MANDIBULAR PREMOLARS

Dr. Preeti Sharma
Reader
Oral & Maxillofacial Pathology
SDC
- The mandibular premolars are four in number.
- Mandibular first premolars are developed from four lobes. But mandibular second premolars, in most of the cases, develop from 5 lobes. Three buccal and two lingual.
- The first premolar has a large buccal cusp that is long and well formed, with a small, nonfunctioning lingual cusp that is no longer than cingulum found on maxillary canines.
The second premolar has well formed cusps in most of the cases, one large buccal cusp and two small lingual cusps.

The mandibular first premolar has many characteristics of a small canine because its sharp buccal cusp is the only part occluding with the maxillary teeth. It functions along with mandibular canine.

The mandibular first premolar is always smaller than second premolar.
The mandibular second premolar has more characteristics of small molar because its lingual cusps are well developed, which places both the marginal ridges high and produces more efficient occlusion with opposing teeth.
MANDIBULAR FIRST PREMOLAR

Dr. Preeti Sharma, Subharti Dental College, SVSU
The mandibular first premolar resembles a canine in the following ways:

1. The buccal cusp is long and sharp and is the only occluding cusp.
2. The buccolingual measurement is equal to that of canine.
3. The occlusal surface slopes sharply lingually in a cervical direction.
4. The mesiobuccal cusp ridge is shorter than the distobuccal cusp ridge.
5. The outline form of occlusal aspect resembles to incisal aspect of canine.
The characteristics that resemble second premolar are:

1. Except for the longer cusps, the outline of crown and root from the buccal aspect resembles the second premolar.
2. The contact areas, mesially and distally, are near the same level.
3. The curvatures of cervical line mesially and distally are similar.
4. The tooth has more than one cusp.
The root of mandibular first premolar is slightly shorter than mandibular second premolar.
Buccal Aspect
- Crown is roughly *trapezoidal* in shape with cervical margin as shortest of the uneven sides.
- From buccal aspect, the form of mandibular first premolar crown is nearly symmetrical bilaterally.
- The middle lobe is well developed resulting in a large, pointed buccal cusp.
- The mesial cusp ridge is shorter than distal cusp ridge.
- The contact areas are broad and almost at the same level proximally, a little more than half the distance from cervix to cusp tip.
The crown exhibits little curvature at the cervical line buccally with the crest of curvature approaching center of the root.

The mesial outline of the crown is slightly concave above the cervical line to a point where it joins the curvature of mesial contact area.

The mesial slope of buccal cusp shows some concavity unless wear has taken place.
The tip of buccal cusp is pointed and located a little mesial to the center of crown.

Distal outline of crown is slightly concave from cervix to curvature of distal contact area. The curvature is broader than mesial.

The distal slope of buccal cusp exhibits little concavity.

The cervix is narrow mesiodistally.

The root is 3-4mm shorter than that of mandibular canine.
- The buccal surface of crown is more convex than maxillary premolars.
- The *middle buccal lobe* is prominent ending in a pointed cusp. *Developmental depressions* are seen between the three lobes.
- *Buccal ridge* can be seen extending from cervix to cusp tip.
Lingual Aspect
The crown of mandibular first premolar tapers lingually as the lingual measurement mesiodistally is less than that buccally.

The lingual cusp is small and resembles cingulum of canine.

Most of the mesial and distal surface can be seen from lingual aspect as the crown and root taper towards lingual.

The occlusal surface slopes greatly towards the lingual cervically down to the short lingual cusp. Most of the occlusal surface can therefore be seen from this aspect.
The cervical portion of the crown is narrow and convex with concavities between the cervical line and the contact areas on the lingual portion of mesial and distal surface.

The contact areas and marginal ridges are pronounced and extend above the narrow cervical portion of the crown.

Although the lingual cusp is short and less developed, it has a pointed tip.

This cusp tip is in alignment with the buccal triangular ridge of occlusal surface.
The mesial and distal occlusal fossae are seen on each side of the triangular ridge.

A characteristic mesiolingual developmental groove acts as a line of demarcation between mesiobuccal lobe and lingual lobe and extends up to the mesial fossa of occlusal surface.

