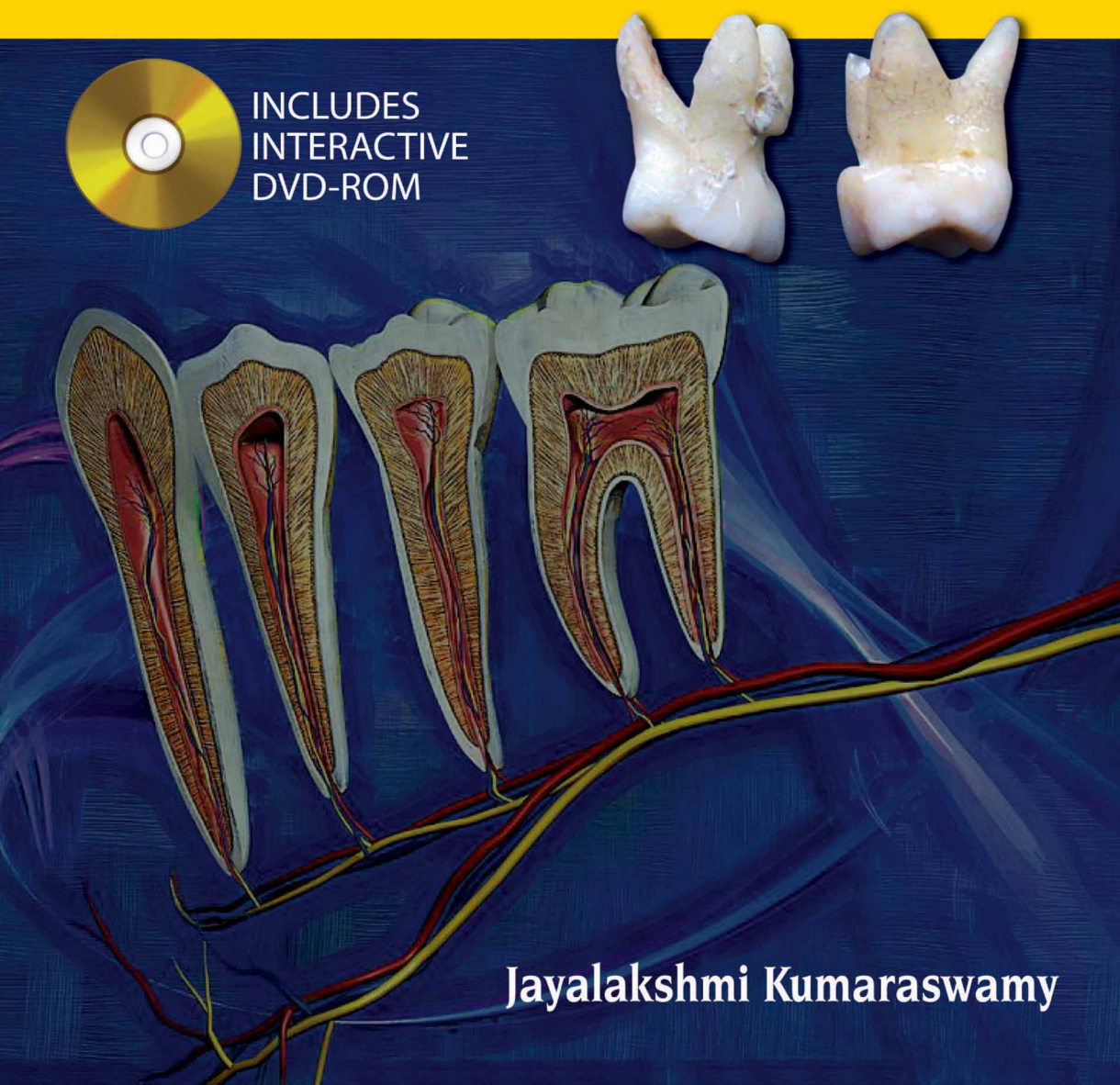
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JAYPEE

