DEVELOPMENT OF THE DENTITION AND THE OCCLUSION

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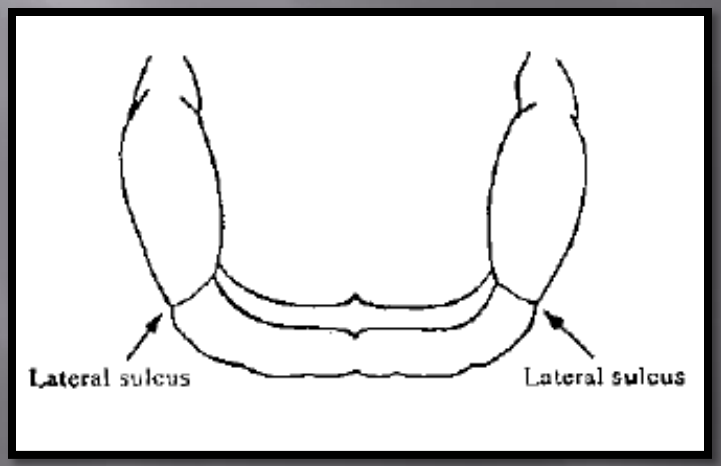
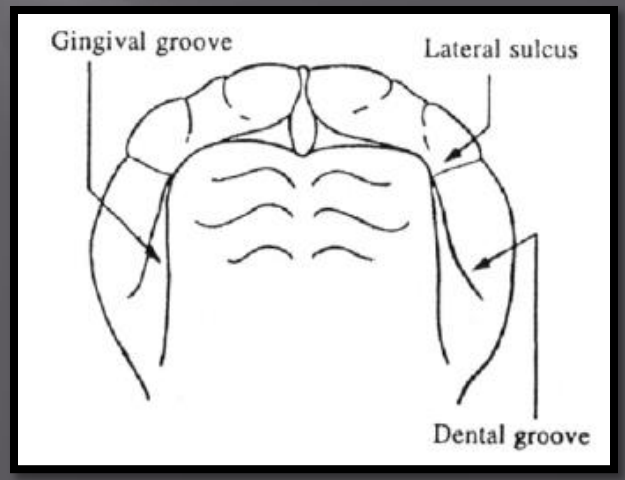
THE MOUTH OF THE NEONATE

- The maxillary arch is horseshoe-shaped and the gum pads tend to extend buccally and labially beyond those in the mandible; furthermore, the mandibular arch is posterior to the maxillary arch when the gum pads contact.





Neonatal Jaw Relationships

- The mouth of the neonate is a richly endowed sensory guidance system providing input for many vital neuromuscular functions, for example, suckling, respiration, swallowing, and coughing,.

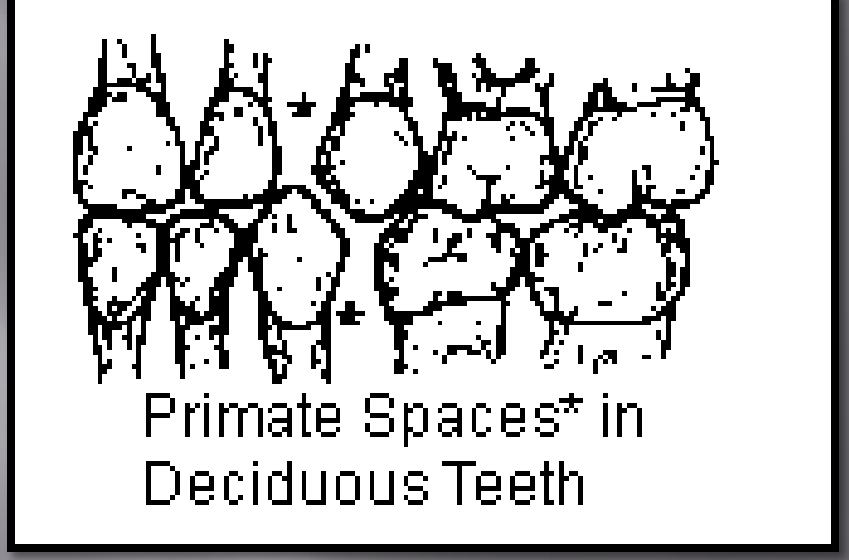
Erupted Primary Teeth

- Occasionally, a child will be born with teeth already present in the mouth.
- Natal (present at birth),
- neonatal (erupted during the first month), and
- pre-erupted (erupting during the second or third months)
- teeth are almost always mandibular incisors which frequently display enamel hypoplasia. There are familial tendencies for such teeth. Such teeth should not be removed, if they are near normal, even though they may cause the mother some discomfort during nursing, unless they are certainly supernumeraries.

