

ANATOMICAL ANOMALIES / VARIANTS. Neill Serman

DEFINITION: An anomaly is a variation of the normal

CAUSES: Local
Inherited
Developmental
Manifestations of systemic conditions

CLASSIFICATION.

A. MORPHOLOGICAL

I. Number

- a. Congenitally missing teeth/ roots.
- b. Anodontia, oligodontia, hypodontia
- c. Supernumary teeth
- d. Additional cusps, nerve canals, or roots

II. Form and size

- a. Enamel pearl
- b. Micro / macrodontia
- c. Fusion and gemination
- d. Concrescence
- e. Dens invaginatus / in dente and dilated odontoma
- f. Tuberculated premolars. Dens evaginatus
- g. Hypercementosis

III. Position

- a. Ectopic
- b. Transmigration
- c. Transposition
- d. Rotation

B. ANOMALIES OF TOOTH FORMATION / DEVELOPMENTAL

1. Dentinogenesis imperfecta
2. Dentinal dysplasia
3. Amelogenesis imperfecta
4. Turner tooth
5. Odontogenesis imperfecta / Odontodysplasia
6. Complex dental anomalies
7. Taurodontia
8. Split lip / palate/jaw
9. Dilaceration
10. Additional roots
11. Delayed tooth eruption

HYPERTROPHY - very rare.

1. of the tuberosity
2. of the angle of the jaw
3. of the coronoid process
4. of the mandible on one side
5. of the side of the face

C. Developmental defect of mandible. [Stafne bone cyst.]

Lingual salivary gland defect / depression.

A. MORPHOLOGICAL

I. Number

1. Congenitally missing teeth / Hypodontia or Oligodontia [also missing/ additional roots, nerve canals or cusps] Often **inherited** pattern. Any tooth in the arch may be missing but the most commonly missing teeth are the **last teeth of the series.**

Thus—

molars - all third molar teeth

premolars - second premolar teeth [mandibular]

incisors - maxillary lateral

Permanent teeth are more often congenitally missing than the deciduous teeth but a primary tooth and its successor may be absent.

In **ectodermal dysplasia** there may be oligodontia or anodontia. Where the tooth has not yet formed / formed incompletely, therapeutic radiation may prevent further tooth formation and the affected teeth will be absent / incompletely formed.

Radiographic examination permits the accurate diagnosis of congenitally missing teeth before the time of eruption

Some other (rare) syndromes with hypodontia

Chondro ectodermal dysplasia

Down syndrome

Thalidomide embryopathy

Oro-digito facial dysostosis

1. [Total] Anodontia of permanent teeth where the primary teeth are normal is very rare. No inherited or systemic defects present. Very rare.
2. Supernumary teeth (Hyperdontia / oligodontia)

Often familial tendency. The supernumary tooth may be normal in appearance or may be conical in shape. Usually smaller in size. The supernumary tooth often prevents eruption of the other teeth/ tooth in the arch and there is a tendency to cyst formation of unerupted teeth.

Mesiodens - supernumary tooth in midline of maxilla

Supernumary - lateral incisors often associated with split palate

premolars; more often in mandible
Paramolar - supernumary between the molars
Retromolar / Distodens - supernumary distal to molars

Supernumary teeth are seen in **cleidocranial dysostosis** and **Gardner syndrome**. In Gardner syndrome there are osteomas [often multiple] around the jaws - which are otherwise rare in this area. There may also be subcutaneous fibromas, and cutaneous sebaceous cysts. There is also often multiple polyposis of the large intestine Remember that multiple polyposis of the **small** intestine is found in **Peutz-Jeghers syndrome** where freckles are seen in / around the mouth.

II. FORM AND SIZE

1. Enamel pearl / enameloma

Most commonly found at the cemento-enamel junction in the furcation area but can be found in any teeth. May consist of enamel only, enamel and dentin or may also contain a small pulp.

Radiographically: seen as a round radiopacity in the furcation area of mandibular molars. Don't mistake it for a pulp stone which is completely WITHIN the nerve chamber.

2. Micro / Macrodontia. Usually localized. Macrodontia is very rare

The size of a tooth of an individual does not always have a relation to the size of the person (familial?)

Microdontia often has a familial pattern and the teeth affected are often the same as those that are congenitally missing i.e. 3rd molars, 2nd premolars and maxillary lateral incisors. The whole tooth may be smaller or only the crown or the root.

