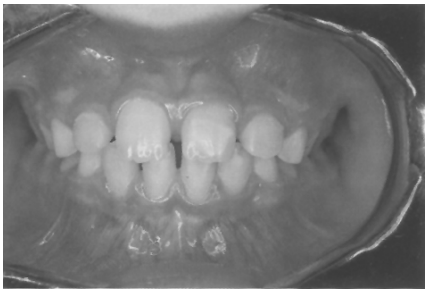
Local factors associated with enamel defects

- Trauma
- Local infection
- Irradiation

Enamel hypoplasia



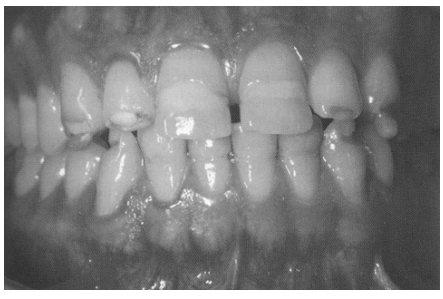
Enamel hypocalcification



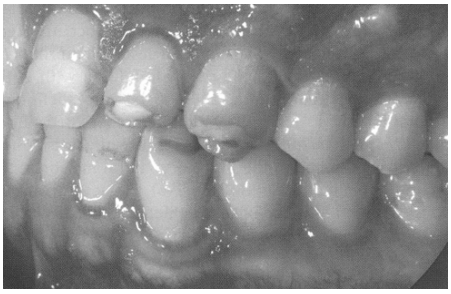
Systemic factors associated with enamel defects

- Infections
- Medications
- Inherited diseases
- Metabolic disorders
- Malnutrition
- Birth-related trauma

