

## Identifying a Malocclusion

### Etiology of Malocclusion

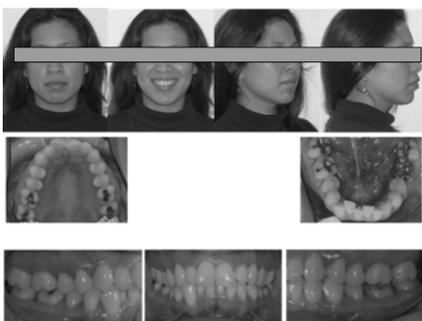
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## Identifying a malocclusion

- Chapters 1 and 5
- “Contemporary orthodontics” by Proffit, WR, 4th ed.
- <http://ohsu-eres.lib.pdx.edu/courseindex.asp>
- [www.ohsu.edu/library](http://www.ohsu.edu/library) → Electronic resources → Electronic reserves (ERes) → Electronic reserves and course materials → select “school of dentistry” → select SODORD732
- No Password is set

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## Identify malocclusion? Etiology?



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## History of Orthodontics

- Norman Kingsley: In 1866, first to use extraoral force to correct protruding teeth



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## History of Orthodontics

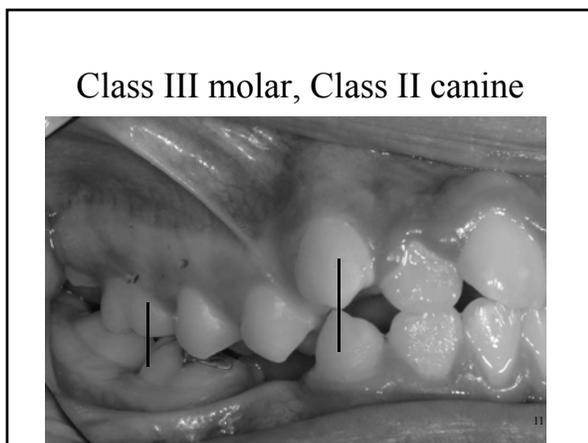
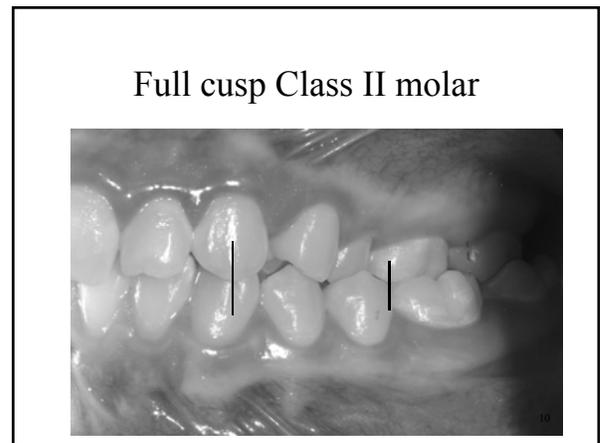
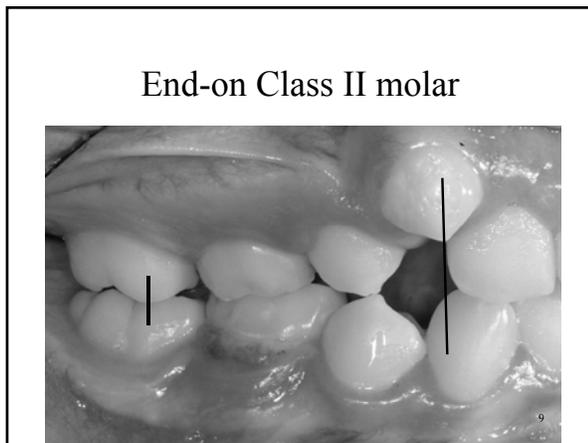
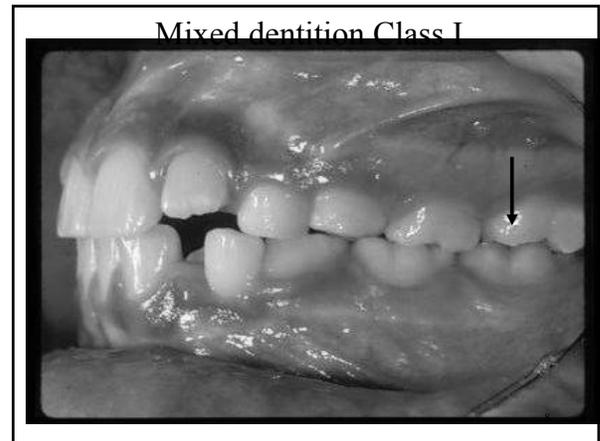
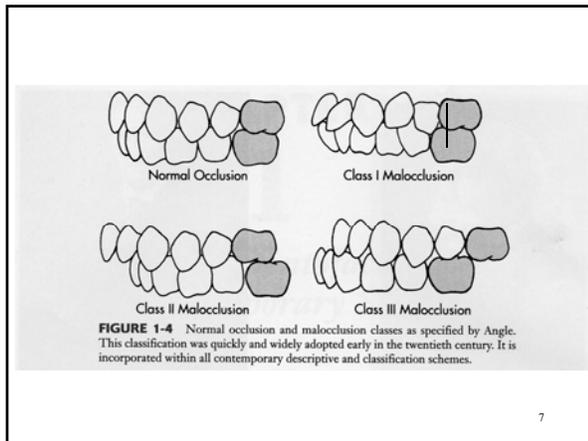
- Late 1800's: concept of occlusion was developed to make good prosthetic teeth
- Edward H. Angle:
  - Father of modern orthodontics.
  - Took the concept of prosthetic occlusion and extended it to the natural dentition.
  - Developed the classification system used today.

