

# DEVELOPMENTAL ANOMALIES OF PRIMARY AND PERMANENT TEETH

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# Developmental anomalies of primary and permanent teeth

- Numerical variations
  - Polydontia/hyperodontia
    - Dens supernumerarius
    - Dens supplementarius
    - Dens connatalis/neonatalis
  - Olygodontia/ hypodontia
    - Aplasia
    - Anodontia partialis, anodontia totalis
  - Double formations (fusio, geminatio)
- Morphological variations
  - Supernumerary cusps
  - Supernumerary roots
  - Dilaceratio dentis
  - Invaginatio dentis
  - Size variations-  
macrodontia/microdontia
- Structural anomalies
  - Endogen
  - Exogen
  - Genetic
- Eruption problems



# Disturbances in the different developmental stages

- Initiation stage(6-7.week)
  - Numerical variations(hypodontia, hyperodontia)
- Bud stage (8.week)
  - Macrodontia, microdontia
- Cap stage(9-10 week)
  - Double formations (geminatio, fusio)
  - Invagination ( dens in dente)
  - Supernumerary cusps
- Bell stage (11-12. week)
- Apposition and maturation stages
  - Enamel and dentin hypoplasia
- Root formation
  - Supernumerary roots
  - Dilaceration
- Cement formation
  - Concrescence



# Numerical variations

## Hypodontia

- **Aplasia** (1 missing germ)
- **Oligodontia** (6/more missing germ)
- **Partial anodontia**
- **Totalis anodontia**

## Hyperodontia

- **Dens connatalis**
- **Dens neonatalis**
- **Dens supplementarius**
- **Dens supernumerarius**



# Numerical variations

## Hypodontia

- Primary/ permanent dentition
- Etiology:
  - Inheritance, infection, trauma, dystrophia, developmental or nutrition problems
- Ectodermal dysplasia -triad
  - **Primary dentition:** anodontia partialis/ totalis +structural deficiency+Dentitio difficilis
  - **Hypotrichosis**
  - **Hypo/anhydrosis**
- Bolk terminal reduction:
  - Last element of each tooth class is often agenetic or reduced in size
  - Maxilla : 2. incisor, 2. premolar, 3. molar
  - Mandible: 1. incisor, 2. premolar,3. molar



# Numerical variations

## Hypodontia treatment:

- Primary dentition: rare, generally 1-2 missing tooth, treatment is not necessary
- Permanent dentition: complex treatment
  - Guided eruption
  - Orthodontic space closure
  - Preprotetic orthodontic treatment
  - Prosthodontic
  - Implant-prosthodontic
  - Autotransplantation



# Numerical variations

## Hyperodontia

- Prevalence
  - 75-90% upper front region
  - Primary dentition: 0.3%
- **Types:**
  - **Dens connatalis:** tooth –at birth
  - **Dens neonatalis:** tooth erupting after birth in a month
  - **Dens supplementarius:** normal morphology
  - **Dens supernumerarius:** abnormal morphology



# Numerical variations

## Hyperodontia

- Dentitio praecox- early eruption:
- *Dens connatalis*: often supernumerary tooth, at birth
- *Dens neonatalis*: often supernumerary tooth, after birth
- If it is stable, do not cause problem-extraction **not** indicated
- If it is mobile, risk of exfoliation (swallowing/ aspiration) extraction
- Differential diagnostic:
  - Dentitio praelactales: tooth formation without roots, gum keeps it, mobile, extraction is indicated
  - Epstein pearl-cysta gingivalis



Epstein pearl  
on the palate





# Numerical variations

## Hyperodontia

- Dens supplementarius
  - Supernumerary tooth with normal morphology
- Dens supernumerarius
  - Supernumerary tooth with abnormal morphology
  - Types-based on the position
    - Mesiodens:
      - Midline or close to midline
      - Prevalence 0.5-0.7% boys>girls
      - 25% spontaneous eruption, sometimes retriinclined
      - Rare 2-3 tooth
    - Paramolar/perimolar
    - Distomolar/retromolar



