

# Aetiology of Malocclusion- Contributing Factors

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## Overview

- **Systems of Classification**
  - Heritability
  - McCoy and Shepard
  - Moyers
  - Salzman
  - Graber
- **Graber-General factors**
- **Graber-Local factors**

# Systems of Classification

## Heritability

- Inherited (predetermined)(genetic)
- Acquired (environmental)

## **McCoy and Shepard(1956)**

- Direct (determining)
- Indirect (predisposing)

## **Moyers (1972)**

- Heredity
- Developmental Defects
- Trauma
- Physical agents
- Habits
- Diseases
- Malnutrition

## Salzman

- Prenatal
- Postnatal

## Graber

- General (extrinsic) factors
- Local (intrinsic) factors

## Graber-General factors

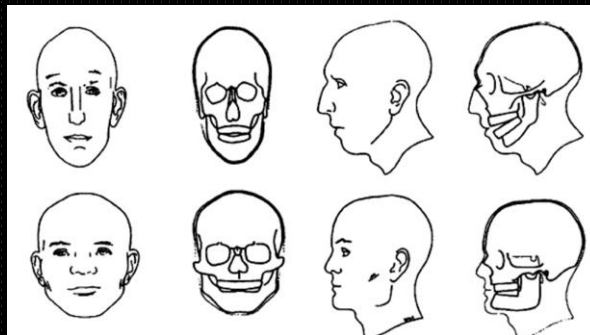
- Heredity
- Congenital defects
- Environment
- Predisposing metabolic climate & disease
- Diet
- Abnormal pressure habits
- Posture
- Trauma

# Heredity

- For each individual there is a basic pattern or blueprint for dentofacial development which may be masked but not really changed (unless by surgery)
- Racial and familial characteristics
- They affect
  - Neuromuscular system
  - Dentition
  - Skeletal structures
  - Soft tissues (other than the neuromusculature).

## Facial Typing

- Brachycephalic-short, broad
- Dolicocephalic-narrow, tapering, long
- Mesocephalic-round, oval



## Facial Typing-profile

- Convex-Class II (protrusive maxilla or retrusive mandible) or Class 1 bimaxillary
- Concave-Class III (protrusive mandible or retrusive maxilla)
- Flat-Class I (dental bases in harmony)

## Features Affected by Heredity

- Tooth size
- Variations in tooth shape
- Hypodontia
- Supernumerary teeth
- Size and position of the jaws
- Arch length and width
- Height of the palatal vault

## Features Affected by Heredity

- Crowding or spacing
- Overbite and overjet
- Position and configuration of muscles
- Tongue size and shape
- Character of the oral mucosa
- Congenital deformities
- Facial asymmetry

## Hypodontia

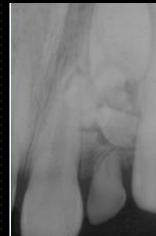




## Hypodontia & peg-shaped lateral incisor



## Supernumerary teeth



## Overjet



## Deep bite



## Mandibular prognathism



## Mandibular prognathism Habsburg family (1515)

Maximilian I



Charles V

## Mandibular Retrusion



## Maxillary hypoplasia



## Crowding



## Spaces



## Diastema



## Congenital Defects

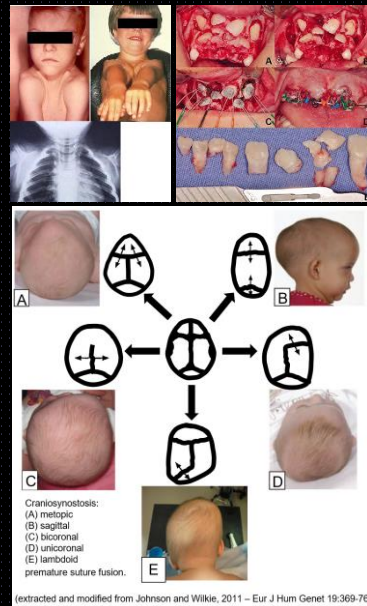
## Examples

- Clefts of the lip and palate
- Cerebral Palsy
- Crouzons syndrome



## Examples

- Cleido-Cranial Dysostosis
- Cranial Synostosis



# Environmental Factors

## Prenatal

- Trauma
- Maternal diet
- Maternal metabolism & diseases
- Fetal posture
- Maternal consumption of alcohol & drugs



## Postnatal

- Birth injuries
- TMJ injuries
- Accidents, fractures
- Avulsion or displacement of teeth

## Injuries



## Dilaceration



## Metabolic Factors & Diseases

- Acute febrile disease- e.g. measles, mumpes, chicken-pox,etc.
- Diseases of muscle dysfunction-e.g. muscular dystrophy, cerebral palsy, polio.
- Endocrine disorders-e.g. pituitary, thyroid, parathyroid.