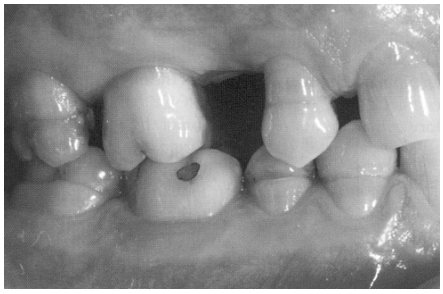
Enamel hypoplasia



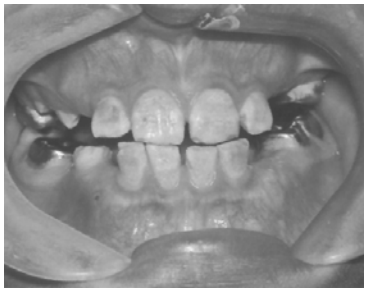
Enamel hypoplasia



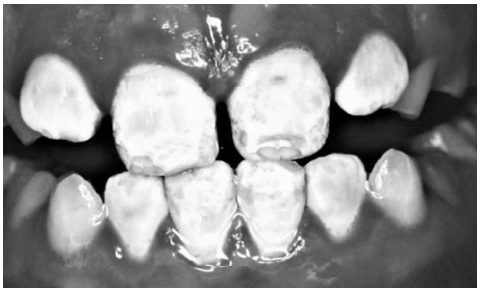
Enamel hypoplasia



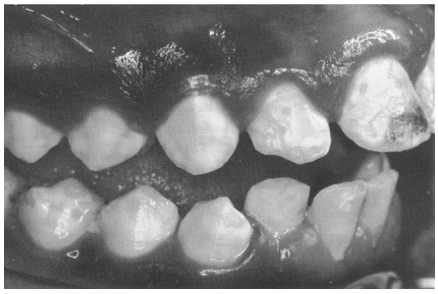
Enamel hypoplasia-Rickets



Fluorosis



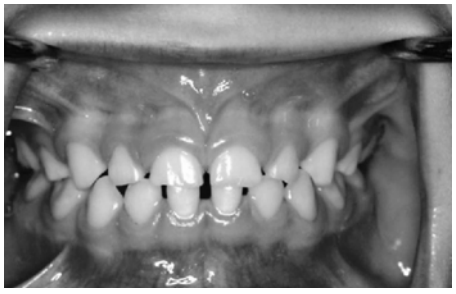
Fluorosis



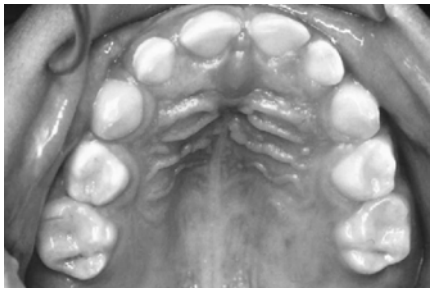
Postdevelopmental tooth loss

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

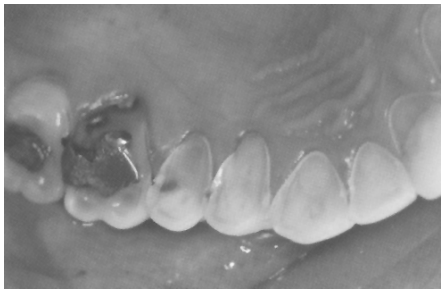
Attrition



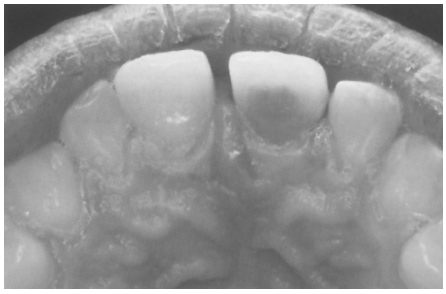
Attrition



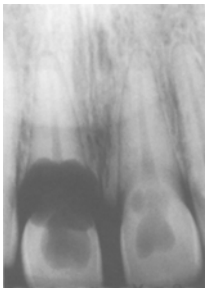
Erosion-Bulemia



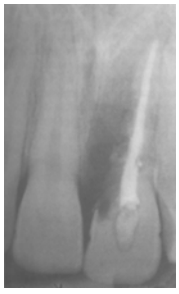
Internal resorption



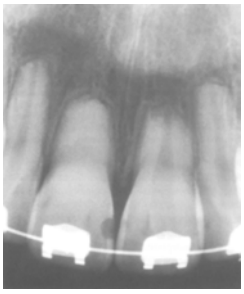
Internal resorption



External resorption



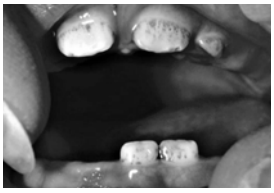
External resorption

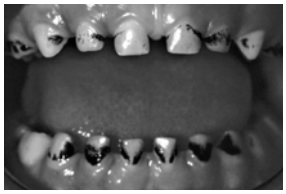


Environmental discoloration

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

Iron stain





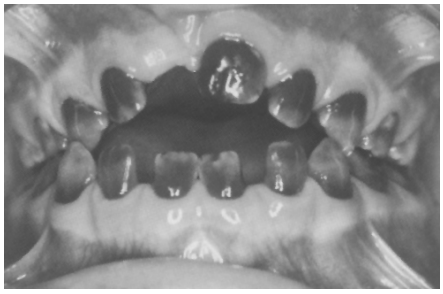
Environmental discoloration

- 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
- Prophyrin present in enamel and dentin of deciduous teeth so discoloration worse
- Only dentin of permanent teeth affected