# Morphological variations

- Variations in size
  - Macrodontia, microdontia
- Supernumerary cusps
  - Carabelli , Talon
- Supernumerary roots
- Dilaceration
- Invagination dentis
- Dens evaginatus
- Double formations
  - Geminatio, fusio, concrescence
- Taurodontism
- Enamel pearl



# Morphological variations

## Variations in size:

- 1 tooth/ total dentition
- *Macrodontia*
  - Bigger tooth size → esthetic problem, crowding
  - All part of the tooth affected
  - Gigantismus coronae- just the crown is affected
  - Gigantismus radice- just the root is affected
- *Microdontia*
  - Smaller size → esthetic, diastema
  - Often upper 2. incisor (Bolk terminal reduction)
  - Small size of the root
    - Orthodontic-resorption
    - Odontodysplasia-abnormal form
    - Chemoterápia under root development



# Morphological variations

## Supernumerary cusp:

- *Carabelli-cusp*
  - On upper 6, near the mesiopalatal cusp palatally
  - Sometimes on the upper second primary tooth
  - Dahlberg scale: 7 different size
- *Talon-cusp*
  - incisors <2. incisors palatal cusp

Plaque retention area

May disturb occlusion ( selective grinding)



# Morphological variations

## Supernumerary roots:

- Molar and premolar teeth
- Radix entomolaris, paramolaris
- Root canal treatment difficulties



# Morphological variations

## Dilaceration:

- Prevalence 1%
- Mainly by upper front teeth
- Crown + root curve or contact in angle (angulatio)
- Reason: homolog primary tooth trauma
- Diagnose: x-ray from different direction or CBCT
- No spontaneous eruption
- Treatment: surgical-orthodontic alignment/ extraction



# Morphological variations

## Invagination dentis („dens in dente”)

- Tooth formation in the tooth
- Reverse order of hard tissues (enamel is closer to lumen)
- Mainly first and second incisor

### Diagnose

deep foramen coecum → RTG

contact with oral flora through the foramen

### Treatment:

- fissure sealing even under eruption time
- root canal treatment → bad prognose



# Morphological variations

## Dens evaginatus

- Mostly premolar tooth
- Tuberculum on the occlusal surface
- Fractures easier
- Sometimes pulp tissue inside- RTG

### Treatment:

- Disturbing occlusion- selective grinding
- Waiting for reactive dentin building
- Pulpotomia





# Morphological variations

## Double formations:

- Mainly front teeth
- Esthetic problem, crowding, fissure caries
- Geminatio/fusio/concretio dentium

### 1. *Gemination*

- Incomplete division of a tooth germ
- RTG: 1 pulp chamber + 1 root canal
- Prevalence primary > permanent
- When counting gemination for 1 tooth  
→ normal number of teeth



# Morphological variations

## 2. Fusion

- Union in dentin and/or enamel between two separately developed in normal tooth
- ED fusion+ pulp chamber partly/ totally/ 2 separated pulp chamber and root canal
- When counting fusion for 1 tooth: fewer tooth in dentition
- Often permanent tooth aplasia
- Treatment: fissure sealing between the tooth segment

## 3. Concrescence

- Under root development
- Often by upper 7,8 teeth
- The roots of two teeth are fused only in the cementum
- Reason: crowding or position disorder



# Morphological variations

## Taurodontism

- Enamel-cement junction no invagination
- Crown, pulp chamber bigger
- Root furcation more apical
- Root is straight and widening
- Depending on the size of the pulp chamber:
  - Hipo/ meso/ hypertaurodont forms
- For ex.by amelogenesis imperfecta, ectodermal dysplasia