## Acute febrile diseases

- Acute febrile diseases may affect the dentition and its surrounding hard and soft tissue.
- If severity and duration is not prolonged the child is able to recoup and catch up growth is possible

## Muscular dystrophy



## Endocrine diseases

- **Diabetes mellitus**, is a group of metabolic diseases in which there are high blood sugar levels over a prolonged period.
- **Thyroid disorders** is the condition that occurs due to excessive or insufficient production of thyroid hormone by the thyroid gland.
- **Cushing's syndrome** is a collection of signs and symptoms due to prolonged exposure to cortisol.
- **Addison's disease** is a rare, chronic endocrine system disorder in which the adrenal glands do not produce sufficient steroid hormones.

## Oral manifestations of **Endocrine disorders**

Pituitary dwarfism	Microdontia, Retarded tooth eruption
Congenital hypothyroidism	Macroglossia, Retarded tooth eruption
Gigantism/acromegaly	Spaced teeth, Mandibular prognathism, Macroglossia, Megadontia
Hyperparathyroidism	Bone rarefaction, Brown tumours
Addison's disease	Mucosal hyperpigmentation
Diabetes mellitus	Periodontal disease, Xerostomia, Candidiasis, Sialosis, Lichen planus
Pregnancy	Gingivitis, Epulis

# Diet

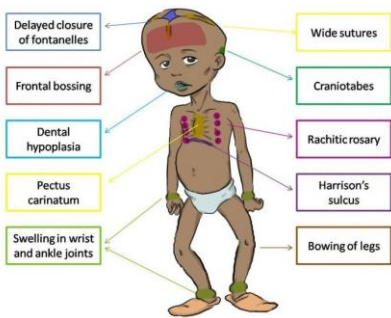
- Poor diet may cause deficiency diseases such as **Rickets**, **beriberi**, **scurvy** etc.
- These may cause severe malocclusion due to interference with **craniofacial growth** and development in addition **Periodontal problems** associated with significant bone loss

## Diet-malnutrition (quality and nature of food)



# Rickets

## 10 important clinical features in Rickets



Clinical aspect of a patient with hypophosphatemic Rickets

# Causes of Rickets

## CAUSES OF RICKETS

### VITAMIN D DISORDERS

- Nutritional Vitamin D deficiency
- Congenital Vitamin D deficiency
- Secondary Vitamin D deficiency
  - Malabsorption
  - Increased degradation
  - Decreased Liver 25-hydroxylase
- Vitamin D dependent ricket Type 1
- Vitamin D dependent ricket Type 2
- Chronic Renal Failure

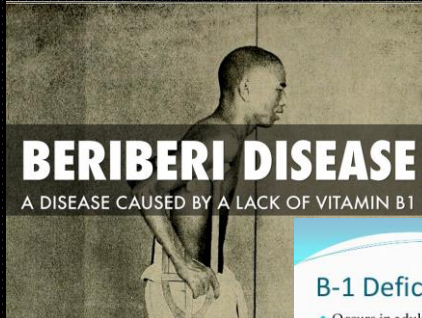
### CALCIUM DEFICIENCY

- Low intake
  - Diet
  - Premature Infant
- Malabsorption
  - Primary Disease
  - Dietary inhibitors of calcium absorption

### PHOSPHORUS DEFICIENCY

- Inadequate intake
  - Premature infants
  - Aluminium containing antacids

# Beriberi Disease



## B-1 Deficiency(beri beri)

- Occurs in adults when the intake drops below 1mg/day.
- Three forms-dry, wet, acute
- Dry-no edema, severe muscle wasting, and cardiomegaly.
- Wet-peripheral edema, ocular paralysis, ataxia and mental impairment.
- Infantile beriberi more subtle than adults occurs in breastfed infants of thiamine deficient mothers.
- Cardiac involvement with cardiomegaly, cyanosis, dyspnea, and aphonia if untreated results in death.