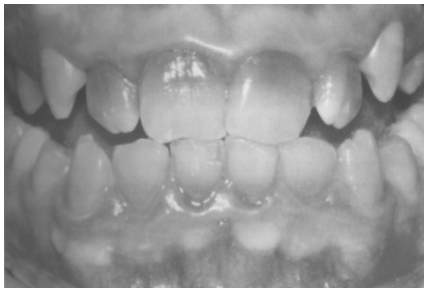
Erythropoietic porphyria



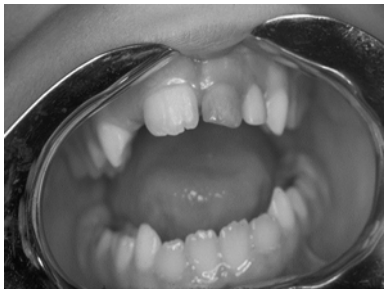
Hyperbilirubinemia

- 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

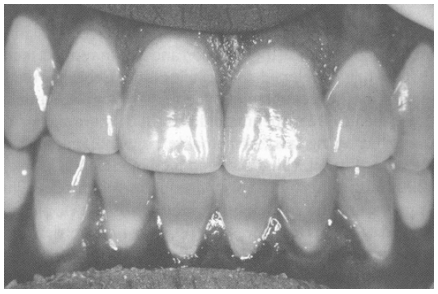
Hyperbilirubinemia



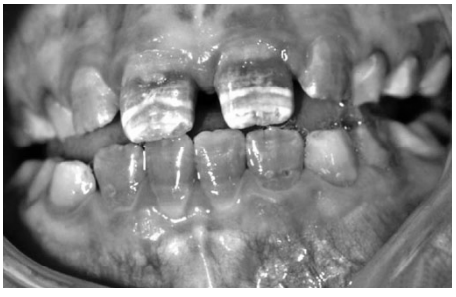
Trauma



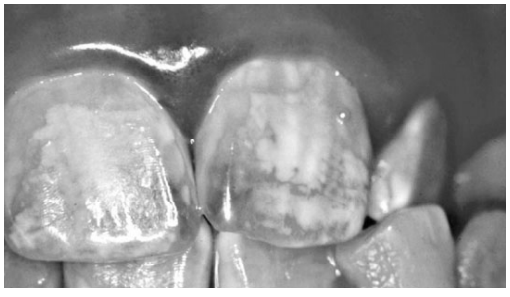
Tetracycline stain



Tetracycline stain



Fluorosis



Localized disturbances of eruption

- Ankylosis
- Natal teeth

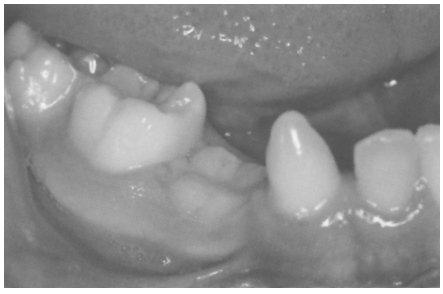
Ankylosis

- Cessation of eruption after emergence occuring 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

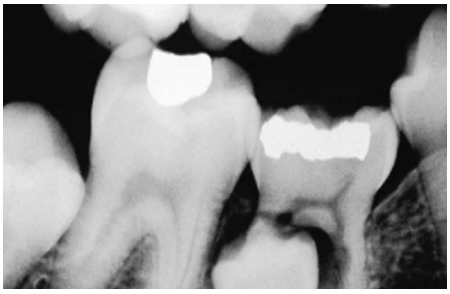
Ankylosis

- 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

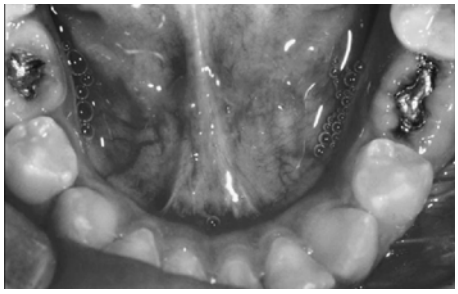
Ankylosis



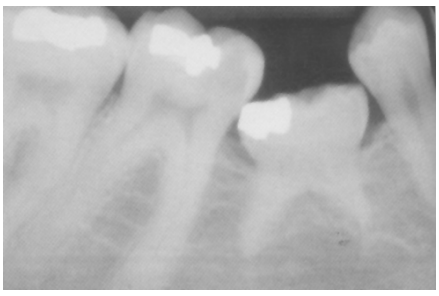
Ankylosis



Ankylosis



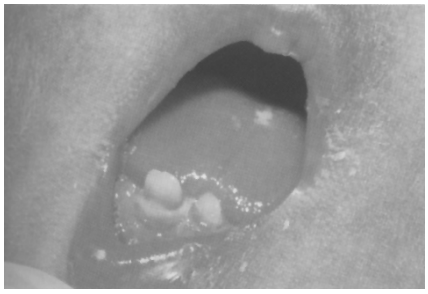
Ankylosis



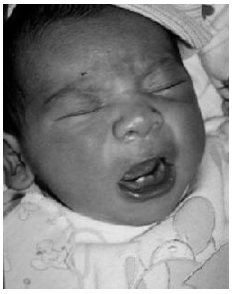
Natal teeth

- 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

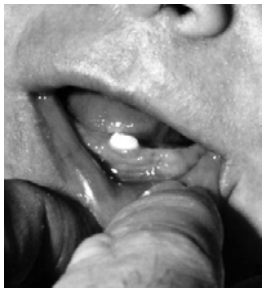
Natal teeth



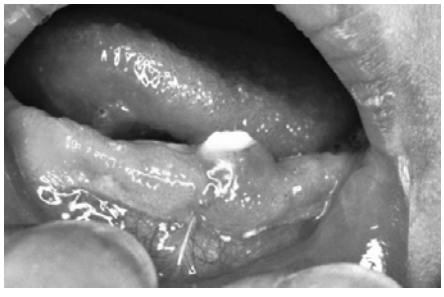
Natal teeth



Natal teeth



Natal teeth



Developmental alterations

- Number
- Size
- Shape
- Structure

Developmental alterations

- Number
  - Hypodontia
    - Lack of development of one or more teeth
  - Anodontia
    - Total lack of tooth development
  - Hyperdontia
    - Development of an increased number of teeth

