



TATYASAHEB KORE DENTAL COLLEGE AND RESEARCH CENTRE

NEW PARGAON – 416 113

Tal.: Hatkanangale Dist.:Kolhapur (Maharashtra State)

National Dental Commission

INFORMATION REGARDING INSTITUTIONAL COMPLIANCE



4. Clinical Compliance

4.2 Student clinical work registers are updated regularly.

Mahatma Gandhi Charitable Medical Trust, Warananagar.


TATYASAHEB KORE DENTAL COLLEGE & RESEARCH CENTER, NEW PARGAON

RECOGNISED BY DENTAL COUNCIL OF INDIA, NEW DELHI.

&

AFFILIATED TO MAHARASHTRA UNIVERSITY OF HEALTH SCIENCES, NASHIK.




Dr. Harish Kulkarni M.D.S.
Principal
T. K. D. C. & Research Centre,
New Pargaon, Tal. Hatkanangle,
Dist. Kolhapur 416 127

DENTAL ANATOMY RECORD BOOK

NAME: Sakshi Shahaji Chavan

Permanent Registration No. 02242811840

University Exam No. 811840 ROLL NO.: 04

Mahatma Gandhi Charitable Medical Trust, Warananagar.

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**DENTAL ANATOMY
RECORD BOOK**

CERTIFICATE

This is to Certify that, Mr./ Miss. Sakshi Shahaji Chavan

Roll No. 04

has satisfactorily carried out the practical work in Dental Anatomy as prescribed by
the Maharashtra University of Health Sciences, Nashik. for the year 2023 & 2024



Dr. Harish Kulkarni M.D.S.
Principal
T. K. D. C. & Research Centre,
New Pargaon, Tal. Hatkanangla,
Dist. Kolhapur, 416127

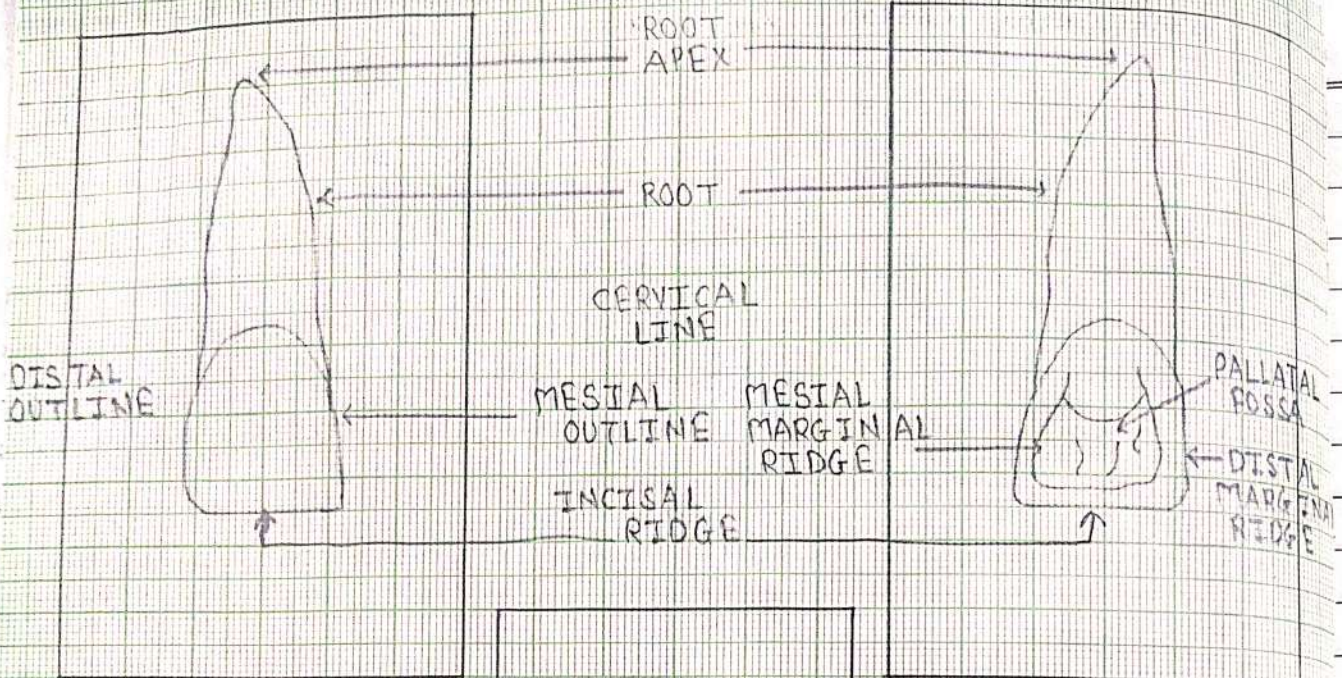
Staff Incharge

Date: 09/09/2024

Professor & Head

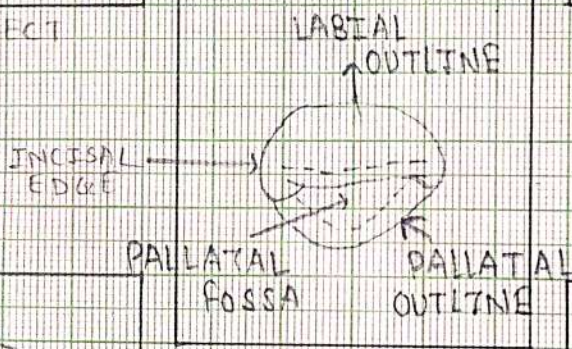
Department of
Dental Anatomy - Dental Histology

PERMANENT MAXILLARY CENTRAL INCISOR

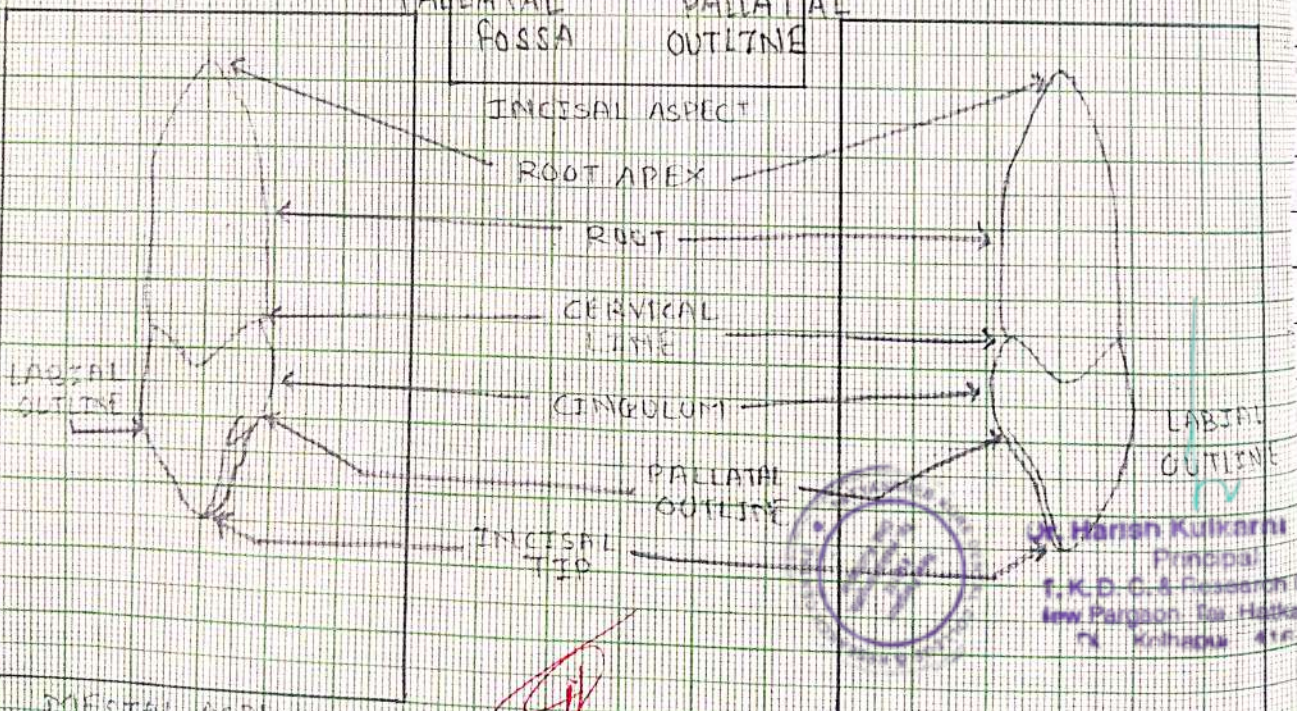


LABIAL ASPECT

PALATAL ASPECT



INCISAL ASPECT



MESIAL ASPECT

DISTAL ASPECT

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Principal
I.K.D.C. & Research Centre
New Parganah, Tal. Hatkanangle
Dist. Kolhapur - 416 117

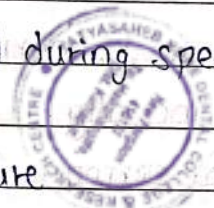
PERMANENT MAXILLARY CENTRAL INCISORS.

Introduction :

- ① There are two maxillary central incisors. Two are on either side of midline, with their mesial surfaces facing each other
- ② They are widest mesio-distally
- ③ Their labial surface is smooth throughout with exceptions of the mamelon on incisal one-third. However mamelons are present for only short duration and soon worn out under masticatory forces
- ④ The mamelons represent the labial development lobes on labial surface.
- ⑤ The mesioincisal line angle of incisors is sharper than distoincisor line angle.
- ⑥ The palatal surface is more irregular with the (convexity) cingulum located on the cervical one third and (concavity) palatal fossa occupying most of the middle one third and incisal one third which is bounded by proximal aspect by marginal lines.
- ⑦ The root generally appears as gently tapering cone.
- ⑧ Most of the time the root is broader labio-palatally than mesio-distally. Among all the maxillary incisors, centrals are wider mesio-distally.

FUNCTIONS OF CENTRAL INCISORS :

- ① Cutting and biting the food
- ② Articulating different speech sound during speech and play role in aesthetics.
- ③ Supporting lips and labial musculature
- ④ Guiding the mandible into centric occlusal during final phase of closure



Dr. Harish Kulkarni
Principal
T.K.D.C. & Research Centre
New Pargaon, Tal. Hatkanangle
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CHRONOLOGICAL DATA -

First evidence of calcification	3-4 months
Enamel completion	4-5 years
Eruption	7-8 years
Root completion	10 years

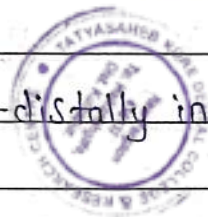
ODONTOMETRIC DATA -

cervico-incisal length of crown	10.5 mm
Length of Root	13 mm
Mesio-distal diameter of crown	8.5 mm
Mesio-distal diameter of (crown at) cervix	7 mm
Labio-lingual diameter of crown	7 mm
Labio-lingual diameter of (crown at) cervix	3.5 mm
Curvature of cervical line - mesial	3.5 mm
Curvature of cervical line - distal	2.5 mm

TRAITS

A. SET TRAITS

- Permanent maxillary central incisors are yellowish white in colour.
- The permanent maxillary central incisors have cervical portion of crown less prominent
- The crown is narrower mesio-distally in comparison with cervico-incisally.
- Roots of permanent maxillary central incisors are wider and shorter.



Dr. Harish Kulkarni M.D.S.
F.R.C.D. C. & Research Centre
New Pargaon, Tal. Hatkanangle
Dist. Kolhapur, 416 122

ii) MESIAL AND DISTAL OUTLINE

Mesial outline :

Less convex compared to distal outline mesio-incisal angle is sharp forming a right angle

Distal outline :

More convex compared to mesial outline. Disto-incisal angle is more rounded than mesio-incisal.

iii) CREST OF CURVATURE / CONTACT POINT :

- Mesial contact point is at incisal one third in central incisors.
- Distal contact point or crest of curvature in central incisor is at the junction of middle and incisal one third.

iv) INCISAL RIDGE

- Incisal ridge on central incisors is straight. mesio-distal this is due to distal contact area being located more cervically.
- At the time of eruption of tooth the incisal ridge of teeth is marked by three rounded protrusions called mamelon which represent three developmental lobes. But they soon worn out from ridge and become flattened.

v) HEIGHT OF CONTOUR

It is present towards cervical one third forming bulk in that region.



Jr. Harish Kulkarni M.D.S.
Principal
T.K.D.C. & Research Centre
New Pargaon, Tal. Hatkanangle
Dist. Kolhapur 416 122

vi) CERVICAL LINE

cervical line on maxillary central incisors is semi-circular facing apically.

vii) IMBRICATION LINE

- They may be present or absent in some cases.
- These are parallel lines to cemento-enamel junction or cervical lines.

② ROOTS :

Roots are generally tapering cone. They are 2-3 mm longer than crown. Both outlines (mesial and distal) are regular and tapers to form blunt apex. The line through crown and root tends to bisect it and is a straight line.

B. PALATAL ASPECT

① CROWN

i) PALATAL FOSSA

Much of the portion of tooth at palatal surface is occupied by a concavity called as palatal fossa, depth of palatal fossa varies from shallow to deep sometimes palatal fossa appears deep with prominent marginal ridges.

Palatal fossa is bounded by

- Incisally by incisal ridge
- cervically by cingulum
- Proximally by marginal ridges



Dr. Harish Kulkarni M.D.S
Principal
T. K. D. C. & Research Centre
New Pargaon, Tal. Hatkanangle
Dist. Kolhapur 416 127

ii) DEVELOPMENTAL GROOVE

These grooves are present in palatal fossa

iii) PALATAL TAPER

Both crown and root tapers uniformly (palatally) therefore the mesio-distal dimensions of crown at palatal line angle is lesser than that of labial line angle.

iv) CINGULUM

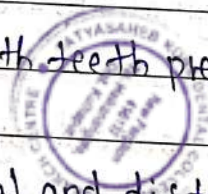
Below cervical line occupying entire cervically third of crown of central incisors with convexity called cingulum. It represents fourth developmental lobe.

v) MARGINAL RIDGES

- The palatal fossa is bounded on both side by rounded elevations. The rounded elevated border on enamel called as mesial and distal marginal ridges
- The cingulum in central incisor is off-centered towards distally, that's why mesial marginal ridge is longer than distal marginal ridge.

② ROOT

- The root outlines each of both teeth present gently tapering cone.
- Due to palatal taper of mesial and distal aspect of root can be viewed from this aspect.



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Dist. Kolar

C. MESIAL ASPECT

① CROWN

Tooth looks wedge shaped or triangular shaped from this aspect

i) Labial outline -

The labial outline from crest of curvature till incisal ridge is very slightly convex.

ii) Palatal Outline -

It is not smooth comprises convexities and concavity.

First towards the incisal ridge it is slightly convex due to incisal ridge, then becomes concave due to palatal fossa and more convex towards cingulum.

iii) Cervical line -

Cervical line is more curved towards mesial aspect than distal aspect and more distinct.

iv) Crest of curvature -

Labial crest of curvature : Towards cervical third

Palatal crest of curvature : Towards cervical third.

② ROOT

- Root is conical with blunt apex

- Straight line drawn from incisal ridge to the apex passes straight

- More flattened



Dr. Harish Kulkarni M.D.S.
Principal
T. K. D. C. & Research Centre
Jeev Paragon, Tar Hatkanangle
K. J. Somaiya Institute of Postgraduate & Research Studies
Vashi, Kurlhappa 411 127

D. DISTAL ASPECT

① CROWN

It is wedge or triangular in shape

i) PALATAL OUTLINE

First slightly convex towards incisal ridge concave due to palatal fossa in middle and more convex towards cingulum

ii) CERVICAL LINE

It is less distinct than mesial aspect

iii) LABIAL OUTLINE

It is more cervically towards both palatal and labial outlines

② ROOT

- Root is conical with blunt apex
- It appears more convex

E. INCISAL ASPECT

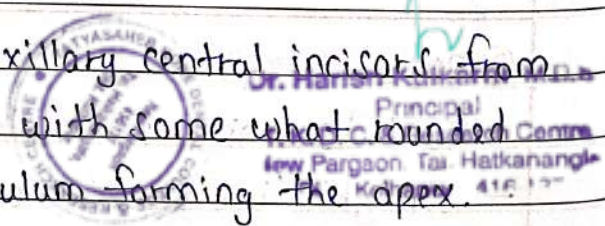
① CROWN

i) SHAPE AND SIZE

Shape of incisal crown maxillary central incisors from their aspect appears triangular with some what rounded labial surface to base and cingulum forming the apex.

ii) CROWN WIDTH

Shape of incisal crown maxillary central incisor is wide



mesio-distally compared to their labio-palatal width. Sometimes in case of presence of mamelons, prominent pulp horns may be seen in the incisal region. However, the pulp canal tapers evenly from cervical region and exists through apical region.

iii) INCISAL RIDGE

In order to confirm outline of arch the incisal ridges appears.

iv) PALATAL RIDGE

It is prominent cingulum marginal ridge as well as palatal fossa can be viewed.

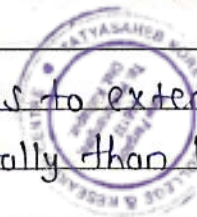
ENDODONTIC DATA :

A. LABIO-LINGUAL SECTION

- Pulp cavity follows the outline of crown and root
- Pulp appears very narrow labio-lingually in incisal region.
- Sometimes due to secondary dentine, it can become obliterated in incisal region.
- The cervical region of pulp cavity shows greater labio-lingual width
- Below cervical region pulp canal following the external tooth, root tapers and may exit the apical foramen either at the tip of root or slightly labial to root tip.

B. MESIO-DISTAL SECTION

- The pulp cavity generally confirms to extend form of tooth
- Pulp chamber is wider mesio-distally than labio-lingually or labio-palatally.
- Sometimes in case of presence of mamelons, prominent pulp horns



Dr. Harish Kulkarni, M.D.S.
T.K.D.C. & Research Centre
Kothnagar, Kolhapur
416 127

may be seen in the incisal region. However, the pulp canal evenly from the cervical region taper and exits through apical foramen slightly away from central part of root in central incisors.

c. CERVICAL CROSS-SECTIONS OF ROOT

- Pulp cavity is wider at cervical region
- In young people, pulp chamber appear triangular and apex towards palatal surface.
- Due to secondary dentine formation shape can change to round or crescent (c-shaped)

VARIATIONS -

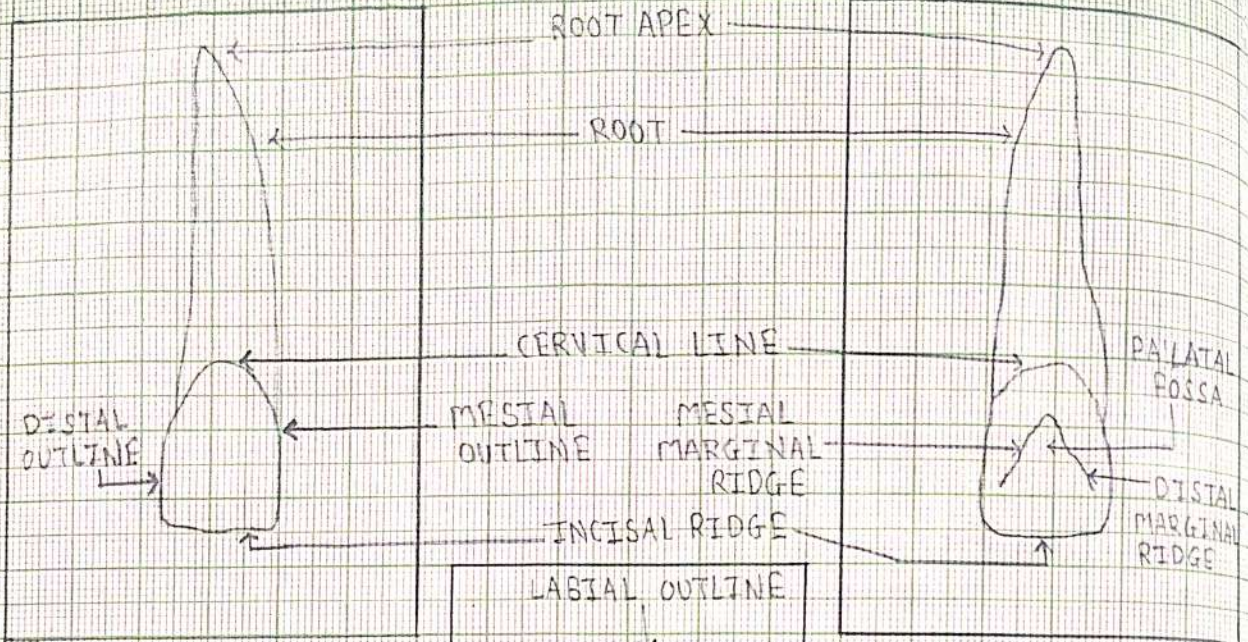
- Extralingual inclination of incisal portion of crown
- Root extremely long
- Specimen small in all dimensions.
- Crown extremely long, root very short
- Specimen malformed crown usually long, cervix very wide
- Root short and tapering
- Root with unusual curvature
- Crown and root narrow labiolingually, mesio-distally root extremely long.

BTT



Dr. Harish Kulkarni M.D.S.
Principal
T. K. D. C. & Research Centre
New Pargaon, Tal. Hatkanangle
Dist. Kolhapur 416 117

PERMANENT MAXILLARY LATERAL INCISORS

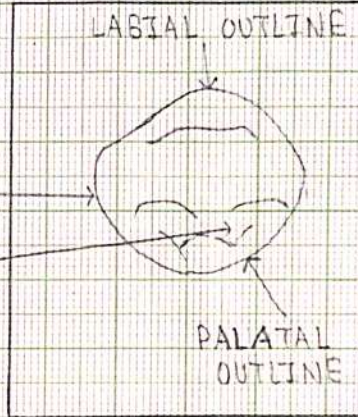


LABIAL ASPECT

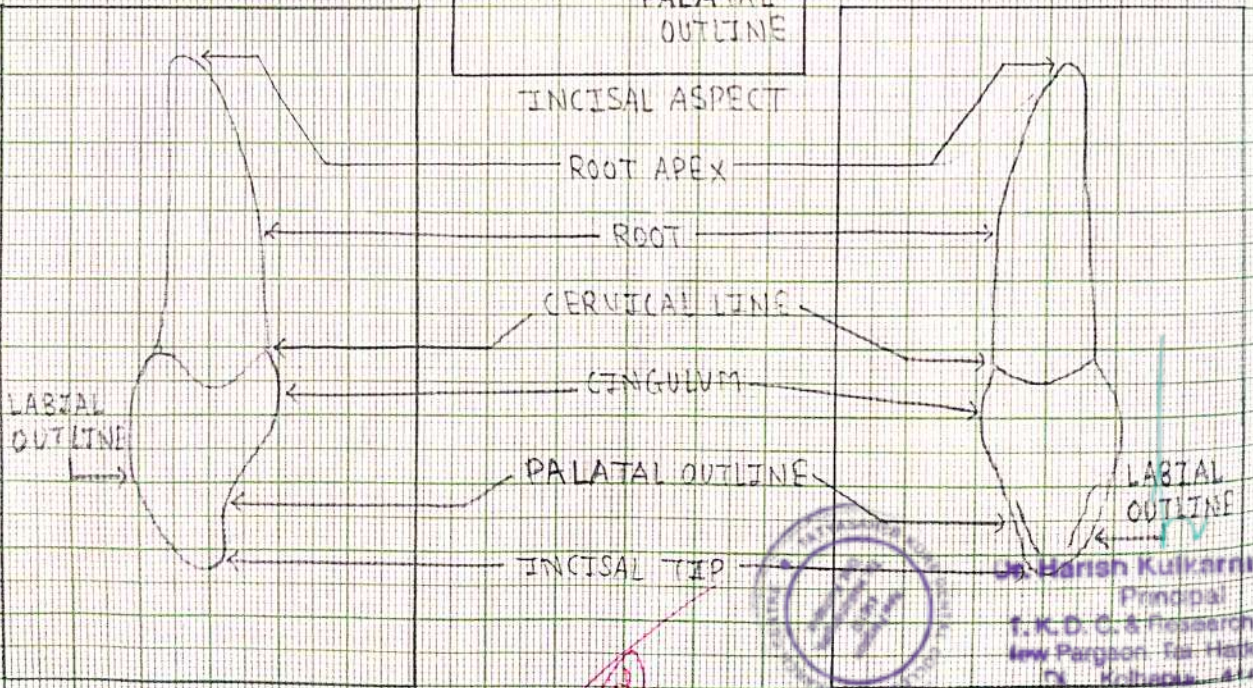
PALATAL ASPECT

INCISAL EDGE

PALATAL FOSSA



INCISAL ASPECT



MESIAL ASPECT

DISTAL OUTLINE

Dr. Harish Kulkarni M.D.S.
Principal
I.K.D.C. & Research Centre
New Parganah, Tal. Halakange
Dist. Kolhapur, 416 117

PERMANENT MAXILLARY LATERAL INCISOR

INTRODUCTION

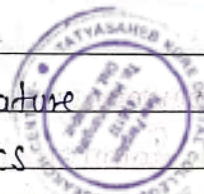
There are 2 maxillary lateral incisors located to distal central incisors. The distal surface by of lateral incisors. The distal surface of lateral incisors contact with lateral incisors medial surface by canine.

The labial surface of maxillary lateral incisors is smooth throughout with exception of mamelons on incisal third. However, mamelons are present are only for short duration and soon worn away.

- The mamelons represents labial developmental lobes on labial surface.
- The mesio-incisal angle of lateral incisal is less rounded than that of disto-incisal angle
- The lingual surface is more irregular with convex located cervical third and concavity occupying most of the middle and incisal third which is proximal aspect by marginal ridge.
- The root generally appears as gently tapering cones.
- Most of the time root is broader labio-lingually than mesio-distally so morphology shows maximum variations in shape and size.

FUNCTIONS

- 1) Cutting and biting food
- 2) Supporting lip and facial musculature
- 3) Plays important role in aesthetics
- 4) Veilding mandible into centric occlusion during final phase of course of mouth.



Dr. Harish Kulkarni M.D.S
Principal

T. K. D. C. & Research Centre
Jew Pargan, Tal. Hatkanangle
Dist. Kolhapur 416 127

CHRONOLOGICAL DATA

First evidence of calcification	10-12 months
Enamel completion	4-5 years
Eruption	8-9 years
Root completion	11 years.

