Fundamental & Preventive Curvatures of Teeth and Tooth Development

Lecture Three
Chapter 15 Continued; Chapter 6 (parts)
Dr. Margaret L. Dennis
Proximal contact areas

- **Contact areas** are on the mesial and distal surfaces of teeth where one tooth touches its neighbor in the same arch.
  - It prevents food from being packed between the teeth.
  - Also offers support to neighboring tooth.
Contact areas

- **Anterior teeth** - contact area located closer to the incisal surface.
- **Posterior teeth** - contact area located closer to the middle third of the crown.
- **Exception**: The more posterior the tooth is located in the mouth, the more cervical the contact area.

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**Fig. 11-4**: A maxillary first molar has a trifurcation at the point of junction where the three roots join the root trunk. (From Zeitze RC, Nacebich J. Dental anatomy, St. Louis, 1949, Mosby.)

**Fig. 13-1**: A maxillary right canine. A. Labial view. (From Zeitze RC, Nacebich J. Dental anatomy, St. Louis, 1949, Mosby.)

**Fig. 10-5**: Maxillary right central incisor, labial view. (From Zeitze RC, Nacebich J. Dental anatomy, St. Louis, 1949, Mosby.)
Location of contact areas:

- proximal contact areas are flattened surfaces, not pointed.
- located at the **widest part (height of contour)** of the mesial and distal contours of the teeth.
Contact area vs. contact point

• Contact area
  – Where one tooth touches its neighbor in the same arch.
  – It is a flattened surface.
  – Located on mesial and distal surfaces.

• Contact point
  – Where occlusal cusp touches opposing tooth in the opposite arch.
  – It is a point of contact.
  – Located on occlusal surfaces.
Embrasures

• An Embrasure is a triangular shaped space between two teeth of the same arch.
• It allows passage of food so food is not forced between the teeth.
• Embrasures are named for their location:
  – Buccal, lingual, incisal, or occlusal embrasures.
Embrasures

This feature of the dental arches is found occlusal to the contact area and is designed to direct the flow of food away from the interproximal space. Facial, lingual, incisal, and occlusal embrasures are named for their location.
Interproximal spaces

• Triangular shaped spaces between the teeth.

• In health, these spaces are filled with gingiva – called interdental papillae.

• In disease, the tissue no longer fills the space and a void exists between the teeth.
Healthy interdental tissue completely fills the interdental space which is also called the cervical embrasure.
Interdental voids
Embrasures function to:

- Prevent food impaction
- Reduce occlusal trauma
- Self-cleansing
- Permit stimulation to gingiva by frictional massage and protect gingiva.
Embrasures widen as you move in a posterior direction in the oral cavity.
## EMBRASURE Review

<table>
<thead>
<tr>
<th>Anterior</th>
<th>Posterior</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contact area near incisal of teeth</td>
<td>Contact area near middle third of teeth</td>
</tr>
<tr>
<td>Narrow embrasure</td>
<td>Wide embrasure</td>
</tr>
<tr>
<td>Tall interproximal spaces</td>
<td>Short interproximal spaces</td>
</tr>
</tbody>
</table>

Exception: It is normal for children to have spaces between the teeth, no contact areas on anterior teeth, until the first molars erupt (around 6 years old).

Adult with contact areas between the teeth.
Teeth Shapes

Triangle

Pentagon

Trapezoid

Rhomboid
Teeth Shapes

Anterior teeth

Labial

Mesial

Canines

Labial

Mesial

Labial

Mesial

Labial

Mesial
Teeth Shapes

Premolars

Molars

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Curvatures and Alignment of Teeth Function to:

- Maintain the teeth within dental arch
- Protect gingiva and periodontium
- Disperse occlusal trauma and biting forces.
- Aid in preventing disease, calculus build-up, bacterial invasion.
- Increase the life expectancy of the tooth.
Facial & Lingual Contours

The FACIAL height of contour (HOC) is in the gingival third of the crown.
LINGUAL SURFACES

1. Anterior teeth HOC is in the **cervical third**

2. Posterior teeth HOC is located in the **middle third** closer to the occlusal.
Height of Contour
buccal and lingual

Buccal height of contour

Lingual height of contour
Terms/Definitions

- **Crest of Curvature** - refers to the widest part of the crown of the tooth.

- **Height of Contour (HOC)** - same as the crest of curvature, it is the widest part of the crown of the tooth.

- **Curvature of CEJ** (cementoenamel junction) – the CEJ (cervical line) is a continuous landmark around the circumference of the tooth. The curvature of the CEJ is greater on anterior teeth than it is on posterior teeth.
Curvature of the CEJ

1. The more anterior a tooth is located the greater the curvature of the CEJ.
2. This provides more cementum for bony attachment and, thus, more stability.
Curvature of the CEJ

1. The mesial curvature is always greater than the distal curvature on the same tooth.

2. Distal curvatures on posterior teeth are very slight.
LINE ANGLES

To further specify location on a tooth, the concept of line angles and point angles is utilized. A line angle is the part of a crown where two surfaces intersect forming an imaginary line.