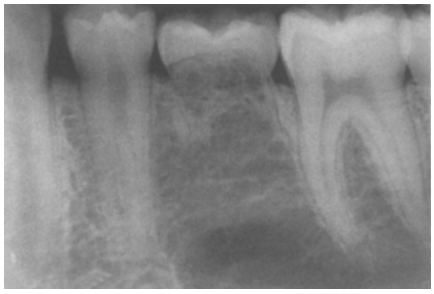
Hypodontia

- 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

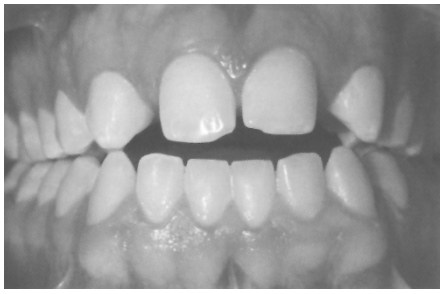
Syndromes associated with hypodontia

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

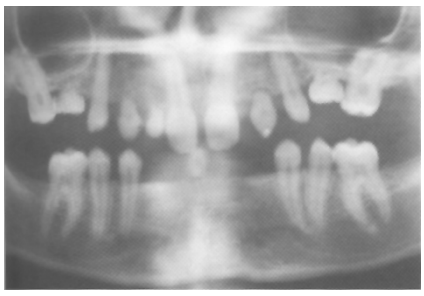
Hypodontia



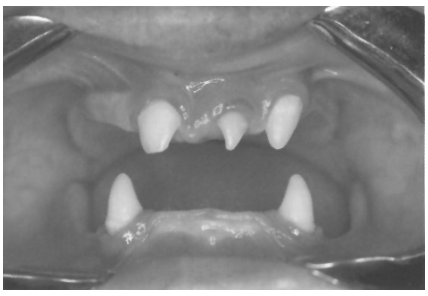
Hypodontia



Hypodontia



Hypodontia-Ectodermal dysplasia



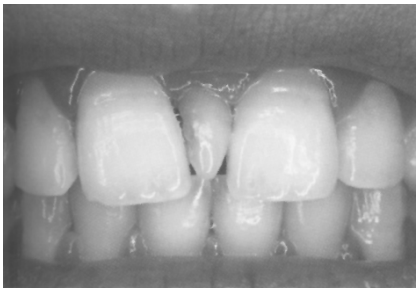
Hyperdontia

- 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

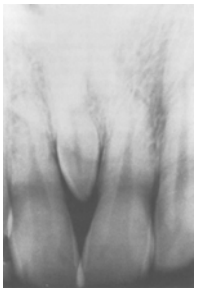
Syndromes associated with hyperdontia

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

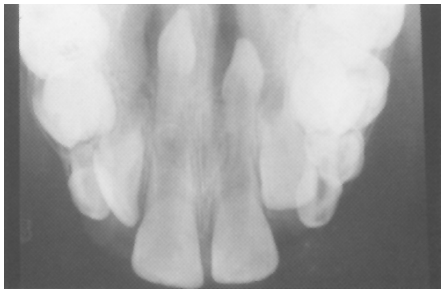
Hyperdontia



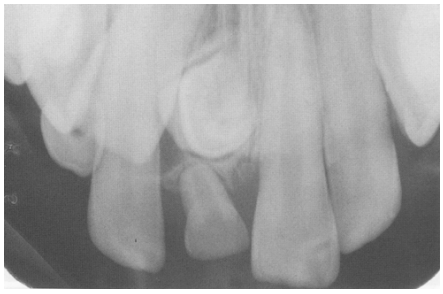
Mesiodens



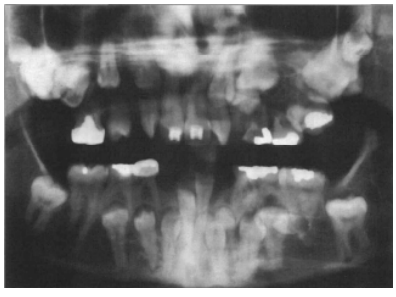
Hyperdontia



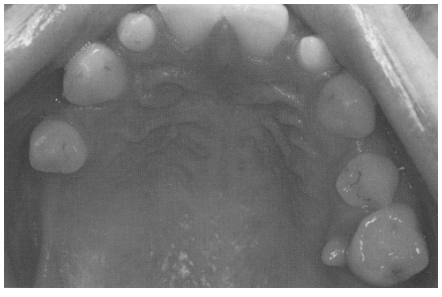
Hyperdontia



Cleidocranial dysplasia



Paramolar