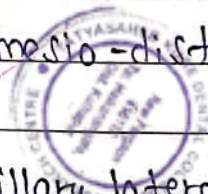
ODONTOMETRIC DATA

cervico-incisal length of crown	9 mm
length of root	13 mm
Mesio-distal diameter of crown	6.5 mm
Mesio-distal diameter of (crown at) cervix	5 mm
labio-lingual diameter of crown	6 mm
curvature of cervical line - mesial	3 mm
curvature of cervical line - distal	2 mm
labio-lingual diameter of (crown at) cervix	5 mm

TRAITS

SET & TRAITS :

- Permanent maxillary lateral incisors are yellow white colour.
- Permanent maxillary lateral incisors have less prominent cervical portion
- The crown is narrower mesio-distally compared to central incisor
- Root of permanent maxillary lateral is wider and shorter and apical foramen is constricted
- It shows presence of mamelons on newly erupted incisors which wear off due to masticatory forces



Dr. Harish Kulkarni M.D.S.
Principal
T.K.D.C. & Research Centre
New Pargaon, Tal. Halol, Dist. Amalgar

ARCH TRAITS

- Maxillary lateral incisors are wider and less symmetrical.
- They have pronounced marginal ridge, deeper palatal fossa and larger cingulum
- Cingulum is central mesio-distally
- Mesial and distal outline are slightly and distinctly rounded respectively.

CLASS TRAITS

- The incisors are rectangular in shape, longer cervico-incisally than mesio-distally
- They taper from widest mesio-distally i.e. contact point to cervical line.
- Palatally they have palatal fossa, cingulum
- They have single rounded root

TYPE TRAITS

A] LABIAL ASPECT

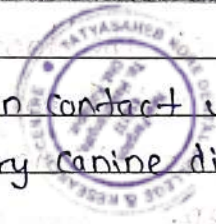
① CROWN

i) SHAPE AND SIZE

Permanent maxillary lateral incisors are trapezoid in shape. This is widest incisally and becomes narrower towards base

ii) Contact area

The lateral incisors and mesially in contact with maxillary central incisors and laterally with maxillary canine distal contact are towards incisal third.



Dr. Harish Kulkarni M.D.S.
T.K.D.C. & Research Centre
Holkarwadi, Hallanganli
Kulhadu 414 122

iii) OUTLINES
Mesial - It is slightly rounded
Distal - It is distinctly rounded

iv) ANGLES
Mesioincisal angle of these lateral incisors is slightly rounded.
Distoincisal angle of maxillary lateral incisors are rounded.

v) CERVICAL LINE
It is semicircular in shape. It shows convexity which is facing towards root.

② ROOT

- Root of maxillary lateral incisors are conical in shape
- Root appears to $1\frac{1}{2}$ times longer than crown appear
- hence root appears to be longer than crown
- It shows distal curvature hence root appears to be twisted distally in apical third.

B7 PALATAL ASPECT :

1. PALATAL FOSSA -

Most of the tooth surface palatally is occupied by concavity called palatal fossa. Lateral fossa of incisors have prominent marginal ridge so fossa appears to be more deep.



Dr. Harish Kulkarni
M.D.S. C. & Research Centre
New Pargaon, Raipur, Chhattisgarh

2. CINGULUM

Below palatal fossa, just above the cervical line located convexity in cingulum. This cingulum is smooth and centered mesio-distally in cervical third.

3. MARGINAL RIDGE

Palatal fossa bounded by rounded elevation penetrating mesial and distal margin of incisors of marginal ridge

Their marginal ridges i.e. mesial marginal ridge and distal marginal ridge more prominent in case of maxillary lateral incisors

4. DEVELOPMENTAL GROOVE

Their groove are present on palatal fossa

II) ROOT

Due to convergence of root lingually we are able to see the mesial and distal outline of tooth

Root appears to be distal outline of conical in shape and it's end into blunt apex

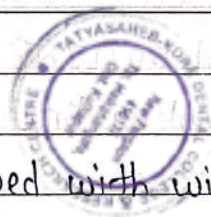
We can also see distal developmental depression from lingual aspect with this seen on distal aspect.

C] MESIAL ASPECT

① CROWN

i) SHAPE AND SIZE

Crown appears to be curved shaped with wide at base of crown and taper incisally forming shape ridge.



Dr. Harish Kulkarni M.D.S.
Principal
T.K.D.C. & Research Centre
New Pargaon, Tal. Hatkanangle

ii) LABIAL OUTLINE

Labial outline of central maxillary incisors is smooth. They appear to be slightly convex from the crest of curvature.

iii) PALATAL OUTLINE

Palatal outline is no more smooth due to convexity-concavity of palatal aspect of tooth. It is slightly incisally due to presence of incisal ridge then appears convex due to cingulum.

② ROOT

- Root is conical in shape
- Mesial aspect is more flattened
- Straight line is drawn from incisal ridge to apex of root passes straight

D] DISTAL ASPECT

① CROWN

i) SHAPE AND SIZE

Shape appears to be triangular or wedge in shape with base which is widest and incisally appears to be narrow.

ii) LABIAL OUTLINE

Labial outline appears to be more convex from crest of curvature.



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Tal. Kolhapur 416 122

iii) PALATAL OUTLINE

First incisally shows less convexity than towards middle appears concave due to palatal fossa and cingulum is forming cervical convexity.

iv) CREST OF CURVATURE

labial crest of curvature is towards cervical third and palatal crest of curvature is also towards cervical third.

② ROOT :

- Root is conical in shape
- It ends into blunt apex and seems to be concave
- Developmental depressions can be seen

E] INCISAL ASPECT

① CROWN

i) SIZE AND SHAPE

If aspects appears to be triangular in shape with base towards incisal ridge and apex towards cingulum

ii) CROWN WIDTH

Crown appears to be wide mesiodistally compact to be seen labiolingually.

iii) PALATAL SURFACE

On palatal surface fossa and marginal (shape) ridge can be seen.



Dr. Harish Kulkarni M.D.S.
Principal
T. K. D. C. & Research Centre
Kothrud, Pune
Pin: 411 004

iv) INCISAL RIDGE

- It is present incisally
- When maxillary central incisor are newly erupted they show presence of mamelons in this region
- There are mamelons which wear out due to masticatory forces.

ENDODONTIC ANATOMY

(A) LABIAL - LINGUAL SECTION :

- It follows outline of crown and root
- It is narrow labio-lingually in incisal region
- Secondary dentine deposition may occur. It becomes obliquely directed in incisal region
- Below cervical line pulp canal follows external tooth taper and may exist the apical foramen either at tip of root or slightly labial to root tip.

(B) MESIO - DISTAL SECTION :

- Pulp chamber is wider mesio-distally than labio-lingually
- Sometimes in presence of mamelons pulp canal tapers from cervical region
- However pulp canal tapers evenly from cervical region and exist through apical foramen, slightly away from root

(C) CERVICAL CROSS SECTION :

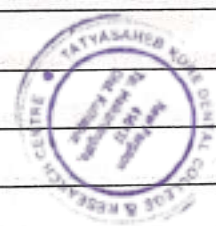
- Pulp cavity is widest in cervical region
- In young people, it appears triangular
- Due to secondary dentine depositions it appear round

or cusp shape.

VARIATIONS :

- Odd twist to crown and root
- Deep developmental grooves distally not pit in lingual fossa.
- Mal-formed generally.
- Deep concavity above contact area of crown
- Single cusp development and malformed root called peg lateral incisor
- On lingual aspect occasionally shows presence of palatolingual groove.

B.T.P.

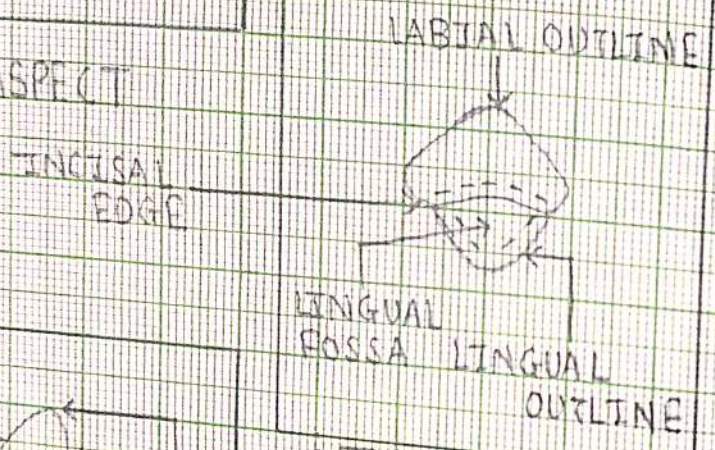


Dr. Harish Kulkarni M.D.S
Principal
T. K. D. C. & Research Centre
New Pargaon, Tal. Hatkanangle
Dist. Kolhapur 416 122

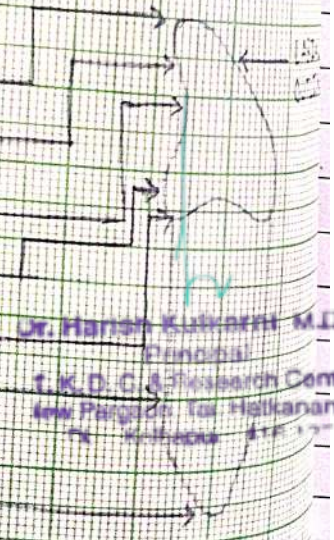
PERMANENT MANDIBULAR CEN



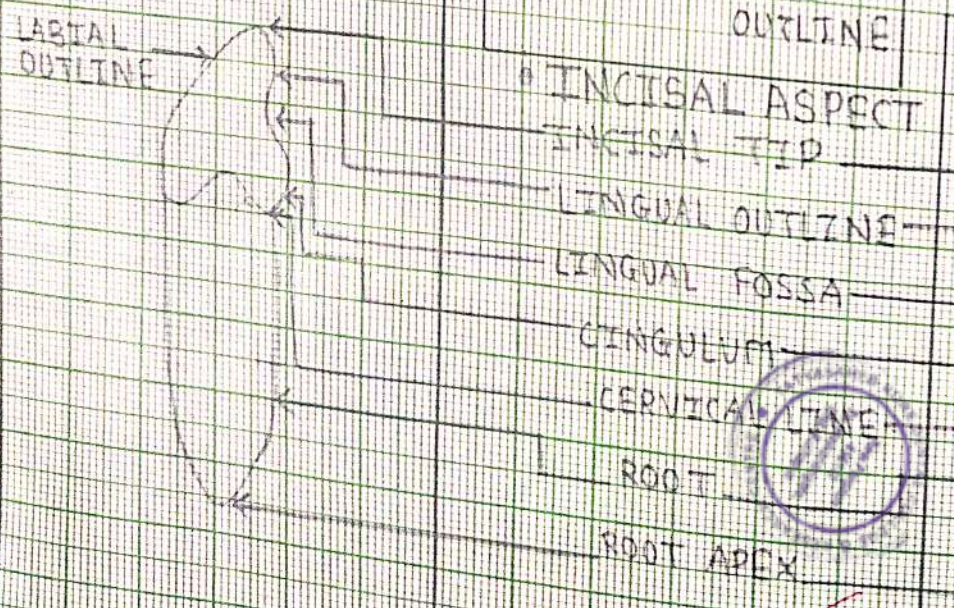
LABIAL ASPECT



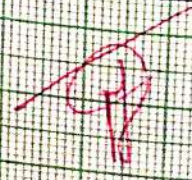
LINGUAL ASPECT



INCISAL ASPECT



MESIAL ASPECT



Jr. Harsh Kulkarni M.D. (Dentist)
 I.K.D.C. Research Centre
 New Parade, Tor Helkanangla
 K. K. Nagar, 411 007

PERMANANT MANDIBULAR CENTRAL INCISORS.

INTRODUCTION :

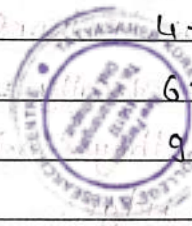
1. Mandibular central incisors are two in number.
2. The mandibular central incisors come in contact with the other in the middle while the distal surface contact with each other with mesial surface of mandibular laterals.
3. Morphologically and functionally mandibular incisors are quite similar to maxillary incisors.
4. Prominent differences are :
Mandibular incisors are smaller in dimensions with mandibular central incisors are smallest in entire dentition.

Functions :

1. Cutting and biting the food.
2. Articulating various speech sounds during speech.
3. Supporting the lip musculature
4. Aesthetics
5. Guiding the mandible into centric occlusion during the final phase of closure.

CHRONOLOGICAL DATA :

- First evidence of calcification - 3-4 months
- Enamel completion - 4-5 years
- Eruption - 6-7 years
- Root completion - 9 years



Dr. Harish Kulkarni M.D.S
Principal
K. K. D. C. & Research Centre
Kulhadu, Tal. Hatkanangle
Dist. Kolhapur 416 127

• ODONTOMETRIC DATA :

cervico-incisal length of crown	
length of root	9.5 mm
mesio-distal diameter of crown	12.5 mm
mesio-distal diameter of crown at cervix	5 mm
labio-lingual diameter of crown	3.5 mm
labio-lingual diameter of crown at cervix	6 mm
curvature of cervical line - mesial	5.3 mm
curvature of cervical line - distal	3 mm
	2 mm

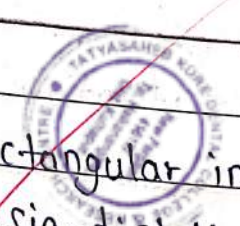
• TRAITS :

(A) Set Traits -

- Permanent mandibular central incisors are larger in overall dimensions
- Permanent teeth are yellowish white.
- The root length is smaller as compared to crown length case of permanent mandibular central incisor.
- The crown is wider in proportion to its length.
- Incisal edge is central on lines bisecting labiolingually

(B) Class Traits -

- Mandibular incisors are rectangular in shape, longer incisio-cervically while mesio-distally
- lingually they contain lingual fossa, cingulum and slope marginal ridges
- They contain flat labial surface and straight incisal edge



Dr. Harish Kulkarni M.D.S
Principal
T.K.D.C. & Research Centre
Ch. B. Road, Tal. Kolhapur
Dist. Kolhapur 416 122

- Crown tapers cervically as well as lingually
- Proximally they are wedge shaped
- They are single rooted.

(c) Arch Traits -

- Mandibular central incisor is along narrow symmetric
- Mandibular central incisor is small than lateral incisor
- crown is wider labio-lingually than mesio-distally
- Mesial and distal incisal angle in mandibular central incisors are sharp
- smooth lingual surface, shallow lingual fossa.

• TYPE ASPECT

(A) LABIAL ASPECT

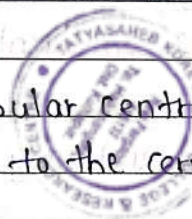
(I) CROWN

1. Shape and Size :

- Like maxillary incisors, the shape of crown of mandibular central incisors from the labial and lingual aspect is trapezoidal.
- crown of mandibular central incisor appears long and narrow due to lesser mesio-distal diameter in comparison with crown height
- Mandibular central incisor is bilaterally symmetrical.

2. Mesial and Distal Outline :

- Mesial and distal outline of mandibular central incisor are flat and run straight from contact area to the cervical line forming an even taper incisio-cervically.



Dr. Harish Kulkarni M.D.S.
F.R.C.S.
T.K.D.C. & Research Centre
Kulhadgaon, Kolhapur
Kulhadgaon, Kolhapur

3. Mesial and distal contact point :

- Mesial and distal outline point in the incisal one third here the mesio-incisal angle almost level with the incisal edge.
- Distal outline point - In the incisal one third about the same level as the mesial contact area which is unique to mandibular central incisor.

4. Labial surface :

- Labial surface of mandibular central incisor is quite flat in the incisal and middle third with the cervical third being slightly convex.

5. Incisal ridge :

- The incisal ridge of mandibular central incisor is straight and perpendicular to line bisecting the crown and root mesio-distally.
- In mandibular central incisor both the incisal angle are sharp.

(II) ROOT :

- The root appears very narrow mesio-distally but wide labio-lingually.
- It tapers uniformly on both sides from cervical line to apex.
- The apical end may curve slightly to distal.



Dr. Harish Kulkarni M.D.S.
Principal
Dental Research Centre
New Pargson, Tal. Hatkanangle
Tal. Kolhapur 415 127

(B) Lingual Aspect :(I) CROWN1. Lingual fossa :

- Entire lingual surface till the cingulum presents little concavity because marginal and incisal ridge are not so prominent.
- The concavity of lingual fossa is very shallow and located at the middle and incisal one third.

2. Cingulum :

- The cingulum of both mandibular central incisor is small, convex and centred mesio-distally.

3. Marginal Ridges :

- The marginal ridges of mandibular central incisors are not so prominent comparative to well developed marginal ridges of maxillary incisors.

4. Lingual taper :

- Just like taper of maxillary incisors mandibular incisors also exhibit a taper towards the lingual aspect of crown and root.

5. Lingual surface :

- Except for concavity of lingual fossa and small convexity of cingulum, the lingual surface represents no other developmental grooves and ridges.

(II) ROOT

- The root appears as an evenly tapering cone with slight distal curve in apical one third.



Dr. Harish Kulkarni M.D.S.
Principal
T.K.D.C. & Research Centre
New Pargaon, Tal. Hatkanangle
Dist. Kolhapur 416 122

- Due to lingual tapering of crown and root the mesial distal developmental depressions in the root can be seen from the lingual aspect.

(c) PROXIMAL ASPECT :

(I) CROWN

1. Shape and Size

- The proximal aspects of mandibular central incisor is demonstrated as triangular or wedge shaped with base directed cervically and apex incisally.

2. Labial Outline

- The labial outline of mandibular central incisor is straight and flat above crest of curvature sloping till incisal tip.

3. Lingual Outline

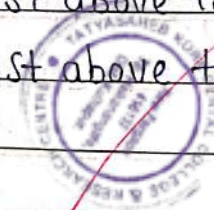
- The lingual outline above the convexity of cingulum slope labially till the concavity of lingual fossa extends incisal joining the convex outline of incisal ridges.

4. Crest of Curvature

- Labial crest of curvature just above the cervical third.
- Lingual crest of curvature just above the cervical third.

5. Cervical line

- Curvature of cervical line, more on mesial aspect than distal aspect.



Dr. Tatyashree M.D.S.
Principal
T.K.D.C. & Research Centre
New Pargana, Tal. Hatkanangle
Tal. Krihanpur 416 122

- cervical line curves incisally.

6. Proximal surface morphology :

- The mesial and distal surface of mandibular central incisor are smooth and concave in the incisal third while the tooth is broad and flat in middle and cervical third.
- The incisal cervical length on mesial and distal aspect of mandibular central incisor is same.

(II) ROOT

1. Root outline

- Labial and lingual root outline on mandibular central incisors are namely parallel till middle one third below which it tapers.
- From the proximal aspect it can be seen clearly that the root is quite broad.

2. Root depression

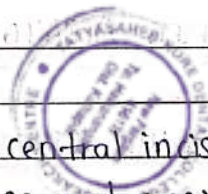
- Both mesial and distal aspect of root of mandibular central incisors exhibit development depressions
- However the depressions on distal aspect of root is more distinct and deeper than that of mesial.

(D) INCISAL ASPECT

(I) CROWN

1. Shape and size

- The shape of crown in mandibular central incisor is roughly triangular with labial surface forming the base and apex towards cingulum.



Dr. Harish Kulkarni M.D.S
Principal

S. K. D. C. A. Research Centre
New Pargana, Kolhapur
Dist. Kolhapur - 416 127

2. Crown outline proportion :

- In mandibular central incisor the labio-lingual dimensions are always greater than mesio-distally.
- central incisors look bilaterally symmetrical
- Due to lingual inclination of labial surface more of than lingual surface can be seen.

3. Lingual Tapers :

- Lingual taper can be seen from this aspect.

4. Incisal ridge :

- The incisal ridge is exactly of the right angle to the line bisecting the crown - mesio-distally.

5. Labial surface :

- The labial surface of mandibular central incisor from this aspect appears flat with same convexity at cervical third.

6. Lingual surface :

- The lingual surface represents shallow concavity i.e. lingual fossa in middle and incisal 3rd which merges with concavity of cingulum in cervical 3rd.

ENDODONTIC ANATOMY

A) LABIOLINGUAL SECTIONS :

- The pulp chamber labiolingually broad in mandibular central incisors.



Dr. Harish Kulkarni M.D.S.
Principal
T.R.D. C. & Research Centre
New Pargaon, Tal. Hatkariangla
Dist. Kolhapur 416 122

- A single prominent pulp horn is seen in incisors but this prominence is lost due to secondary dentin deposition.
- The entire pulp cavity gradually tapers from incisal region to the apex, root apex is usually at the buccal aspect of the root apex.

B) MESIO-DISTAL SECTION :

- The pulp cavity appears quite narrow mesio-distally especially to the cervical triangle region many time secondary dentine can block.
- Single prominent pulp horn is seen. Pulp canal is quite narrow and gently taper till the apical constriction.

C) CERVICAL CROSS SECTION :

- The labio-lingual dimensions of pulp cavity appears greater than it's mesio-distal dimension
- The pulp is centered in the root in mandibular central incisor often two root canals can be seen.

• VARIATIONS :

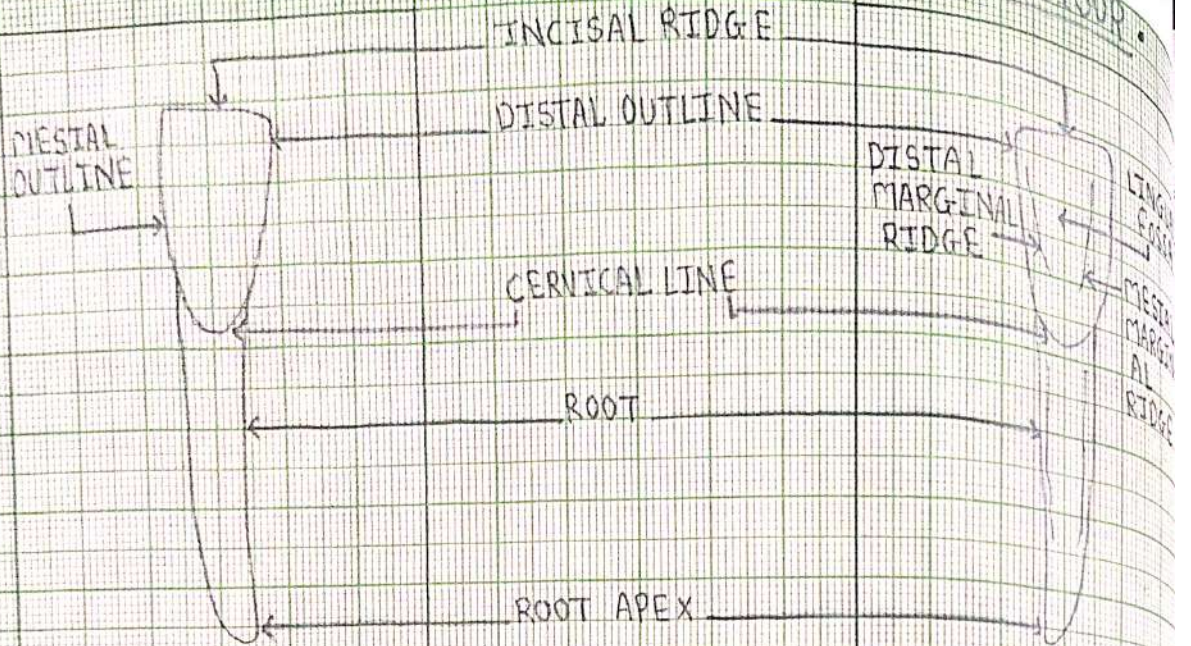
- Crown and root very broad mesio-distally malformed enamel at incisal ridge of crown.
- crown widge at incisal third with short crown and root
- Malformed crown and short root.
- No curvature labially at cervical third, extreme labial curvature at root end.
- contact area pointed at incisal edge, crown and root very long



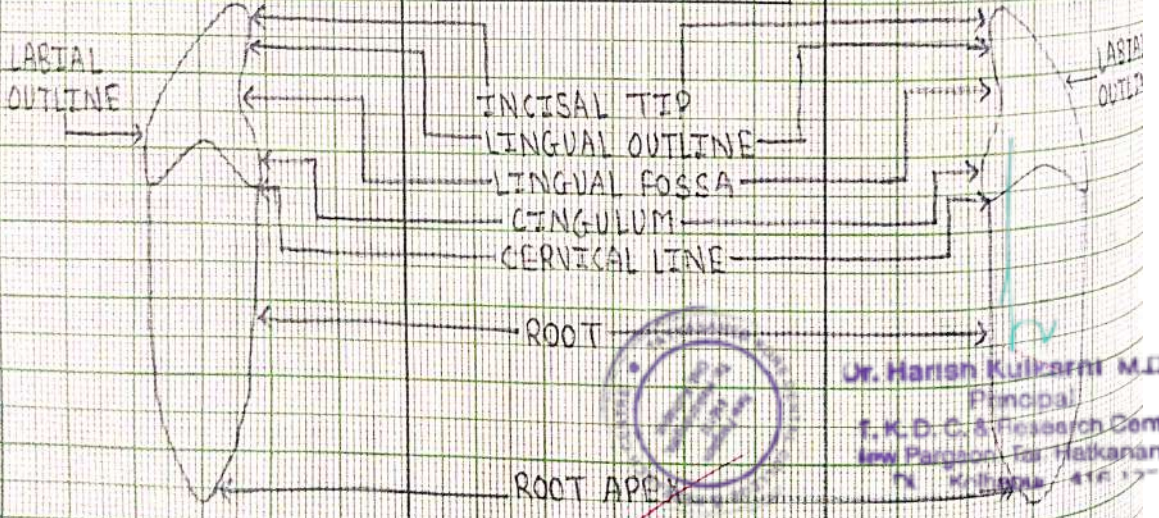
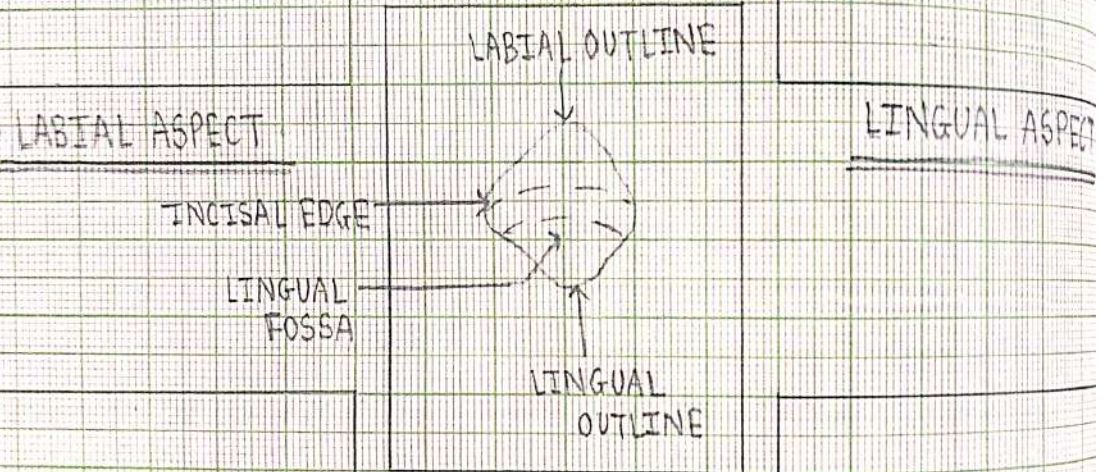
Dr. Harish Kulkarni M.D.S.
Principal

T.K.D.C. & Research Centre
New Barve, Tal. Kolhapur
Dist. Kolhapur 416001

PERMANENT MANDIBULAR LATERAL INCISOR



INCISAL ASPECT



MESIAL ASPECT

DISTAL ASPECT



Dr. Harish Kulbarni M.D.S
Principal
T.K.D.C.S. Research Centre
New Pargana, Faridkot
Kullu - 171 122

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• PERMANENT MANDIBULAR LATERAL INCISORS •

• INTRODUCTION -

- i) They are two in number
- ii) Their mesial surface is in contact with the distal surface of central incisor and their lateral surface is in contact with mesial surface of canine
- iii) Morphologically and functionally the mandibular lateral incisors are as same as maxillary incisors.
- iv) They are slightly bigger in dimensions than mandibular central incisors
- v) Labial surface of lateral incisors inclined lingually
- vi) contact areas are not at same level.

