The Premolars

Chapter 17
Permanent Posterior Teeth
(p. 230-244)
General Information

Function:

- Hold and grind food
- Work with molars in mastication.
- Even without molars one may be able to chew well with the premolars.
- There are two in each quadrant

Fig 17-1
General Features - All Premolars

- Develop from **four** lobes except the mandibular 2nd premolar which develops from **five**
- **Lingual lobe forms cusp** rather than cingulum as in anterior teeth
- Premolars have occlusal surface, bordered by **marginal ridges**.
- Occlusal surfaces have cusps, grooves, ridges, and fossae.
**GENERAL INFORMATION**

◆ Crowns are shorter than the anterior teeth.

◆ They have a vertical **buccal ridge** on the buccal surface (similar to the labial ridge on canines)

◆ The proximal contact areas are more cervically located than incisors.

◆ There are no premolars in the primary dentition.

◆ Permanent premolars are **succedaneous** teeth - they replace the deciduous **molars**.
The CEJ is less pronounced on the posteriors than on the anteriors.
The CEJ is often quite straight for posteriors.
**Development**

Permanent Maxillary 1st Premolar
- Evidence of calcification - 1.5 yrs.
- Eruption - 10 - 11 yrs.
- Root complete 13 yrs.

Permanent Maxillary 2nd Premolar
- Evidence of calcification - 2 yrs.
- Eruption - 10 - 12 yrs.
- Root complete 13 yrs.
**Development**

Permanent Mandibular 1st Premolar
- Evidence of calcification - 2 yrs.
- Eruption - 10 - 12 yrs.
- Root complete 13 yrs.

Permanent Mandibular 2nd Premolar
- Evidence of calcification - 2.5 yrs.
- Eruption -11 - 12 yrs.
- Root complete 14 yrs.
Development

11 years
(± 9 months)
**General Characteristics**

**Maxillary Premolars**
- Wider F-L than M-D dimensions
- Two major cusps on each
- Resemble each other
- Trapezoidal shaped proximal.

**Mandibular Premolars**
- F-L and M-D dimensions almost equal
- Facial cusps much larger
- Do not resemble each other.
- Rhomboidal shaped proximal.
Comparing Proximal View of Crown

Max

Trapezoid Shape

Mand

Rhomboid Shape
Maxillary First PM
- Two roots (usually)
- Lingual cusp shorter and narrower than facial cusp
- Mesial marginal groove and depression

Maxillary Second
- One root (usually)
- Cusps of nearly equal length and width.
- No mesial marginal groove or depression
Maxillary First Premolar Occlusal Aspect:

- Long central developmental groove.
- Few supplemental grooves.
- Hexagonal shape to occlusal outline.

Maxillary Second Premolar Occlusal Aspect:

- Shorter central developmental groove.
- Many supplemental grooves.
- Ovoid shape to occlusal outline, rounder.
**Mandibular First**
- There is one root with two pulp horns
- Small lingual cusp (nonfunctional cusp); facial cusp is twice as large.
- Occlusal anatomy can be seen from the lingual view.

**Mandibular Second**
- There is one root with three pulp horns
- Well developed lingual cusp, with the possibility of two lingual cusp.
- Can see little of occlusal anatomy from lingual view.
Mandibular First Premolar Occlusal Aspect:

- Occlusal outline is diamond shape
- M-L groove is present.
- No central pit.

Mandibular Second Premolar Occlusal Aspect:

- Occlusal outline is square.
- No M-L groove.
- Has “Y” groove pattern or an “H” groove pattern
Maxillary First Premolars
5, 12

- Have buccal and lingual cusp; buccal slightly longer
- Usually have two roots***
  (only premolar with this feature)
- Two pulp canals most common, even if one root is present
- Broader mesial and distal contact areas

*** check your tooth ID sheets from lab
Labial Aspect:

◆ Looks similar to maxillary canine though narrower & shorter

◆ Contact areas at same height mesially and distally

◆ Well-developed middle facial lobe
Maxillary First Premolar

- Transverse ridge
  - Buccal triangular ridge
  - Lingual triangular ridge
- Distobuccal triangular groove
- Distal marginal ridge
- Distolingual triangular groove
- Mesiobuccal triangular groove
- Mesial marginal groove
- Mesial marginal ridge
- Mesiolingual triangular groove

DISTAL PIT
MESIAL PIT

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Maxillary First Premolars
5, 12

• Has mesial marginal groove and concavity (depression).

