Maxillary first molar

Chronology:

First evidence of calcification: At birth.
Crown completed: 3 – 4 years.
Eruption: 6 – 7 years.
Root completed: 9 – 10 years.

The maxillary first molar is the largest tooth in the maxillary dental arch. It has four well developed functioning cusps and one supplemental cusp of little practical use. The four large cusps are the mesiobuccal, distobuccal, the mesiolingual and the distolingual. The supplemental cusp (which is not an actual cusp since it does not represent a lobe) is called the tubercle of Carabelli, it can take the form of a well developed cusp or it may be very under developed, in such cases it may be presented by just a groove or a very slight elevation. The tubercle of Carabelli is found on the lingual aspect of the mesiolingual cusp and it is characteristics to the upper first molar.

The upper first molar has three roots a mesiobuccal, a mesiolingual and a lingual root. The lingual root is the longest, the mesiobuccal root is not as long but it is broader buccolingually, the distobuccal root is the smallest of the three roots.

Morphological Description

Buccal surface:

1. Crown:

   1. Geometric outline:

   The crown is roughly trapezoidal with the short of the uneven sides cervically and the long one occlusally. Looking to the buccal surface, the two buccal cusps as well as part of the two lingual cusps are seen, this is because the distobuccal line angle is obtuse.
2. **Surface outline:**

   - **Mesial outline:**

     The mesial outline is more or less straight with a mesial direction from the cervical line to the mesial contact area which is located at the junction of the occlusal and middle thirds then the outline curves distal and becomes continuous with the mesial slope of the mesiobuccal cusp to reach its tip.

   - **Distal outline:**

     The distal outline is convex from the cervical line to the distal contact area which lies at the middle of the middle third, the outline continues as a convex line to the tip of distobuccal cusp.

   - **Cervical outline:**

     The cervical line shows little curvature than the teeth anterior to this tooth, generally it is regular and slightly convex toward the root.

   - **Occlusal outline:**

3. **Surface description:**

   The mesiobuccal cusp is broader than the distobuccal cusp, this is because its mesial slope meets its distal slope at an obtuse angle, while the mesial and distal slopes of the distobuccal cusp meet at right angle, therefore the distobuccal cusp is sharper and at least as long or often longer than the mesiobuccal cusp.

   A buccal developmental groove separates the two buccal cusps and ends buccally midway between the occlusal surface and the cervical line. At its terminus a mesial and distal dips in the enamel are found.
II. Roots:

The three roots are seen from the buccal aspect. The axes of the roots are inclined distally. However, the two buccal roots tend to inclined at a point half way between the furcation area and their apices. The mesiobuccal root inclines distally while the distobuccal root inclines mesially. The root trunk has a length of about 4 mm from the cervical line to the furcation area. A deep developmental groove extends on the buccal surface of the root trunk from the furcation area toward the cervical line where it terminates in a shallow depression or it may extends slightly on the enamel surface at the cervix. On the average the length of the roots are about twice as long as the length of the crown.

Lingual surface:

I. Crown:

The two lingual cusps are the only ones to be seen from this aspect.

The mesiolingual cusp:

1. is the largest and the longest cusp of this tooth. Its mesiodistal width as about three fifth of the total mesiodistal diameter of the crown, while the distolingual cusp makes up the remaining two fifths.

2. The mesial outline is almost straight and forms a right angle with the mesial slope of the mesiolingual cusp,

3. while the mesial and distal slope of this cusp, form an obtuse angle.

The distolingual cusp:

1. The distal outline is smoothly convex and becomes continuous with the rounded distal slope of the distolingual cusp forming an arc that is almost semicircle.
2. In general, the distolingual cusp is so smooth and spheroidal that no angle could be described between its mesial and distal slopes.

**Surface description:**

1. A lingual developmental groove starts approximately at the center of the lingual surface mesiodistally, curves sharply to the distal as it crosses between the lingual cusps and continues on the occlusal surface.

2. The tubercle of Crabelli is seen on the lingual surface of the mesiolingual cusp. If it is well developed its cusp ridges lie approximately 2 mm cervical to the cusp ridges of the mesiolingual cusp.

**II. Root:**

The three roots are seen from the lingual aspect, most of the fourground is made by the large lingual root which is conical and terminates in a plunt apex.

**Mesial surface:**

**I. Crown:**

1. **Geometric outline:**

   The mesial surface is roughly trapezoidal with the short side occlusally and the long side cervically. The great buccolingual dimension of this tooth is evident from this aspect.

2. **Surface outline:**

   - **Buccal outline:**

     Starting from the cervical line, the buccal outline makes a short arc buccally, the crest of the curvature of this arc is located at the cervical third, then the buccal outline comes concave and then convex to the tip of the mesiobuccal cusp.
• Lingual outline:

The lingual outline is convex from the cervical line (the crest of this convexity is at the middle of the crown). If the tubercle of Carabelli is well developed the lingual outline dips inward to illustrate it, if it is poorly or undeveloped the lingual outline continues from the crest of the curvature to the tip of the mesiolingual cusp which lies in line with the long axis of the lingual root.