• FUNCTIONS -

- i) Cutting and biting the food
- ii) Articulating various speech sound during speech
- iii) Supporting lip musculature
- iv) Esthetics
- v) Guiding the mandible into centric occlusion during the final phase of closure

• CHRONOLOGICAL DATA -

First evidence of calcification	-	3-4 months
Enamel completion	-	4-5 years
Eruption	-	7-8 years
Root completion	-	10 years

Dr. Harish Kulkarni M.D.S.
Principal
T.K.D. C. & Research Centre
New Pargaon, Tal. Hatkanangle
Dist. Kolhapur 416 117

• ODONTOMETRIC DATA -

cervicoincisal length of crown	9.5 mm
length of root	14 mm
mesiodistal diameter of crown	5.5 mm
mesiodistal diameter of crown at cervix	4 mm
labiolingual diameter of crown	6.5 mm
labiolingual diameter of crown at cervix	5.8 mm
curvature of cervical line - mesial	3 mm
curvature of cervical line - distal	2 mm

• TRAITS :

1) Set Traits -

- They are yellowish white in colour
- Root are wider and show constricted apical foramen
- crown is longer cervico-incisally than mesio-distally
- When tooth is newly erupted it shows presence of mottling

2) class Trait -

- single rooted tooth
- Proximally they are wedge shaped
- Labially trapezoidal in shape
- Lingually show fossa, marginal ridges and lingual groove
- crown tapers cervically as well as lingually.



Dr. Harish Kulkarni M.D.S
Principal
I.K.D.C. & Research Centre
New Pargaon, Tal. Hatkanangle

3) Arch Trait -

- They are wider than central incisors
- Marginal ridges and cingulum are not so prominent
- Lingual fossa is shallower without developmental grooves
- Root is thin mesiodistally
- Incisal edge is lingual to root apex

• TYPE TRAITS :

A) LABIAL ASPECT -

(I) CROWN :

a) Shape and size -

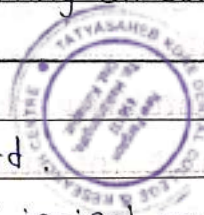
- like maxillary incisors, their crown shape from labial and lingual aspect is trapezoid
- It has shortest uneven side cervically and longest uneven side incisally.
- Their crown approaches long and narrow due to lesser mesiodistal diameter in comparison with crown height

b) mesial and distal outline -

- Mesial and distal outlines of mandibular lateral incisors are flat and run straight
- From contact area to cervical line forming an even taper incisio-lingual

c) Mesial and distal contact point -

- Mesial contact point at incisal $\frac{1}{3}$ rd.
- Distal contact point at junction of incisal and middle $\frac{1}{3}$ rd.



Dr. Harish Kulkarni M.D.S.
Principal
T.K.D.C. & Research Centre
New Pargaon, Tal. Hatkanangle
Kolhapur

d) Labial surface -

- Their labial surface is quite flat in incisal and middle with cervical third being slightly convex.

e) Incisal Ridge -

- Their incisal ridge appears to be sloped from mesial distal due to distal contact point being more cervically compared to mesial contact point

- Their mesio-incisal angle is sharp and disto-incisal angle is slightly rounded.

(II) ROOT :

- It appears very narrow mesio-distally but wide labio-lingually.

- It tapers uniformly on both sides from cervical line apex.

- The apical end may curve slightly to distal side.

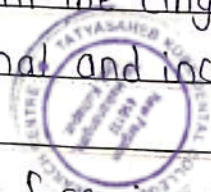
B) LINGUAL ASPECT -

I) CROWN

a) Lingual Fossa -

- Entire lingual surface till the cingulum, present little concavity because marginal and incisal ridges are not prominent

- The concavity at lingual fossa is very shallow and located at middle incisal third.



Dr. H. D. Kulkarni M.D.S.
Principal
T. K. D. C. & Research Centre
Tatyashaheb Kore Institute of Dental Sciences
Kolhapur, Maharashtra

b) Cingulum -

- The cingulum of mandibular lateral incisors is smooth, small, convex and centered mesio-distally.

c) Marginal Ridges -

- Marginal ridge of mandibular lateral incisors are not so prominent comparative to well developed marginal ridge of maxillary incisor.

d) Lingual Taper -

- Just like palatal taper of maxillary incisors these mandibular incisors also exhibit the taper towards lingual side.

e) Lingual Surface -

- Except for concavity of lingual fossa and small convexity of cingulum the lingual surface represent no other developmental grooves or ridges.

II) ROOT :

- It appears as an evenly tapering cone with slight distal curve in apical third
- Due to lingual taper of crown and root the mesial and distal developmental depressions in root can be viewed from lingual aspect

c) PROXIMAL ASPECT -I) CROWN :a) Shape and size -

- The proximal aspect of mandibular lateral incisors demonstrate triangular or wedge shaped outline of crown with base directed



Dr. Harish Kulkarni M.D.S.
Principal
T.K.D.C. & Research Centre
New Pargaon, Tal. Hatkanangle
Dist. Kolhapur - 416 127

cervically and apex incisally.

b) Labial outline -

- The labial outline of tooth is straight and flat above crest of curvature sloping till the incisal ridge.

c) Lingual outline -

- The lingual outline above the convexity of cingulum sloping labially till concavity of lingual fossa and extends incisally to join the convex outline of incisal ridge.

d) Crest of curvature -

- Labial crest of curvature is just above cervical line on cervical third.

- Lingual crest of curvature is just above cervical line on cervical third.

e) Incisal Ridge -

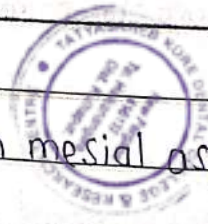
- Observed from mesial or distal aspect incisal ridge appears to be placed lingual to the line bisecting the crown and labio-lingually.

f) Cervical line -

- Its curvature is more on mesial aspect than distal with curve incisally.

g) Proximal surface morphology -

- The mesial and distal surface of mandibular teeth



Dr. Harish Kulkarni M.D.S
Principal
T.K.D.C. & Research Centre
Warananagar, Maharashtra
Kihada 410 127

are smooth and convex in middle and cervical third.

- In lateral incisors due to its shape of incisal ridge distally, the incisal cervical length of distal aspect is lesser than mesial aspect.

II) ROOT :

1) Root Outline -

- Their labial and lingual crest of curvature outline are nearly parallel till middle third below which it tapers till root apex which is centrally located.

- From proximal aspect it can be seen closely that root is quite broad labio-lingually.

2) Root Depressions -

- Both mesial and distal aspect of root of lateral incisors exhibit developmental depressions on most of the length of root.

- However, the depressions on distal aspect of root is more distal and depressed than of mesial surface.

D) INCISAL ASPECT :-

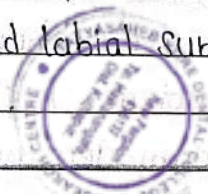
I) CROWN :

a) Shape and Size -

- It is roughly triangular with curved labial surface forming the base and apex towards the cingulum.

b) Crown Outline Proportion -

- Labiolingually dimensions are always greater than mesiodistal



Dr. Harish Kulkarni M.D.S.
Principal
T. K. D. C. & Research Centre
New Paragon, Tq. Hatkanangle
Tal. Kolhapur 416 117

dimensions in mandibular lateral incisors due to lingual surface can be viewed from lateral aspect.

c) Crown lingual taper -

Lingual taper can be seen from this aspect

d) Incisal Ridge -

- On lateral incisor ridge appears to be disto-incisally appears lingually to mesio-distal angle.

- It appears as to conform the shape of dental arch.

e) Labial surface -

- The labial surface of both incisors from this aspect appears flat with some convexity at cervical third.

f) Lingual surface -

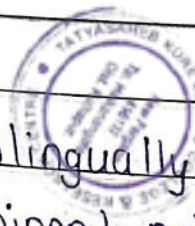
- The surface presents shallow concavity i.e. lingual foss in middle and incisal curve which merge with convexity cingulum in cervical third.

• ENDODONTIC ANATOMY :

1) Labiolingual section -

- The pulp chamber is labiolingually broad in mandibular lateral incisor. A single prominent pulp horn from last distal to secondary dentine deposition as age.

- The entire pulp cavity gradually tapers from incisal to apex.



Dr. Harish Kulkarni M.D.S.
Principal
T.K.D.C. & Research Centre
Jyoti Nagar, Warananagar
Karnataka 576 127

- It's apical foramen that is on root apex is usually as that teeth or broad aspect of root apex.

2) Mesio-distal section -

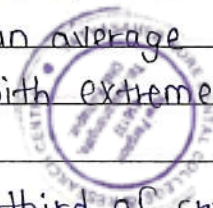
- Pulp cavity appears quite narrow mesio-distally especially so that cervical region many times secondary dentine can block.
- The single prominent pulp horn is seen in pulp canal is quite narrow and gently taper till apical constriction.

3) cervical cross section -

- The labiolingual dimensions of pulp cavity appears greater than it's mesio-distal dimensions the pulp is centred in root.

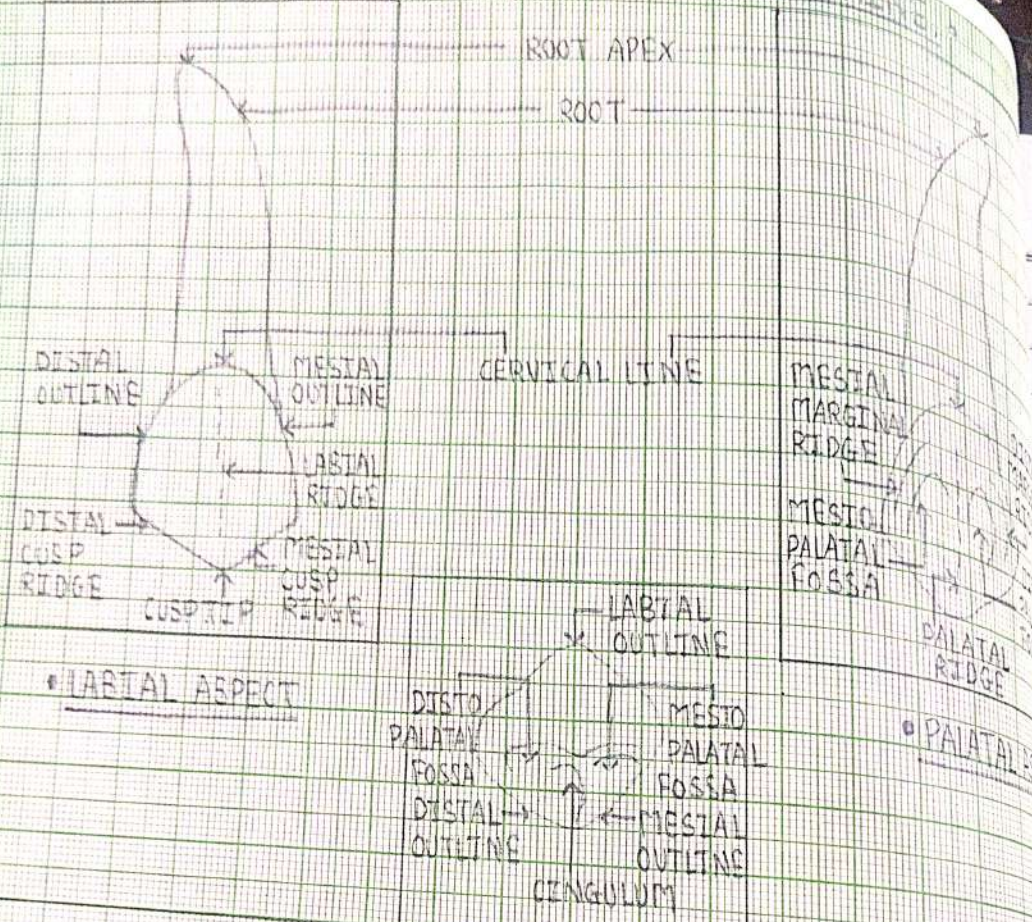
• Variations :

- Tooth is very large, cervix constricted in comparison with crown width.
- Specimen well formed smaller than average
- Root extra long, extreme curvature at apical third, mesial and middle mamelons intact on incisal ridge
- Extreme mesiodistal measurement for crown length. Contact area very broad cervicoincisally
- Specimen undersized.
- Incisal edge labial to centre of root, root rounded, cingulum with more curvature above root than average
- Malformed crown and root, root with extreme length, crown very wide, root short
- Very slightly curvature at cervical third of crown. entire tooth oversized, malformation at root end.



Dr. Harish Kulkarni M.D.S.
T.K.D.C. & Research Centre
Jew Pargan, Tal. Hatkanangle
Dist. Kolhapur, 416 122

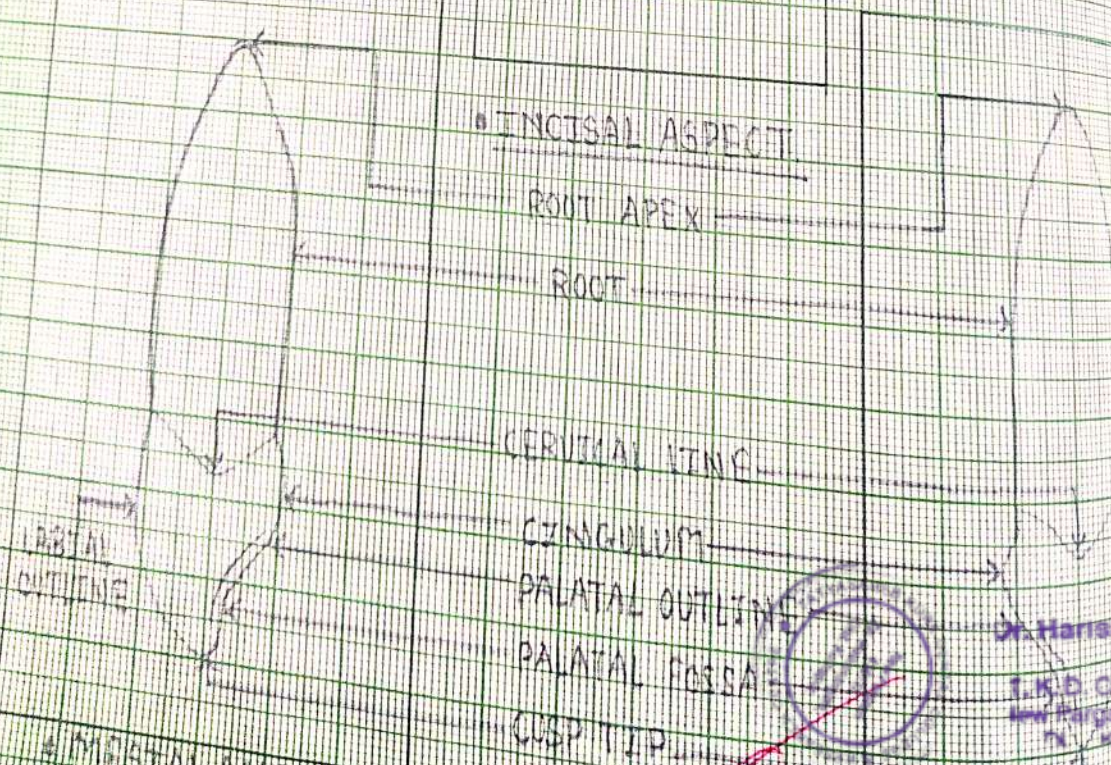
PERMANENT MAXILLARY CANINE



• LABIAL ASPECT

• PALATAL ASPECT

INCISAL ASPECT



• LABIAL ASPECT

• DISTAL ASPECT

INTRODUCTION

- Maxillary arch.
- canines lie
- Distal surf of canine ar
- surface of
- Prominenc
- properties
- lost due to

FUNCTION

- Cutting
- Support
- Due to
- for fixe
- Guides
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CHRONOL

Evidence
Enamel
Eruption
Root c

Dr. Harish Kulkarni, M.D.
Principal
I.K.D. C. & Research Centre
New Pargana, Faridkot
Punjab, INDIA 151001

• PERMANENT MAXILLARY CANINE •

• INTRODUCTION -

- Maxillary canines are two in number, located at corners of dental arch.
- canines lie distal to lateral incisors and mesial to first premolars.
- Distal surface of lateral incisor comes in contact with mesial surface of canine and distal surface of canine comes in contact with mesial surface of first premolar.
- Prominence of their cusp lobe provides them with excellent cleansing properties and along with strength canine is the last tooth to be lost due to age, caries, etc.

• FUNCTIONS -

- cutting and tearing the food
- Supporting lip and facial musculature
- Due to their large longer root, canine act as excellent attachment for fixed partial denture and removable partial denture.
- Guides occlusio by their skin vertical overlap between maxillary and mandibular canine.

• CHRONOLOGICAL DATA -

Evidence of calcification	-	4-5 months
Enamel completion	-	6-7 years
Eruption	-	11-12 years
Root completion	-	13-15 years

Dr. Harish Kulkarni M.D.S
Principal
I. K. D. C. & Research Centre
New Pargaon, Tal. Hatkanangle
Dist. Kolhapur

• ODONTOMETRIC DATA

Cervicoincisal length of crown	10 mm
Length of the root	17 mm
Mesiodistal diameter of crown	7.5 mm
Mesiodistal diameter of crown at cervix	5.5 mm
Labio palatal diameter of crown	8 mm
Labio palatal diameter of crown at cervix	7 mm
Curvature of cervical line - mesial	2.5 mm
Curvature of cervical line - Distal	1.5 mm

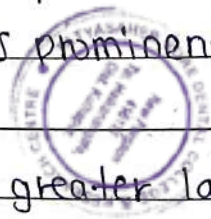
• TRAITS

1) Set Trait -

- Permanent maxillary canines are yellowish in colour
- It has more cervical portion prominent
- The root length is greater in comparison with crown in case of deciduous maxillary canine.

2) Class Trait -

- Canines are longest teeth in mouth
- Canine has single sharp cusp.
- Labial surface of canine is prominently covered with a ridge
- Measurement of crown is greater labio palatally than mesiodistally.
- Canine are wedge shaped proximally.
- Canine have two palatal fossae with prominent palatal



Dr. Harish Kulkarni M.D.S.
Principal
F.K.D. & Research Centre
New Bazaar, Tarapur, Maharashtra

3) Arch Trait -

- More acute cusp angulation of maxillary canine.
- crown of maxillary canine is more short and wide.
- It has more pronounced labial ridge.
- More pronounced marginal ridges and palatal ridge with two fossae in maxillary canine.
- Cingulum is prominent and central.
- Cusp tip is labial to line bisecting root and crown labiopalatally.
- Roots of maxillary canine are longer than roots of mandibular canine.

• TYPE TRAITS

① LABIAL ASPECT :

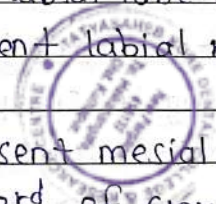
(a) Crown -

i) shape and size -

- Like all anterior teeth the shape of maxillary canines is considered trapezoidal with largest uneven side towards incisal one third and shortest uneven side towards cervical one third.

ii) labial ridge -

- canine develops from 4 lobes, 3 on labial aspect and 1 on palatal fossa.
- out of the 3 lobes labially the labial lobe shows greatest development and forms the prominent labial ridge which runs cervico-incisally.
- crown shallow depressions are present mesial and distal to labial ridge which extend till middle $\frac{1}{3}^{\text{rd}}$ of crown.



iii) Mesial and distal outline -

- The mesial outline is relatively flat as it begins at cervical line, then it reaches middle 1/3rd and becomes broadly convex.

iv) Mesial and distal contact points -

- Mesial contact point : At the junction of incisal and middle 1/3rd

- Distal contact point : In the middle 1/3rd

v) Cusp ridges and cusp tip -

- The canine has cusp so it is also referred to as cuspid

- The single cusp has two cusp ridges, i.e. mesial and distal cusp ridges.

- The angle made up cusp ridge is roughly about less which is more acute than that of maxillary canines which is

- The cusp tip is usually mesial to the line bisecting the crown and root mesiodistally.

vi) Cervical line -

- cervical line is uniformly convex with convexity directed apically.

(b) Root -

- The root appears long, mesiodistally slender, conical and terminating in sharp or blunt apex

- Apical 1/3rd usually curves distally. Labial surface of root is smooth and convex



Dr. Harish Kulkarni M.D.S
Principal
T.K.D.C. & Research Centre
New Parganah, Tal. Hatkanangle
Dist. Kolhapur 416 127

② PALATAL ASPECT :

(a) Crown -

i) Palatal ridge and palatal fossa -

- The centre of palatal surface of maxillary canine is often marked by a palatal ridge running cervico-incisally from cingulum to tip.
- Due to palatal ridge the concavity of palatal fossa is divided into mesial and distal palatal fossa.

ii) Marginal ridges -

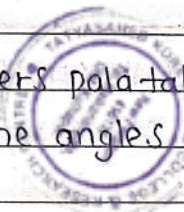
- The palatal fossa is bordered proximally by mesial and distal marginal ridge which are less prominent than palatal fossa.
- Among the marginal ridges, the mesial marginal ridge is less pronounced than the distal marginal ridge.
- The mesial marginal ridge is longer than the distal marginal ridge.
- The mesial contact area is more because incisally located and mesial cusp ridge is short because mesial marginal ridge is longer than distal marginal ridge.

iii) Cingulum -

- The cingulum of canines of maxilla is longer and centered mesiodistally. Many times a pointed cingulum resembling a small cusp is present.

iv) Palatal taper -

- The crown of maxillary canine tapers palatally. Thus measurement of crown and root on its palatal line angle is lesser than that of labial line angles.



(b) Root -

- Root appears long, slender and has gently tapering Co with a sharp or blunt apex
- Due to palatal taper of tooth muscle of mesial and distal aspect of root can be viewed with their developmental depressions.

(3) MESIAL ASPECT :

(a) Crown -

i) Shape and size -

- It is triangular or wedge shape with shortest uneven side located incisally and longest uneven side located cervically.

ii) Labial outline -

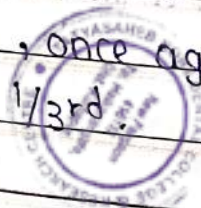
- Labial outline from cervical line to cusp tip is smooth and convex with convexity being more than that of maxillary central incisors.

iii) Palatal outline -

- Palatal outline from the secondary cervical line is convex till the junction of the cervical and middle 1/3rd which then often becomes concave, once again becoming convex in the cusp tip i.e. incisal 1/3rd.

iv) Crest of curvature -

- Labial : on cervical 1/3rd
- Palatal : on cervical 1/3rd.



Principal
T.K.D.C. & Research Centre
New Patagon, For Hatkanangle
Kulhabla 416 17

v) Cusp Tip -

- The cusp tip is located slightly labial to the line bisecting the crown and root labio-palatally.

vi) Cervical line -

- It is more deeper on mesial aspect than on distal aspect.

(b) Root -i) Root Outline -

- The root of canine is broad labio-palatally when it's labial and palatal outlines parallel till the junction of middle and apical 1/3rd.

ii) Developmental depression -

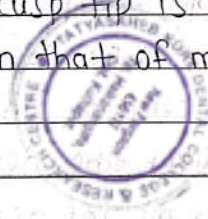
- It is shallow developmental depression for part of the root length.

(4) DISTAL ASPECT :(a) Crown -i) Shape and size -

- It is triangular or wedge shape with shortest uneven side located incisally and longest uneven side located cervically.

ii) Labial Outline -

- Labial outline from cervical line to cusp tip is smooth and convex with convexity being more than that of maxillary central incisors.



⑤ INCISAL ASPECT :

(a) Crown -

i) Shape and size -

- The crown shape is roughly rhomboidal
- The corners of the rhombus being formed by the prominences of labial ridge, cingulum, mesial and distal contact areas.

ii) Crown properties -

- The arch trait of maxillary canine is exhibited in the incisal aspect. i.e. the labio-lingual dimensions being greater than the mesio-distal dimensions.

iii) Cusp tip and cuspal ridges -

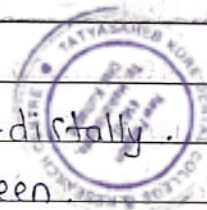
- The cusp tip appears to be slightly labial to line bisecting the crown mesio-distally.
- The cuspal slopes travel the crown mesio-distally with middle usually in straight line.

iv) Labial surface -

- The labial surface appears asymmetrical mesio-distally with middle 1/3rd of mesial surface prominently convex than distal half.
- Distal surface is slightly flat or concave.

v) Palatal surface -

- A palatal cingulum centered mesio-distally.
- Prominent marginal ridges can be seen.
- Palatal fossa is divided into mesial and distal half by palatal ridge.



Dr. Harish Kulkarni M.D.S.
Principal
T.K.D.C. & Research Centre
New Pargaon, Tal. Hatkanangle
Dist. Kolhapur 416 127

• ENDODONTIC ANATOMY

i) Labiopalatal section -

- Maxillary canine has maximum labiopalatal width in cervical region because of it's size of pulp cavity appears larger.
- Pulp chamber closely confirms to the external morphology of the teeth with a prominent pulp horn projecting below the cusp.
- Pulp chamber at cervical third of crown and at root canal is very wide. Apical $\frac{1}{3}$ rd pulp canal shows obstruct.

ii) Mesiodistal section -

- Pulp cavity appears narrower mesiodistally.
- Pulp canal confirming to the external root form tapers gradually till the apical foramen existing. The root either at it's tip or mesial or distal to it.

iii) cervical cross section -

- Pulp chamber is gradually centered with the tooth shape of pulp usually appears triangular, elliptical or ovoid.

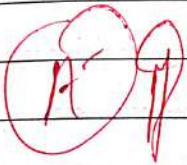
• VARIATIONS -

- crown very long with extreme curvature of apical third of the root.
- Entire tooth unusually long [Note - Hypercementosis at root end]
- Very short crown, root small and malformed.