Textbook of Dental Anatomy

A Practical Approach



Jayalakshmi Kumaraswamy

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CHAPTER

4

The Permanent Canines

There are four canine teeth: two in the upper (maxillary) and two in the lower (mandibular) arch. A canine is placed laterally to each lateral incisor. They are larger and stronger than the incisors, and their roots sink deeply into the bones, and cause well-marked prominences upon the surface.[1,2,3]

In mammalian oral anatomy, the **canine teeth**, also called as **dog teeth, fangs** are relatively long, pointed teeth.[3] However, they can appear more flattened, causing them to resemble incisors and leading them to be called *incisiform*.[3] They evolved and are used primarily for firmly holding food in order to tear it apart, and occasionally as weapons.[3] They are often the largest teeth in a mammal's mouth. Most species that develop them normally have four per individual, two in the upper jaw and two in the lower, separated within each jaw by its incisors; humans and dogs are examples. In most animals, canines are the anterior-most teeth in the maxillary bone.[3]

With many animals the canine teeth in the upper or lower jaw, or in both, are much larger in the males than in the females, or are absent in females, except sometimes a hidden rudiment.[3]

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THE PERMANENT MAXILLARY CANINE

Morphology

The other synonyms for canine:[2]

1. Cornerstone—Present in the corners of the mouth
2. Cuspid teeth—A single cusp is present
   They are so-called canines because of resemblance to carnivores.[2]

Importance of permanent canine:

- Because of the longest root, anchorage is better in the jaws.[2]
- Gives guidance for intercuspal position by canine guidance.[2]
- Because of the shape of the crown, they are self cleansing and less prone to dental caries.
- Give arch form in complete denture prosthesis, so are extracted after extracting all other teeth.[2]
- A bony ridge over the labial portions of the roots called as the canine eminence,[2] has a cosmetic value ensuring normal facial expression.

Labial Aspect[1,2] (Fig. 4.1)

The mesial half of canine contacts with the lateral incisor and distal half contacts with first premolar and so the contact areas are at different levels.

The crown and root are narrower mesiodistally than those of the maxillary central incisor.

Outline

Crown: The mesial outline from cervical line is slightly convex till the mesial contact area. The mesial contact area is present at the junction of middle and incisal third. The outline from here is continuous with the mesial slope, which is short and straight.

The distal outline of the crown is concave at the cervical third till the distal contact area. The distal contact area is present at the middle of middle third, from here it is continuous with the distal slope, which is long and curved.

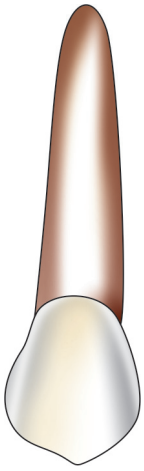


Fig. 4.1: Permanent maxillary right canine, labial aspect

The cusp tip is placed mesially. The cervical line curves—the convexity is toward the root and concavity is toward the cusp tip.

Root: The outline of the root is gradually tapering, long, slender and conical in form with a pointed root apex.

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Surface

Crown: The surface of the crown is smooth. The middle labial lobe is well developed giving rise to the labial ridge. This ridge is seen from center of cervical line to the cusp tip and it shows curvature, where the convexity is toward the mesial surface and concavity is toward the distal surface. Lateral to this labial ridge, mesially and distally, developmental depressions are present.

Root: The root surface is smooth and convex throughout the length of the root.

Lingual Aspect[1,2] (Fig. 4.2)

The crown and root tapers lingually.

Outline

The outline of the crown and root is similar to labial aspect, except for the cervical line which may be straight on the lingual aspect.

Surface

Crown: The cervical third shows greater convexity, i.e. cingulum. Mesial and distal marginal ridges are confluent with cingulum. The lingual ridge extends from cingulum to cusp tip. Lateral to the lingual ridge, mesial and distal lingual fossae are present. The lingual surface of the crown is otherwise smooth.