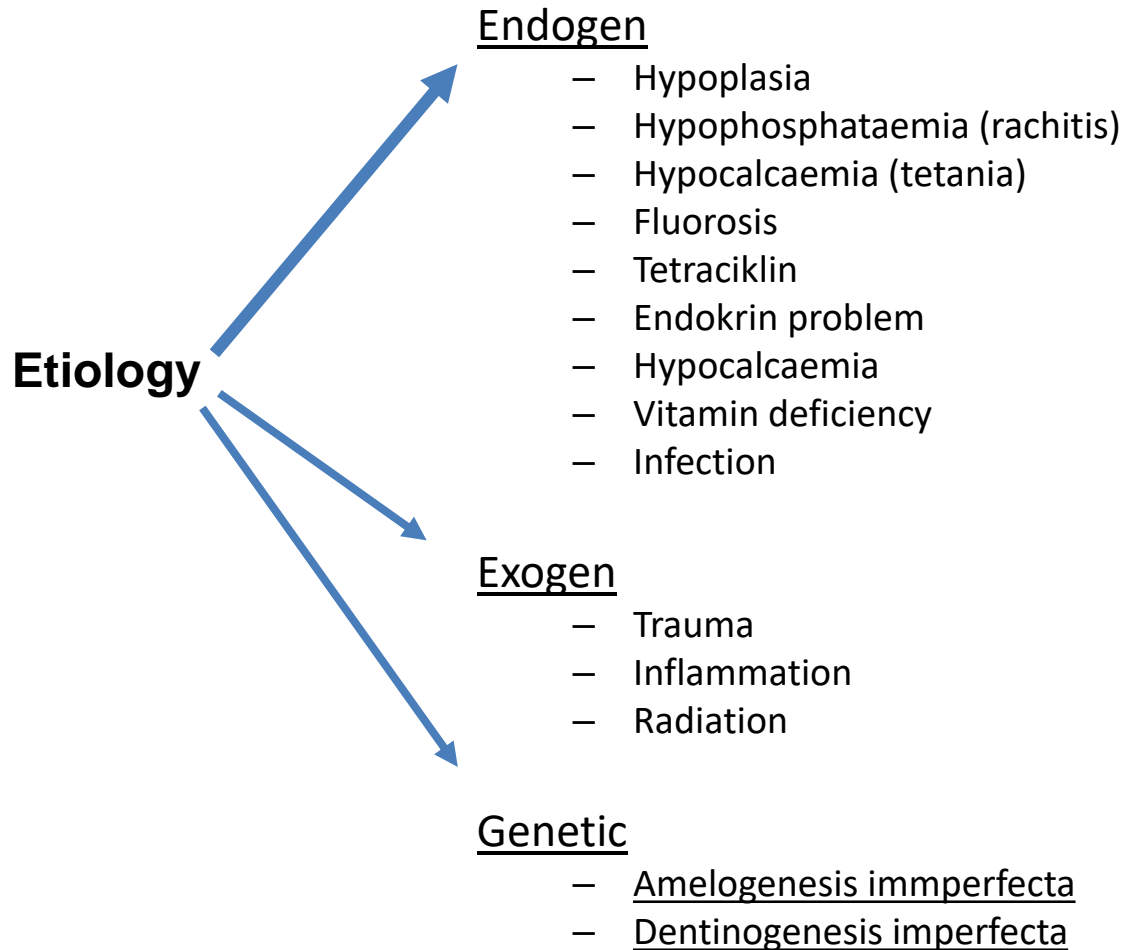
# Morphological variations

## Enamel pearl

- Round enamel formation
- On the root surface- near the enamel cement junction/  
near bifurcation
- Not at all or few dentin/ pulp tissue
- Reason: ameloblast migration
- DD: tartar-this cannot be removed with scaling



# Structural anomalies



# Structural anomalies

## Endogen

### *Hypoplasia*

- Calcification stage
- Developmental problem of the enamel –macroscopic anomalia
- Short term disturbance: enamel striated disturbance till dentin layer
- Long term disturbance: more serious enamel defect, fragile
- Mild form:
  - Normal surface, discoloration
- Moderate form:
  - Porous enamel, macroscopic deficiency
  - Strict line between hypoplastic and normal enamel
  - Localisation shows when was the endogen harm
- Reason:
  - Local factor when just 1 tooth has anomalia
  - Trauma-primary molar intrusio-permanent ameloblast injury (exogen reason)
  - Inflammation-ameloblast derangement: Turner tooth
  - Systematic factor: symmetric anomalia by more teeth



# Structural anomalies

## Endogen

### *Molaris-incisivus hypomineralisatio (MIH)*

- Epidemiology: more frequent enamel disturbance
- Prevalence: 2,8%-25% , incidence growing
- A multifactorial ameloblast cell dysfunction – the process of amelogenesis is faulted
  - Less phosphate and calcium infiltrate in the matrix builded by the ameloblasts
  - Amelogenesis - permanent incisors 3 months - 5 years of age  
permanent molars: embrionary 8. months - 4 years of age