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## Classification of teeth

- According to Angle: the key to occlusion was the maxillary 1<sup>st</sup> molar
- Class I (normal occlusion)
- Class I malocclusion
- Class II malocclusion
- Class III malocclusion

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### History of Orthodontics

- 1930's: extraction of teeth was suggested as a method to enhance facial esthetics and achieve stability
- After WWII: Cephalometric radiology allowed orthodontist to measure growth and treatment changes and define skeletal malocclusions

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## Goals of modern orthodontists

- The creation of the best possible occlusal relationship within the framework of acceptable facial esthetics and stability of the result

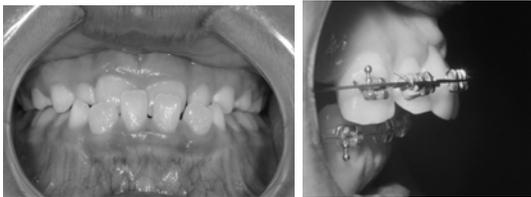
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## Components of malocclusion

- Crowding: the most significant contributor to malocclusion
- A-P problems: 2<sup>nd</sup> most prevalent finding
- Vertical problems: open bites (black: white or Hispanic = 5:1) or deep bites (black: white or Hispanic = 1: 2)
- Transverse problem: relatively rare

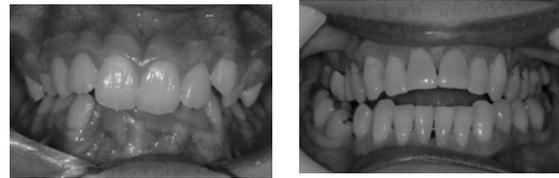
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## A-P Problems



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## Vertical Problems

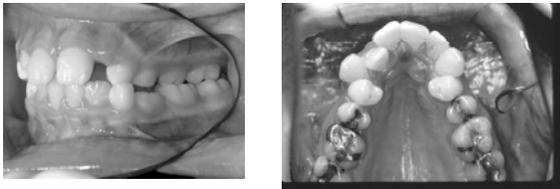


Deep bite

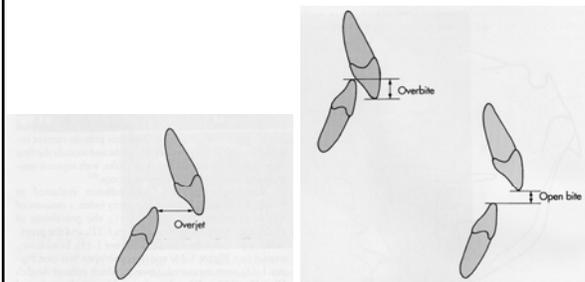
Open bite

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## Transverse Problems



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Overjet: Horizontal overlap of incisors