• Cervical outline:

The cervical line is irregular with little curvature occlusally.

• Occlusal outline:

The mesial marginal ridge is irregular, convex cervically and it is continuous with the mesial cusp ridges of the mesiobuccal and mesiolingual cusp.

3. Surface description:

The mesial contact area is located just cervical to the mesial marginal ridge at the junction of the occlusal and the middle thirds slightly to the buccal side of the mesial third. Cervical to the contact area, a shallow depression that may extends to involve the mesial surface of the root trunk is found.

II. Roots:

1. Two roots are seen from this aspect, the mesiobuccal root and the lingual root. The distobuccal root is hidden behind the broad mesiobuccal root, which occupies two thirds of the buccolingual measurement of the tooth at its cervix.

2. The furcation area is nearer to the cervical line than buccally.

3. The mesiobuccal root: The buccal outline of the mesiobuccal root extends upward and outwards to end in a blunt apex, while its lingual outline
extends from its blunt apex to the furcation area as a straight line.

4. **The lingual root** is longer but narrower than the mesiobuccal root. It is banana shaped with convex lingual outline and a concave buccal outline. Its apical third flares outside the confines of the greatest crown projection. Although its apex is rounded, it appears more pointed than that of the mesiobuccal root.

**Distal surface:**

**I. Crown:**

1. Because the buccal surface tends to taper or converge distally, the buccolingual dimension of the tooth is smaller distally than mesially, thus part of the buccal surface could be seen from the distal aspect.

2. The distal marginal ridge is more curved cervically exposing most of the occlusal surface.

3. The cervical line is almost straight.

4. The distal surface is generally convex with a small concave area at the cervical third near the distobuccal root, it may extend to involve the distal surface of the distobuccal root up to the area of furcation which lies more apical than on the buccal or mesial surface.

**II. Roots:**

The distobuccal root is narrower than the other two roots, its buccal outline starts as concave line then it turns to be convex till the root apex. Its lingual outline is concave from the apex to the furcation are.

**Occlusal surface:**

1. **Geometric outline:**
From the occlusal aspect the maxillary first molar is somewhat rhomboidal with:

- Acute mesiobuccal and distolingual angles
- Obtuse distobuccal and mesiolingual angles.

2. **Dimensions:**

   The buccolingual measurement of the crown is greater mesially than distally, while the mesiodistal measurement is greater lingually than buccally. Thus the crown is wider mesially than distally and wider lingually than buccally. The mesiolingual is the largest cusp and the distolingual cusp is the smallest one.

3. **Surface outline:**

   The occlusal surface of the upper first molar is bound by the cusp ridges buccally and lingually and by the marginal ridges mesially and distally.

4. **Surface description:**

   - **Cusps:**

     The design of the occlusal surfaces of maxillary molars may be described developmentally to be formed of three major cusps. Called primary cusps. These are the mesiolingual, mesiobuccal and the distobuccal cusps and a one secondary cusps, is the distolingual cusp common to all maxillary molars. This is called the maxillary molar primary cusp triangle and it is based on the fact that the distolingual cusp becomes progressively smaller on the second and third molars and often disappears as a major cusp.

   - **Ridges:**

     An oblique ridge formed by the union of the triangular ridges of the mesiolingual and distobuccal cusps (and reduced in height of the marginal ridges) crosses the occlusal surface obliquely.
Fossae:

Major fossae:

1. **The central fossa** which is roughly triangular and lies mesial to the oblique ridge.

2. **The distal fossa** which is linear and lies distal to the oblique ridge.

Minor fossae:

The **mesial** and **distal** triangular fossae that lie inside the mesial and distal marginal ridges respectively.

grooves:

1. The central fossa contains at its depth a central developmental pit. From this pit the buccal developmental groove radiates buccally continuing onto the buccal surface of the crown between the buccal cusps.

2. Starting again from the central pit, a central developmental groove extends in a mesial direction and terminates at the apex of the mesial triangular fossa. Here it is joined by short supplemental groove that radiates from its terminus into the triangular fossa.

3. An additional groove radiates from the central pit, crosses the oblique ridge transversely and joins the central and distal fossa. This groove is called the transverse groove of the oblique ridge.

4. The distal fossa is linear and lies distal to the oblique ridge. At its depth, there is an irregular developmental groove called the distal oblique groove which joins the lingual developmental groove that extends between the lingual cusps and ends on the lingual surface.

5. The distal oblique groove terminates in two branches that form the two sides of the distal triangular fossa. Also supplemental grooves may be found radiating from it.