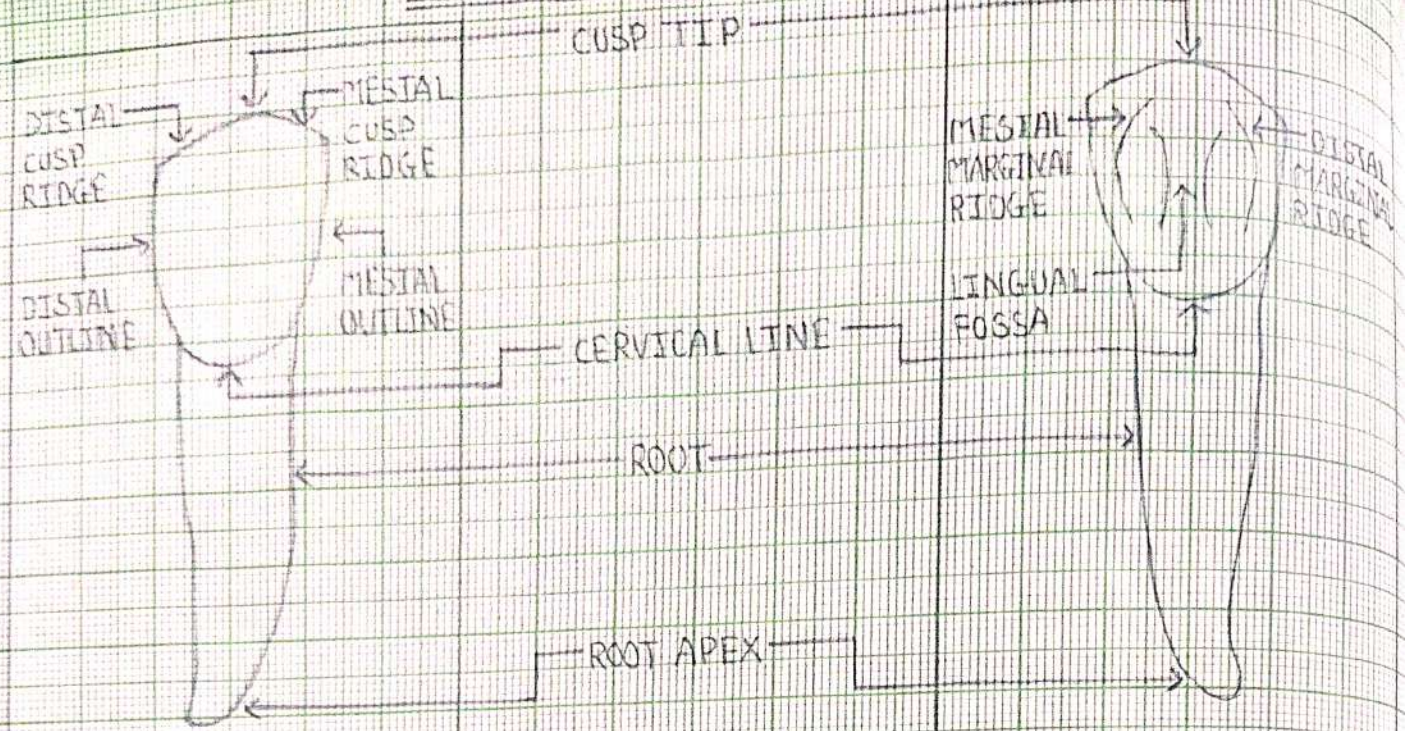
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Principal
T.K.D. C & Research Centre
New Pargaon, Tal. Hatkanangle
Dist. Kolhapur - 415 122

- Mesiodistal dimensions of crown at contraction extreme
- calliberations at cervical narrow in comparison with root, short for crown of this size.
- Extreme labiolingual calliberation, root with unusual curvature.
- Tooth mal-formed generally.
- large crown, short root.
- Root enlargement.
- Root very blunt at apex.
- odd curvature of root, extra length.
- crown poorly formed, root extra long.



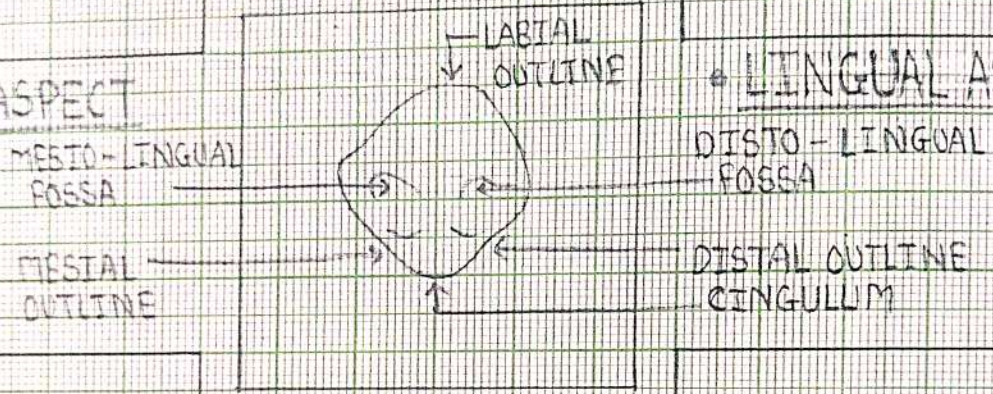
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Principal
T. K. D. C. & Research Centre
New Pargaon - Tal. Hatkanangle
Dist. Kolhapur - 416 127

PERMANENT MANDIBULAR CANINE

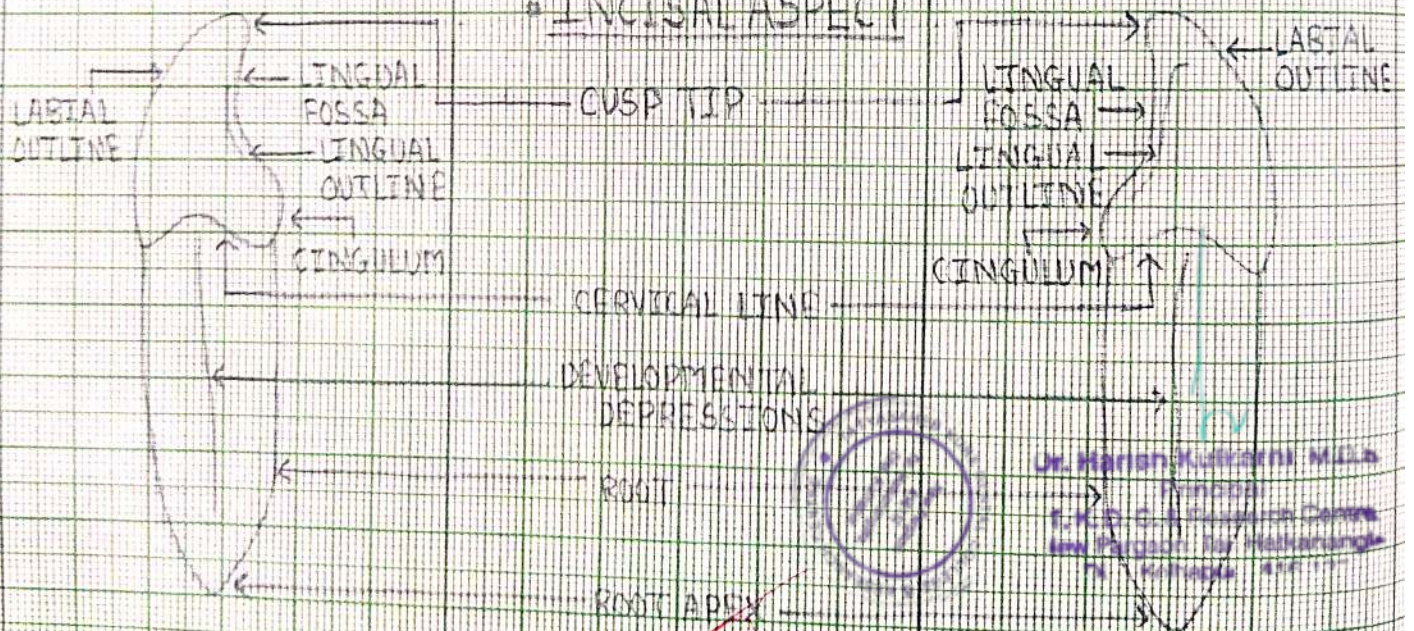


LABIAL ASPECT

LINGUAL ASPECT



INCISAL ASPECT



MESIAL ASPECT

DISTAL ASPECT



Dr. Harish Kulkarni M.D.S.
 Professor
 F.P.S. & P.D.S. Research Centre
 Jawahar Institute of Postgraduate
 & Research
 Bangalore - 560022

• PERMANENT MANDIBULAR CANINE •

• INTRODUCTION -

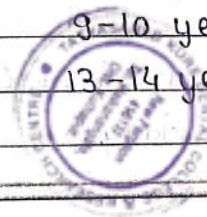
- Mandibular canines are two in numbers
- Their mesial surface contacts lateral incisor, while distal surface contact first premolar
- Mandibular canines are functionally similar to maxillary canines.
- Even morphologically they are quite similar but few differences do exist
- A not very uncommon variation (anatomical) is bifurcated root.

• FUNCTIONS -

- Help in cutting and tearing the food.
- Supports lip and fascial musculature.
- Guides occlusion by their shape, vertical overlap between maxillary and mandibular canine.
- Due to long root canines act as excellent abutment for removed partial denture.

• CHRONOLOGICAL DATA -

First evidence of calcification	4-7 months
Enamel completion	6-7 years
Eruption	9-10 years
Root completion	13-14 years



Dr. Harish Kulkarni M.D.S
Principal
T.K.D.C. & Research Centre
New Pargaon, Tal. Hatkanangle
Dist. Kolhapur - 416 127

• ODONTOMETRIC DATA -

cervico-incisal length of crown	11 mm
length of root	16 mm
Mesiodistal diameter of crown	7 mm
Mesiodistal diameter of crown at cervix	5.5 mm
labiolingual diameter of crown	7.5 mm
labiolingual diameter of crown at cervix	7 mm
curvature of cervical line - Mesial	2.5 mm
curvature of cervical line - Distal	1 mm

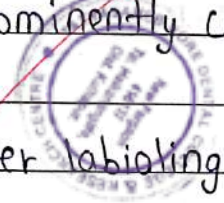
• TRAITS -

1) Set Trait -

- Permanent mandibular canine is yellowish white.
- They have more prominent cervical protion.
- They root length is greater than the crown length is case of deciduous mandibular canine.

2) Class Trait -

- Canine are longest teeth in mouth.
- It has single sharp cusp (cuspid)
- Labial surface of canine is prominently convex with labial ridge
- Measurement of crown is greater labiolingually than mesio-distally.



Dr. Harish Kulkarni M.D.S.
Principal
T.K.D.C. & Research Centre
New Parson, Tal. Hatkanangle
Dist. Solapur 413 117

3) Arch Trait -

- cusp angulation on mandibular canine is 120°
- Both contact areas never at cusp tip.
- Mandibular canines have less pronounced marginal ridges less prominent cingulum towards distal or center.
- cusp tip is lingual to line bisecting root and crown labio-lingually
- mesial cusp slope is much shorter than distal cusp slope.
- Root is straight and short.

• TYPE TRAIT -

A) LABIAL ASPECT :

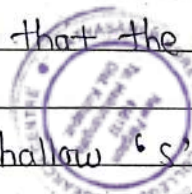
(a) CROWN :

1) Shape and size -

- Just like maxillary canine, shape of crown of mandibular canine from labial and lingual aspect is considered as trapezoid.
- The cervico-incisal length of maxillary canine appears less than mandibular canine.
- Also mandibular canines are narrower mesio-distally.

2) Mesial and Distal outline -

- Mesial outline is typically flat or slightly convex from mesial contact area.
- An important point to be noted is that the mesial outline of root unlike maxillary canine.
- The distal outline is considered as shallow 's' with slight convexity at cervical $1/3^{\text{rd}}$ and concave on middle $1/3^{\text{rd}}$.



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Principal

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3) Contact Area -

Mesial contact area - In incisal $\frac{1}{3}^{\text{rd}}$.

Distal contact area - At junction of middle and incisal $\frac{1}{3}^{\text{rd}}$.

4) Cusp tip and cusp slopes -

- Mesial cusp ridge of mandibular canine is shorter than the distal cusp slope.

- However the mesial cusp ridge is almost horizontal while the distal cusp ridge slope apically.

- Mesial and distal cusp ridge meet at one or more obtuse angle than that of maxillary canine due to which cusp tip of mandibular canine appears blunt.

- The cusp tip is located on the line bisecting the crown and the root mesio-distally.

5) Labial Ridge -

- The entire labial surface of mandibular canine appears smooth and convex.

- This is because of labial ridge is much less prominent compared to maxillary canines.

6) cervical line -

- The cervical line is regular and convex with convexity directed apically.

(b) ROOT :

Mesial and distal outline of root gently tapers in apical direction to a blunt apex with apical $\frac{1}{3}^{\text{rd}}$ dimensions.



Dr. Harish Kulkarni, M.D.S.
T. K. D. C. & Research Centre,
Jew Parganah, Tal. Hatkanangla,
Dist. Kolhapur 416 122

straight without any curve mesially or distally.

B) LINGUAL ASPECT :

(a) CROWN :

1) Lingual ridge and fossa -

- Lingual ridge compare to that of the maxillary canine is not so prominent

- Sometimes being absent.

- Lingual fossa is shallower than that of maxillary canine.

- Due to shallow lingual fossa and less prominent lingual and marginal ridges of the entire surface appears smooth compared to maxillary canine.

2) Marginal Ridges -

- Marginal ridge are not so prominent

- Mesial marginal ridge is less prominent straighter and larger compared to the distal marginal ridge

3) Cingulum -

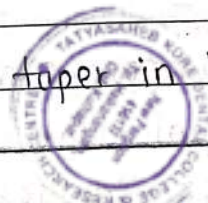
- compare to maxillary canine cingulum of mandibular canine is poorly developed and less bulky.

4) Lingual Taper -

Like all teeth mandibular canine taper in lingual taper

(b) ROOT :

The lingual surface of root is smooth and convex as the root tapers lingually much of mesial and distal aspect of root



Dr. J. K. D. C. A. Research Centre
Principal
New Pargaon, Tal. Hatkanangla
Dist. Khatrapada 751 022

with their developmental depression can be seen from this aspect.

(c) PROXIMAL ASPECT :

(i) MESIAL ASPECT :

(a) CROWN :

1) Shape and size -

- From proximal aspect, mandibular canine appears triangular or wedge shaped.

2) Labial and lingual outline -

- Labial outline of mandibular canine is less convex compared to maxillary canine.

- Lingual outline also present lesser convexity and concavity from cervical line till cusp tip due to poorly developed cingulum and shallower lingual fossa.

3) crest of curvature -

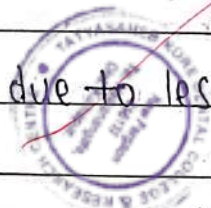
labial - In cervical $\frac{1}{3}$ rd but closer to cervical line than maxillary canine.

lingual - In cervical $\frac{1}{3}$ rd but bulge of cingulum is less.

4) cusp Tip -

- cusp tip appears much thinner due to lesser bulk of labial and lingual ridge

- The cusp tip lies slightly lingual to the line bisecting the crown and root labio-lingually.



Dr. Harish Kulkarni, M.D.S.
T. K. D. C. & Research Centre,
New Pargaon, Tal. Hatkanangle,
Dist. Kolhapur 416 117

5) cervical line -

- cervical line curves incisally more on mesial aspect and not on distal aspect
- In mandibular canine cervical line curvature is more

(b) ROOT :1) Outlines of root -

- Labial and lingual outline gently taper or are almost parallel in the middle $\frac{1}{3}$ rd after which they taper sharply apically.

2) Developmental depressions -

- Mesial developmental depression is more shallower.

② DISTAL ASPECT :(a) CROWN :1) Shape and size -

- crown from distal aspect appears triangular or wedge shaped.

2) Labial and lingual outlines -

- Labial outline is less convex
- Lingual outline presents less convexity and concavity from the cervical line in tip due to poorly developed cingulum and shallow lingual fossa.

3) crest of curvature -

Labial - In cervical $\frac{1}{3}$ rd but closer to cervical line than maxillary canine.



Dr. Harish Kulkarni M.D.
Principal
T. K. D. C. & Research Centre
Krihadi 411012

Lingual - In cervical $\frac{1}{3}$ rd but bulge of cingulum is lesser.

4) Cusp Tip -

- cusp tip appears much thinner due to lesser bulk of labial and lingual ridge
- A tip of cusp lies slightly lingual to the line bisecting the root and crown labio-lingually.

5) cervical line -

- cervical line curves incisally and it is less on distal aspect.

(b) ROOT :

1) outline of root -

- labial and lingual outline gently taper are almost parallel till middle $\frac{1}{3}$ rd after which they taper sharply apically.

2) Developmental depression -

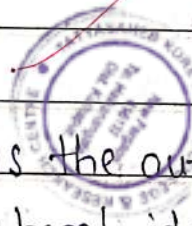
- Developmental depression is more on distal aspect of mandibular canines appears rhomboidal.

E) INCISAL ASPECT :

(a) CROWN :

1) Shape and size -

- Just like the maxillary canines the outline of the crown of mandibular canine appears rhomboidal.



Dr. Harish Kulkarni M.D.S
Principal
T.K.D.C. & Research Centre
New Bargaon, Tal. Antrangi
Mumbai - 400 004

2) Crown proportion -

- Labio-lingual width is more than mesio-distal width of crown.
- The difference in dimensions is more in mandibular canines than that of maxillary canine.

3) Labial surface -

- Labial surface is more symmetrical as compared with that of maxillary canine.
- Mesial half of labial surface is convex while distal half is often flat or concave.

4) Lingual surface -

- On lingual surface, centered cingulum, less prominent.
- Marginal ridges and shallower lingual fossa can be seen.

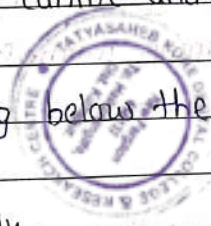
5) Cusp ridges and cusp tip -

- Cusp tip lies lingual to the line bisecting the root and crown labio-lingually.
- Cusp ridges are slightly lingually.

• ENDODONTIC ANATOMY :

1) Labio-lingual section -

- Pulp cavity similar to that of maxillary canine and closely confirm the external tooth form.
- Prominent pulp horns are seen projecting below the single cusp tip.
- Pulp chamber is very wide labio-lingually.
- Many times two root canals are present.



Dr. Harish Kulkarni
F.K.D.C. & Research Centre
New Pargan, Tal. Hatkangal
Dist. Kolhapur 416 002

2) Mesio-distal section -

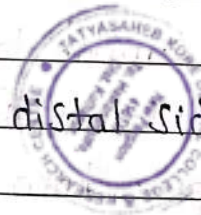
- Pulp is very narrower mesio-distally.
- Pulp horn appears very blunt
- Pulp canal may curved mesially or distally in apical $\frac{1}{3}$ rd region.

3) Cervical cross section -

- considerable variation is seen in size and shape of pulp chamber.
- It may be rectangular, oval or triangular.

• VARIATIONS :

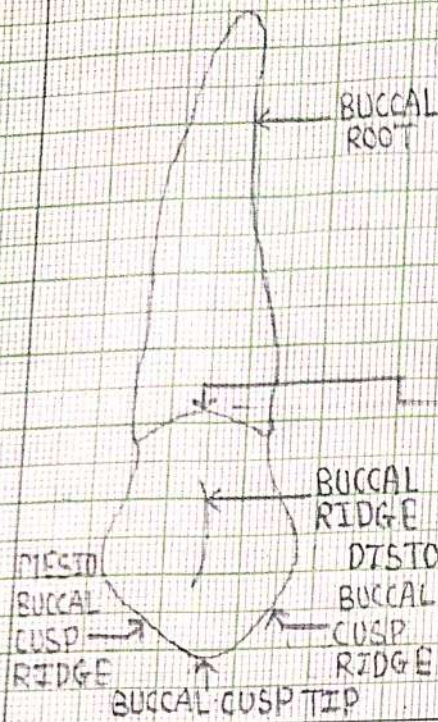
- Well formed crown, two roots (1 labial and 1 lingual)
- Well formed crown, with longer roots
- Well formed crown portion, poorly formed root.
- Root longer than normal average with extreme curvature
- Deep developmental groove dividing the root.
- Crown resembling mandibular lateral incisor, root short.
- Root extremely long with odd mesial curvature starting at cervical $\frac{1}{3}$ rd.
- Crown extra long and irregular in outline, root short and poorly formed at apex.
- Crown with straight mesial and distal sides wide at cervix with a root.



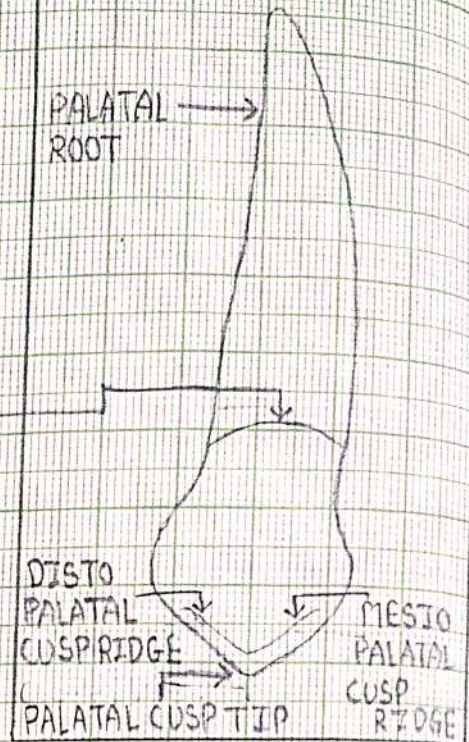
Dr. Harish Kulkarni M.D.S.
Principal
New Pargaon, Tal. Hatkanangle
Dist. Kolhapur 416 127

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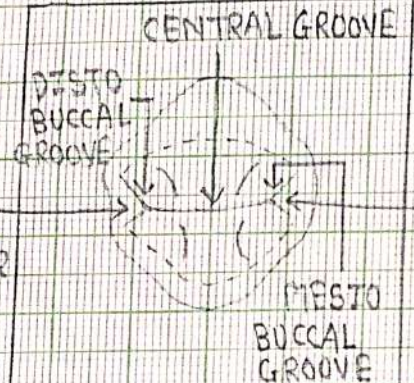
PERMANENT MAXILLARY FIRST PREMOLAR



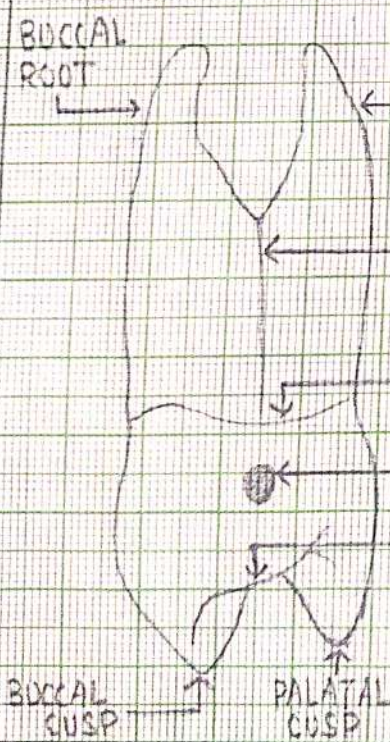
• BUCCAL ASPECT



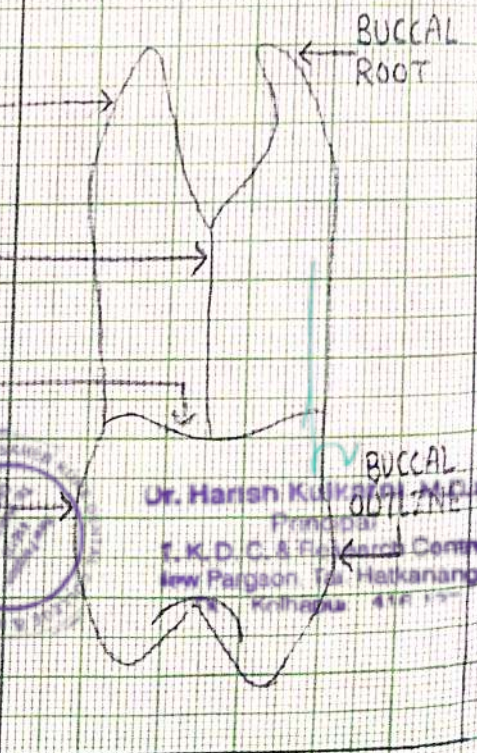
• PALATAL ASPECT



• OCCUSAL ASPECT



• MESIAL ASPECT



• DISTAL ASPECT

Dr. Harish Kulkarni M.D.S
Principal
I.K.D.C. & Research Centre
New Parganah, Tal. Hatkanangle
Kothrud, Pune 411 007

PERMANENT MAXILLARY 1st PREMOLAR.

INTRODUCTION -

- Maxillary first premolar are 2 in number, one on right and one on left side located posterior to canine and anterior to 2nd premolar.
- These premolars develop from four lobes.
- Both crown and roots of maxillary premolar are shorter than maxillary canine but longer than that of molar.

FUNCTIONS -

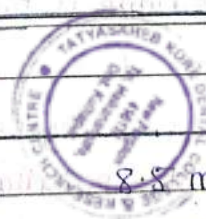
- The first premolar helps the canine in cutting the food into smaller pieces.
- Along with the molars the premolar helps to maintain the vertical dimensions of face.

CHRONOLOGICAL DATA -

- 1st evidence of calcification - $1\frac{1}{2}$ to $2\frac{3}{4}$ yrs
- Enamel completion - 5 to 6 yrs.
- Eruption - 10 to 11 yrs.
- Root completion - 12 to 13 yrs.

Odontometric Data -

- cervico-occlusal length of crown 8.8 mm
- length of root 14 mm
- Mesiodistal diameter of crown 7 mm



Dr. Harish Kulkarni M.D.S
Principal
F.K.D.C. & Research Centre
New Pargaon, Tal. Hatkanangle
Dist. Kolhapur - 416 127

Mesio-distal diameter of crown at cervix	5 mm
Buccopalatal diameter of crown	9 mm
Buccopalatal diameter of crown at cervix	8 mm
curvature of cervical line - Mesial	1 mm
curvature of cervical line - Distal	0 mm

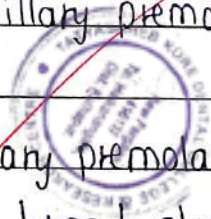
• TRAITS -

1) class Traits -

- Premolars have 2 cusps (Bicuspid)
- Mandibular premolar may have 3 cusps.
- Buccal surface is pentagonal in shape with buccal ridge
- Lingual surface is well developed and convex
- Marginal ridges of premolars are oriented in a horizontal plane
- Occlusal surface consists of cusps (2/3), triangular fossa, marginal ridges and grooves.
- All premolars are single rooted except maxillary first premolar (2 rooted).