Root: As the root tapers lingually, a smooth lingual ridge is seen throughout the length of root. Developmental depressions are present mesially and distally.

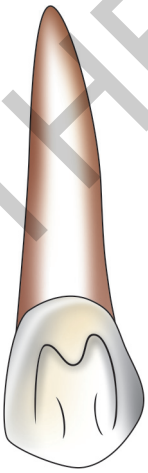


Fig. 4.2: Permanent maxillary right canine, lingual aspect

Mesial Aspect[1,2] (Fig. 4.3)

The mesial aspect shows greater bulk and greater labiolingual measurement than the incisors.

Outline

Crown: The outline is wedge shaped. The labial outline from cervical line till the cusp tip is more curved. The cusp tip is placed labially. The lingual outline at the cervical third is convex, middle third is concave and incisal third is slightly convex.

The curvature of cervical line is about 2.5 mm, that is less than the incisors. The convexity is toward the cusp tip and concavity is toward the root apex.

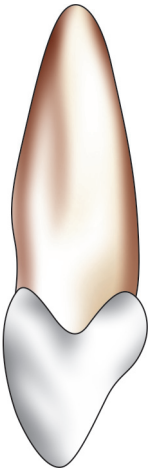


Fig. 4.3: Permanent maxillary right canine, mesial aspect

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Root: The labial outline of the root is perpendicular to the crown. The lingual outline of the root tapers more.

The root apex may be pointed or blunt from this aspect.

Surface

Crown: The surface of the crown is smooth and convex except at the cervical third of the crown which is flat or concave. The mesial contact area present at the junction of middle and incisal third shows greater convexity.

Root: The surface of the root is broad, with a shallow developmental depression at middle and apical third of the root. This developmental depression on heavy root helps in anchorage of the tooth in alveoli, i.e. to prevent rotation and displacement.

Distal Aspect[1,2] (Fig. 4.4)

The outline and surface of the crown and root on distal aspect is similar to mesial aspect except for few differences.

The differences are:

a. The curvature of cervical line is less by 1 mm than the mesial aspect.
b. The distal marginal ridge is heavier and more irregular in outline.
c. The cervical third of the crown exhibits more concavity than on the mesial aspect.
d. Developmental depression on the root is more deeper than on the mesial aspect.

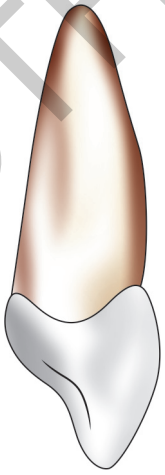


Fig. 4.4: Permanent maxillary right canine, distal aspect

Incisal Aspect[1,2] (Fig. 4.5)

Dimension

The labiolingual width is greater than the mesiodistal width.

Outline

When the tooth is posed correctly so that the long axis of the root is directly in the line of vision, the tip of the cusp is placed labially and mesially.

The labial outline from incisal aspect is more curved, whereas the lingual outline shows convexity (cingulum) and concavities (lingual fossa). The distal portion of the crown appears to be stretched to make contact with the first premolar. A line drawn bisecting the cusp and cusp ridges is straight.

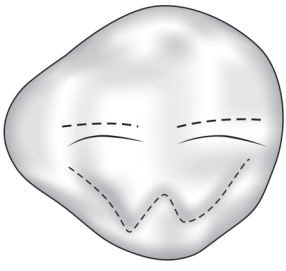


Fig. 4.5: Permanent maxillary right canine, incisal aspect

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Surface

The labial ridge is seen prominent on the cervical third of labial surface and it flattens toward middle and incisal third.

Cingulum shows greater convexity on the lingual surface of the crown.