Microdontia may be found in :-

- {a) osteogenesis imperfecta - rare
- {b) underdevelopment of the jaw with hemi-atrophy of the face
- {c) where young children were radiated for the treatment of a tumor
- {d) familial pattern

[Mulberry molar and Hutchinson's incisor found in congenital syphilis]

3. Fusion and Concrescence

Fusion is a **developmental** defect where the dentin of adjacent teeth fuse during tooth formation; (before calcification); often resulting in an abnormally large tooth. Only the crown or root may be seen. Unless fusion occurs with a supernumary tooth [very rare] there will be a tooth missing in the arch and the root will be enlarged. Deciduous or permanent teeth may be affected. May be partial or total. More common in anterior teeth but molars also affected.

Concrescence *usually* is a **pathological** fusion of cementum of adjacent teeth after tooth formation. Molar teeth are more commonly affected and may prevent eruption. Deciduous and permanent dentition affected. When extracting a tooth the adjoining attached tooth may be extracted at the same time.

3. Gemination and twinning

The developmental, partial division of the crown of a tooth, and thus the normal number of teeth are present in the arch. More common in deciduous teeth especially in the incisor and canine regions. **Twinning** = successful gemination.

4. Dens-in-Dente / Dens Invaginatus / Dilated odontoma

Invagination of the epithelium of the outer layer of the enamel organ during development produces an invagination (lined with enamel but may also have dentine only or also nerve chamber) in the crown of the tooth. Maxillary lateral incisor is the tooth most commonly affected and rarely it may be bilateral. Can occur in the root as well.

There are 4 types:

- a. Depression of the enamel palatally close to cervical margin. The depression is vertical and there is no widening or dilation
- b. The invagination widens and a pit is seen
- c. The invagination extends to the pulp chamber and is dilated
- d. The invagination occupies much of the coronal pulp and may extend beyond the amelo-cemental junction with root widening – **dilated odontoma**;**

The enamel and dentin in the invagination of a dilated odontoma may be defective or absent. In severe cases the pulp may be exposed and pulp death at an early stage often results. Early carious involvement is also common.

Dilated Odontoma is seen mainly in the root of the tooth and can be due to the invagination of the sheath of Hertwig.

5. Tuberculated premolar / Dens evaginatus / Leong's cusp

Evagination of the enamel organ during development resulting in the formation of a tubercle, usually on the occlusal surface. Gemination on the cusp or on or near the occlusal surface often obliterates the fissure of a normal tooth. commonly a premolar]. The evagination may break off / wear, exposing dentin (prone to caries) or the pulp. Rarely incisor or molar teeth also affected. Found in Mongolian races [thus Eskimos] and may be bilateral. Often results in occlusal trauma or malocclusion. Appears as a polyp-like protrusion

Radiographically: seen as well-defined radiopaque extensions of tooth above the occlusal surface.

6. Hypercementosis

Excessive formation of cement, mainly on the apical portion of the root of the tooth, mainly premolar teeth. In the majority of cases the teeth are vital and it is not associated with any systemic condition. In non-vital teeth, chronic infection in the periodontal ligament may cause hypercementosis. Hypercementosis presents a problem when extracting a tooth. In **Osteitis deformans** there is often a loss of the lamina dura associated with the hypercementosis

Radiographically - well-demarcated radiopacity around the root but the periodontal ligament space and lamina dura are normal in appearance but **peripheral** to opacity. Less radiopaque than dentin.

7. Delayed eruption of teeth

Delayed eruption of teeth under 1 year of age is considered a normal eruption pattern.

Local causes odontoma, supernumary tooth over retained deciduous tooth.

Systemic causes:

1. Hypopituitarism
2. Hypothyroidism
3. Facial hemiatrophy

Individual teeth may be involved e.g. 3rd molars and premolars. Non- eruption of individual teeth may be due to lack of space or over-retained deciduous teeth. Non-eruption of deciduous and permanent teeth is seen in cleidocranial dysostosis.

8. Dilaceration

Disturbance of root formation resulting in a **marked** curve of the roots of a tooth, thought to be due to trauma during root formation. Seen on radiographic examination. More common in premolar teeth. Beware with extraction and endo but these teeth make good bridge abutments.

9. Number of roots. Any tooth.

Reduced number of roots especially 3rd molars. Also 2nd molars.
Additional roots - especially mandibular premolars and canines.

III. POSITION

1. Ectopic

This is the condition where a tooth erupts in a position that is not normal e.g. a maxillary canine in the nasal cavity or a maxillary premolar in the middle of the hard palate, or a mandibular 3rd molar through the skin covering the mandibular arch.

2. Transmigration - very rare

This is a specific type of ectopic eruption seem mainly in mandibular canines and appears as if the teeth migrate to the opposite arch. Occasionally also mandibular premolars.

3. Transposition Rare.

Adjacent teeth in the dental arch change places with each other. Rarely found in deciduous teeth. The canine and incisor in the mandible commonly involved. Also, maxillary second premolar and maxillary first molar. Thought to be due to abnormal position of tooth bud. Also associated with hypodontia and supernumary teeth

4. Rotation – Rare

Tooth rotates developmentally through 180 degrees. Maxillary 2nd premolar most commonly involved. Not just a small amount of rotation. This is not partial rotation due to a lack of space.