PRIMARY DENTITION TO AGE THREE

- The primary teeth begin to form at 7 weeks in-utero and the enamel of all the primary teeth is usually completed by first year of age. All of the primary teeth generally would have erupted by 24 to 36 months of age.
- The histologic analysis shows that the calcification occurs in 24 units in maxilla and mandible. 20 are deciduous and 4 permanent

- The first tooth to erupt in the oral cavity is the mandibular primary incisor. The tooth usually erupts in a vertically upright position. As other primary teeth erupt, they may be spaced apart from each other particularly in the incisor area.

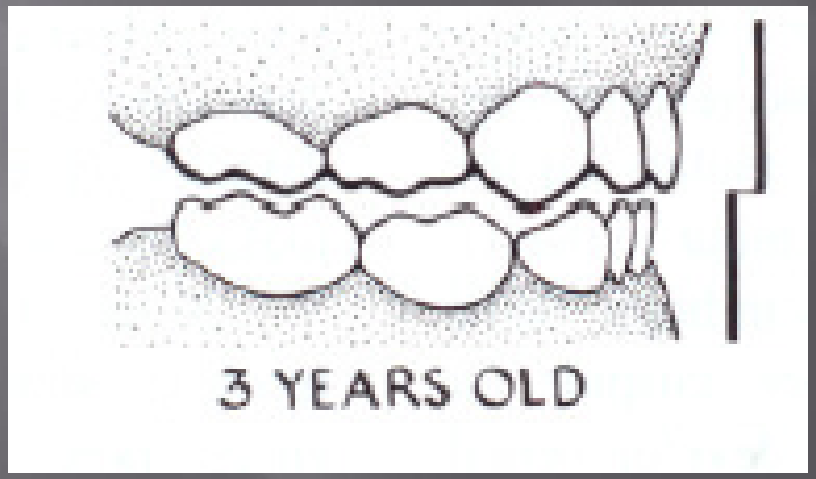


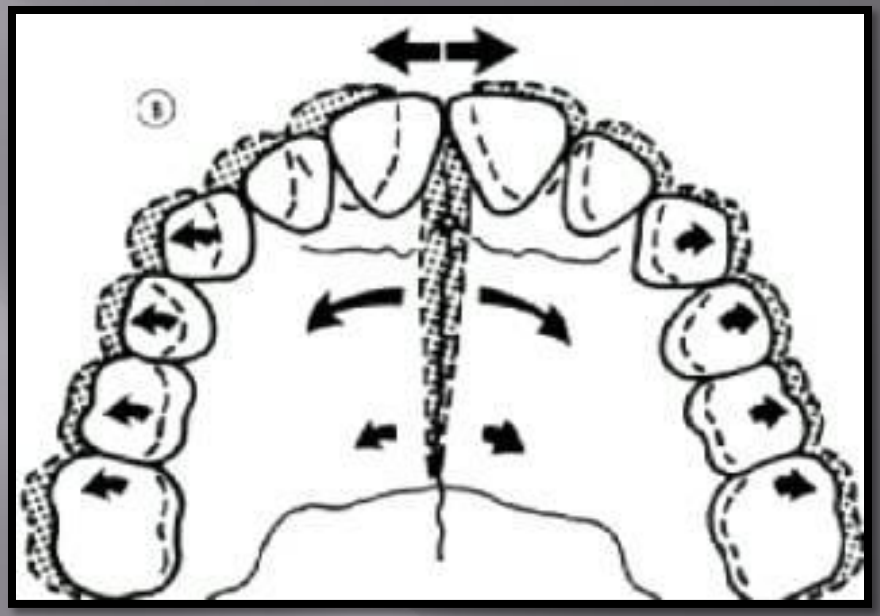
Primate Spaces* in Deciduous Teeth

- Primate spaces are frequently recognized which are spaces between the mandibular primary cuspid and the first molar and between the maxillary primary lateral incisor and cuspid

Permanent dentition till the age of 3 years

- The first permanent molar is the first tooth to show germ formation at age 3 ½ to 4 months in utero.
- It is followed by the central and the lateral incisors which demonstrate formation at 5 to 5 ½ months in utero.