Carving technique

Measurements (in mm)

Cervico-incisal length of crown	–	10.0
Length of root	–	17.0
Mesiodistal diameter of crown	–	7.5
Mesiodistal diameter of crown at cervix	–	5.5
Labiolingual diameter of crown	–	8.0
Labiolingual diameter of crown at cervix	–	7.0
Curvature of cervical line - mesial	–	2.5
Curvature of cervical line - distal	–	1.5

To carve a canine, both crown and root should be carved together similar to incisors. The following steps can be followed.

Step 1: Smoothen the surface of the wax block. Mark the four aspects on the base of the wax block, i.e. **La** for labial, **Li** for Lingual, **M** for mesial and **D** for distal aspect. Draw a midline and then mark the length of crown, root and also the mesiodistal width of crown and at cervix (Fig. 4.6A).

Step 2: Draw the labial outline of canine and then carve according to the outline leaving about 0.5 mm excess wax than the outline as shown in Figures 4.6B and C. The dotted line indicates the extra wax.

Step 3: Turn the carving toward the mesial aspect, draw the midline, extend the length of crown and length of root from labial to mesial aspect. Mark the labiolingual width of crown and at cervix on mesial aspect (Fig. 4.6D).
Draw the mesial outline of the crown and root (Fig. 4.6E).

Step 4: Now carve according to the mesial outline leaving about 0.5 mm extra than the outline (Fig. 4.6F).

Step 5: Move toward the lingual aspect, reduce the width of cingulum at the cervical third of the crown and taper the root lingually. Now carve the lingual ridge extending from cingulum to cusp tip. To carve the ridge, reduce the wax laterally leaving the wax at the margins for mesial and distal marginal ridge. The reduced wax or concavity will be the lingual fossae (mesial and distal lingual fossae) (Fig. 4.6G).

Step 6: Turn the carving toward the labial aspect. Carve the labial ridge curving mesially. To carve this ridge, reduce the wax laterally leaving the wax from the center of cervical line to the cusp tip. Now the left over wax at the center will serve as the labial ridge.

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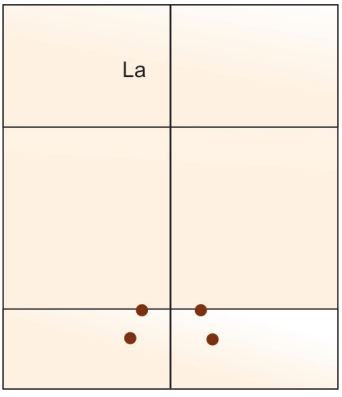


Fig. 4.6A: Step 1

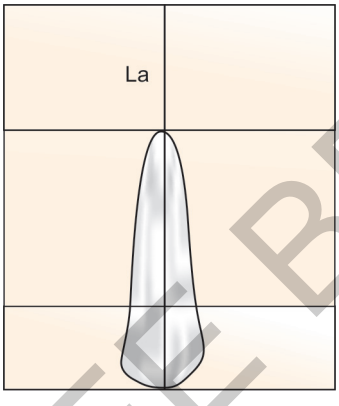




Fig. 4.6B: Step 2

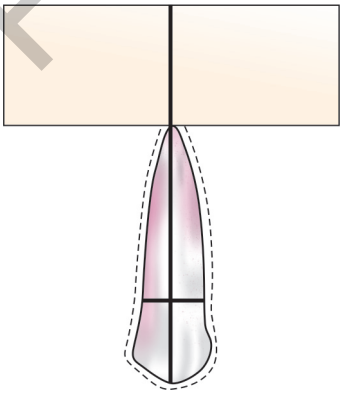




Fig. 4.6C: Step 2

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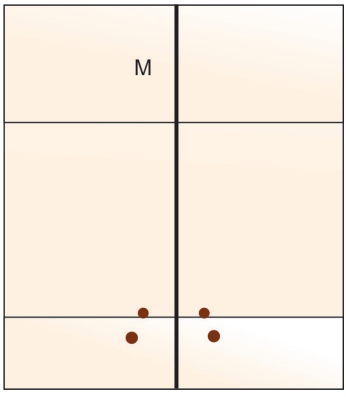
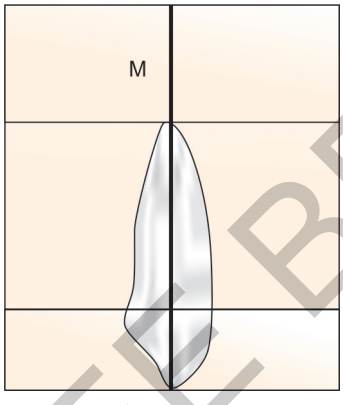