Fig. 15-12
Point Angles

The intersection of three surfaces of the tooth crown marks a point angle.

Fig. 15-13
What is an overhanging restoration?

• A condition where the margin of a restoration extends far beyond the tooth surface.
• Usually a rough surface or ledge where food and plaque collect.
• Can cause:
  – recurrent caries (decay)
  – hard deposit buildup – calculus formation
  – periodontal disease
Overhangs, if present, may be detected on dental radiographs on the proximal surface, depending on the quality of the radiograph.

May also be detected with an explorer during the clinical exam.
Recession of the gingiva due to disease opens this space to bacteria, food and debris. Beneath the contact, a space results that was formerly filled with gingiva; that space is called the cervical embrasure. As additional bone is lost, the cervical embrasure widens and enlarges.
Are teeth self-cleaning?

• Consider the following:
  – Shapes of teeth
  – Chewing & eating habits
  – Health of periodontium
  – Missing teeth

• Teeth, by virtue of the morphology and positioning in the dental arches, are largely self-cleansing. Their shape directs food toward the awaiting digestive system and their smooth enamel surface reduces adherence of food.
Self-cleaning properties

- Enamel is smooth
- Shape of teeth aid cleaning by stimulating and deflecting food from gingiva
- Tongue and cheek muscles aid by forcing food onto chewing surface and by helping to remove food particles after eating.
Development and Rules of Eruption:

1. Mandibular teeth precede maxillary teeth of the same type (ex: mandibular central incisors erupt before maxillary central incisors).

2. Teeth in both jaws erupt in pairs (one on the right and one on the left erupt at the same time).
Rules of Eruption

3. Teeth erupt at an earlier age in girls than in boys.

4. If eruption of primary teeth is at an early age, then eruption of the permanent teeth will be at an early age.
Development, Form & Eruption

- Teeth first develop within the alveolar bone before they erupt in the mouth.
- Teeth first erupt in the infant around 6 months of age.
- When teeth erupt in the mouth the roots are not yet fully developed. The roots are the last thing to calcify, after the crown.
Tooth Germ

• “tooth bud”

• The tissue that will develop into a tooth. It develops within the alveolar bone and contains the cells that will form the tissues of the teeth (enamel, pulp, dentin, cementum).
Tooth Bud
Calcification

• when organic tissue becomes hardened by deposits of calcium salts. Occurs over a period of time.
Resorption

- physiological removal of the roots of the primary teeth.
Exfoliation

• shedding or natural loss of primary teeth.
Exfoliation
Stages of Eruption:

• **Preeruptive** - begins with development of the crown, calcification.

• **Eruptive** - begins with the development of the root.

• **Post eruptive** - begins when teeth come into occlusion and continues throughout life.
By age 3 the primary dentition is fully erupted.

## Table 18-1

Approximate Eruption and Shedding Ages for Primary Teeth

<table>
<thead>
<tr>
<th>Maxillary Teeth</th>
<th>Eruption</th>
<th>Shedding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central incisor</td>
<td>8-12 months</td>
<td>6-7 years</td>
</tr>
<tr>
<td>Lateral incisor</td>
<td>9-13 months</td>
<td>7-8 years</td>
</tr>
<tr>
<td>Canine</td>
<td>16-22 months</td>
<td>10-12 years</td>
</tr>
<tr>
<td>First molar</td>
<td>13-19 months</td>
<td>9-11 years</td>
</tr>
<tr>
<td>Second molar</td>
<td>25-33 months</td>
<td>10-12 years</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mandibular Teeth</th>
<th>Eruption</th>
<th>Shedding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central incisor</td>
<td>6-10 months</td>
<td>6-7 years</td>
</tr>
<tr>
<td>Lateral incisor</td>
<td>10-16 months</td>
<td>7-8 years</td>
</tr>
<tr>
<td>Canine</td>
<td>14-18 months</td>
<td>9-12 years</td>
</tr>
<tr>
<td>First molar</td>
<td>17-23 months</td>
<td>9-11 years</td>
</tr>
<tr>
<td>Second molar</td>
<td>23-31 months</td>
<td>10-12 years</td>
</tr>
</tbody>
</table>

Adapted from Ash MM. *Wheeler’s Dental Anatomy, Physiology and Occlusion*, ed 8. WB Saunders, Philadelphia, 2002
# Order of Eruption of Primary and Permanent Teeth

**Table 6-22**  
Pg. 70 and 71

<table>
<thead>
<tr>
<th>PRIMARY DENTITION</th>
<th>PERMANENT DENTITION</th>
</tr>
</thead>
<tbody>
<tr>
<td>PREGNATAL</td>
<td>INFANCY</td>
</tr>
<tr>
<td>5 months in utero</td>
<td>2 years (± 6 months)</td>
</tr>
<tr>
<td>7 months in utero</td>
<td>3 years (± 6 months)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>EARLY CHILDHOOD (preschool age)</th>
<th>MIXED DENTITION Late childhood (school age)</th>
<th>PERMANENT DENTITION Adolescence and adulthood</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 months (± 2 months)</td>
<td>7 years (± 9 months)</td>
<td>11 years (± 9 months)</td>
</tr>
<tr>
<td>9 months (± 2 months)</td>
<td>4 years (± 9 months)</td>
<td>12 years (± 6 months)</td>
</tr>
<tr>
<td>1 year (± 3 months)</td>
<td>5 years (± 9 months)</td>
<td>15 years (± 6 months)</td>
</tr>
<tr>
<td>18 months (± 3 months)</td>
<td>6 years (± 9 months)</td>
<td>21 years</td>
</tr>
<tr>
<td></td>
<td>10 years (± 9 months)</td>
<td>35 years</td>
</tr>
</tbody>
</table>
### Permanent Teeth