# Scurvy

## Cause

- Deficiency of Vitamin C (ascorbic acid) for at least 3 months

## Signs

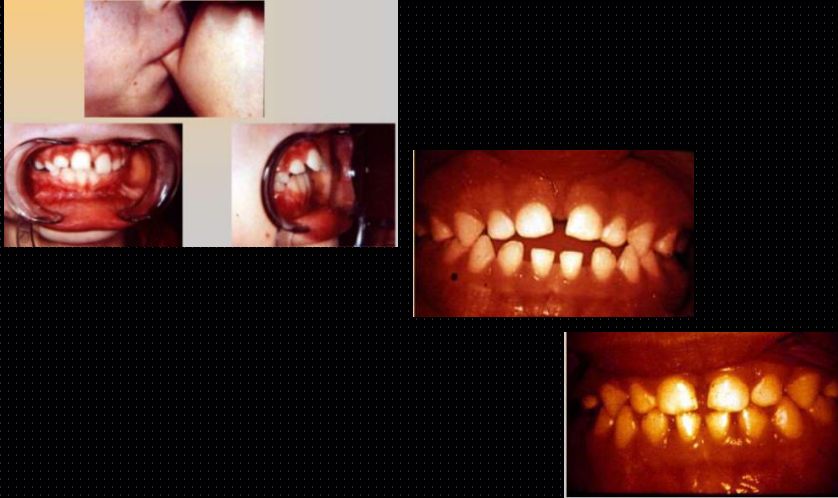
- Muscle weakness
- Joint & muscle aches
- A rash on the legs
- Bleeding of the gingiva



# Habits

- Thumb or finger sucking
- Foreign objects
- Tongue thrusting
- Lip or cheek biting
- Mentalis muscle strain
- Mouth breathing

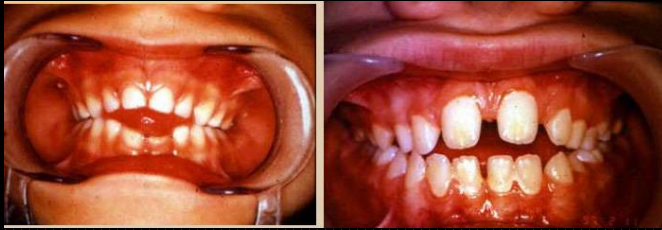
## Thumb-sucking



## Finger sucking



## Tongue thrust swallowing



## Tongue thrust



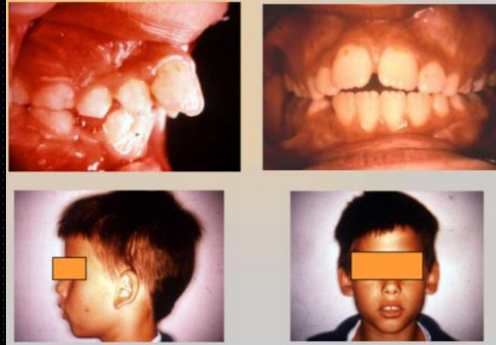
## Malposition of the lower lip



## Hyperactive mentalis muscle



## Disturbed respiratory function mouth-breathing



# Posture

- Not an important factor
- May be a contributing factor
- Seldom considered a primary cause
- They may be associated with other abnormal pressure or muscle imbalances increasing the risk of malocclusion

### Grabber-Local factors

- Congenital absence of teeth
- Supernumerary teeth
- Anomalies of tooth size
- Anomalies of tooth shape
- Abnormal labial frenum
- Premature loss of deciduous teeth
- Retained primary teeth

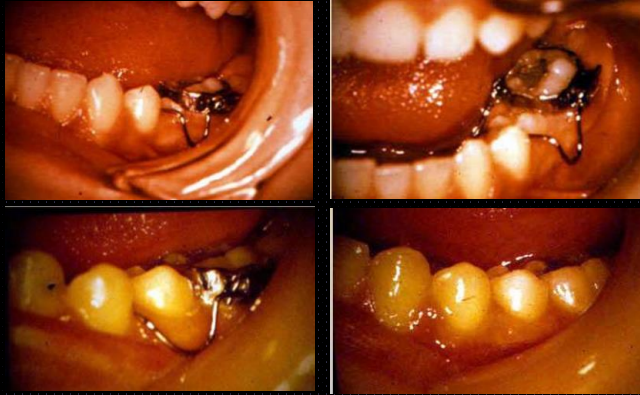
## Grabber-Local factors

- Abnormal resorption of deciduous teeth
- Delayed eruption of permanent teeth
- Abnormal eruptive path
- Ankylosis of deciduous teeth
- Proximal caries
- Improperly contoured restorations

## Premature extraction of primary teeth



## Space maintainer

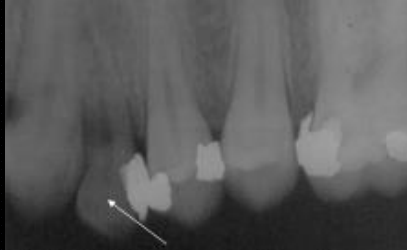


## Retained primary teeth





## Over Retained Primary Canine



## Ankylosed Primary Molar



## Abnormal eruptive path