Fig. 4.6D: Step 3



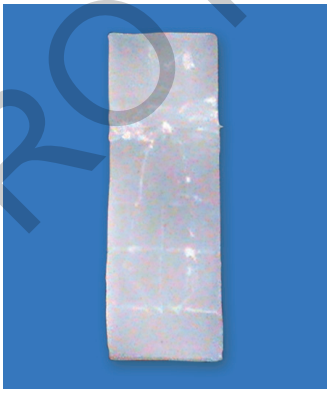


Fig. 4.6E: Step 3

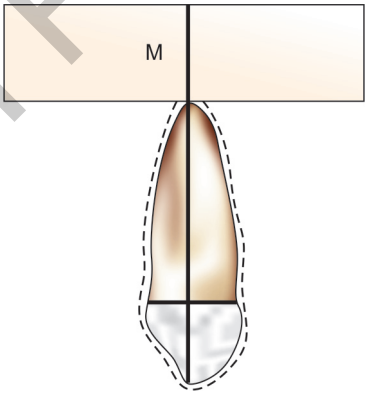




Fig. 4.6F: Step 4

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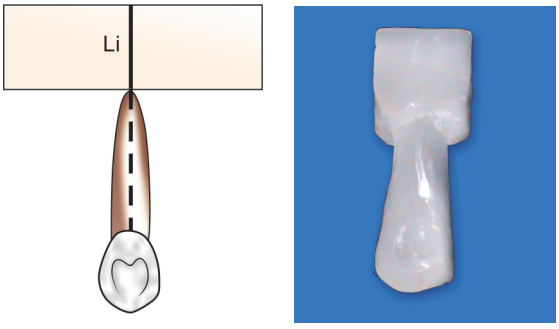


Fig. 4.6G: Step 5

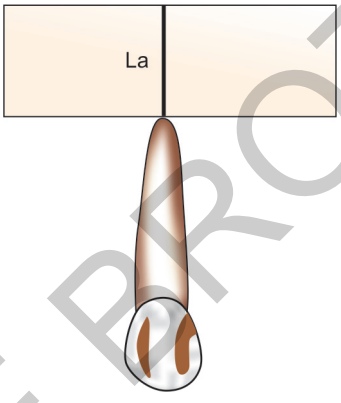


Fig. 4.6H: Step 6—shaded part represents developmental depression

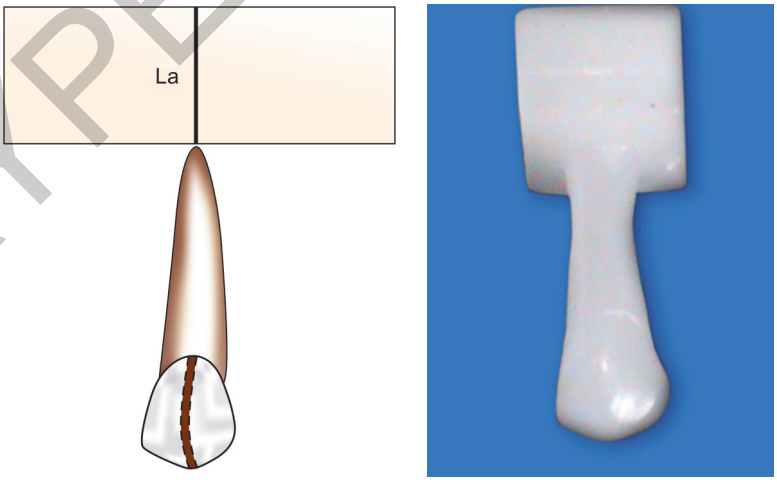


Fig. 4.7: Carved permanent maxillary canine

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Deepen the wax lateral to the labial ridge, which will be the developmental depressions on the labial surface (Fig. 4.6H).