**Approximate Eruption Schedule & Root Completion for Permanent Teeth**

<table>
<thead>
<tr>
<th>Teeth Type</th>
<th>Eruption</th>
<th>Root Completion</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Maxillary Teeth</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Central incisor</td>
<td>7-8</td>
<td>10</td>
</tr>
<tr>
<td>Lateral incisor</td>
<td>8-9</td>
<td>11</td>
</tr>
<tr>
<td>Canine</td>
<td>11-12</td>
<td>13-15</td>
</tr>
<tr>
<td>First premolar</td>
<td>10-11</td>
<td>12-13</td>
</tr>
<tr>
<td>Second premolar</td>
<td>10-12</td>
<td>12-14</td>
</tr>
<tr>
<td>First molar</td>
<td>6-7</td>
<td>9-10</td>
</tr>
<tr>
<td>Second molar</td>
<td>12-13</td>
<td>14-16</td>
</tr>
<tr>
<td>Third molar</td>
<td>17-21</td>
<td>18-25</td>
</tr>
<tr>
<td><strong>Mandibular Teeth</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Central incisor</td>
<td>6-7</td>
<td>9</td>
</tr>
<tr>
<td>Lateral incisor</td>
<td>7-8</td>
<td>10</td>
</tr>
<tr>
<td>Canine</td>
<td>9-1</td>
<td>12-14</td>
</tr>
<tr>
<td>First premolar</td>
<td>10-12</td>
<td>12-13</td>
</tr>
<tr>
<td>Second premolar</td>
<td>11-12</td>
<td>13-14</td>
</tr>
<tr>
<td><strong>First molar</strong></td>
<td>6-7</td>
<td>9-10</td>
</tr>
<tr>
<td>Second molar</td>
<td>11-13</td>
<td>14-15</td>
</tr>
<tr>
<td>Third molar</td>
<td>17-21</td>
<td>18-25</td>
</tr>
</tbody>
</table>

Impacted

- a tooth that is not completely erupted and is partially or completely covered by bone.
Impacted wisdom tooth

Horizontal Impaction

Vertical Impaction
Impacted 3rd Molar
Congenitally Missing

- condition in which the tooth never developed. Hereditary trait involving missing tooth buds.
Missing tooth buds
Missing Permanent premolar
Mesial drift

• is a phenomenon of the movement of teeth toward the midline.

• Teeth continue to move mesially after eruption.
Space Maintainers
Occlusal Plane-
• as the teeth erupt they meet the opposing tooth in the opposite arch.
Curve of Spee

- the anatomical line beginning at the tip of canines and following cusps of the premolars and molars.
**Landmarks of the Tooth**

**Apex** – tip of the tooth root

**Apical Foramen** – the hole in the apex through which nerves and blood vessels enter and leave the tooth

**Buccal Groove** – a groove on the buccal surface of molars (particularly mandibular) that extends onto the occlusal surface

**Buccal Pit** – a depression formed by intersecting grooves
Cingulum – a bulge adjacent to the gingiva on the lingual surface of anterior teeth

Cusp – a pointed or rounded projection on the chewing surface of a tooth

Cusp of Carabelli – the “fifth cusp” located on the mesiolingual surface of maxillary first molars
Developmental Groove – linear depression formed by the joining of tooth lobes during development

Fissure – a developmental groove where decay often occurs

(From Salt E, Goldberg M, Fuhrenbach HJ: Illustrated dental embryology, histology, and anatomy, ed 2, St Louis, 2009, Saunders.)
**Fossa** – a shallow depression

**Furcation** – space where roots divide in a multi-rooted tooth
**Lobes** – tooth crowns begin in pieces called lobes that fuse together to form the whole (not pictured)
Mamelons – three bumps on the incisal edge of newly erupted incisors; they usually wear away rapidly

Marginal Ridges – elevated enamel ridges that form the mesial and distal borders of occlusal surfaces of posterior teeth
Oblique Ridge — an enamel elevation that crosses the occlusal surface of molars obliquely

Pit — a depression formed by intersecting grooves
Ridge - an elevated portion of the crown of the tooth

Supplemental Groove – smaller grooves that radiate from the developmental grooves
**Transverse Ridge** – the union of two triangular ridges across the occlusal surface of a posterior tooth

**Triangular Ridge** – enamel ridge that starts at the cusp tip and widens into a triangle as it descends to the middle of the occlusal surface

The End