• This requires special consideration when scaling.
Maxillary First Premolar Root and Pulp Cavity.

◆ Bifurcated root most common although single root possible
◆ Buccal root larger and longer than lingual:
◆ Two root canals present, even in single rooted tooth
◆ Two pulp horns
◆ Rarely, single rooted, single canal 1st premolar found
Example of Possible Root Canal Configurations

- Two roots two canals
- One root two canals

Fig. 11-8. A, A maxillary left premolar with two roots and two canals. © 2004 Mosby, Inc. All rights reserved.

Fig. 11-8. B, A maxillary right premolar with one root and two canals. © 2004 Mosby, Inc. All rights reserved.
Maxillary Second Premolars

4, 13

- Similar in form and function to 1st premolar, though more rounded
- One root present most commonly
- Appearance varies more than 1st premolars
- Root longer than 1st premolar
Maxillary Second Premolars
4, 13

Lingual Aspect:
- Buccal & lingual cusps are about the same length

Mesial Aspect:
- No deep developmental grooves and no depressions are present on the mesial surface
- Groove on single-rooted tooth gives fused root appearance
Occlusal Aspect of Maxillary Second Premolar:

◆ More rounded outline than 1st premolar, appears ovoid.

◆ Many supplemental grooves.

◆ More wrinkled in appearance.
Root & Pulp Cavity:

◆ Single root most common with groove on mesial and distal surfaces

◆ One canal most common though divided canal occurs frequently

◆ Two pulp horns

Maxillary Second Premolars
4, 13

Fig 17-18
Mandibular First Premolars
21, 28

◆ Share characteristics with mandibular canine
◆ Generally smaller than mandibular 2nd premolar (opposite pattern for maxillary premolars)
◆ Four lobes contribute to this tooth with lingual cusp small, non-occluding and, therefore, afunctional

Fig 17-20
**Labial Aspect:**

- Looks similar to canine
- Single sharp buccal cusp
- Buccolingual dimension similar to adjacent canine
- Well developed buccal ridge
- Mesial cusp ridge shorter than distal
- Mesial and distal contact areas at same height
- Shorter root than canine
Occlusal Aspect of Mandibular premolars:

◆ More variation in occlusal anatomy is present on mandibular premolars than maxillary premolars
◆ Sharp convergence from buccal to lingual cusp
◆ Large buccal triangular ridge w/ mesial and distal fossae
◆ Fossae may contain pits
Mandibular First Premolars

Lingual Aspect:
- Severely tapers toward the lingual
- Very small lingual cusp
- Occlusal pits in fossae on either side of triangular ridges
- **Prominent mesiolingual developmental groove** separates mesial marginal ridge from lingual cusp

Figure 17-22
Mandibular First Premolars

Mesiodistal view

- Mesiobuccal triangular groove
- Distobuccal triangular groove
- Mesial marginal ridge
- Distal marginal ridge
- Mesiolingual groove
- Distolingual triangular groove
- Distal pit
- Mesial pit
- Central groove

Figure 17-24
Root & Pulp Cavity

- Single-rooted form most common, although buccal-lingual two-rooted 1st premolar possible
- If bifurcated, a longitudinal groove found proximally
- Two pulp horns, one canal most common
Mandibular Second Premolars
20, 29

◆ Larger than 1st premolar
◆ Contact areas at same height mesially and distally
◆ Shorter buccal cusp and longer root than 1st premolar
◆ More developed lingual cusp(s) function as molar
◆ Marginal ridges higher than 1st premolar
◆ Two forms: two-cusp type
    three-cusp type
Mandibular Second Premolars

Labial Aspect:

- Shorter buccal cusp than 1st premolar
- Mesial and distal cusp ridges more rounded
- Wider, longer root

Fig 17-26
**Mandibular Second Premolars**

**Lingual Aspect**

- Varies due to cusp variety
- At least one lingual cusp (in 3-cusp variety) is longer than 1st premolar
- Mesiolingual cusp usually larger in 3-cusp form
- Large single cusp in 2-cusp form compared to 1st premolar
- Wider lingual surface than 1st premolar

Fig 17-26
Occlusal Aspect of Mandibular 2nd Premolar:

- **Two-cusp form (U or H-shaped)**
  - Occlusal outline more rounded than 3-cusp form
  - No lingual developmental groove
  - U shape groove pattern and a H shape groove pattern
  - No central pit
  - Mesial and distal pit may be present

![Occlusal Pattern Diagram](image.png)
Occlusal Aspect of Mandibular 2nd Premolar:

- **Three-cusp form (Y-shaped)**
  - Buccal largest, then mesiolingual, then distolingual
  - Each cusp has triangular ridge
  - Mesial, distal and lingual developmental grooves separate cusps
  - Mesial, distal and central pit may be present as well as mesial and distal triangular fossae
  - Developmental grooves more common and less deep

Fig 17-27
Root & Pulp Cavity

◆ Single-rooted
◆ Distal root depression in middle third of root
◆ Single pulp canal most likely
<table>
<thead>
<tr>
<th></th>
<th>MAXILLARY FIRST PREMOLAR</th>
<th>MAXILLARY SECOND PREMOLAR</th>
<th>MANDIBULAR FIRST PREMOLAR</th>
<th>MANDIBULAR SECOND PREMOLAR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Universal number</td>
<td>#5 and #12</td>
<td>#4 and #13</td>
<td>#21 and #28</td>
<td>#20 and #29</td>
</tr>
<tr>
<td>International number</td>
<td>#14 and #24</td>
<td>#15 and #25</td>
<td>#34 and #44</td>
<td>#35 and #45</td>
</tr>
<tr>
<td>General crown features</td>
<td>Occlusal table with marginal ridges and cusps with tips, ridges, inclined planes, grooves, fossae, and pits</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Buccal ridge</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Specific crown features</td>
<td>Larger than second. Buccal cusp longer of two cusps. Long central groove. Mesial surface features unlike second</td>
<td>Smaller than first. Two cusps same length. Short central groove, with increased supplemental grooves. No mesial surface features like first</td>
<td>Smaller than second. Smaller lingual cusp of two cusps. Mesial surface features</td>
<td>Larger than first. Usually three cusps with: Y-shaped groove pattern or two cusps with H- or U-shaped groove pattern. Increased supplemental grooves</td>
</tr>
<tr>
<td>Mesial and distal contact*</td>
<td></td>
<td></td>
<td>Just cervical to junction of occlusal and middle thirds</td>
<td></td>
</tr>
<tr>
<td>Distinguish right from left</td>
<td>Longer mesial cusp slope than distal cusp slope, with mesial features: deeper CEJ curvature, marginal groove, developmental depression</td>
<td>Lingual cusp offset to the mesial</td>
<td>Shorter mesial cusp slope than distal cusp slope, with mesial surface features: deeper mesial CEJ curvature and mesiolingual groove</td>
<td>Distal marginal ridge more cervically located, thus more occlusal surface visible from distal view</td>
</tr>
<tr>
<td>General root features</td>
<td>Two roots with root trunk</td>
<td></td>
<td></td>
<td>Single root</td>
</tr>
<tr>
<td>Specific root features</td>
<td>Elliptic on cross section. Proximal root concavities</td>
<td></td>
<td>Oval or elliptic on cross section. Proximal root concavities</td>
<td></td>
</tr>
</tbody>
</table>

*CEJ, Cementoenamel junction.

*Height of contour of posteriors for the buccal is in cervical third and lingual in middle third.
• Single, permanent premolars can be extracted in each quadrant during orthodontic therapy to improve dental arch spacing.

• If a premolar has been extracted, the distinctive pit and groove patterns on the occlusal surface will help in identifying the remaining premolars when the arch space from the extraction is lost if the remaining molars are not restored. However, orthodontic therapy tends instead to include expansion of the jaw, if needed, instead of removing premolars to retain a more natural rounded curved shape to the arches. If still needed, first premolars are usually extracted more often than second premolars.
Specific Overall Features

- A distinct **mesial root concavity** is present on the root trunk of maxillary first premolar, extending from the contact area to the bifurcation.

Surgical access facilitates debridement of the root surface.

Fehrenbach, MJ. *Slide Collection.*
Clinical Considerations for Maxillary Second Premolars

- With premature loss of the primary second molars, the developing permanent maxillary first molar inclines and drifts mesially.
- The developing permanent tooth is prevented from normal eruption because its arch leeway space is nearly closed.

Figure 20-3
Impacted Mandibular Second Premolar