2) Arch Trait -

- Maxillary 1st premolar is larger than 2nd premolar and vice-versa is true for mandibular premolars.
- Buccal ridge is prominent in maxillary premolars than mandibular premolar.
- There is a lingual tilt in maxillary premolar.
- Occlusally maxillary premolars are broad along faciolingually whereas mandibular premolars are more sense
- Maxillary pre-molars have 2 roots.



Dr. Harish Kulkarni M.D.S.
Principal
T.K.D.C. & Research Centre
New Pargson, Tal. Hatkanangle
Dist. Kolhapur 416 122

TYPE TRAITS :

1) BUCCAL ASPECT -

A) CROWN -

① shape and size -

- Maxillary 1st premolars are trapezoidal in shape with shortest uneven side located cervically and longest uneven side located occlusally.

② Mesial and distal outline -

- The mesial outline from the cervical line to the mesial point of contact is slightly convex in 1st premolar.

- The distal outline runs straight course from cervical line to distal contact point.

③ contact Area -

- Mesial : At junction of middle and occlusal 1/3rd.

- Distal : Middle of middle 1/3rd.

④ Buccal cusp tip and cusp slopes -

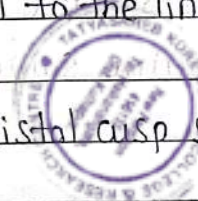
- The buccal cusp tip of maxillary 1st premolar appears shorter and more pointed as the angle formed by mesial and distal cusp slopes of buccal cusp is more acute.

- The buccal tip is located slightly distal to the line bisecting the crown and root mesiodistally.

- The mesial cusp slope is longer than distal cusp slope.

⑤ Buccal surface morphology -

- The buccal surface of maxillary 1st premolar is more irregular than



- that of 2nd premolar.

- This is due to the presence of well defined buccal ridge which is not so prominent in 2nd premolar.

- On either side of buccal ridge of 1st premolar, shallow depressions are usually found existing upto the junction of occlusal and middle 1/3rd.

B) ROOT -

- The root of maxillary 1st premolar is usually bifurcated

- The slope of root is similar to maxillary canine and appears as evenly tapering cone.

2) PALATAL ASPECT -

A) CROWN -

① Palatal Taper -

- The crown tapers palatally, thus the mesial and distal aspect of crown and root are visible from this aspect.

② Mesial and distal outline -

- The mesial and distal outlines of crown of the 1st premolars are generally convex from contact area.

③ Palatal surface Morphology -

- The entire surface is smooth and is spherical.

B) ROOT -

- The palatal root is convex and tapers evenly from cervical line to blunt apex.



Dr. Harish Kulkarni M.D.S.
Principal
J. K. D. C. & Research Centre
New Pargaon, Tal. Hatkanangle
Dist. Kolhapur - 416 122

3) MESIAL ASPECT -

A) CROWN -

① Shape and size -

- The maxillary 1st premolar exhibits the characteristic shape of all posterior teeth, i.e. trapezoid with shortest uneven side located occlusally and longest uneven side located cervically.

② Cusp height, tip and intercusp distance -

- From this aspect the buccal cusp appear taller than the palatal cusp.
- The tip of both the cusps are located well within the outline of root.

- Buccal and palatal outline is an important factor providing functional support for the larger occlusal area.

- However the buccal and palatal cusps are not wider than second premolars.

③ Buccal and palatal outline -

- Both the outlines are smooth and convex from the cervical line till cusp tip.

④ Crest of curvature -

- Buccal : At the junction of cervical and middle 1/3rd

- Palatal : Middle of middle 1/3rd

⑤ Marginal Ridges -

- The mesial and distal marginal ridges are the rounded borders of enamel forming the proximal boundaries of occlusal surface of tooth of both premolars. Distal marginal ridge is more cervically located



Dr. Harish Kulkarni M.D.S
Principal

T. K. D. C. & Research Centre
Jew Pargaon, Tal. Hatkanangle
Dist. Kolhapur - 416 122

than the mesial marginal ridges.

⑥ Proximal Surface Morphology -

- The mesial surface of 2nd premolar differs markedly.
- There are two characteristic features which can be used to differentiate between 1st and 2nd premolar.

⑦ Mesial developmental depression or canine fossa -

- canine fossa is also called as fossa canine which is absent on distal outline and centred buccopalatally is located just cervical to mesial contact area.
- It is believed to be because of the pressure from maxillary canine.
- This concavity usually extends apically beyond cervical line joins the deep developmental depressions between roots towards canine fossa is on single rooted 1st premolar but not prominent.

⑧ Developmental groove on mesial marginal ridge -

- A well defined developmental groove is almost found crossing mesial ridge of 1st premolar
- It is continuous with central developmental groove and crosses the mesial marginal ridge, at short distance cervically.

⑨ Cervical Line -

- From this like other teeth the curvature of cervical line is more occlusally directed to mesial surface.



Dr. Harish Kulkarni M.D.S
Principal
T.K.D.C. & Research Centre
New Pargson, Tal. Hatkanangle
Dist. Kolhapur 416 122

- This curvature is shallower than that seen on anterior teeth.

⑩ Root Outline -

- From this aspect roots are usually seen on 1st premolar
- Both the roots of 1st premolar are straight
- However palatal outline is usually inclined buccally.

⑪ Developmental depression -

- The mesial developmental depression or canine fossa present on mesial aspect of 1st premolar extends apically beyond the cervical line and joins the deep developmental depressions till the root root bifurcation in apical 1/3rd region.
- Even if only one root is present a deep developmental depression is centrally found.

4) DISTAL ASPECT -

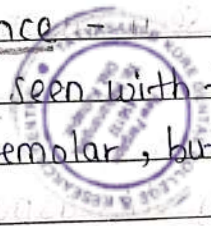
A) CROWN -

① Shape and size -

- The 1st premolar exhibits the characteristic shape of all premolar i.e. trapezoidal with shortest uneven side located occlusally and longest uneven side located cervically.

② Cusp height, tip and intercusp distance -

- From distal aspect both the cusps are seen with the buccal cusp taller than the palatal cusp on both premolar, but more on first premolar.
- The tips of cusp are located well within the canine of root.
- Buccal and palatal outline are an important factor in providing



functional support for the larger occlusal area.

- However, buccal and palatal cusp are not wider as in 2nd premolar.

③ Buccal and palatal outline -

- Both the outlines are smooth and convex from the cervical line till the cusp tip.

④ Crest of curvature -

- Buccal : At the junction of cervical and middle 1/3rd

- Palatal : Middle 1/3rd

⑤ Marginal Ridges -

- These are rounded borders of enamel forming the prominent boundaries of occlusal surface of 1st premolar.

- Distal marginal ridge is more cervically located than mesial marginal ridge.

⑥ Cervical line -

- Like all other teeth the curvature of cervical line is more occlusally directed to mesial and distal outline.

- However on mesial surface this curvature is shallower than that seen on anterior teeth.

B) ROOT -

- From this aspect, usually two roots are seen on 1st premolar.

- Both the roots are straight palatal outline usually.



Dr. Harish Kulkarni M.D.S
Principal

T.K.D.C. & Research Centre
New Pargaon, Tal. Ratkanangle
Dist. Kolhapur - 416 122

5) OCCUSAL ASPECT -

① shape and size -

- This aspect is roughly six sided hexagon.

② Crown Outline -

- The 6 sides which form asymmetrical hexagonal shape are mesio-buccal, mesial, mesio-palatal, disto-palatal, disto-buccal and distal.

- The hexagon appears asymmetrical because mesio-buccal cusp ridge is longer than the disto-buccal cusp ridge.

- The crown appears buccopalatally wider than its mesiodistal width, which is a characteristic feature of all maxillary teeth.

③ Contact Area -

- The distal contact area appears buccally located than the mesial contact area.

- The crest of buccal ridge appears distal to that of palatal ridge.

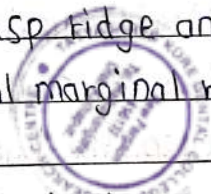
④ Ridges -

- The buccal aspect of 1st premolar is bounded by cusp ridges and marginal ridges.

- The cusp ridges and marginal ridges are mesiobuccal cusp ridge, distobuccal cusp ridge, mesiopalatal cusp ridge and distopalatal cusp ridge and two marginal ridges: mesial marginal ridge and distal marginal ridge.

- The mesiobuccal cusp ridge meets the distomarginal ridge at acute angles.

- The mesiopalatal and distopalatal cusp ridges are smoothly



Dr. Harish Kulkarni M.D.S
Principal
T.K.D.C. & Research Centre
Jew Pargan - Tar Hatkanangle
Krihapur, 416 127

confluent with their respective marginal ridges.

⑤ Grooves and fossae -

- Three grooves are present which are central developmental groove, mesiobuccal developmental groove and distobuccal developmental groove as well.
- The central developmental groove well formed located at the bottom of central sulcus and extends from the mesial to distal marginal ridge joining the mesial marginal ridge to distal marginal ridge.
- Just inside the mesial marginal ridge and distal marginal ridge at the termination of central groove, radiate outward the mesiobuccal and distobuccal developmental groove.
- Two fossae are present on 1st premolar, mesial triangular depression located

⑥ Palatal Taper -

- The palatal taper of crown is more pronounced.

• ENDODONTIC ANATOMY -

① Buccopalatal section -

- Demonstrate well developed roots and root canals
- Pulp horns are prominent but as the buccal cusp is longer than palatal cusp the buccal pulp horn extends from occlusally.

Dr. Harish Kulkarni M.D.S
Principal
I.P.D.C. & Research Centre
12, Palghar Road, Kharapur,
Kharapur, 416 122

② Mesiodistal section -

- In this section pulp horn is blunt.
- Pulp chamber is not clearly distinguished from root canal.
- Entire pulp cavity exhibits an uniform taper from occlusal to apical region.
- Root canal usually exits as root tip.

③ cervical cross section -

- The 1st premolar characteristically exhibits the kidney shaped outline of palatal canal.

• VARIATIONS -

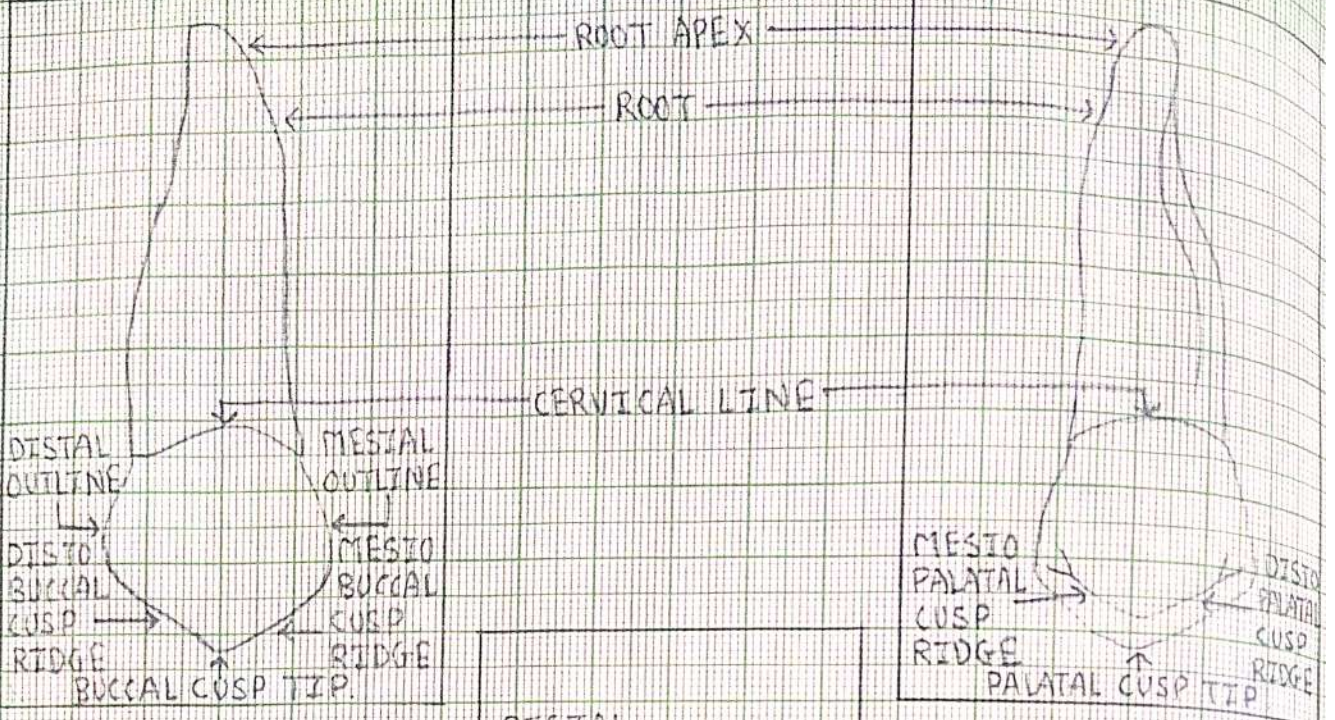
- constricted occlusal surface
- short root.
- single root of extreme length.
- short root with considerable separation.
- Buccolingual caliberation greater than usual.
- Root extremely long, distal contact area curves high.

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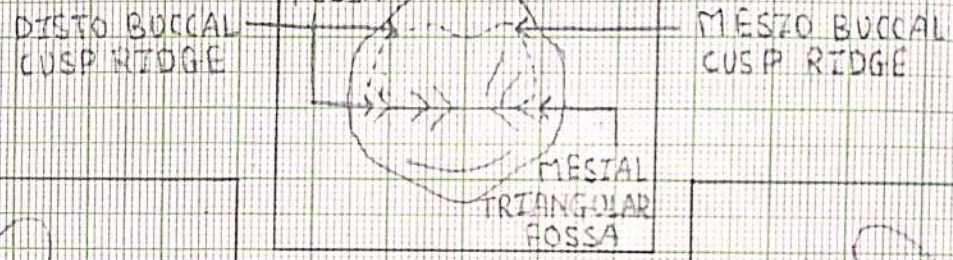
Dr. Harish Kulkarni M.D.S.
Principal
T. K. D. C. & Research Centre
New Pargaon, Tal. Hatkanangle
Dist. Kolhapur - 416 127

PERMANENT MAXILLARY SECOND PREMOLAR

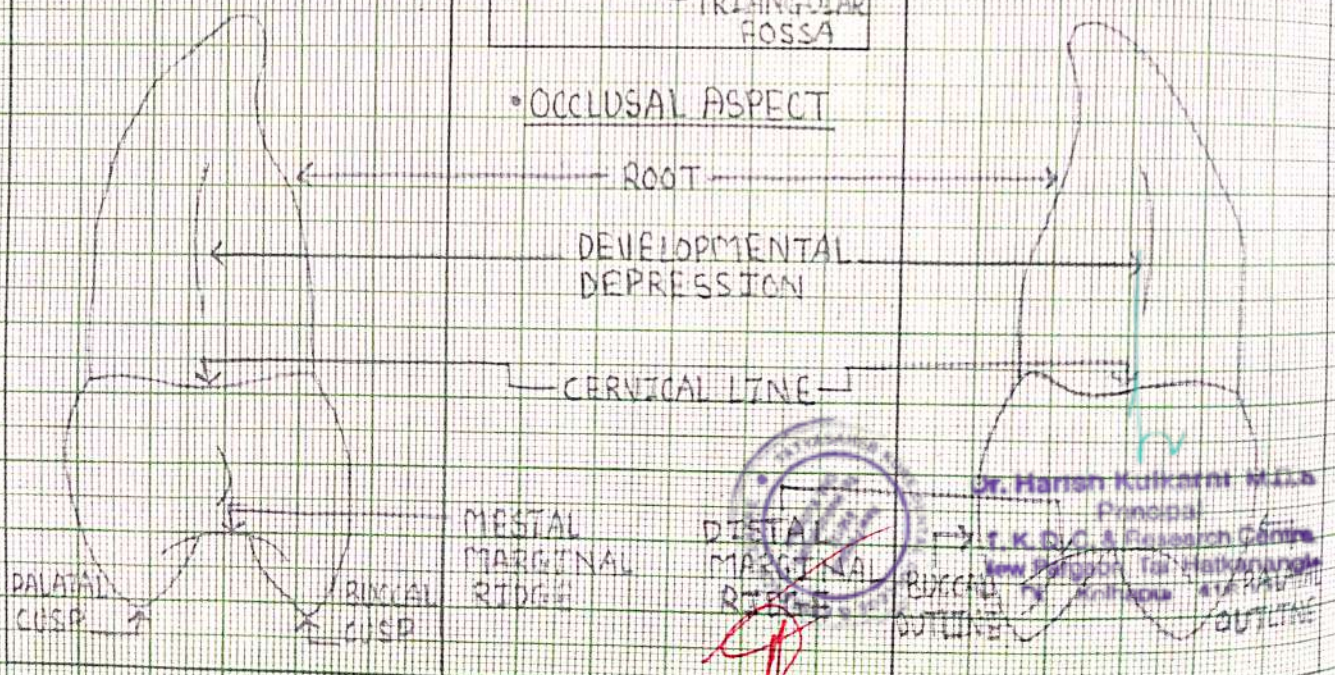


• BUCCAL ASPECT

• PALATAL ASPECT

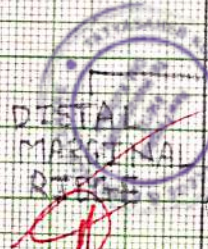


• OCCUSAL ASPECT



• MESIAL ASPECT

• DISTAL ASPECT



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• PERMANENT MAXILLARY 2nd PREMOLAR •

INTRODUCTION -

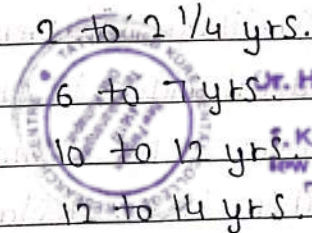
- They are two in number.
- One is on the right side and one is on the left side, located posterior to 1st premolar and anterior to 1st molar.
- These premolars in fact all premolars with exception of 3 cusp variant (5 lobes) of mandibular 2nd premolar, develop from 4 lobes.
- Both crown and root of maxillary premolar are shorter than maxillary canine but longer than that of maxillary molars.

FUNCTIONS -

- Second premolars due to their short and less sharp cusp help the molars in grinding the small bits of food.
- Along with molars, premolars assist in maintaining the vertical direction of face.

CHRONOLOGICAL DATA

First evidence of calcification	9 to 2 1/4 yrs.
Enamel completion	6 to 7 yrs.
Eruption	10 to 12 yrs.
Root completion	12 to 14 yrs.



Jr. Harish Kulkarni M.D.S.
Principal
S.K.D.C. & Research Centre
New Pargson, Tal. Hatkanangla
Dist. Kolhapur 416 127

ODONTOMETRIC DATA

cervicoincisal length of crown	8.5 mm
length of root	14 mm
mesiodistal length of crown	7 mm
Mesiodistal length of crown at cervix	5 mm
curvature of cervical line - mesial	1 mm
curvature of cervical line - distal	0 mm
labiolingual length of crown	9 mm
labiolingual diameter of crown at cervix	8 mm

TRAITS

1) Class Trait

- Premolars have two cusps (Bicuspid)
- Buccally pentagonal in shape with buccal ridge
- Palatal surface is well developed and convex
- The marginal ridge is oriented in horizontal plane
- The occlusal surface consists of cusp, triangular ridges, marginal ridges and triangular fossae.

2) Arch Trait

- Maxillary 1st premolar is longer than the 2nd premolar
- Buccal ridge is prominent in maxillary premolar
- There is no lingual tilt in maxillary premolar
- There is no distal tilt in maxillary premolar
- occlusally maxillary premolars are more squarish.

BUCCAL ASPECT

① CROWN

i) shape and size

It is trapezoidal in shape, with shortest uneven side located cervically and longest uneven side located occlusally.

ii) Mesial and distal outline

- Mesial outline from cervical line to mesial contact area is always straight

- Distal outline runs a straight course from cervical line to distal contact area.

iii) Contact area

Mesial - Junction of middle and occlusal third.

Distal - slightly more cervical tilt in middle third.

iv) Buccal cusp tip and cusp slopes

- Buccal cusp tip of maxillary 2nd premolar is less pointed than that of 1st premolar.

- Angle formed by mesial and distal cusp slope of buccal cusp of 1st premolar is more acute than 2nd premolar.

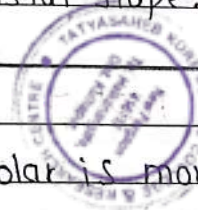
- In 2nd premolar buccal cusp tip is over same line.

- Mesial cusp slope is shorter than distal slope.

v) Buccal surface morphology

- Buccal surface of maxillary 2nd premolar is more regular than 1st premolar.

- This is due to well developed buccal ridge on maxillary 1st



premolar.

PALATAL ASPECT

① CROWN

i) Palatal Taper -

- The crown and root taper palatally.
- The mesial and distal aspect of crown and root are visible from this aspect.

ii) Mesial and distal outline

- Mesial and distal outlines of crown are generally convex from contact point area to the cervical line but just before reaching the cervical line, the outlines straighten out.

iii) Palatal cusp size and cusp slope

- Palatal cusp is shorter than buccal cusp.
- Palatal cusp is only slightly shorter or of same height.
- Mesial and distal cusp slopes of palatal cusp meet at right angle creating a pointed tip.

② ROOT

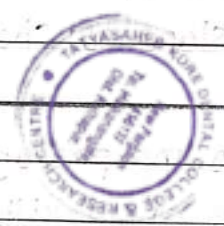
- Root is smooth and convex and tapers evenly from cervical line to blunt apex.

MESIAL ASPECT

① CROWN

i) Shape and size -

- From proximal aspect 2nd premolar exhibits a characteristic



Dr. Harish Kulkarni M.D.S
Principal
T. K. D. C. & Research Centre
New Parganah, Tal. Halakange
Tal. Kolhapur 416 127

trapezoid shape with shortest uneven side located occlusally and longest uneven side located cervically.

ii) Cusp height, tip and intercusp distance.

- From proximal aspect, both cusp are seen, with the buccal cusp taller than palatal cusp.

- Buccal and palatal cusp are located well within confines of root, buccal and palatal outlines which is an important factor in providing good functional support for large occlusal area.

iii) Crest of curvature

Buccal - Junction of cervical and middle 3rd.

Palatal - Middle of middle 3rd.

iv) Buccal and palatal outline

Both outlines are smooth and convex from cervical line to cusp tip.

v) Marginal Ridges

- Mesial and distal marginal ridges are rounded borders of enamel forming the proximal boundaries of buccal surface

- Distal marginal ridge is slightly more cervically located compare to mesial marginal ridge.

vi) Proximal surface Morphology

- Mesial surface of cervical line is more occlusally located on mesial than distal surface.

- However, on mesial surface curvature is shallower than that of



Dr. Harish Kulkarni M.D.S.
Principal
T. K. D. C. & Research Centre
New Parganah, Tal. Hatkanangli
Dist. Kolhapur 416 122

DISTAL ASPECT

i) Shape and size

- From proximal aspect, crown exhibits on a characteristic shape with the shortest uneven side located occlusally and longest uneven side located cervically.

ii) Buccal and palatal outline

- Both the outlines are smooth and convex from cervical line till cusp tip.

iii) Cusp height, tip and intercusp distance

- From proximal aspect both cusp are seen with the buccal cusp taller than the palatal cusp.

- The tip of both cusps are located well within the confines of root.

- Buccal and palatal outlines are an important factor providing good functional support.

iv) Crest of curvature

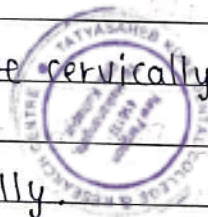
Buccal - Junction of cervical and middle 3rd

Palatal - Middle of middle 3rd

v) Marginal Ridge

- Distal marginal ridge is more cervically located compared to mesial marginal ridge.

- It is located more occlusally.



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vi) Proximal surface morphology

- Distal surface is smooth and convex buccopalatally.

vii) Cervical line

- Curvature of cervical line is more occlusally directed on mesial than distal surface.

OCCLUSAL ASPECT

i) Crown shape

- It is more rounded or oval in shape.

ii) Crown Outline

- The six sides which forms oval shape of occlusal aspect of 2nd premolar.

- It appears asymmetrical because mesial buccal cusp ridge is larger than distobuccal cusp ridge is larger than which in turn makes mesial side shorter than distal side.

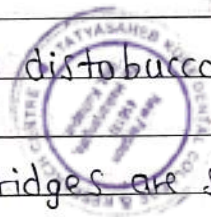
- The crown also appears buccopalatally wide than mesiodistal which is a characteristic feature of all maxillary teeth.

iii) Ridges

- The occlusal surface is bounded by four cusp ridges and two marginal ridges.

- The cusp ridges are mesiobuccal and distobuccal cusp ridges, mesio and distopalatal cusp ridges.

- Mesiopalatal and distopalatal cusp ridges are smoothly confluent with their marginal ridges.



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iv) Grooves and fossae

- central developmental groove
- Supplementary groove
- Mesial and distal triangular fossa.
- Mesial and distal pits.

v) Palatal Taper

- The second premolar's palatal taper is considerably lesser than first premolar.

ENDODONTIC ANATOMY

1) Buccopalatal section

- The 2nd premolar shows one root and one root canal.
- In 2nd premolar the pulp chamber and pulp canal are broad buccopalatally.
- Therefore a clear demarcation between pulp chamber and pulp canal is lacking.
- Root canal usually exits through the root tip.

2) Mesiodistal section

- In mesial section of the second premolar pulp horn appears blunt.
- Pulp chamber cannot be clearly distinguished from root canal.
- Entire pulp cavity exhibits an uniform taper from occlusal to apical region.



Dr. Harish Kulkarni M.D.S.
Principal
Tatyasaheb Kore Institute of Dental Sciences
New Pargana, Tar, Hatkanangla
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3) cervical cross section

- Second premolar demonstrate an oval shaped.

Variations

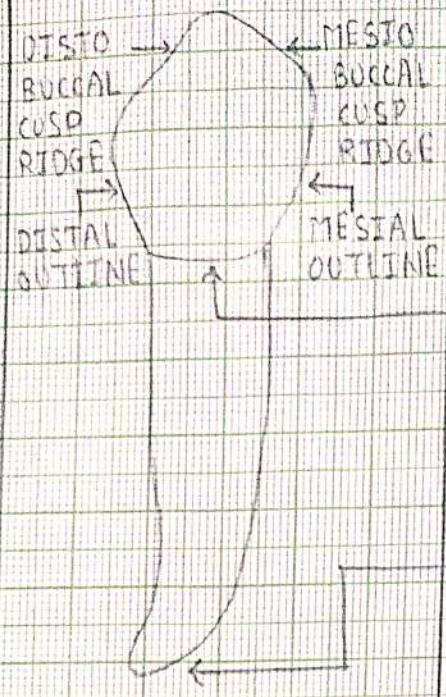
- Root dwarf and malformed
- Broad occlusal surface
- crown very broad mesiodistally, root dwarfed.
- Root extremely long.
- Bifurcation of root end.