- Transverse maxillary growth is largely a result of midpalatal sutural changes whereas the growth of the body and the angle of mandible are result of apposition and resorption.

- Posterior maxillary and mandibular growth helps to accommodate the emerging permanent first molars. Consistent with eruption of primary teeth, often the magnitude of vertical change is appreciated. The permanent anteriors will also occupy more anterior and protrusive position in the face

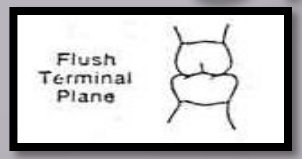
- This is relatively a stable period clinically for the primary dentition before its eruption was completed by 24 to 36 months and before root formation and completed by 3 years. This is the significant period of time for the development of clinical crown of the permanent dentition and their subsequent eruption.

- There will be some root resorption during this period.The occurrence of the primate spaces in deciduous dentition is a significant aspect as this would allow for the eruption of the permanent successors which have wider mesio-distal diameter

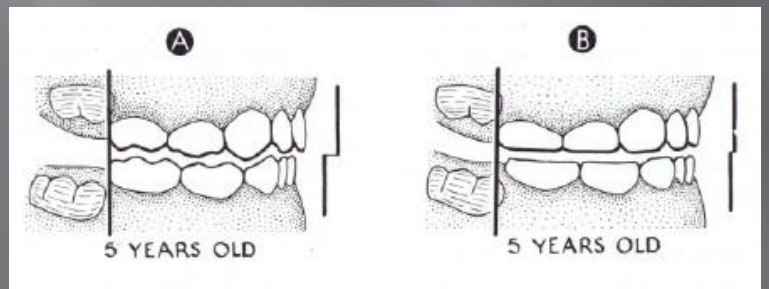
THE TRANSITIONAL YEARS:

- Mixed dentition refers to the stage where both the permanent and the primary teeth are present in the mouth.There are three stages in mixed dentition.

STAGE 1: INTRA ARCH GROWTH AND DEVELOPMENT



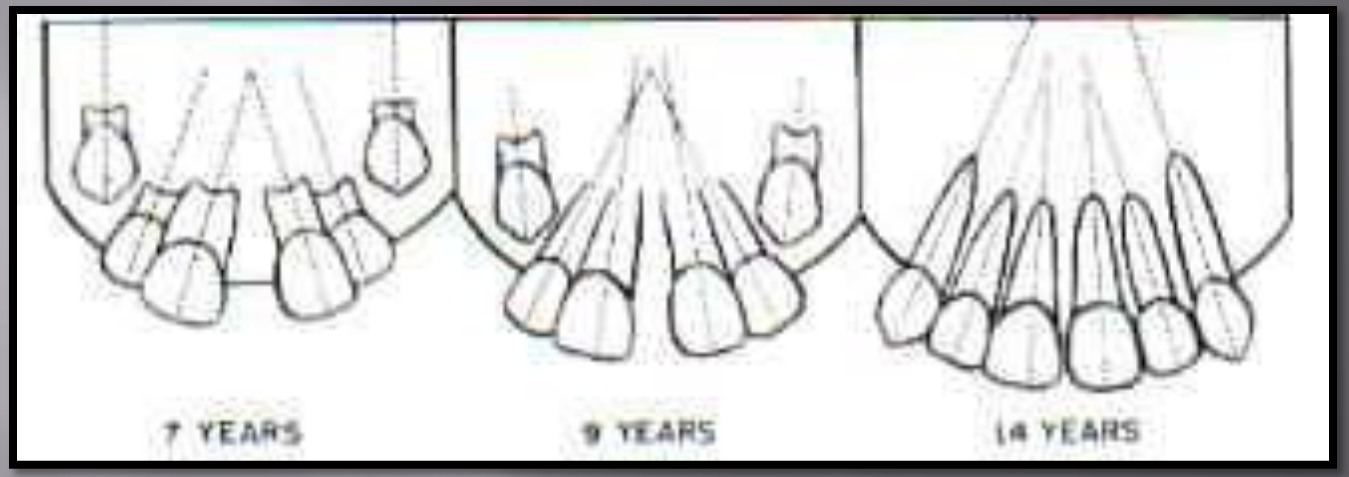
- The early phase of stage 1 is the period when four permanent molars erupt distal to the second primary molars and eight permanent incisors erupt after the primary incisors are shed. These events occur in a variable sequence from 5 to 8 years of age. Most children experience these events around 6- 8 years. The permanent first molars erupt end to end as Angle Class 1