# Structural anomalies

## Endogen

### *Molar-incisivus hypomineralisatio*

- Etiology is multifactorial
- Hypothesis: from embryonic till young age some disease which cause metabolic problem can influence the enamel development
- Etiological factors:
  - High dose of dioxin and polychlorinated biphenyls in maternal milk
  - Hypoxia in early childhood
  - Respiratory diseases: Asthma, bronchitis, COPD
  - Infective diseases: Diphtheria, Mumps
  - D vitamin deficit, malnutrition, malabsorption, metabolic disorders





# Structural anomalies

## Endogen

### *Molaris-incisivus hypomineralisatio*

- Detailed anamnesis should be taken up
- Oral hygiene and nutritional habits need to be investigated
- The clinical picture includes:
  - Matt white and yellowish-brown spots
  - Dental hard tissues with high porosity
  - Adequate enamel thickness
  - Rapid caries development
- Histology: from enamel-cement junction till the occlusal surface less mineralisation



# Structural anomalies

## Endogen

### *Molaris-incisivus hypomineralisatio differential diagnose*

- Amelogenesis imperfecta:
    - Genetic disease,
    - dentin normal, enamel structure anomalia, all teeth are affected
  - Enamel hypoplasia:
    - Disturbance in the secretion stage of amelogenesis
    - Local disturbance
    - Between hypoplastic and normal enamel regular borders
  - Fluorosis:
    - More fluoride absorbtion in mineralisation stage
    - Symmetric, diffuse, decay resistance
  - Caries:
    - Predilection areas
- Tetraciklin administration under pregnancy or under 6 years of age:
  - calcium+tetraciklin-celate complex irreversible binding on enamel or dentin



# Structural anomalies

## Endogen

### *Hipophosphataemia-rachitis*

- Rare disease
- D avitaminosis-Ca, phosphor metabolic problem
- Under development-mainly affecting permanent teeth
- Eruption problems in primary dentition
- Fragile teeth, caries incidence higher
- Maxilla and mandible growing slower
- Narrow maxilla, gothic palate
- O or X shaped leg



# Structural anomalies

## Endogen

### *Fluorosis*

- Under enamel development time, higher serum fluoride concentration → Ameloblast derangement
- Enamel crystals, prism development and enamel maturation derangement
- Amoxicillin 2,5 x higher incidence
- Severity depends on:
  - Absorbed fluoride dose
  - Exposition time
  - Tooth development stage
  - Individual sensitivity



# Structural anomalies

## Endogen

### *Fluorosis*

Severity depending on the drinking-water fluoride amount:

- Mild: 2 ppm
- Moderate: 3-5 ppm
- Severe: 5-6 ppm



# Structural anomalies

## Endogen

### *Tetraciklin*

- Administration under 8 years of age/pregnancy cause primary and permanent teeth discoloration
- Severity depending on the dosage
  - Ca Mg, Al+tetraciklin-chelate complex irreversible binding to enamel, dentin
  - High dose- ameloblast derangement- hypoplasia
  - Types depending on severity:
    - Light yellow/ brown discoloration
    - Intensive darker brown discoloration
    - Dark bluish, greyish discoloration



# Structural anomalies

## Endogen

### *Rubeola*

- Intrauterin virusinfection (1. trimester)
- Micro/ hydrocephalus
- Cataracta
- Microphthalmus
- Septumdefect-heart
- Dentition:
  - Structural anomalia
  - Hypodontia
  - Dentitio tarda



# Structural anomalies

## Endogen

### *Syphilis connatalis*

- The mother's treponema infection is infecting the baby at birth or transplacental (from the 2. phase of pregnancy)
- Early connatalis syphilis:
  - pemphigus syphiliticus: palmo-plantaris papulae- infective
  - parrot- scar: around lips fissures, scars
  - osteogenetic problems
- late connatalis syphilis
  - Diagnose with serology
  - Parrots osteochondritis, saddle nose, gothic palate, Hutchinson teeth)