B. ANOMALIES OF TOOTH FORMATION - ALL ARE DEVELOPMENTAL

1. Dentinogenesis imperfecta / Opalescent dentine

Autosomal dominant
BOTH primary and permanent dentition affected
Roots fracture easily - do not crown these teeth.

Enamel: normal but **chips off easily**
Often marked attrition of teeth

Color - gray-pink-brown or bluish - opalescent hue.

Radiographically Bulbous crowns; particularly posterior teeth
Obliteration of the nerve chamber
Sometimes short roots

2. Dentinal dysplasia - Rushton 1939 - very rare
Primary and permanent teeth affected.

Radiographically Complete obliteration of the nerve canal. Short roots / but crown normal size. Abscess and cyst formation occurs very often i.e. several periapical radiolucencies with incomplete roots. May affect individual teeth especially mandibular, premolar and canine. Rarely a variation is found where there are large pulp stones or pulp spaces

3. Amelogenesis Imperfecta

Autosomal dominant. All the enamel or only parts of the enamel may be affected.
Primary and / or permanent dentition may be affected

Two types: Hypoplastic
Hypomineralized

Radiographically Enamel less radiopaque or absent
Dentin, pulp and cementum normal
Appears as crown preps
In the hypomineralized type, the enamel can be seen radiographically interproximally

Clinically Teeth smaller and often apart
Dark yellow in color and loss of sheen i.e. **chalky**
Low incidence of caries
All OR only parts of the teeth may be affected as bands
Clinically the corners of the teeth wear and are **rounded**.

4. Turner tooth

Hypoplastic, pitted enamel of a permanent tooth due to **trauma** or **infection** of deciduous tooth. Individual teeth affected - mainly mandibular premolars. Infection affects ameloblasts in enamel organ before enamel formation completed. Can involve the whole crown of the tooth or seen as pits

5. (Regional) Odontodysplasia / Odontogenesis imperfecta – rare
Primary or secondary dentition. A few teeth only are affected but not all. Mainly maxillary anterior teeth affected. Only the shell of the teeth is seen.

Radiographically Pulp chambers unusually large.
Enamel + dentin less radiopaque due to hypoplasia & hypomineralization.
Roots are not clearly seen often due to incomplete formation.
Affected teeth usually **do not erupt**.

6. Complex dental anomalies - very rare
Early formation, eruption and exfoliation of primary teeth and some secondary teeth

TEETH Enamel - normal

Dentin - tubules reduced in number and often arranged in whorled pattern.

Few odontoblasts

Pulp chamber - reduced in size

Cementum - greatly reduced or absent

ANATOMY Cleft lip /palate; Basal Cell Nevus Syndrome; Crouzon's Disease

7. Taurodontia - not uncommon
Primary and secondary dentition may be affected. May be bilateral

Clinically - nothing seen

Radiographically. Total length of tooth normal. Roots and nerve canals are very short as pulp chambers extend deep into the roots. Thought to be due to the late invagination of the sheath of Hertwig. Taurodontia was found in Neanderthal man. Commonly found in Eskimos.

8. Split palate and jaw

Split palate due to lack of union of palatal processes. Alveolar split (between lateral incisor and canine) due to lack of union of globular process and maxillary bone. In these cases supernumary teeth; missing teeth and impacted teeth are often seen. Ectopic eruption of teeth in split or in nose seen.

Radiology shows the number, size and position of teeth and the amount of bone loss or lack of formation

C. HYPERTROPHY

1. Hypertrophy of the tuberosities B
Usually bilateral - problems with dentures
Unusual attrition of teeth

Radiology - will determine the distance the maxillary sinus extends into this area
- often extensive

2. Hypertrophy of angle of the jaw
Hereditary usually unilateral and rare.

Acquired due to

1. Bruxism - bilateral
2. Abnormal chewing habits
3. Habitual stress on teeth

The masseter muscle is noticeably enlarged and may affect shape of face. Rarely unilateral and may simulate a tumor

3. Hypertrophy of the coronoid process

May associated with tumor formation commencing at puberty. May extend to infra-orbital fossa and may limit jaw movement

4. Lingual mandible salivary gland defect / depression.

Radiographically - found incidentally on radiographic examination. Round or elliptical radiolucent area usually close to angle of jaw and inferior to mandibular canal.

Rarely found in anterior mandibular region. Very rarely seen in children but does not increase in frequency with age. Contains salivary tissue. Is merely due to a lack of bone in that area due to the presence of salivary tissue. It is NOT a cyst.