Overbite: vertical overlap of the incisors

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## Prevalence of malocclusion in Angle's classification

- Class I normal occlusion: 30%
- Class I malocclusion: 50-55%
- Class II malocclusion: 15%
- Class III malocclusion < 1%
- More class II in whites and more class III in Asians.
- Class III and open bite are more frequent in African than European populations

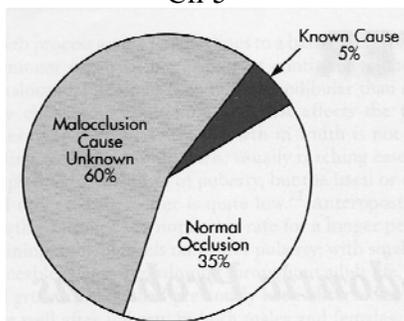
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## Need for orthodontic treatment

- 3 types of problems from protruding or malposed teeth:
  - Discrimination because of facial appearance
  - Problems with oral function: jaw movement, TMD, mastication, swallowing or speech
  - Greater susceptibility to trauma, periodontal disease, or tooth decay

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## Etiology of orthodontic problems Ch 5



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## Specific causes of malocclusion

- Disturbances in embryological development
- Skeletal growth disturbances
- Muscle dysfunction
- Acromegaly and hemimandibular hypertrophy
- Disturbances of dental development

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## Disturbances in embryological development

- Causes: range from genetic disturbances to specific environmental insults
- Teratogens: chemical and other agents capable of producing embryologic defects if given at the critical time
- <1% of children who need orthodontics had a disturbance in embryologic development as a major contributing cause.

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## Disturbances in embryological development

Teratogens	Effect
13-cis Retinoic acid (Accutane)	Retinoic acid syndrome: malformations virtually same as hemifacial microsomia, Treacher Collins syndrome
Aspirin	Cleft lip and palate
Cigarette smoke (hypoxia)	Cleft lip and palate
Dilantin	Cleft lip and palate
Ethyl alcohol	Central mid-face deficiency
Rubella virus	Microphthalmia, cataracts, deafness
Thalidomide	Malformations similar to hemifacial microsomia, Treacher Collins syndrome
Valium	Cleft lip and palate
Vitamin D excess	Premature suture closure
X-radiation	Microcephaly

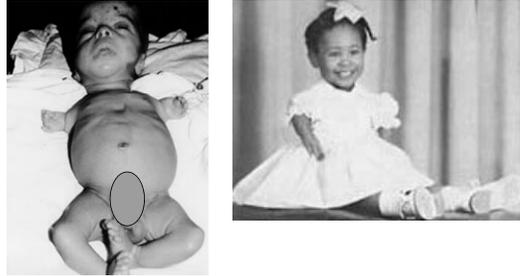
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## Thalidomide

- Introduced from Germany in 1957 but was never approved by FDA.
- Prescribed to pregnant women to combat morning sickness
- When taken in the 1<sup>st</sup> trimester, the child has various defects, including short limbs, hemifacial microsomia
- Banned in 1960s

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## Phocomelia caused by thalidomide



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## Hemifacial microsomia



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## Skeletal growth disturbances

- Fetal molding and birth injuries
  - Intrauterine molding: pressure against the face
  - Birth trauma to the mandible: use forceps in delivery



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## Intrauterine molding

- an arm is pressed across the face in uterus, resulting in severe maxillary deficiency at birth
- a fetus' head is flexed tightly against the chest in uterus, preventing the mandible from growing forward normally.
  - related to a decreased volume of amniotic fluid.
  - extremely small mandible at birth, usually accompanied by a cleft palate

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- Childhood fractures of the jaw
  - 75% of children with early fractures of the mandibular condylar process have normal mandibular growth