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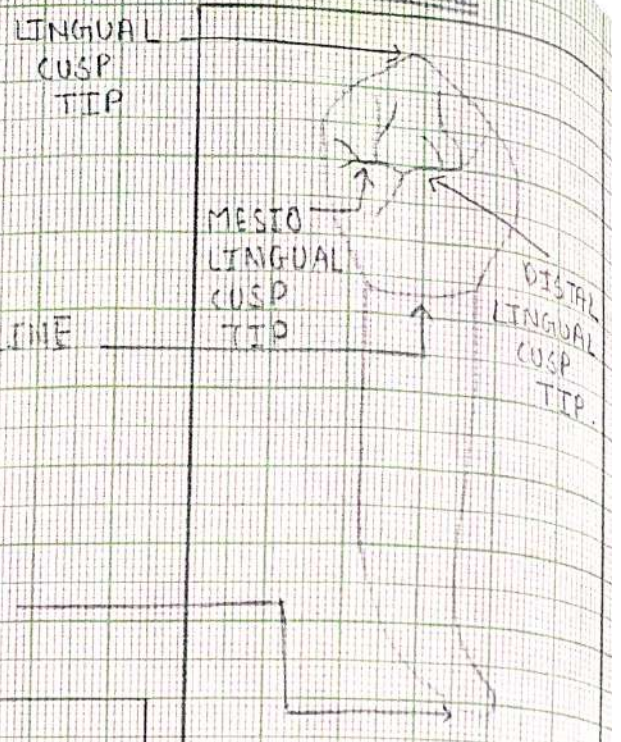


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Principal
T. K. D. C. & Research Centre
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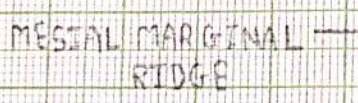
PERMANENT MANDIBULAR FIRST PREMOLAR



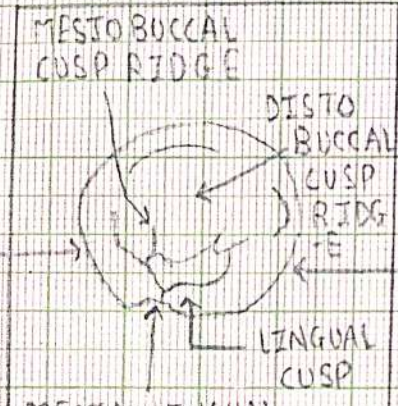
BUCCAL ASPECT



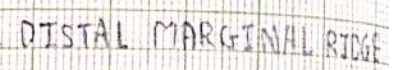
LINGUAL ASPECT



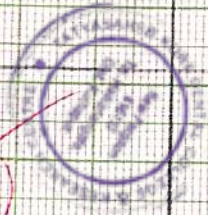
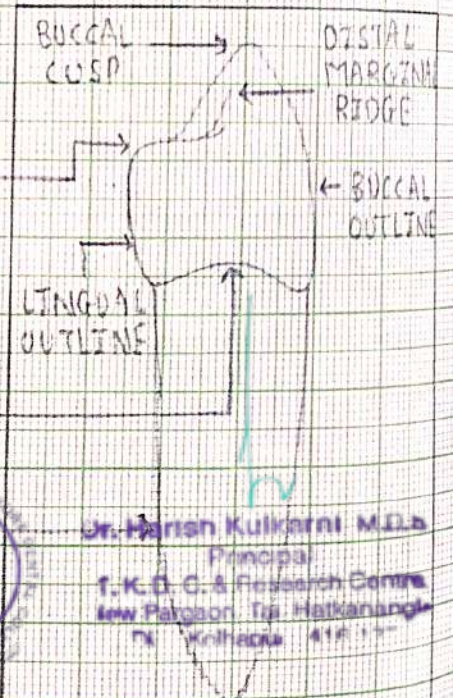
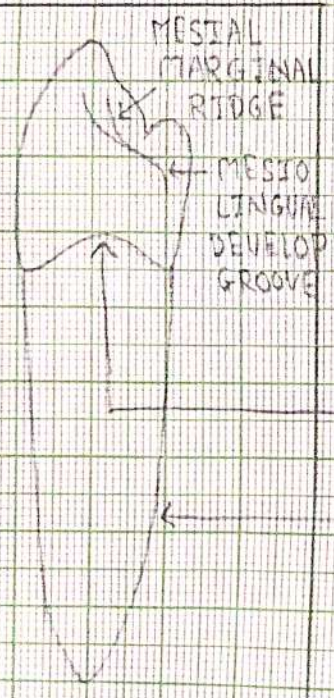
MESIAL ASPECT



OCCUSAL ASPECT



DISTAL ASPECT



Dr. Harsh Kulkarni M.D.S.
Principal
T.K.D.C. & Research Centre
New Palsoni, Taj Hatkanangla
Tal. Kolhapur 416111

• PERMANENT MANDIBULAR 1st PREMOLAR •

INTRODUCTION

- Mandibular premolar are four in number two on each side.
- Functionally mandibular premolars are similar to maxillary premolars but morphologically they are quite different.
- 1st premolar develops from and lobes
- 1st premolar is smaller than 2nd premolar which is reverse of that in maxillary.

FUNCTIONS

- 1st premolar assist the premolar canine in cutting and tearing the food into small pieces.
- Along with molars, the premolars assist in maintaining the vertical dimension of face.

CHRONOLOGICAL DATA

- | | |
|---------------------------------|-------------------------------|
| First evidence of calcification | - 1 ^{3/4} to 2 years |
| Enamel completion | - 5 to 6 years |
| Eruption | - 10 to 12 years |
| Root completion | - 12 to 13 years. |

ODONTOMETRIC DATA

cervicoincisal length of crown	-	8.5 mm
Length of Root	-	14 mm
Mesiodistal diameter of crown	-	7 mm
Mesiodistal diameter of crown at cervix	-	5 mm
Buccolingual diameter of crown at cervix	-	6.5 mm
Buccolingual diameter of crown	-	7.5 mm
curvature of cervical line - Mesial	-	1 mm
curvature of cervical line - Distal	-	0 mm

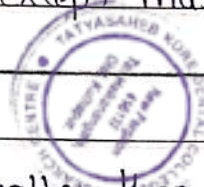
TRAITS

1) Class Trait

- Premolars are 2 in cusp number or bicuspid
- Buccally pentagonal in shape with buccal ridge
- Lingual surface is well developed and convex
- The marginal ridge of premolar are oriented in a horizontal plane.
- Occlusal surface consist of 2 or 3 cusp, triangular ridges, marginal ridges, fossae and groove
- All premolar are single rooted except maxillary 1st premolar.

2) Arch Trait

- Mandibular 1st premolar is smaller than 2nd premolar which reverse in maxillary premolar.
- Buccal ridges is prominent in maxillary premolars than mandibular premolars.



Dr. Harish Kulkarni M.D.S.
Principal
T.K.D.C. & Research Centre
New Pargaon, Tal. Hatkanangle
Dist. Kolhapur

- Mandibular premolars are slightly tilted.
- Occlusally premolars are long faciolingually whereas mandibular premolars are more squarish.

TYPE TRAIT

BUCCAL ASPECT

i) CROWN

ii) Shape and size

- It is trapezoidal in shape with shortest uneven side located cervically and longest uneven side located occlusally.

iii) Mesial and distal outline

- Mesial outline occurs concave in cervical $\frac{1}{3}$ rd and then becoming convex as it joins the mesial contact area.
- Distal outline appears concave in cervical $\frac{1}{3}$ rd.

iii) Contact area

Mesial - Middle of middle $\frac{1}{3}$ rd

Distal - Middle of middle $\frac{1}{3}$ rd

iv) Cusp tip and cusp slope

- As like all the premolars, mesial cusp ridge is shorter than distal cusp ridge.
- Buccal cusp tip is more pointed.

v) Cervical line

Very little curvature of cervical line is found on 1st premolar.



Dr. Harish Kulkarni M.D.S.
Principal
T.K.D.C. & Research Centre
New Pargaon, Tal. Hatkanangle
Kolhapur - 416 127

with concavity towards apex.

2) ROOT

- Root of 1st premolar appears shorter or slender mesio-distally than that of 2nd premolar.

LINGUA ASPECT

i) Lingual Taper

Crown tapers lingually therefore much of the mesial and distal aspect can be seen.

ii) Mesial and distal outline

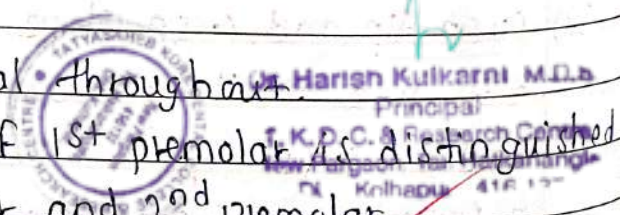
- Mesial and distal outline are concave in cervical 1/3rd and becomes convex as they merge with contact areas.

iii) Lingual cusp, size and number

- Lingual cusp is poorly developed and almost half of buccal cusp due to which occlusal surface appears slope lingually.
- As consequence much of occlusal aspect of 1st premolar can be viewed from this aspect.

iv) Lingual surface morphology

- Gently smooth and spherical throughout.
- However in occlusal 1/3rd of 1st premolar is distinguished feature between 1st premolar and 2nd premolar.
- on 1st premolar a mesiolingual developmental groove which start from mesial fossa of occlusal surface.



PROXIMAL ASPECT

i) Shape and Size

- The crown of 1st premolar shows a characteristic rhomboidal shape.

ii) Cusp number, cusp tip and height

- From proximal aspect seen that lingual cusp is almost half of size of buccal cusp.

- Buccal cusp tip of 1st premolar is lingually inclined and centered over the root.

- The lingual cusp tip of 1st premolar is inclined with lingual outline of root.

iii) Crest of curvature

Buccal - Junction of cervical and middle 1/3rd

Lingual - Middle of middle 1/3rd

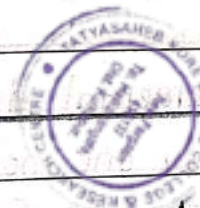
iv) Marginal Ridges

- Mesial marginal ridge of 1st premolar is smooth and convex throughout except on mesiolingual developmental groove.

- As mesial marginal ridge of 1st premolar is more cervically located so much of the occlusal surface can be viewed from this aspect.

2) ROOT

- Buccal and lingual outline of 1st premolar taper gently till apical 1/3rd after which they taper sharply upto apex.



Dr. Harish Kulkarni M.D.S.
Principal

T. K. D. C. & Research Centre
New Pargaon, Tal. Hatkanangle
Tal. Kolhapur 416 117

DISTAL ASPECT

i) shape and size

It shows rhomboidal shape.

ii) Cusp number, cusp tip and height

- Lingual cusp is almost half the size of buccal cusp.
- Buccal cusp is lingually inclined and so centered over root.

iii) Crest of curvature

Buccal - At the junction of cervical and middle $\frac{1}{3}$ rd.
Lingual - Middle of middle $\frac{1}{3}$ rd.

iv) Marginal ridge

- Distal marginal ridge is more cervically than mesial marginal ridge.
- This feature present on all posterior teeth with exception of mandibular 1st premolar.

v) Proximal surface morphology

- Distal surface of tooth premolar is smooth and convex buccolingually.

vi) Developmental depression

- If only one root is present, a deep developmental depression is found.
- It has much shallower developmental depression on mesial aspect of root.



Dr. Harish Kulkarni M.D.S.
Principal
T.K.D.C. & Research Centre
New Parganah, Tal. Hatkanangle
Dist. Krihnapur, 416 122

OCCLUSAL ASPECT

i) Crown shape

The occlusal surface of 1st premolar resemble roughly six sided hexagon.

ii) Crown outline

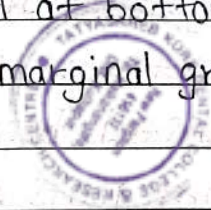
- The six sides which form asymmetrical hexagonal shape of occlusal surface of 1st premolar are mesial and distobuccal cusp ridges, mesial and distal marginal ridges, mesio and distopalatal cusp ridge.

iii) Ridges

- occlusal surface bounded by 4 cusp ridges and 2 marginal ridges.
- 4 cusp ridges are mesiobuccal, distobuccal, mesiopatal and distopalatal cusp ridges.
- The mesiobuccal cusp ridge meets mesial marginal ridge at right angle.

iv) Grooves and fossa

- The grooves present on 1st premolar are central developmental groove mesiobuccal and distobuccal groove.
- central groove is well formed located at bottom of central sulcus. Marginal ridge joining mesial marginal groove which crosses mesial marginal ridge.



ENDODONTIC ANATOMY

1) Buccolingual section

- 1st premolar demonstrate well developed root
- Pulp horn is prominent and buccal cusp is better developed and longer than lingual cusp.

2) Mesiodistal section

- In this pulp horn appears blunt
- Entire pulp cavity uniformly tapers from occlusal to apical region
- Root canal usually exists at root tip
- Pulp chamber can't be distinguished from root canal

3) Cervical cross section

In 1st premolar pulp canal exhibits characteristic kidney shaped outline.

VARIATIONS

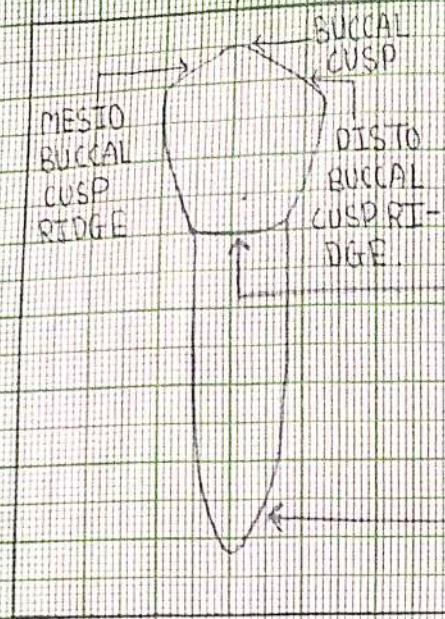
- Tooth with short root
- Single root of extreme length
- Short root with 2 buccal roots fused
- Twisted buccal root
- Three roots are fused.



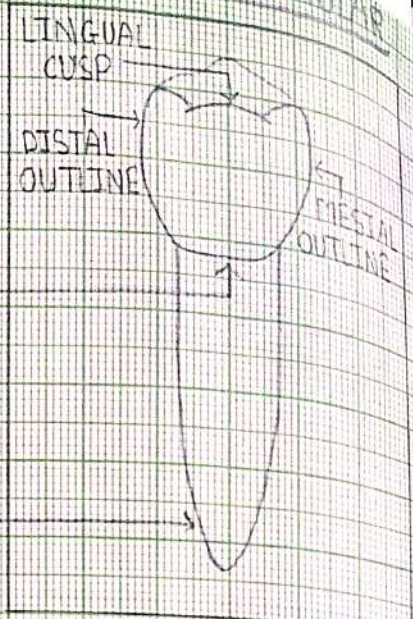
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Principal
T.K.D.C. & Research Centre
New Pargaon, Tal. Hatkanangle
Tal. Kolhapur 416 127

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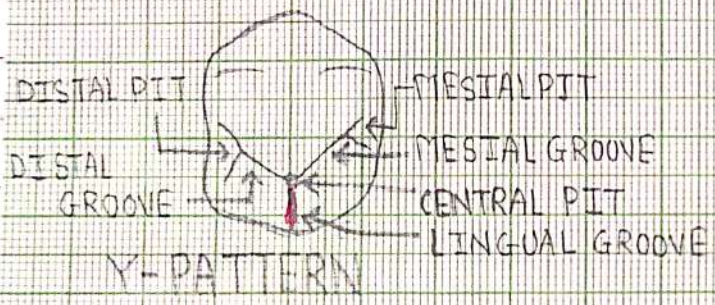
PERMANENT MANDIBULAR SECOND PREMOAR



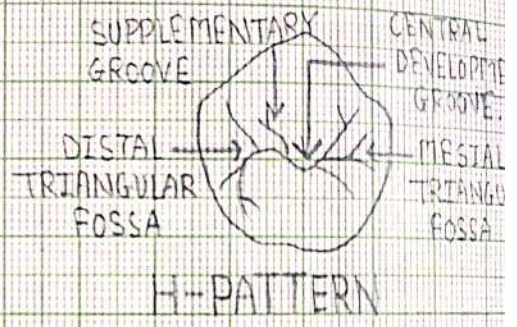
BUCCAL ASPECT



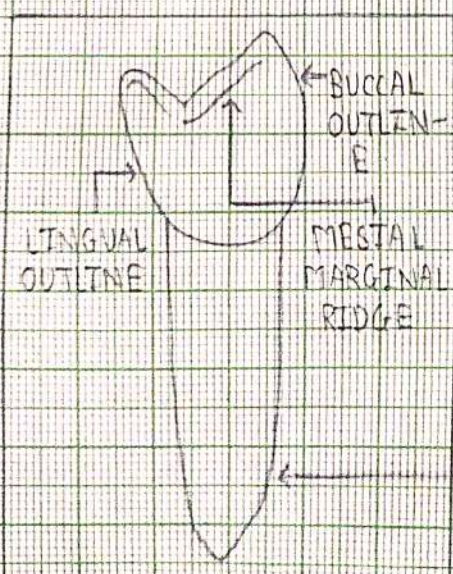
LINGUAL ASPECT



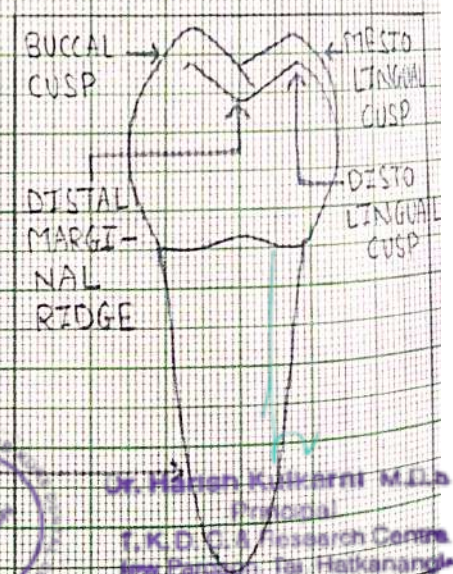
Y-PATTERN



H-PATTERN



MESIAL ASPECT



DISTAL ASPECT



Dr. Hansh Kulkarni M.D.S
 Professor
 T.K.D.C. & Research Centre
 New Pargana, Tal. Hatkanangla
 Dist. Kolhapur, Maharashtra

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• PERMANENT MANDIBULAR 2nd PREMOLAR. •

INTRODUCTION

- Mandibular premolars are four in number, two on either side, located posterior to canine and anterior to 1st molars.
- All premolars with the exception of 3 cusps variant (5 lobes) of mandibular 2nd premolar develop from 4 lobes
- Both crown and root of mandibular premolars are shorter than canines but longer than that of the molars.

FUNCTIONS

- Second premolars due to their shortest and less sharp cusp, assist the molar in grinding the food
- Along with the molars, the premolars assist them in maintaining the vertical direction of face.

CHRONOLOGICAL DATA

First evidence of calcification	2 - 2 ^{1/2} yrs
Enamel completion	6 - 7 yrs
Eruption	10 - 12 yrs
Root completion	12 - 14 yrs

Dr. Harish Kulkarni M.D.S.
Principal
T. K. D. C. & Research Centre
New Pargaon, Tal. Hatkanangla
Dist. Kolhapur 416 127

ODONTOMETRIC DATA

cervicoincisal length of crown	8.5 mm
length of root	14 mm
Mesiodistal diameter of crown	7 mm
Mesiodistal diameter of crown at cervix	5 mm
labiolingual diameter of crown	9 mm
labiolingual diameter of crown at cervix	8 mm
curvature of cervical line - Mesial	1 mm
curvature of cervical line - Distal	0 mm

TRAITS

1) Class Trait

- Premolar have 2 cusps (Bicuspid)
- Mandibular 2nd premolar may have 3 cusps
- Buccally pentagonal in shape with buccal ridge
- Lingual surface consists of cusps (2 or 3), triangular ridges, marginal ridges, fossae, grooves
- All premolars are single rooted, except maxillary 1st premolar

2) Arch Trait

- Mandibular 1st premolars are smaller than mandibular 2nd premolars and vice versa for maxillary premolars
- Buccal ridge is prominent in maxillary than mandibular premolars.
- Mandibular premolars are lingually tilted.
- Mandibular premolars are distally tilted.

- occlusally maxillary premolars are more faciolingually wide whereas mandibular premolars are squarish

TYPE TRAIT

① BUCCAL ASPECT

CROWN

i) Shape and size

- The 2nd premolar is trapezoidal in shape from buccal and lingual aspect with the shortest uneven side located cervically and longest uneven side located occlusally.

ii) Mesial and distal outline

- Mesial outline of 2nd premolar appears concave in cervical 1/3rd and then becoming convex as it joins the mesial contact area.

- Distal outline of 2nd premolar appears concave in cervical 1/3rd and then becoming convex as it joins the distal contact area.

iii) Contact Area

Mesial - Junction of middle and occlusal 1/3rd

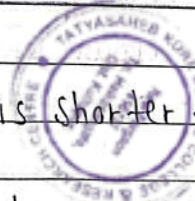
Distal - Junction of middle and occlusal 1/3rd

iv) Cusp tip and cusp ridges

- As like all premolars, mesial cusp ridge is shorter than distal cusp ridge.

- The mesial cusp ridge is straight in 2nd premolar

- However in 1st premolar the buccal cusp tip is more pointed



Dr. Harish Kulkarni M.D.S.
Principal
& Research Centre
New Pargaon, Tal. Hatkarnangi
Dist. Kolhapur

than that of 2nd premolar.

v) Buccal surface morphology

- The buccal surface of 2nd premolar is smooth and convex throughout
- This occurs because out of 4 lobes the middle lobe shows maximum developmental areas and forms a prominent buccal ridge on 1st premolar which is lacking in case of 2nd premolar.

vi) cervical line

- Very little curvature of cervical line is found with convexity towards apex

vii) ROOT

- Root of 2nd premolar is almost of identical length with the root of 1st premolar, appearing more slender mesio-distally than 2nd premolar
- The root apex of 2nd premolar is not as sharp as 1st premolar.

②

LINGUAL ASPECT

i) Lingual taper

- crown of 2nd premolar tapers lingually
- so much of the mesial and distal aspect can be seen

ii) Mesial and distal outline

- In 2nd premolar the mesial and distal



Jr. Harish Kulkarni, M.B.B.S.
Principal
T.K.D.C. & Research Centre
New Pargson, Tal. Hatkanangla
Dist. Kolhapur 416 127

bisecting the crown buccolingually.

iii) Buccal and lingual outline

- Both outlines of 2nd premolar are significantly curved from cervical line till cusp tip

iv) Crest of curvature

Buccal - Middle of middle 1/3rd

Lingual - Middle of middle 1/3rd

v) Marginal ridge

- Mesial marginal ridge of 2nd premolar is more horizontally oriented at right angle to the long axis of the tooth.

- In 2nd premolar (2 cusp type) a developmental depression is located at the junction of the distal marginal ridge and distolingual cusp ridge.

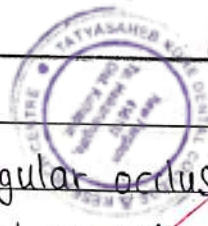
vi) Proximal surface morphology

- The proximal surface of 2nd premolar is smooth and convex throughout

- Mesiolingual developmental groove can be seen on occlusal 1/3rd of mesial surface.

vii) Cervical line

- cervical line shows smooth regular occlusally curved line which is more deeper on mesial aspect.



Jr. Harish Kulkarni M.D.S.
Principal
I.K.D.C. & Research Centre
New Pargaon, Tal. Hatkanangle

viii) Root outline

- The buccal and lingual outlines of 2nd premolar taper gradually till root apex terminating in relatively sharp apex.

ix) Developmental depression

- on 2nd premolar developmental depressions are present on mesial aspect of root

DISTAL ASPECT

i) shape and size

- From distal aspect, the 2nd premolar shows a characteristic rhomboidal shape

ii) cusp number, tip and height

- In 2nd premolar, cusp is inclined lingually but buccal to the line bisecting the crown and root buccolingually.

iii) Buccal and lingual outline

- Both the outlines of 2nd premolar are significantly curved from the cervical line till the cusp tip

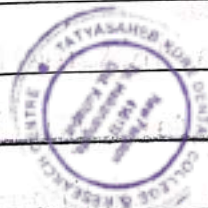
iv) crest of curvature

Buccal - Middle of middle 1/3rd

Lingual - Middle of middle 1/3rd

v) Marginal Ridges

- Distal marginal ridge of 2nd premolar is cervically located to the mesial marginal ridge.



Jr. Harish Kulkarni M.D.S.
Principal
T.K.D.C.A. Research Centre
New Pargaon, Tal. Hatkanangle
Dist. Kolhapur 416 122

In 2nd premolar (2 cusp type) a developmental depression is located at the junction of distal marginal ridge and distolingual cusp ridge.

vii) cervical line

- cervical line shows smooth occlusal cusp which is less deeper on distal aspect.

viii) Root outline

- Buccal and lingual outlines taper gently till root apex terminating relatively blunt apex.

Occlusal Aspect

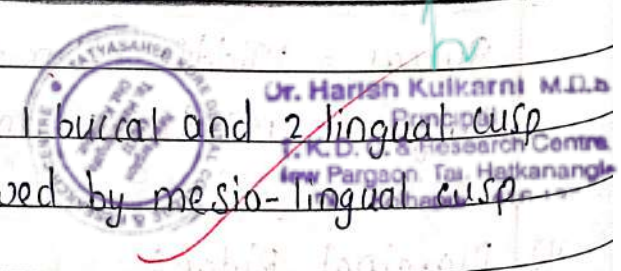
i) Y-Pattern

ii) Shape and size

- No central developmental groove
- In 3 cusp type occlusal aspect is squarish with minimal lingual convergence
- In some teeth lingual aspect is even wider than buccal aspect

iii) cusp

- In this we can see 3 cusp, 1 buccal and 2 lingual cusp
- Buccal cusp is largest followed by mesio-lingual cusp and distolingual cusp.



Ridges

- All 3 cusp have well developed triangular ridges
- Mesial marginal and distal marginal ridge are found to be forming the boundaries of occlusal aspect.

Grooves

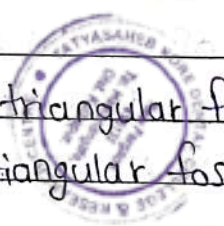
- Total 3 grooves can be seen
 - ① Mesial developmental groove starts from central pit runs in mesial direction and ends in mesial triangular fossa
 - ② Distal developmental groove starts from central pit runs in mesial direction and ends in mesial triangular fossa.
 - ③ Lingual developmental groove starts from central pits and travels in lingual direction between the 2 lingual cusp and runs at a short distance on the lingual surface.
- All the 3 developmental grooves converge at the centre given a 'Y' shaped configuration.