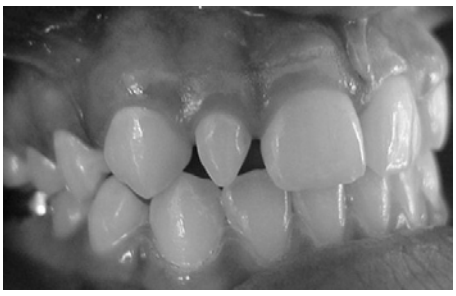
Developmental alterations

- Size
  - Microdontia
  - Macrodontia

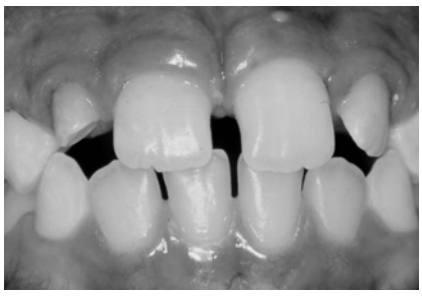
Microdontia

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

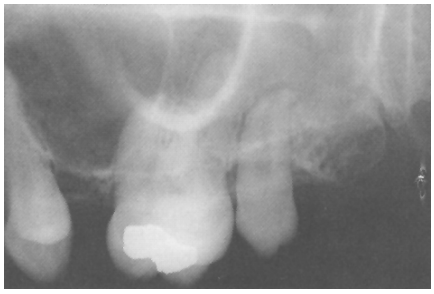
Microdont- peg lateral



Microdont- peg lateral



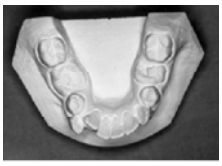
Microdont

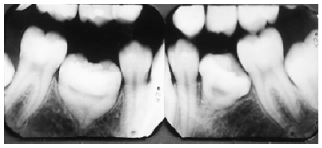


Macrodontia

- 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

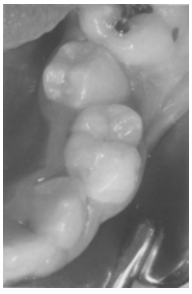
Double teeth

- 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

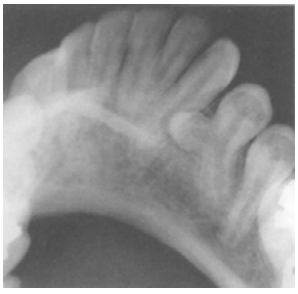
Gemination

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

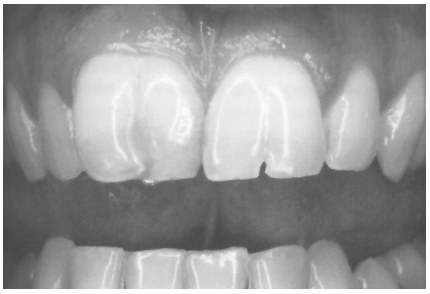
Gemination



Gemination



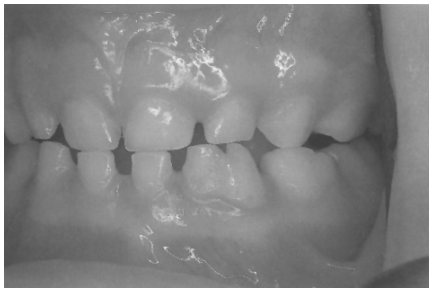
Gemination



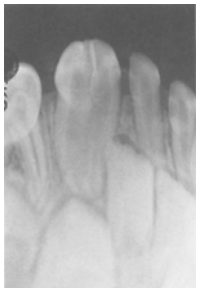
Fusion

- 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?