### Hutchinson-triad:

- **keratitis parenchymatosa, n. cochlearis degeneration, tooth degeneration**
- **lacerated molar occlusal surface**
- **barrel shaped incisor**
- **diastema**





# Structural anomalies

## Endogen

### Erythroblastosis foetalis

- RH incompatibility
- New born-hemolysis → hemosyderin
- Dentin absorption brown-blue discoloration
- Prevention:
  - In 72 h human anti D globulin for the baby



# Structural anomalies

## Endogen

### *Hyperbilirubinaemia*

- Liver disease, bile atresia
- Bilirubin → biliverdin
- Deposited in developing enamel and dentin
- Green-grey discoloration-lightening



# Structural anomalies

## Exogen

### *Turner fog-hypoplasia*

- Calcification stage
- Enamel development disturbance-macroscopic
- Reason: **trauma, homologue primary tooth inflammation**
- Homologue primary tooth shift
- Mainly intrusio or buccalis luxatio

### *Radiation:*

- Crown: hypoplasia
- Root developing disturbance-short roots

After tooth development finished-local disturbance in the alveolar bone, one defect



# Structural anomalies

## Genetic

### *Porphyria*

- Hemoglobin metabolism problem
- boy>girl
- Primary and permanent dentition
- Tooth is reddish-brown, for UV light lilac



# Structural anomalies

## Genetic

### *Amelogenesis imperfecta*

- **AD/ AR/ X**
- enamel-ectodermal origin
- Primary and permanent dentition
- Enamel disturbance –quantitative and qualitative
- Dentin structure normal
- Types: 12, most frequent:

#### *1-Hipoplastic*

- Yellow-white-lightbrown discoloration

Enamel surface is smooth, hard but thin

#### *2-Hipomineralised*

*Two types- hipocalcificated, hipomaturated*

- *yellow-brown discoloration*
- *Enamel thickness normal*
- *Enamel surface rough, unequal,soft*

*Both type:*

- *Enamel fractures soon*
- *Caries frequency depending on type, parodontal deseases higher*
- *Dentitio tarda, open bite*



# Structural anomalies

## Genetic

### *Dentinogenesis imperfecta*

- AD
- primary > permanent dentition
- Dentin structure deficiency,
- dentin canals are irregular
- Enamel fracture fast- dark brown remaining hard tissue
- Tooth color: reddish, brownish
- Often with osteogenesis imperfecta

### Types:

1. dentin problem  
Root and pulp chamber underdeveloped  
primary > permanent dentition
2. dentin problem  
No skeletal defect  
Pulp chamber larger
3. large pulp chamber  
Dentin on x-ray thin  
„shell form” teeth



# Structural anomalies

## *Odontodysplasia*

- Etiology unknown
- Localised in few part of the jaw
- Root don't or partly developing
- X.ray „ghost tooth” transparent

## *Dentindysplasia*

- Genetic disease
- Root/ crown can be affected
- Pulp chamber is large when the crown is affected
- Root small and thin
- Histology. Irregular hard tissue structure



# Eruption problems

## Dentitio praecox

- Early eruption
- Dentitio connatalis, neonatalis
- Most frequent - lower first incisor
- Permanent dentition - rare
- Locally permanent dentition - in case of homologue primary tooth early extraction
- Sometimes hormone problems (thyroid , growth hormon)





# Eruption problems

## Dentitio tarda

- Late eruption
- Systematic:
  - Hypofunkcional thyroid
  - Syndromes :
    - Disostosis cleidocranialis - lot of supernumerary tooth, not erupting
    - Apert syndrome (acrocephalosyndactilia)
- Local:
  - Lack of space ( crowding, supernumerary tooth)
  - Trauma
  - Persisting primary tooth - ankylosis, aplasia
  - Cysta



# Eruption problems

## Dentitio difficilis

- Primary > permanent dentition
- Gum swelling in the place of eruption - leukocyta cells
- Bacterium flora change

### Symptom:

- Swelling, increased saliva production
- High temperature, diarrhoea, lack of appetite

### Treatment

- Teething toys
- Inflammation and painkiller gele locally
- Dentinox/ Osanit / Dologel



# Thank you for your attention!