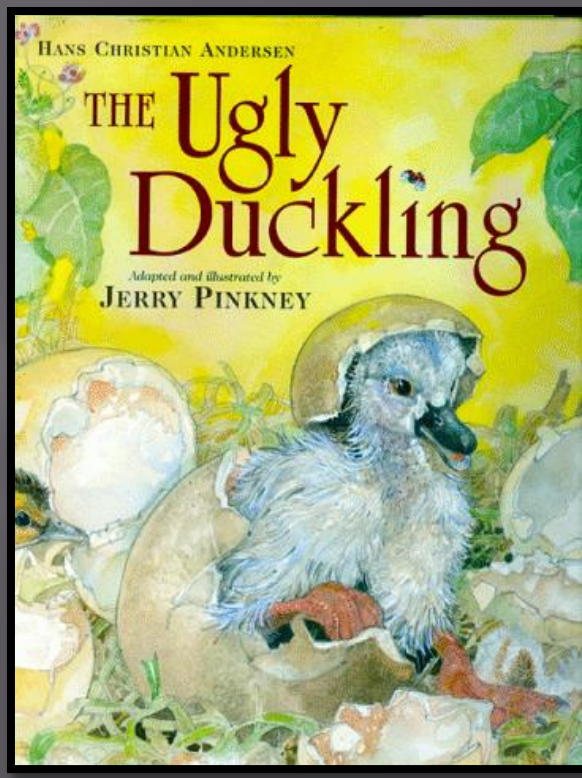
- Dental development is a function of tooth formation and not chronologic age or skeletal development. Teeth usually erupt with the root $\frac{1}{2}$ or $\frac{3}{4}$ formed .If $\frac{3}{4}$ of the root is formed, the tooth is not erupted and methods to assist tooth eruption are indicated. Permanent incisors that erupt before the loss of the primary successor may be deflected lingually. In the case of maxillary incisor it may result in lingual crossbite.

- When the permanent crown is visible in the mouth its corresponding primary predecessor should be exfoliated. Contralateral teeth that erupt within 6 months of each other is considered normal. But if one central incisor has erupted and the other incisor has not even erupted after 6 months; an obstacle has to be suspected. The problem can be trauma, midline supernumerary teeth, or early loss of permanent teeth leading to the formation of dense avascular gingival tissue.

- Crowding is generally common when the maxillary dental arch is narrow. The crowding is usually manifested as lingual blockade or rotation of lateral incisors. It may also result in lateral incisors more labially placed and central incisor more lingually placed leading to Class 2 division 2 malocclusion



- The'UGLY DUCKLING STAGE" refers to the stage where the maxillary lateral incisor has strong distal crown inclination.

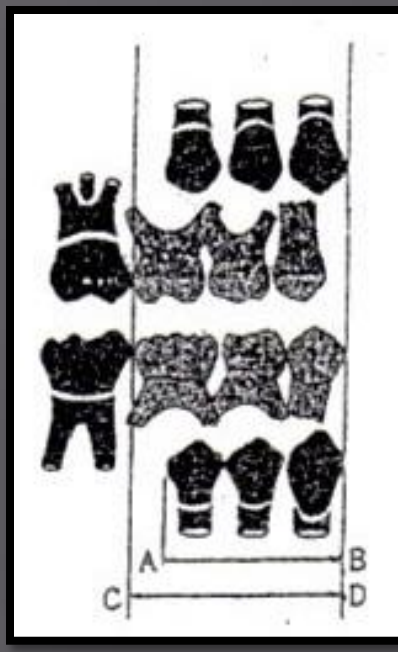


Stage 2: Intra arch growth and development

- The transition from mid-arch dentition to permanent dentition occurs from ages 9 to 13 years. The primary cuspid,the first and the second molars are replaced by the permanent cuspid, the first molar and the second molar. Even the permanent second molar erupts during the second time.