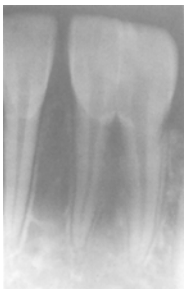
Fusion



Fusion



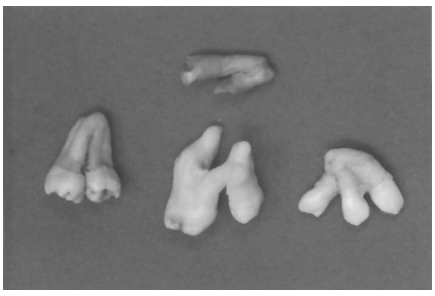
Fusion



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

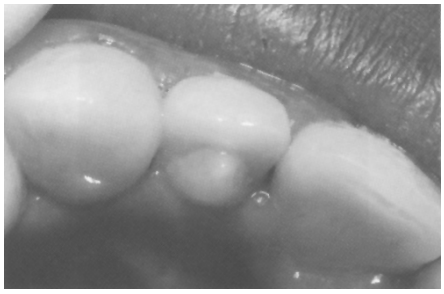
Concrescence



Talon cusp

- 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

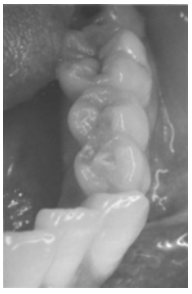
Talon cusp



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

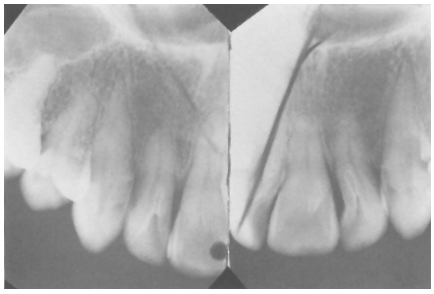
Dens evaginatus



Dens invaginatus

- 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

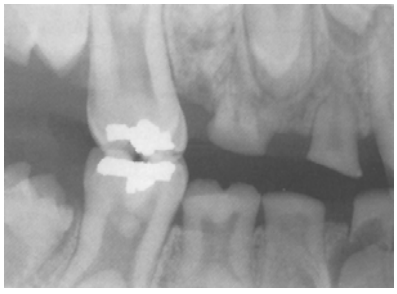
Dens invaginatus



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

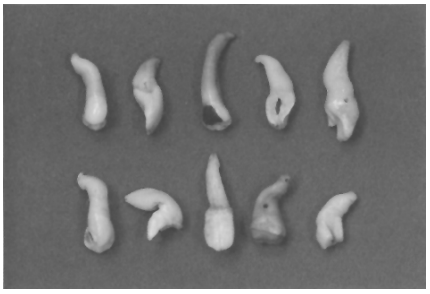
Taurodontism



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

Amelogenesis imperfecta Witkop classification

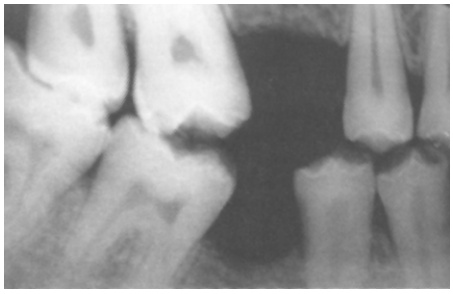
Table 2-1 *Classification of Amelogenesis Imperfecta*

TYPE	PATTERN	SPECIFIC FEATURES	INHERITANCE
IA	Hypoplastic	Generalized pitted	Autosomal dominant
IB	Hypoplastic	Localized pitted	Autosomal dominant
IC	Hypoplastic	Localized pitted	Autosomal recessive
ID	Hypoplastic	Diffuse smooth	Autosomal dominant
IE	Hypoplastic	Diffuse smooth	X-linked dominant
IF	Hypoplastic	Diffuse rough	Autosomal dominant
IG	Hypoplastic	Enamel agenesis	Autosomal recessive
IIA	Hypomaturation	Diffuse pigmented	Autosomal recessive
IIB	Hypomaturation	Diffuse	X-linked recessive
IIC	Hypomaturation	Snow capped	X-linked
IID	Hypomaturation	Snow capped	Autosomal dominant?
IIIA	Hypocalcified	Diffuse	Autosomal dominant
IIIB	Hypocalcified	Diffuse	Autosomal recessive
IVA	Hypomaturation-hypoplastic	Taurodontism present	Autosomal dominant
IVB	Hypoplastic-hypomaturation	Taurodontism present	Autosomal dominant