The root is much narrower, smooth and convex on the lingual side with a lingual ridge.

This allows for most of the proximal surfaces of the root to be seen.

Sometimes developmental depressions may be seen with developmental grooves mesially.
Mesial Aspect

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From mesial and distal aspect the outline of this tooth is fundamental and characteristic of all mandibular posterior teeth.

The outline is roughly rhomboidal.

The tip of buccal cusp is nearly centered over the root.

The convexity of the lingual lobe is more lingual to the root outline.

The tip of lingual cusp is on a line with the lingual border of the root.
The buccal outline of the crown is prominently curved from cervical to the tip of buccal cusp.

The crest of curvature is near the middle third of the crown.

The lingual outline is a curved outline of less convexity than that of buccal.

The crest of curvature approaches middle third of the crown ending at the tip of lingual cusp.

The distance from lingual cervical line to the tip of lingual cusp is about two thirds to that on the buccal aspect.

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The mesiobuccal lobe development is prominent from this aspect, which creates mesial contact area and mesial marginal ridge which has a sharp inclination lingually in a cervical direction.

The lingual border of mesial marginal ridge merges with developmental depression mesiolingually that harbors the mesiolingual developmental groove.

Mesial portion of buccal triangular ridge can be seen from this aspect.
The slope of this ridge parallels to that of mesial marginal ridge.

The sulcus formed by the convergence of buccal and lingual triangular ridges is directly above the mesiolingual groove from this aspect.

The cervical line is regular curving occlusally.

The crest of curvature is centered buccolingually with an average curvature of 1mm.
The root outline is tapered from the cervix, ending in a pointed apex in line with the tip of buccal cusp.

The lingual outline may be straight but buccal is curved.

Sometimes a deep groove may end in a bifurcation at the apical third.
Distal Aspect
Distal aspect differs from the mesial aspect in some areas.

Distal marginal ridge is higher above the cervix and does not have an extreme lingual slope of the mesial marginal ridge. It is nearly at right angles to the long axis of crown and root.

The marginal ridge is confluent with lingual cusp ridge with no developmental groove on the distal marginal ridge.
Most of the distal surface is smoothly convex and spheroidal.

A buccolingual linear concavity can be seen just above the cervical line.

Distal contact area is broader than mesial and is centered buccolingually and cervico-occlusally.

Cervical line has less curvature than on mesially.
Root is more convex than mesially with a shallow developmental depression at the center.

Distal surface slopes gradually from buccal margin towards the center of the root lingually as compared to mesially.
Occlusal Surface
The outline is roughly diamond shape and similar to incisal aspect of mandibular canine.

Some may have a circular form similar to mandibular second premolar.

The common characteristics are:

1. The middle buccal lobe makes up the bulk of crown.

2. The buccal ridge is prominent.
3. Mesiobuccal and distobuccal line angles are prominent and rounded.

4. The curvatures of contact areas, immediately lingual to buccal line angles, are broad and distal being broader.

5. Crown converges sharply to center of lingual surface, starting from mesial and distal contact areas. This makes the part of crown represented by buccal cusp ridges, marginal ridges and lingual lobe triangular in form with base at buccal cusp ridges and apex at lingual cusp.
6. Marginal ridges are well developed.

7. Lingual cusp is small.

8. Occlusal surface shows a heavy buccal triangular ridge and a small lingual triangular ridge.

The mesial and distal fossae can be seen on the occlusal surface.

The mesiolingual developmental depression and the groove is present. These constrict mesial surface of the crown and create a smaller mesial contact area.
Distal portion describes a larger arc to form a larger contact area.

The mesial fossa is linear and sulcate and contains mesial developmental groove, which extends buccolingually. This groove becomes confluent with mesiolingual developmental groove as it passes over mesiolingual surface.

The distal fossa is more circular and is circumscribed by distobuccal cusp ridge, distal marginal ridge, buccal triangular ridge and distolingual cusp ridge.
The distal fossa may contain distal developmental groove that is crescent shaped. It may have distal pit with distal supplemental grooves radiating from it or may have a linear groove running mesiodistally.

Most of the buccal surface is visible from occlusal aspect.