- The primary cuspid is narrower than its permanent sucessor, the permanent first molars are slightly larger or equal in size to permanent first bicuspids and the second primary molar, especially in the mandible are significantly larger The transition from mid-arch dentition to permanent dentition occurs from ages 9 to 13 years.

- The leeway space is used either anteriorly to permit improvement in crowded incisors, or posteriorly to allow the lower permanent first molars to migrate more mesially. When end to end molar relations exist in the mixed dentition, migration is necessary to achieve a class 1 permanent molar relation.



- The status of eruption of permanent molar is an important factor. The second permanent molar exerts a mesial force as it erupts and if by that time second bicuspid has not reached the plane of occlusion, considerable mesial migration of the first permanent molar can occur in a relatively short period of time.

- A tooth usually requires six months or more from the time it is first visible in the mouth until it reaches the plane of occlusion. The Late shift of the permanent molars is influenced by the leeway space at the age of 13-14 years

STAGE 3: INTRA ARCH GROWTH AND DEVELOPMENT

- The relationship between the maxillary and mandibular teeth can vary in three planes of space. Changes in relationship however can occur by changes at one or more of four specific sites of change.

a) Maxillary teeth can move with cellular changes in periodontal tissues

b) The maxilla can grow at its sutural articulations causing the maxillary teeth with it.

c) Mandibular teeth can move with cellular changes.

d) The mandible can grow at its articulations, carrying the mandibular teeth with it

- When the mandibular first molar erupts the posterior interdental spaces, possibly under the influence of the erupting first molars close fully as the posterior teeth move mesially. This shortens the posterior archlength slightly.
- However the total arch length does not change during this period because the larger permanent incisor teeth erupt labial to their primary predecessors,the arch length would probably increase.

CLINICAL SIGNIFICANCE OF PRIMARY DENTITION

- The primary dentition years ie: dento-alveolar changes from 6 to 12 years help the pedodontist in estimating treatment, occlusion, the relation of the inter-canine width and the dimensional change occurring in the eruption of tooth structure also play a major role deciding the mode of treatment the child could be given.

- The shedding of the deciduous second molar generally occurs at 11-12 years and if at that particular age such a tooth is infected it is indicated for extraction rather than conservation

THE ADOLESCENT YEARS

- The important changes taking place in dentition happens to be eruption of the second and third molars.
- The cranio facial changes occuring in the face leads to the slow increase in height of the face leading to prognathism. The mandible exhibits greater prognathic changes than the maxilla.
- The maximum pubertal growth spurt is generally recognized to take place between the age of 10 and 12 years(females) and 12 to 14 years(males).

- The maxillary sinuses which have since birth expanded laterally and vertically occupy the space left by the permanent teeth where they erupt and the sinuses grow downward.
  By puberty the sinuses become fully developed and continue to enlarge.
- There is average increase in the palatal vault of approximately 10mm from birth to adolescence but simultaneously the palate moves downward as a result of appositional growth.

- The growth of the jaws continue during this period. The growth would be sufficient to develop room for the third molars.
- In many cases, the growth becomes adequate and third molars become permanent teeth diminishes as mandible completes the growth under the maxilla and lower incisors become more upright resulting in crowding.

- By the completion of adolescence all the 27 bones of the skull are closely adopted and skull can be considered as a single bone. But growth is considered as a lifelong process and subtle changes keep on occurring

DENTAL CHANGES DURING ADOLESCENT YEARS

- All the permanent teeth generally would have erupted by the age of 12 years excepting the second molars. The presence of any unerupted tooth except the third molars must indeed be an anomaly.
- The roots of all the teeth would have completely formed by the age of 16 years except for those of third molars which are completed at an age of 25 years.