Fossae and pits

- central fossa which is located at the centre of occlusal surface at the base of central fossa is the central pit.
- Mesial triangular fossa is just distal to mesial marginal ridge
- At the base of mesial triangular fossa, mesial pit is present
- Distal triangular fossa is just mesial to distal marginal ridge
- At the base of distal triangular fossa, distal pit is present.

H pattern

- In 2 cusp pattern occlusal surface is round and oval in shape and shows anatomical landmarks such as cusp ridges, fossae, pits and grooves
- In 2 cusp we can see 1 buccal and 1 lingual cusp.
- A central developmental groove is present on occlusal surface travels in mesiodistal direction. This groove may be straight or crescent shape.
- The central developmental groove is present on the occlusal surface travels in mesio-distal direction. This groove may be straight or crescent shape.
- The central developmental groove has supplementary groove radiating from the groove itself and it's terminals.
- 4 cusp ridges are present.
 - i.e. distobuccal cusp ridge, mesiobuccal cusp ridge, distolingual cusp ridge and mesiolingual cusp ridge.
- 2 marginal ridges i.e. mesial marginal ridge and distal marginal ridge and 2 transverse ridge can be seen.
- 2 fossae are seen
 - Mesial triangular fossa is just distal to mesial marginal ridge and distal triangular fossa is just mesial to distal marginal ridge
- Two pits are seen
 - A) At the base of mesial triangular fossa is mesial pit
 - B) At the base of distal triangular fossa is distal pit



Dr. Harish Kulkarni M.D.B.
T.K.D.C. & Research Centre
Kothrud, Coimbatore

ENDO DONTIC ANATOMY

1) Buccolingual section

- Both premolars have 2 pulp horns i.e. buccal and lingual
- Pulp chamber of 2nd premolar is very large and they gently tapers apically.
- Pulp cavity of both premolars are quite similar but overall dimension of 2nd premolar is large.

2) Meriodistal section

- Pulp cavity of both premolars is quite similar but overall dimension is large.
- Pulp horn appears prominent.

3) Cervical cross section

- outline of pulp cavity in this section is either triangular or ovoid or rectangular.

VARIATIONS

1) Very long and very short root

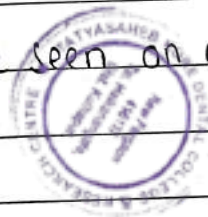
2) Twisted buccal root

3) Sometimes accessory tubercle may be seen on occlusal aspect between buccal and lingual cusp.

4) Short root with mesial tilt.

5) Small crown and extreme root length

6) A developmental groove may be seen on buccal surface of tooth.

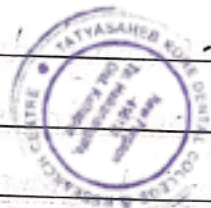


Dr. Harish Kulkarni M.D.S.
Principal
F.K.D.C. & Research Centre
New Pargaon, Tal. Hatkanangle
Dist. Kolhapur, 416 122

7) constricted contact area

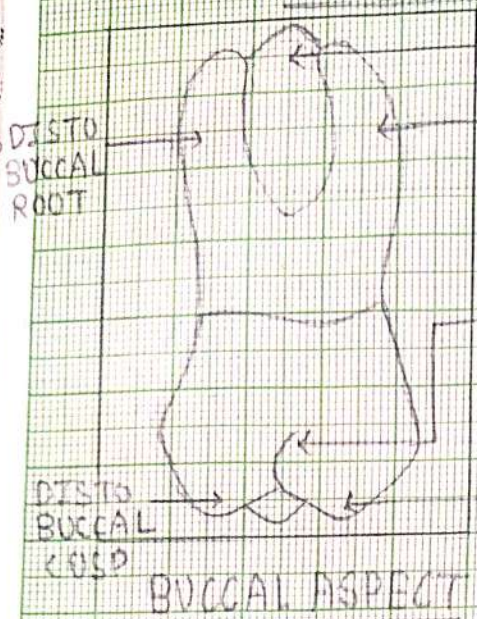
8) crown narrow buccolingually very little curvature buccally and lingually.

9) Root very long with blunt apex, extremely curved at apical 3rd.

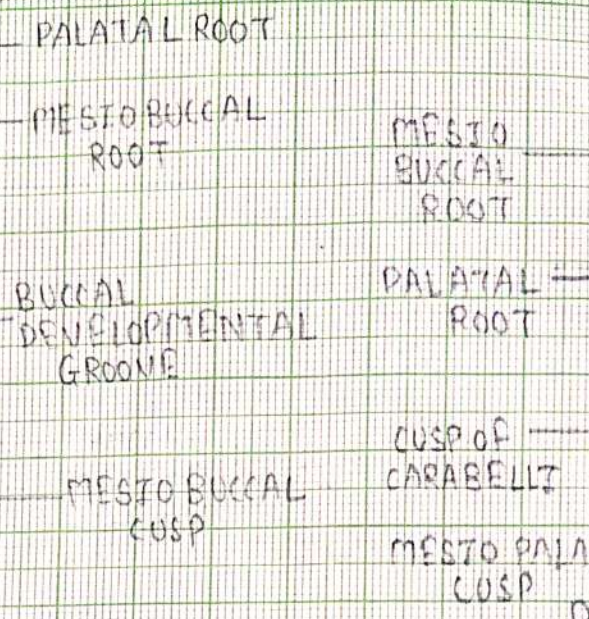


Dr. Harish Kulkarni M.D.S.
Principal
T.K.D.C. & Research Centre
New Pargaon, Tal. Hatkanangle
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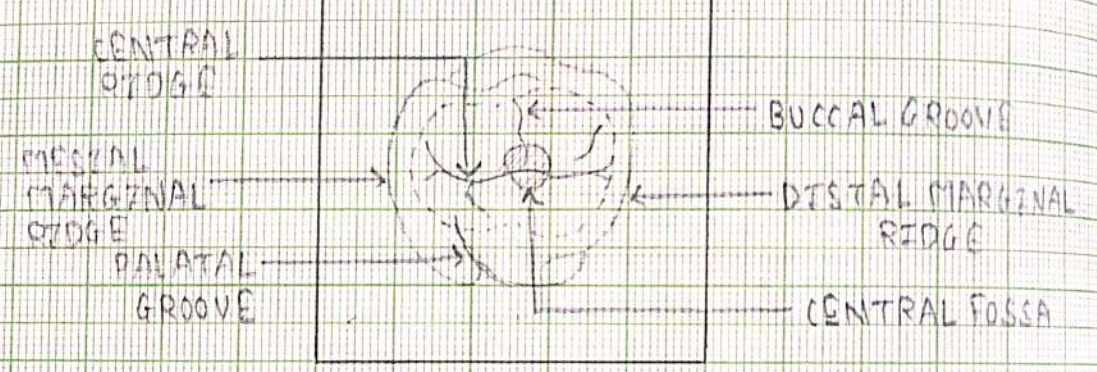
PERMANENT MAXILLARY FIRST MOLAR



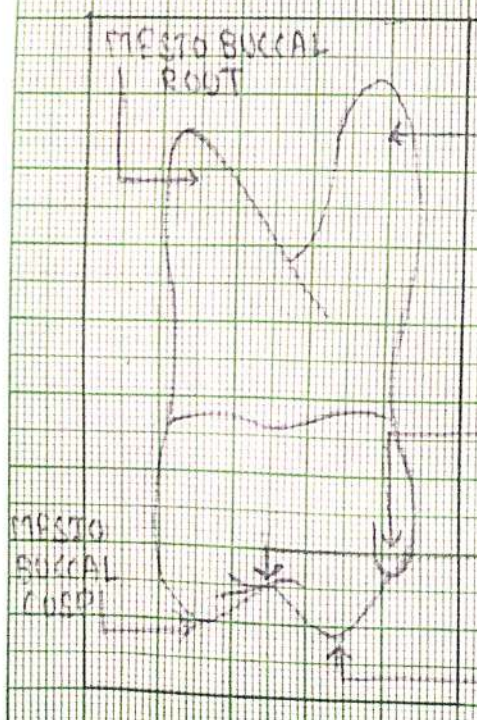
BUCCAL ASPECT



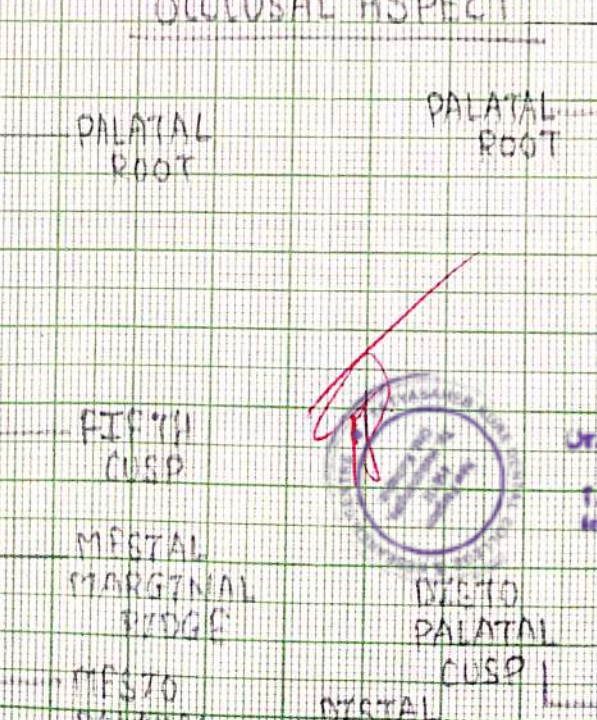
PALATAL ASPECT



OCCLUSAL ASPECT



MESSAL ASPECT



DISTAL ASPECT



Jr. Harish Kulkarni M.D.S
Principal
T.K.D.C. & Research Centre
New Pargan, Tal. Hatkanangle
Dist. Kolhapur 416 155

PERMANENT MAXILLARY FIRST MOLAR

INTRODUCTION

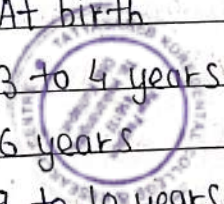
- In dental arch, permanent dentition molars are located distal to premolars.
- permanent 1st molar is located in the centre of the arch anteroposteriorly.
- If 1st molar is lost early and not replaced on time, it can have adverse effect on the arch. Maxillary 1st molar is the layers tooth.

FUNCTIONS

- Plays major role in mastication of food specially in grinding.
- Important in maintaining vertical dimension of face and continuity and integrity of dental arches.
- Play a major role in facial aesthetics by keeping the cheeks pull.

CHRONOLOGICAL DATA

- First evidence of calcification - At birth
- Enamel completion - 3 to 4 years
- Eruption - 6 years
- Root formation - 9 to 10 years



Dr. Harish Kulkarni M.D.S
Principal
T.K.D. C. & Research Centre
New Pargson, Tal. Hathkanangle
Dist. Kolhapur 416 122

ODONTOMETRIC DATA

cervico - occlusal length of crown	7.5 mm
length of root	12 - 13 mm
Mesiodistal dimension of crown	10 mm
Mesiodistal dimension of crown at cervix	8 mm
Buccopalatal diameter of crown	11 mm
Buccopalatal diameter of crown at cervix	10 mm
curvature of cervical line - Mesial	1 mm
curvature of cervical line - Distal	0 mm

TRAITS

① SET TRAIT

- Maxillary 1st molar is larger in overall dimension
- Permanent molar teeth is less white as compared to deciduous teeth.
- Permanent molars have long blunt cusp, less prominent ridge
- Root of permanent molars are slender and long as they spread away.

② ARCH TRAIT

- Maxillary molars have 3 to 4 cusps and 3 roots.
- Maxillary molar crown is wider facio lingually than mesiodistally
- Buccal surface of crown is relatively verticle and flat
- Crown tapers buccally from palatal aspect
- cusp of carabelli, may be present attached to mesiopalatal cusp.

③ CLASS TRAIT

- Molars are largest teeth in arch have 3-4 cusps and 2-3 roots.
- Molars are wider mesiodistally and shorter cervico-occlusally than all other crowns.
- All molars taper from buccal to lingual side except permanent maxillary 1st molar.
- Molar crown tapers distally.
- Molar have broader contact area.

TYPE TRAIT

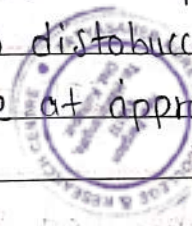
BUCCAL ASPECT

i) Shape and Size

- Trapezoidal in shape with longest uneven side located occlusally and shortest uneven side located cervically.
- Maxillary 1st molar is largest tooth in the arch.
- Crown tapers cervically from broad contact areas.

ii) Number and size of cusp

- On maxillary molars two cusps are seen from buccal aspect one is mesiobuccal cusp and another is distobuccal cusp.
- The mesiobuccal cusp is broader than distobuccal cusp. The mesial slope meets the distal slope at approximately right angle.



Dr. Harish Kulkarni M.D.S
F.R.C.S.
T.K.D.C. & Research Centre
New Pargaon, Tal. Hatkanangle
Dist. Kolhapur 416 127

10.

iii) Outlines -

- Mesial outline is straight from cervical line till crest of curvature. Then it turns outwards and distally till it merges with mesial slope of mesiobuccal cusp.
- The distobuccal outline is convex and the distal surface is spheroid.

iv) Contact Area -

- Mesial - Junction of occlusal and middle third.
- Distal - Middle of middle third.

v) Cervical Line -

- Minimum curvature present with convexity directing apically.

vi) ROOT

- All three roots can be seen from buccal aspect.
- The axis of root are inclined distally.
- The roots are not straight.
- Buccal root show inclination and two curvature half way between point of bifurcation and apex. The mesial root curvature distally straightening at middle third.
- Its axis is usually at right angle.

PALATAL ASPECT

CROWN

i) Number and size of cusp

- Two cusp can be seen from palatal aspect namely mesio-palatal and disto-palatal cusps.



Dr. Harish Kulkarni M.D.S.
Principal
T.K.D.C. & Research Centre
New Parganah, Tal. Hatkanangle
Tal. Kolhapur 416 122

- The mesio-palatal cusp is longer and bigger
- It's mesial and distal cusp slope meet at an maxillary 1st molar is the compound cusp of Carabelli or the rudimentary 5th cusp attached to mesio-palatal cusp.

ii) Palatal developmental groove

This groove separates the two palatal cusp. It extends cervically on the palatal surface and terminates roughly at middle of crown.

ROOT

- All 3 roots are seen from this aspect with the layers of palatal root prominently visible in the foreground.
- In 1st molar, palatal root apex is in the line with palatal developmental groove. The mesial outline of the mesiobuccal root and distal outline of distobuccal root can be seen from this aspect.

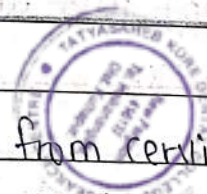
PROXIMAL ASPECT

(A) MESIAL ASPECT

Crown of all maxillary molars are buccopalatally wide than mesiodistally.

i) Buccal outline

The outline of buccal aspect starting from cervical line is convex till the height of contour then it becomes slightly concave. After this concavity the outline again becomes convex. In this progressive downwards towards the mesiobuccal cusp,



Dr. Harish Kulkarni M.D.S.
Principal
T. K. D. C. & Research Centre
Hatkanangli, Tal. Hatkanangli
Dist. Kolhapur 416 112

the tip of the root both the cusp are well within the root outline

ii) Palatal outline

It progresses as smooth (outline) convexity from the cervical line till the crest of curvature. The palatal outline again becomes convex till the tip of mesio-palatal cusp.

iii) Crest of curvature

Buccal - Middle of cervical third

Palatal - Middle of middle third.

iv) Marginal Ridges

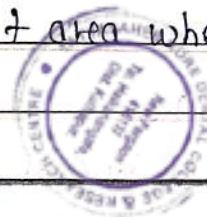
Mesial marginal ridge on both molars is continuous with mesio-buccal cusp and mesio-palatal cusp. The marginal ridge is concave buccopalatally. The depth of concavity faces cervically. Mesial marginal ridge is more occlusally located than distal marginal ridge and also longer buccopalatally.

v) Mesial surface

Mesial surface of both molars is smoothly convex elsewhere except just above the contact area where it is slightly convex.

vi) Cervical line

It appears irregular and curves occlusally by not more than 1 mm



Dr. Harish Kulkarni M.D.S.
Principal

T.K.D.C. & Research Centre,
Jaw Pargaon, Tal. Hatkanangale,
Dist. Solapur, Maharashtra 413 122

ROOT

- Two roots can be seen namely mesio-buccal and palatal root. Mesio-buccal root appears broad with its mesial surface flat and buccal outline extending upwards, outwards and terminates in a blunt apex.
- Bifurcation point is closer to cervical line. Palatal root apex is rounded but appears more pointed than mesiobuccal root.

DISTAL ASPECT

CROWN

i) Palatal outline

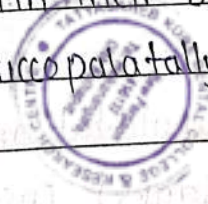
- The outline of buccal aspect starts from the cervical line, convex till the height of contour. Then it becomes slightly convex. After this concavity, the outline becomes downwards towards the distobuccal cusp.
- Tip of tooth cusp are well within the confine of root trunk.

ii) Contact Areas

- Buccal - Middle of cervical third
- Palatal - Middle of cervical third.

iii) Marginal Ridges

- Distal marginal ridge continuous with their buccopalatal and distobuccal cusp. Both are concave buccopalatally and cervically faces cervically.



Dr. Harish Kumar M.D.S.
Principal
T.K.D.C. & Research Centre
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iv) Distal surface

- Distal surface of 1st molar is smoothly convex except for small area of concavity near cervical line
- This continues beyond cervical line till distal surface

ROOT

- Distobuccal and palatal root are seen from distal aspect
- Buccal outline of distobuccal root is slightly concave from cervical line for short distance from it becomes convex
- The bifurcation point of distal aspect is more apical than mesial aspect.

OCCUSAL ASPECT

i) outline and shape

- Maxillary molars appears roughly rhomboidal with two acute angles and two obtuse angle. Angle made by mesiobuccal cusp and mesial marginal ridge are acute and angle made by mesiopalatal cusp and mesial marginal ridge as well as distopalatal cusp and distal marginal ridge are obtuse

ii) Number and size of cusp

In maxillary 1st molar 5 cusps are seen 4 are major and well developed and 1 maxillary rudimentary 5th cusp i.e. cusp of cerebelli. The four cusps are mesiobuccal, distobuccal, mesiopalatal and distopalatal cusps. The mesiopalatal cusp is biggest cusp.

Dr. Harish Kulkarni M.D.S.
T.K.D.C. & Research Centre
New Baroda, Gandhinagar
Gandhinagar, Baroda

iii) RIDGES

1) Oblique Ridge

- They are distinguishing feature of maxillary molars. oblique ridge is one which obliquely crosses occlusal surface of maxillary molars and formed by union of triangular ridge of mesiopalatal cusp. It is so normal because it crosses occlusal surface obliquely. It is seen less prominent in second molar compared to 1st molar

2) Marginal Ridge

- Two in number, namely mesial marginal ridge and distal marginal ridge.
- Both are irregular ridges which are confluent with mesial and distal cusp ridges of mesial and distal cusp.

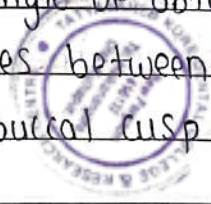
3) Transverse Ridge

- It is more prominent on 1st molar. It is formed by union of mesial cusp ridge of mesio-palatal cusp and triangular ridge of mesiobuccal cusp.

iv) Grooves

1) central developmental groove

- Originated from central pit of an angle of obtuse to the central developmental groove and crosses between two buccal cusps i.e. mesiobuccal cusp and distobuccal cusp and ends on buccal surface



Dr. Harish Kulkarni M.D.
Principal
K.D.C. & Research Centre
Hatkanangle
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2) Palatal developmental groove

- It is palatal extension of distal oblique groove. It exists between two palatal cusps mesiopalatal cusp and distopalatal cusp.

3) Buccal developmental groove

- Originate from central pit of an angle of obtuse to the central developmental groove and crosses between two buccal cusps i.e. mesiobuccal cusp and distobuccal cusp and ends on buccal surface.

4) Distal oblique groove

- Distal oblique groove is located at base of distal fossa which is distal to oblique ridge. The groove terminates at the apex of distal triangular fossa where two supplementary groove radiates from the sides of distal triangular fossa.

5) Transverse groove of oblique ridge

- It originates at central pit at obtuse angle to tooth buccal and central developmental groove. It crosses oblique ridge thereby connecting the central and distal fossa but most commonly this transverse groove fades out before reaching the crest of oblique ridge.



Dr. Harish Kulkarni M.D.S.
Principal

T.K.D.C. & Research Centre
New Pargaon, Tal. Hatkanangla
Dist. Kolhapur 416 122

ENDODONTIC ANATOMY

1) Buccopalatal section

- Pulp chamber is rectangular in shape. Pulp horn is quite prominent.
- 3 roots and 3 pulp canals are seen. Palatal root is longer followed by mesiobuccal and distobuccal roots. Though it is the smallest root. Mesiobuccal root canal is wider buccopalatally with many accessory canals present. Distobuccal root canal is straight.

2) Mesiodistal section

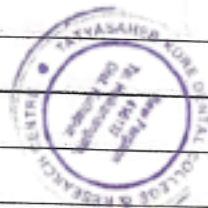
- Pulp horns are well developed. Mesiobuccal root and root canal as well as palatal root and root canal can be seen with mesiobuccal root canal broader buccopalatally. Pulp chamber appears narrow and squarish in shape compared to buccopalatal section.

3) Central cross section

- Palatal root canal appears larger in diameter with distobuccal canal smaller and mesiobuccal canal appears kidney shaped or ovoid due to its buccopalatal flattening.
- Accessory mesiobuccal canal can be seen in this molars section. This section is important to study some molars having more than one canal in root.

VARIATIONS

- Usual curvature of buccal roots
- Roots abnormally long with extreme curvature



Dr. Harish Kulkarni M.D.S.
Principal
T. K. D. C. & Research Centre
New Pargaon, Tal. Hatkarni
Dist. Kolhapur - 415 001

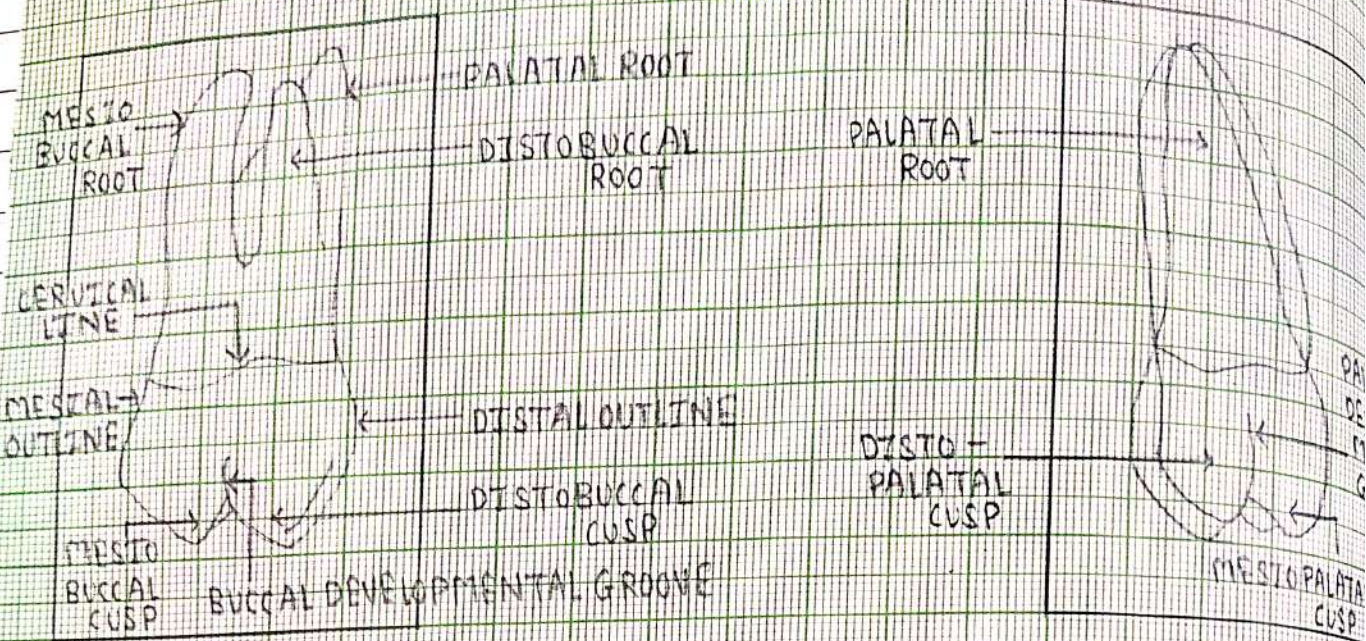
- Lingual and distobuccal roots fused.
- Mesiodistal measurement smaller than usual.
- Extreme rhomboidal development of crown. 5th cusp with maximum development
- Tooth well developed but much smaller than usual.