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Figures 11.12A to C: Mandibular 2nd premolar have diverse occlusal anatomy: (A) With 3 cusps (‘Y’ groove pattern); (B) With 2 cusps (‘U’ groove pattern); (C) With 2 cusps (‘H’ groove pattern)
The mandibular second premolar resembles the mandibular first from buccal aspect only.

The tooth is larger and has better development in other respects.

The tooth exists in two common forms: the most common is three-cusp type that appears more angular from occlusal aspect.

The second form is two-cusp type that appears more rounded from occlusal aspect.
These two types differ in occlusal design. The outlines and general appearance from all the aspect is almost similar.

The single root is larger and longer than that of first and some show deep developmental groove buccally and bifurcation.
Buccal Aspect
Buccal cusp is shorter than the first, with mesiobuccal and distobuccal cusp ridges presenting angulation of less degree.

Contact areas are broad and appear to be higher because of short buccal cusp.

The root is broader mesiodistally.
Lingual Aspect

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The variations evident in comparison to first premolar are:

1. The lingual lobes are developed to a greater degree, making the cusps longer.

2. Part of the buccal portion of occlusal surface can be seen.

3. In the three-cusp type, lingual development brings about the greatest variation with mesiolingual and distolingual cusps and former being larger and longer in most cases.

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A groove is present between them extending a short distance on the lingual surface and centered over the root.

The two-cusp type has no groove but shows developmental depression distolingually where lingual cusp ridge joins distal marginal ridge.

The lingual surface is smooth and spheroidal.

The root is wide lingually but not as wide as buccal.
As lingual portion of the crown converges little from buccal portion, less of mesial and distal sides may be seen from this aspect. The lingual portion of root is smoothly convex for most of its length.
Mesial Aspect
The differences from first premolar are:

1. The crown and root are wider buccolingually.

2. The buccal cusp is not centered on the root trunk and is shorter.

3. Lingual lobe development is greater.

4. The marginal ridge is at right angle to the long axis of the tooth.

5. Less of the occlusal surface can be seen.
6. Absence of mesiolingual developmental groove.

7. The root is longer and convex on the mesial side.

8. The apex is more blunt.
Distal Aspect

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This is similar to the mesial aspect except that more of the occlusal surface may be seen.

It happens because distal marginal ridge is at lower level than mesial. The crowns of all the posterior teeth are tipped distally to the long axes of the roots so that more of the occlusal surface is visible from distal aspect.

This characteristic is present in all the posterior teeth.
Occlusal Aspect
The three-cusp and two-cusp forms are similar in the portion that is buccal to mesiobuccal and distobuccal cusp ridges.

The three-cusp type appears square, lingual to the buccal cusp ridges while two-cusp type appears round lingual to buccal cusp ridges.

The square type has largest buccal cusp, smaller mesiolingual and smallest distolingual cusp.
Each cusp has well-formed triangular ridges separated by deep developmental grooves.

These grooves converge in a central pit and form a Y shape on the occlusal surface.

The central pit is located midway between buccal cusp ridge and lingual margin of occlusal surface and slightly distal to central point between mesial and distal marginal ridges.
Mesial developmental groove starts from central pit and travels in a mesiobuccal direction and ends in mesial triangular fossa just distal to mesial marginal ridge.

Distal developmental groove travels in a distobuccal direction and ends in distal triangular fossa.

Lingual groove extends lingually between two lingual cusps and ends on lingual surface of crown.
As mesiolingual cusp is wider mesiodistally than distolingual cusp, lingual groove lies distal to center on the crown.

Supplemental grooves and depressions can be seen radiating from the developmental grooves.

The two-cusp type has following features:

1. The outline is round lingual to buccal cusp ridges.
2. Lingual convergence of mesial and distal sides can be seen.
3. Mesiolingual and distolingual line angles are rounded.

4. One well-developed lingual cusp is present opposite to buccal cusp.

A central developmental groove can be seen radiating mesiodistally which can be straight or most often crescent shaped. The groove ends in mesial and distal fossae.

The enamel inside these fossae and around their periphery is irregular, that is in contrast to smooth cusp ridges.
Some teeth show mesial and distal developmental pits centered in the mesial and distal fossae instead of central groove.
REFERENCES