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## Fracture of the right condylar process at age 2



Mandibular growth was normal until age 6<sup>31</sup>

## Muscle dysfunction

- Damage to motor nerve → underdevelopment of that part of the face
- Excessive muscle contraction of neck on one side (torticollis) → facial asymmetry

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## Asymmetry caused by missing masseter muscle



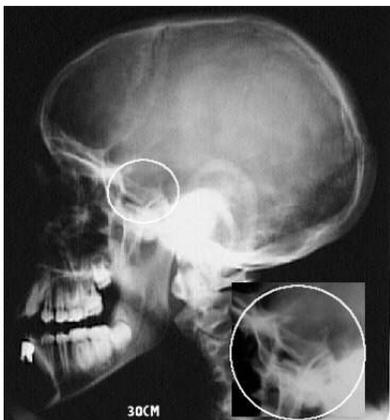
**FIGURE 5-5** A and B, Facial asymmetry in an 11-year-old boy whose masseter muscle was largely missing on the left side. The muscle is an important part of the total soft tissue matrix; in its absence growth of the mandible in the affected area also is deficient.

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## Acromegaly and hemimandibular hypertrophy

- Anterior pituitary tumor secretes excessive amounts of growth hormone → excessive growth of the mandible → long mandible
- Even if the tumor is removed, the skeletal deformity persists and jaw surgery is necessary.

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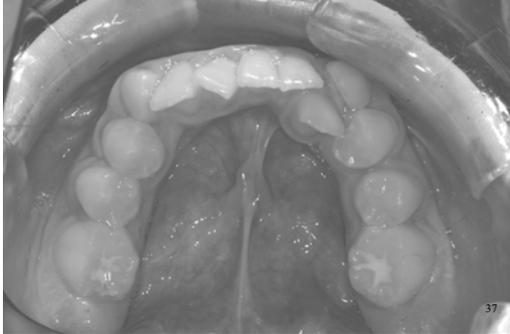
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## Disturbances of dental development

- Congenitally missing teeth
- Malformed or supernumerary teeth
- Fusion, gemination
  - Fusion: teeth with separate pulp chambers joined at the dentin
  - Gemination: teeth with a common pulp chamber

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## Supernumerary teeth



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## Fusion



FIGURE 5-12 Fusion of a mandibular lateral incisor and canine.

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## Disturbances of dental development

- Interferences with eruption:
  - supernumerary teeth, sclerotic bone, heavy fibrous gingiva
  - 5-10% has at least one primary molar ankylosis
- Ectopic eruption: most likely occur in upper first molar
- Early loss of primary teeth: premature loss of primary canine or primary first molar → distal drift of incisors

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## Premature lost of primary canine



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## 1.5 years later of the same patient



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## Disturbances of dental development

- Traumatic displacement of teeth:
  - Damage to permanent tooth buds from an injury to primary teeth
  - Drift of permanent teeth after premature loss of primary teeth
  - Direct injury to permanent teeth

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## Genetic influence

- Inherited in 2 major ways:
  - Disproportion between the size of the teeth and the size of the jaws (Teeth vs. Jaw)
  - Disproportion between size or shape of the upper and lower jaws (Upper vs. Lower)

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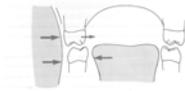
## Environmental influences

- If a habit like thumb sucking created pressure against the teeth for more than the threshold duration (6 hours or more per day), it certainly could move teeth.
- The transseptal fiber was stretched elastically during orthodontic treatment and tends to pull the teeth back toward their original position.

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## Thumb sucking

- During primary dentition: no influence
- If it persists beyond the time that the permanent teeth begin to erupt:
  - Flared and spaced maxillary incisors
  - Lingually positioned lower incisors
  - Anterior open bite
  - A narrow upper arch



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## Etiology

- The etiologic agents are usually no longer present when growth is completed.
- Whatever the malocclusion, it is nearly always stable after growth has been completed.
- If an orthodontic problem is corrected in adult life, a surprising amount of change is also stable.

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