Draw the cervical line on all the aspects. For curvature of cervical line on mesial aspect, mark 2.5 mm and for curvature of cervical line on distal aspect, mark 1.5 mm. Keep a note on the mesial and distal contact area.

Step 7: Carve out any excess wax after measuring the dimensions again. Round off the labial line angles of crown and root. Extend the distal developmental depression of labial surface to cervical third surface of distal aspect. After this, do polishing with a pellet of cotton following the carving to avoid loss of the carved features (Fig. 4.7).

REFERENCES

1. Woelfel JB, Scheid RC. Dental Anatomy. Williams & Wilkins. 1997.
2. Ash, Nelson. Wheelers Dental Anatomy, Physiology & Occlusion. 8th edition. Elsevier. 2003.

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THE PERMANENT MANDIBULAR CANINE

Since, the function is similar to permanent maxillary canine, morphology of permanent mandibular canine has close resemblance to maxillary canine.[2] The difference between every aspect is described.

Labial Aspect[1,2] (Fig. 4.8)

a. The mesiodistal dimension of mandibular canine is less by 1 mm than the maxillary canine.
b. The crown length is greater by 1 mm.
c. The mesial outline is straight along with the mesial outline of the root.
d. The mesial contact area is at mesioincisal angle.
e. Both the cusp ridges are straight, the distal cusp ridge being longer.
f. The distal contact area is present below the distoincisal angle.
g. The crown of mandibular canine appears to be bent over the root base.
h. The curvature of cervical line is similar to maxillary canine, i.e. the convexity is toward the root apex and concavity is toward the cusp tip.
i. The root length is less by 1 mm and the root apex is more pointed than the maxillary canine.
j. The labial ridge is thin, straight and extends from cusp tip to middle of cervical line.
k. The cusp tip of mandibular canine is more pointed than the maxillary canine.

Lingual Aspect[1,2] (Fig. 4.9)

The crown and root outline is similar to the labial aspect. The differences from maxillary canine are:
a. The crown and root tapering is more.
b. Cingulum is less prominent and smooth.
c. Marginal ridges are less pronounced.
d. Lingual fossa is shallow and is visible at the incisal third.
e. The lingual ridge is confined to the cusp tip of the crown.

Mesial Aspect[1,2] (Fig. 4.10)

Outline

Crown: The labial outline is less curved, i.e. the cervical third shows slight convexity. The lingual outline is similar to maxillary canine but is less prominent. The cusp tip is almost centered over the root. The curvature of cervical line is similar to maxillary canine.

Root: The root outline is similar to maxillary canine with a more pointed root apex.

Surface

Crown: The labiolingual width at the cervical third is less and appears thin compared to maxillary canine. The surface of the crown is more flat than the maxillary canine.

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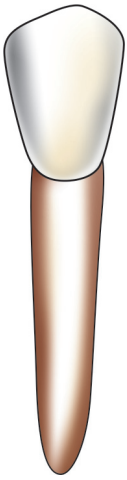


Fig. 4.8: Permanent mandibular right canine, labial aspect

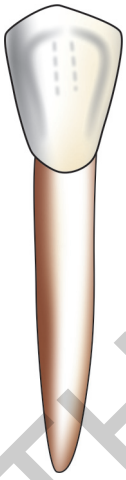


Fig. 4.9: Permanent mandibular right canine, lingual aspect



Fig. 4.10: Permanent mandibular right canine, mesial aspect

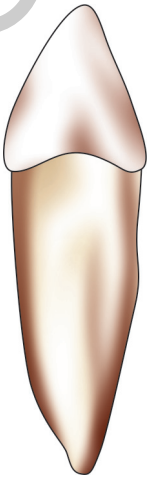


Fig. 4.11: Permanent mandibular right canine, distal aspect

Root: The developmental depression on the root is more deeper than the maxillary canine.