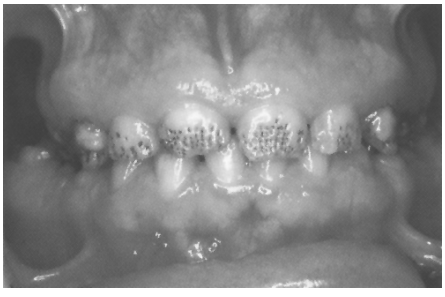
Amelogenesis imperfecta

- 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

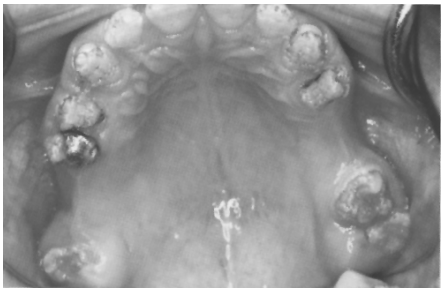
AI-Hypoplastic smooth



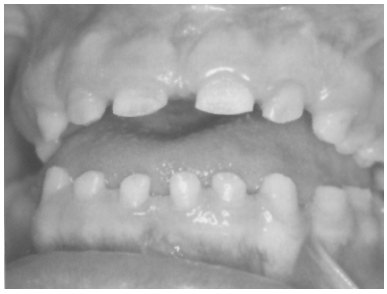
AI-Hypoplastic pitted



AI-Hypoplastic pitted



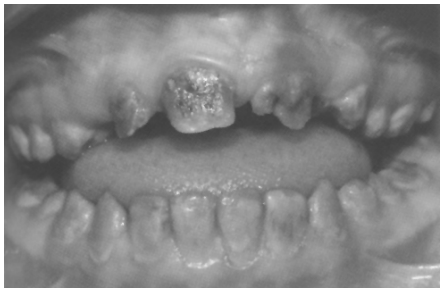
AI-Hypoplastic rough



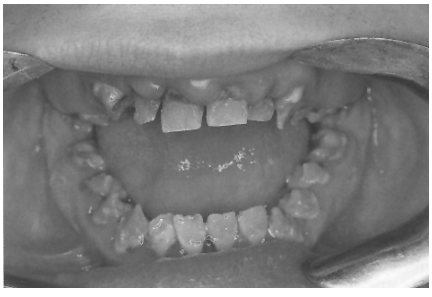
Amelogenesis imperfecta

- Hypocalcified
  - Proper amount of enamel matrix is formed but 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