Distal Aspect[1,2] (Fig. 4.11)

The outline and surface of the crown and root is similar to mesial aspect. No marked difference is seen, except for the curvature of cervical line which is less by 1 mm and developmental depression on the root surface is much deeper than on the mesial aspect.

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Incisal Aspect[1,2] *(Fig. 4.12)*

The incisal outline of mandibular canine is similar to maxillary canine, i.e. the labial outline is curved and the lingual outline shows convexity and concavity. The labiolingual width is greater than mesiodistal width.

It differs from the maxillary canine such that the cusp tip and mesial cusp ridges are lingually placed.



Fig. 4.12: Permanent mandibular right canine, incisal aspect

Carving Technique

The carving technique may be followed similar to that of maxillary canine. The following diagrams illustrate the steps in carving (Fig. 4.13A to 4.13I). Figure 4.14 is a carved permanent mandibular canine.

Measurements (in mm)

Cervico-incisal length of crown	–	11.0
Length of root	–	16.0
Mesiodistal diameter of crown	–	7.0
Mesiodistal diameter of crown at cervix	–	5.5
Labiolingual diameter of crown	–	7.5
Labiolingual diameter of crown at cervix	–	7.0
Curvature of cervical line - mesial	–	2.5
Curvature of cervical line - distal	–	1.0

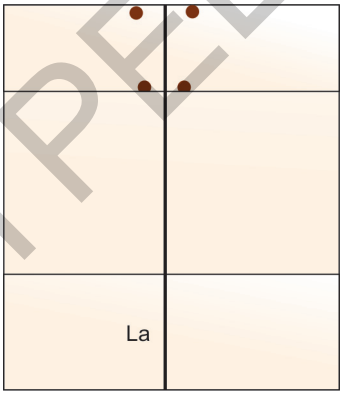


Fig. 4.13A: Step 1—Mark the crown length, root length, mesiodistal width of crown and at cervix

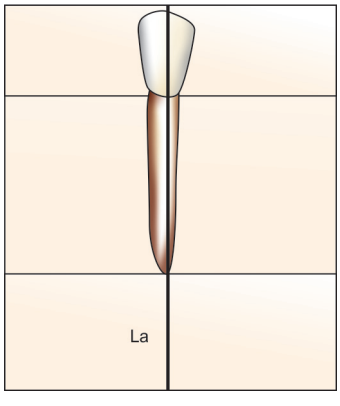


Fig. 4.13B: Step 2—Draw the labial outline

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Salient Features

- Simplified and comprehensive chapters for easy learning and understanding
- Chapters such as Occlusion, Innervation and Blood Supply of Head and Neck Region and Tooth Traits are included with illustrations
- Stepwise carving technique with over 400 illustrations and 80 color pictures
- An outstanding feature is that a live demonstration of carving technique recorded in an Interactive DVD-ROM for visualization and learning.



Jayalakshmi Kumaraswamy BDS MDS presently working as Professor, Department of Oral Pathology and Microbiology, Vydehi Institute of Dental Sciences, affiliated to Rajiv Gandhi University of Health Sciences, Bengaluru, Karnataka, India. She has passed BDS (1998) from Krishnadevaraya College of Dental Sciences, Bengaluru, Karnataka, India and MDS (2002), with excellence from Government Dental College, Bengaluru, Karnataka, India. She worked as Lecturer at Raja Rajeshwari Dental College and MR Ambedkar Dental College, Bengaluru, Karnataka, India. Other academic and research activities to her recognition as reviewer in various national and international journals. She has publications in national as well as in international journals. With over 11 years of academic experience, she is dedicated and innovative instructor who strives to help students.

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