AI-Hypocalcified



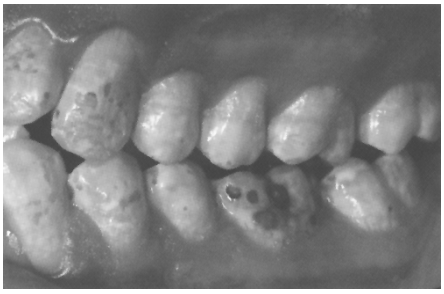
AI-Hypocalcified



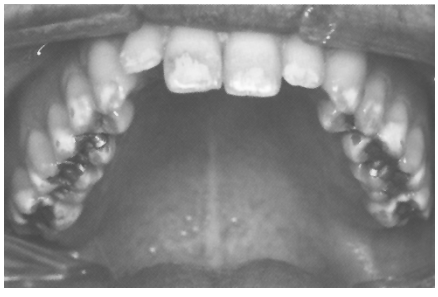
Amelogenesis imperfecta

- 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

AI-Hypomaturative



AI-Hypomaturative, snowcapped



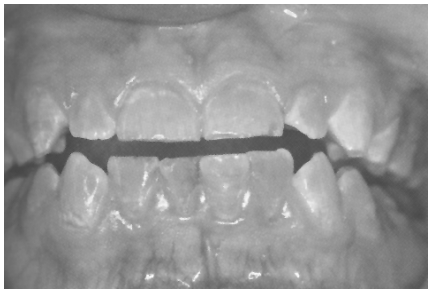
Dentinogenesis imperfecta

- 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

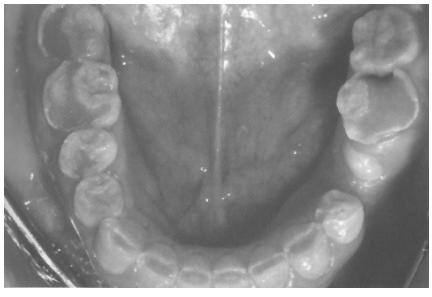
Dentinogenesis imperfecta

- 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

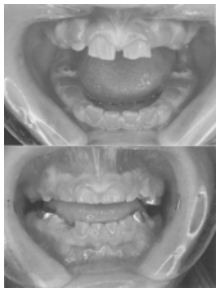
Dentinogenesis imperfecta



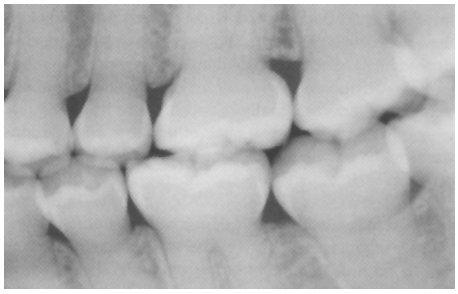
Dentinogenesis imperfecta



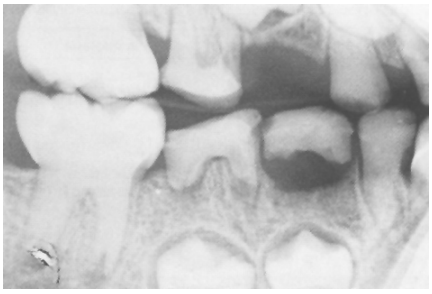
Dentinogenesis imperfecta



Dentinogenesis imperfecta



Dentinogenesis imperfecta



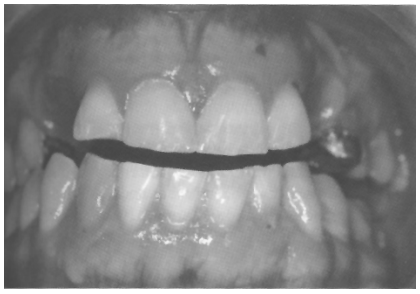
Dentin dysplasia

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

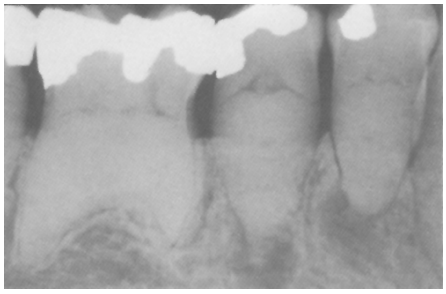
Dentin dysplasia

- 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 severly affected

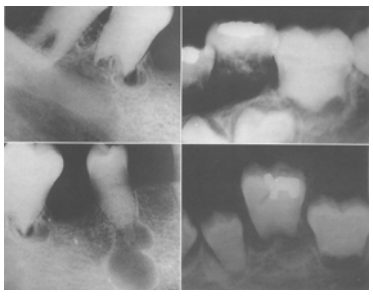
Dentin dysplasia type I



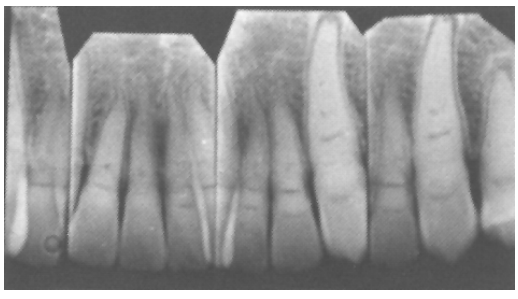
Dentin dysplasia type I



Dentin dysplasia



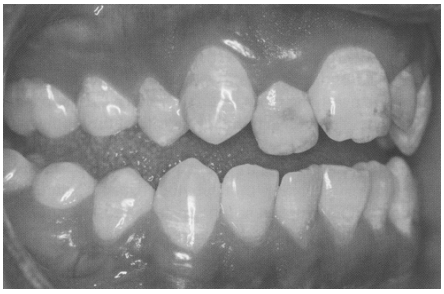
Dentin dysplasia



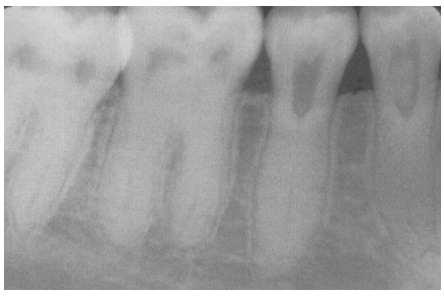
Dentin dysplasia

- 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 dyplasia type II



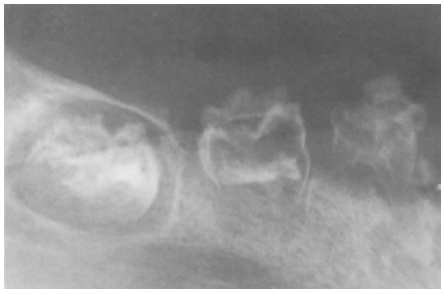
Dentin dyplasia type II



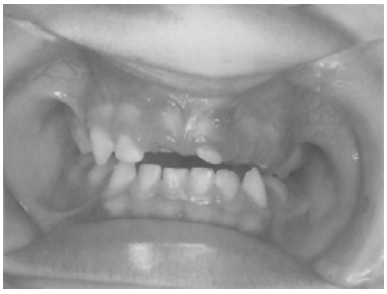
Regional odontodysplasia

- '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

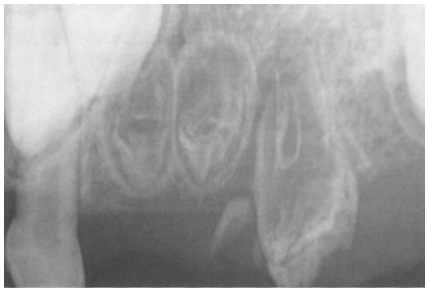
Regional odontodysplasia



Regional odontodysplasia



Regional odontodysplasia



References

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Thank you!