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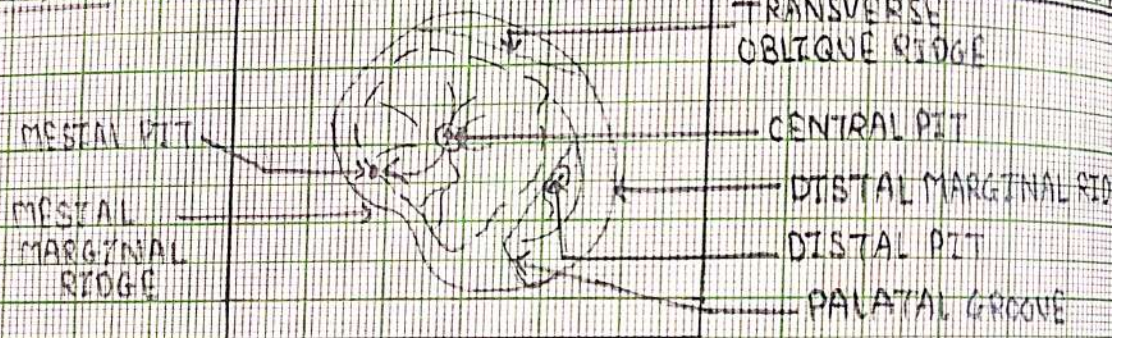
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Principal
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PERMANENT MAXILLARY SECOND MOLAR

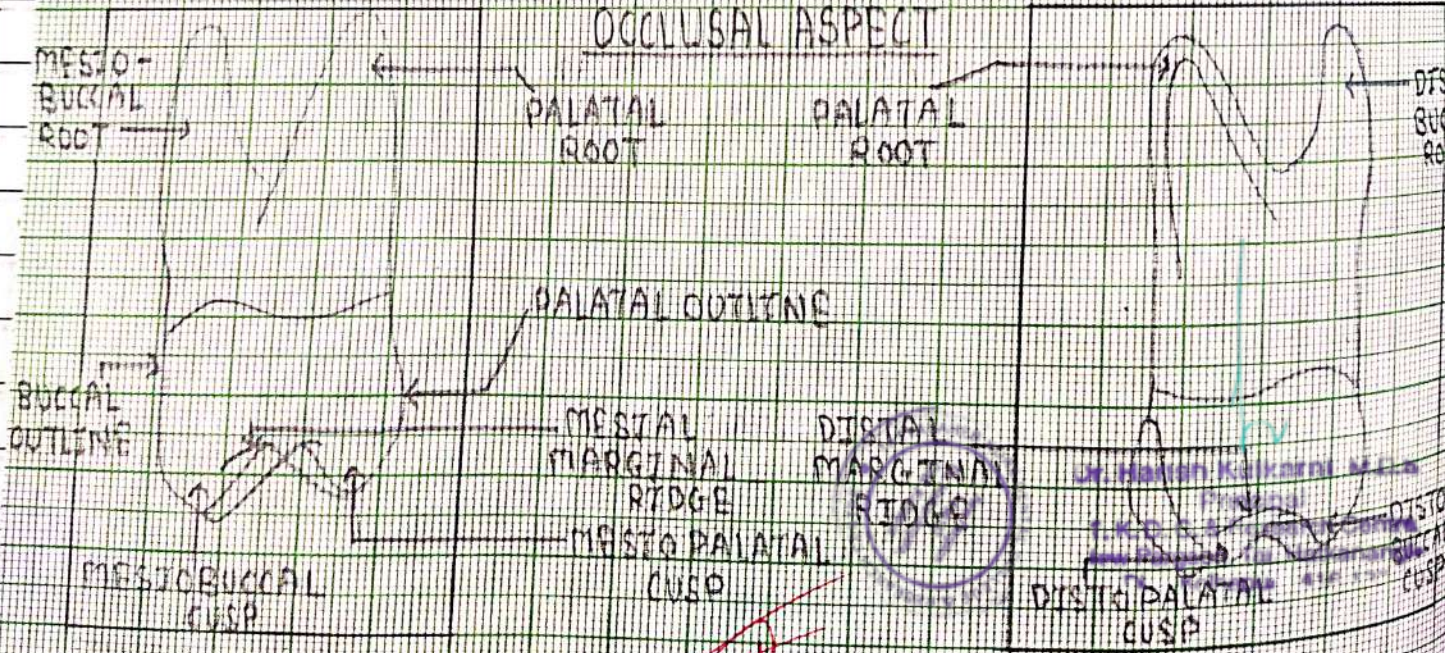


BUCCAL ASPECT

PALATAL ASPECT

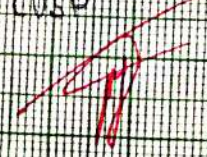


OCCUSAL ASPECT



MESIAL ASPECT

DISTAL ASPECT



PERMANENT MAXILLARY SECOND MOLAR.

INTRODUCTION

- In permanent dentition molars are located distal to premolars
- first molar is located at centre of dental arch anterioposteriorly.
- Maxillary second molar is located distal to the first molar followed by maxillary third molar.

FUNCTIONS

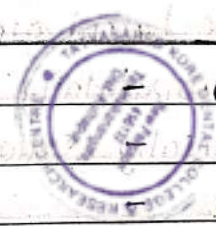
- Play major role in mastication, especially grinding of food.
- Important in maintaining verticle dimensions of face and continuity and integrity of dental arch.
- Play a major role in facial aesthetics by keeping cheeks pull.

CHRONOLOGICAL DATA

- 1st evidence of calcification - 7-9 years
- Enamel completion - 12-16 years
- Eruption - 17-21 years
- Root completion - 18-25 years

ODONTOMETRIC DATA

- cervico occlusal length of crown - 6.5 mm
- length of root - 11 mm
- Mesio-distal dimension of crown - 8.5 mm
- Mesio-distal dimension of crown at cervix - 6.5 mm
- Buccolingual diameter of crown - 10 mm



Dr. Harish Kulkarni M.D.S
Principal
J. K. D. C. & Research Centre
New Ferguson - Tar, Malkanangla
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Buccolingual diameter of crown at cervix - 9.5 mm
curvature of cervical line - Mesial - 1 mm
curvature of cervical line - Distal - 0 mm

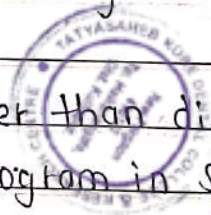
TRAITS

1. SET TRAIT

- Maxillary second molars are larger than deciduous second molar
- Permanent molar teeth are more yellowish in color than deciduous teeth
- Permanent molars are less constricted at cervical region
- Permanent molars have long blunt cusps less prominent ridges
- Roots of permanent molars are slender and long as they are spreaded away.

2. ARCH TRAIT

- Maxillary molar have 4.5 cusps and 3 roots
- Maxillary molars have wider crown faciolingually than mesiodistally
- Buccal surface of crown relatively verticle and flat with single buccal groove
- Mesio palatally cusp is bigger than distopalatal cusp
- Occlusally square or parallelogram in shape consists oblique ridge



Dr. Harish Kulkarni M.D.S

Principal

Low Pargaon, Tal. Hatkanangle

Dist. Solapur, Maharashtra

CLASS TRAIT

- Molars are longer teeth in arch, have an occlusal surface with 3-5 cusps
- Molars are wide mesiodistally and shorter cervico-occlusally than all other crowns
- All molars taper from buccal to lingual side except first molar.
- Molars have broader contact area.

TYPE TRAIT

BUCCAL ASPECT

1) Outline and shape

- Trapezoidal in shape with shortest uneven side located cervically and longest uneven side located occlusally. Crown outline tapers cervically from the broad contact area. Crown of second molar is slightly shorter cervico-occlusally and narrower mesio-distally.

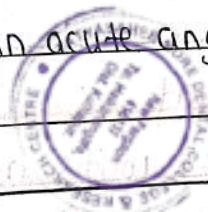
2) Number and size of cusp

- Two cusps are seen mesio-buccal and disto-buccal cusp on buccal aspect. Out of these mesio-buccal cusp is longer and broader than distobuccal cusp. Mesial slope of mesiobuccal cusp meets distal cusp slope at an obtuse angle, while the mesial slope of distobuccal cusp meet the distal slope at an acute angle, hence distobuccal cusp is more pointed.

3) Contact area

Mesial - Junction of occlusal and middle $\frac{1}{3}$ rd

Distal - Middle of middle $\frac{1}{3}$ rd.



Dr. Harish Kulkarni M.D.S.
Principal

T. K. D. C. & Research Centre
New Pargaon, Tal. Hatkanangle
Kulhadgaon 414 111

4) cervical Line

Minimum curvature present with convexity directed apically.

5) Root

- All 3 roots can be seen from buccal aspect. The 3 roots are two on buccal aspect i.e. mesio-buccal and disto-buccal roots and one on palatal aspect
- All 3 roots originates from a single root trunk.
- Roots of maxillary second molar are distally inclined.

PALATAL ASPECT

1) Number and size of cusp

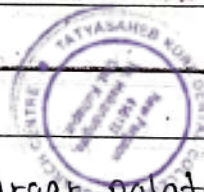
- Two cusp can be seen from palatal aspect namely mesio-palatal and disto-palatal cusp.
- out of 2 cusps mesio-palatal cusp is longer and bigger in 2nd molar.
- The 5th cusp is absent

2) Palatal developmental groove

- This groove separates the two palatal cusp.
- It extends cervically on palatal surface and terminates roughly at the middle of crown

3) Root

- All 3 roots are seen with larger palatal root prominent visible in foreground.
- The palatal root apex is in line with distopalatal cusp hence the palatal root is distally inclined.



Dr. Harish Kulkarni, M.D.S.
Principal
T.K.D.C.A. Research Centre
New Pargan, Tal. Hatkanangle

- The mesial outline of mesiobuccal root and distal outline of distobuccal root can be seen in back ground.

PROXIMAL ASPECT

a) MESIAL ASPECT

1) Buccal outline

- It is convex from cervical line till crest of curvature
- Then it becomes slightly concave. After this concavity the outline again becomes convex as it progresses downwards.
- Both cusp tip mesio-buccal and disto-buccal are well within the confines of root trunk.

2) Palatal outline

- It is smoothly convex from cervical line till crest of curvature
- The tip of mesiopalatal and distopalatal cusp are well within the confines of root trunk.
- on 2nd molar palatal outline is smoothly convex.

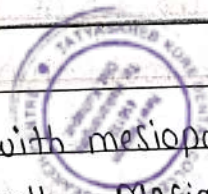
3) Crest of curvature

Buccal - Middle of cervical 1/3rd

Palatal - Middle of middle 1/3rd

4) Marginal Ridges

- Mesial marginal ridge is continuous with mesiopalatal and mesiobuccal cusp. Concavity faces cervically. Mesial ridge is more occlusally located than distal and also longer buccopalatally than distal marginal ridge.



Dr. Harish Kulkarni, M.D.S.
Principal
K. B. S. Research Centre
New Pargaon, Tal. Hatkanangle
Dist. Solapur 415 122

5) Mesial and distal surface

- Both surfaces are generally smoothly convex except just above the contact area where it is slightly concave.

6) Cervical Line

- It is irregular curves occlusally, it is more deeper on mesial than distal aspect

7) Root

- From mesial aspect 2 roots can be seen
- Mesio Buccal root appears broad with its mesial surface flat
- Buccal outline of buccomesial root extends upwards and outwards and terminates in blunt apex.
- Bifurcation point on mesial aspect is more cervically.

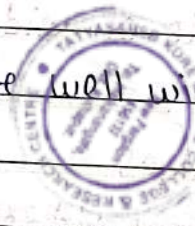
b) DISTAL ASPECT

1. Buccal outline

- outline of buccal aspect from cervical line is convex till the height of contour, then it becomes slightly concave. After this concavity the outline again becomes convex as it progresses downwards.
- The tip of both the cusp are well within the sul confines of root trunk.

2. Crest of curvature

- Buccal - Middle of cervical $\frac{1}{3}$ rd
- Palatal - Middle of middle $\frac{1}{3}$ rd



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T.K.D.C. & Research Centre
New Pargaon, Tal. Hatkanangle
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3. Marginal Ridges

- Distal marginal ridge is continuous with distobuccal and distopalatal cusp. The 2nd molar is concave buccopalatally and convex cervically. Mesial marginal ridge is longer occlusally located than distal marginal ridge.

4. Mesial and distal surfaces

- Both the surfaces are generally smoothly convex except just above the contact area where it is slightly concave.

5. Cervical line

- It is irregular curves occlusally, it is more deeper on mesial than distal aspect

6. Root

- From distal aspect 2 roots can be seen
- Mesio Buccal root appears broad with its mesial surface

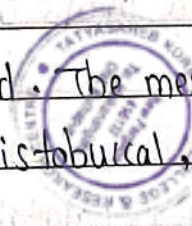
Occlusal Aspect

1) Outline and shape

- Maxillary 2nd molar are wider buccopalatally than mesiodistally.

2) Number and size of cusp

- on 2nd molar 4 cusps are well developed. The mesio palatal cusp is longest followed by mesio buccal, distobuccal, distopalatal cusp.



Dr. Mahesh K. Jharni M.D.S.
Principal
T. K. D. C. & Research Centre,
100/101, P. O. Hatkanangla,
K. Kollam 410 127

3) Ridges

- There are 3 types of ridges - oblique, transverse and marginal

4) oblique ridge

- It is distinguishing character of maxillary molar formed by union of triangular ridge of distobuccal cusp and distal cusp ridge of mesiopalatal cusp.

5) Marginal ridge

- Both mesial and distal marginal ridges are well developed
- Mesial marginal ridge is more longer buccopalatally than its distal marginal ridge

6) Transverse Ridge

- Formed by union of mesial cusp ridge of mesiopalatal cusp and triangular ridge of mesiobuccal cusp.

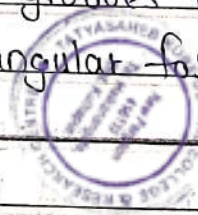
GROOVES

1) Central developmental groove

- originated from central pit of central fossa extends mesially till the apex of mesial triangular fossa from its mesial termination to supplementary grooves radiate forming the two arms of the mesial triangular fossa.

2) Palatal developmental groove

- It is palatal extension of distal oblique groove. It extends between two palatal cusp mesiopalatal cusp and distopalatal cusp.



Dr. Harish Kulkarni M.D.S.
Principal
T. K. D. C. & Research Centre
New Parganah, Tal. Hatkanangle
Tal. Kolhapur, 415 122

3) Buccal developmental groove

- Originate from central pit of an angle of obtuse to the central developmental groove and crosses between two buccal cusps i.e. mesiobuccal cusp and distobuccal cusp and ends on buccal surface.

4) Distal oblique groove

- Distal oblique groove is located at base of distal fossa which is distal to oblique ridge. The groove terminates at the apex of distal triangular fossa where two supplementary groove radiates from the sides of distal & triangular fossa.

5) Transverse groove of oblique ridge

- It originates at central pit at obtuse angle to tooth buccal and central developmental groove. It crosses oblique ridge thereby connecting the central and distal fossa but most commonly this transverse groove fades out before reaching the crest of oblique ridge.

Fossa

1) Central fossa

- Roughly triangular in shape, bounded by crest of oblique and transverse ridge, distal slope of mesiobuccal cusp, mesial slope of distobuccal cusp.

2) Distal fossa

- It is linear in shape and located distal to oblique ridge



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Principal
T.K.D.C. & Research Centre
New Pargason, Tal. Hatkanangle
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3) Mesial Fossa

- Linear in shape and located as mesial aspect of occlusal aspect

Endodontic Anatomy

1) Buccopalatal section

- Pulp chamber is rectangular in shape 3 pulp horns are seen out of which the palatal root is larger followed by mesiopalatal and distobuccal root. Mesio Buccal root canal wider buccopalatally with many accessory canals present at exit of root tip. Distobuccal root canal is straighter.

2) Mesiodistal section

- Pulp horns are well developed mesiodistally. Palatal root canal can be seen with the mesio Buccal canal broader buccopalatally. Pulp chamber appears narrow and squarish in shape compared to buccopalatal section.

3) cervical cross section

- outline of pulp chamber appears rhomboidal in shape. Angle are accentuated i.e. acute angles are present.

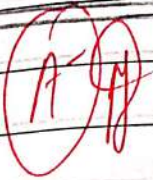
Variations

- Root spread similar to 1st molar.
- Bifurcated mesio Buccal root
- Roots are very short and fused.



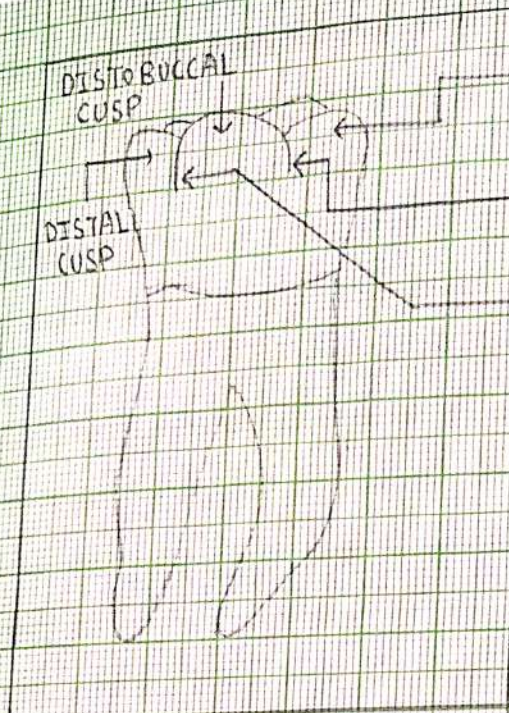
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- mesio-buccal and lingual cusps have complete fusion
- crown is similar as typical 3rd molar
- short roots with similarities with 1st molar.
- Root extra long with abnormal curvature
- Very long roots fused.
- Crown with extreme rhomboidal form.

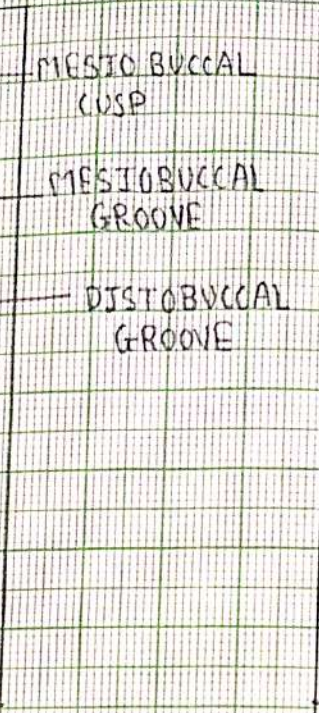


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Principal
T.K.D.C. & Research Centre
New Pargaon, Tal. Hatkanangla
Dist. Kolhapur - 416 122

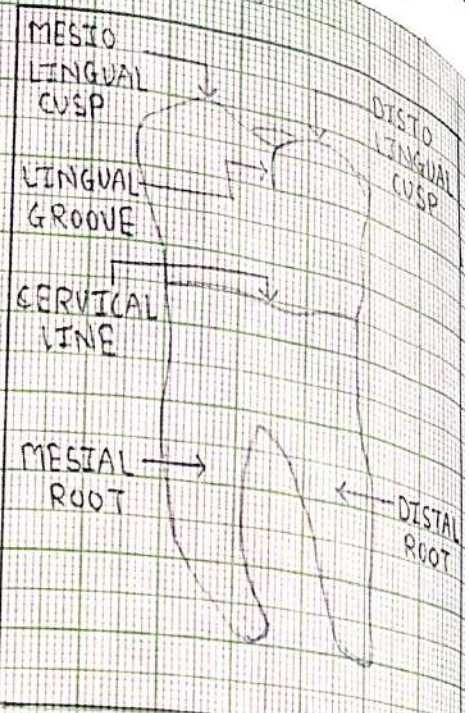
PERMANENT MANDIBULAR FIRST MOLAR



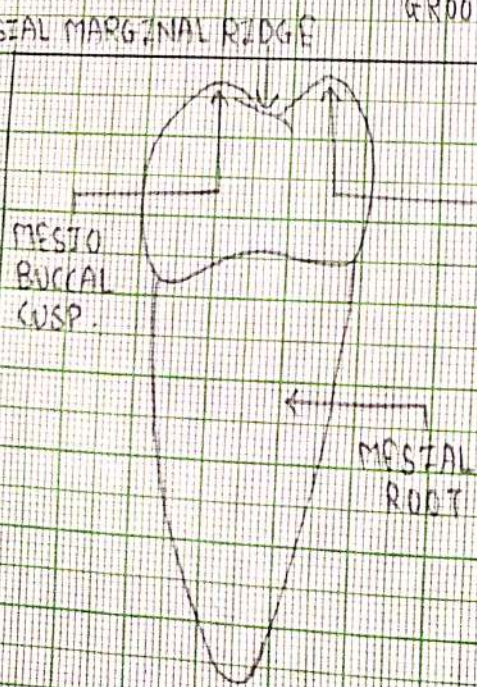
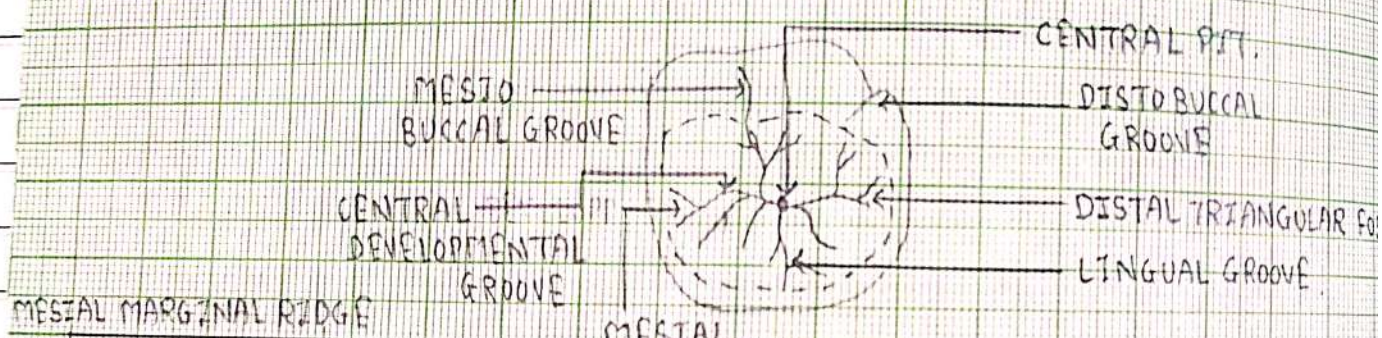
BUCCAL ASPECT



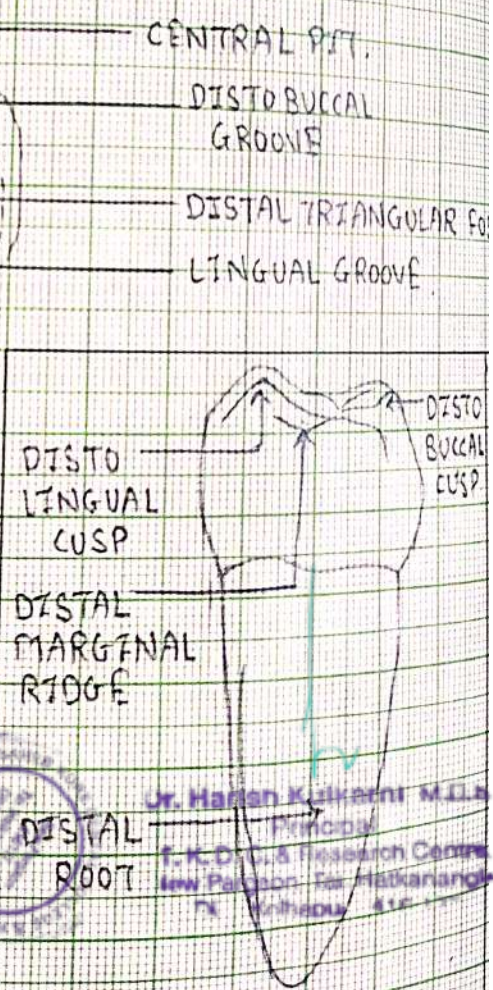
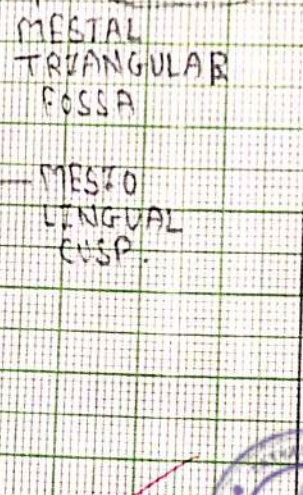
OCCUSAL ASPECT



LINGUAL ASPECT

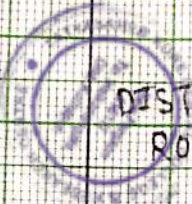


MESIAL ASPECT



DISTAL ASPECT

H



Dr. Harish Kulkarni M.D.S.
Principal
F.K.D.S. & Research Centre
New Palghar, Tal. Matkarangoli
Dist. Talasari, 415

PERMANENT MANDIBULAR FIRST MOLAR.

INTRODUCTION

- Just like maxillary molars mandibular molars are also the largest class of teeth in mandibular arch. Three molars are located on each side, namely first, second and third molars with first molar being largest tooth followed by second and then third.

- crown outline of all mandibular molars is generally similar and each molar has 2 roots i.e. mesial and distal. All mandibular molars have roughly quadrilateral crown outline with mesiodistal width greater than buccolingual width. The cervico-occlusal height of molars is lesser than the anterior teeth but otherwise other dimensions are greater.

FUNCTIONS

- 1) Play major role in mastication
- 2) Helps in grinding of food.
- 3) Maintain vertical dimension of face
- 4) Plays important role in maintaining continuity and integrity of dental arches.
- 5) Plays major role in facial aesthetics by keeping the cheeks pull down.



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New Pargaon, Tal. Hatkanangla
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CHRONOLOGICAL DATA

First evidence of calcification	- At birth
Enamel completion	- 2 1/2 to 3 yrs
Eruption	- 6 to 7 yrs
Root completion	- 9 to 10 yrs.

ODONTOMETRIC DATA

Length of crown	- 7.5 mm
Length of root	- 14 mm
Mesio distal diameter of crown	- 11 mm
Mesio distal diameter of crown at cervix	- 9 mm
Bucco lingual diameter of crown	- 10.5 mm
Bucco lingual diameter of crown at cervix	- 9 mm
Curvature of cervical line - mesial	- 1 mm
Curvature of cervical line - distal	- 0 mm

TRAITS

1) SET TRAIT

- Permanent molar is larger in size
- Permanent molars are yellowish in color.
- Permanent molars are less constricted at cervix
- Permanent molars have long sharp apex and cusp
- More pronounced ridges and shallow occlusal surface.
- Root of permanent molars are thick, short and less spread.

2) CLASS TRAIT

- Molars are longer teeth in arch, having 4 to 5 cusp and 2 to 3 roots.
- Molars are wide mesiodistally and shorter cervico-occlusally.
- All molars taper from buccal to lingual side except permanent maxillary first molar.
- Crown of molars taper distally.
- Molars have broader contact areas.

3) ARCH TRAIT

- Mandibular molars have 4 to 5 cusp and 2 roots.
- Crown wider mesio-distally than bucco-lingually.
- Buccal crown surface convex and tapers lingually.
- Two nearly equal sized lingual cusp. No oblique ridge and no cusp of Carabelli. Occlusally rectangular or pentagonal crown shape.

TYPE TRAIT

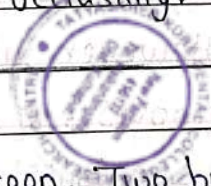
BUCCAL ASPECT

① Crown outline and shape

- It is trapezoidal in shape with shortest uneven side located cervically and longest uneven side located occlusally.

② Number and size of cusps

- From buccal aspect all five cusp can be seen. Two buccal cusp and one distal cusp in the foreground, while only part of two lingual cusp are seen in the background out of three buccal cusp.



mesio-buccal cusp appears largest followed by distobuccal and distal cusp.

③ Developmental Groove

- Two developmental grooves can be seen namely mesio-buccal and disto-buccal.

- The mesio-buccal groove is shorter and separates the mesio-buccal and disto-buccal cusp. The disto-buccal developmental groove separates the disto-buccal cusp and distal cusp.

④ Mesial and distal outline

- Mesial outline is somewhat concave from cervical line till the mesial contact area and then become convex. Distal outline from cervical line till distal contact area is flat.

⑤ Mesial and distal contact area

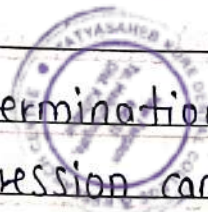
Mesial - Junction of occlusal and middle $\frac{1}{3}$ rd.

Distal - Middle of middle $\frac{1}{3}$ rd.

⑥ Buccal surface morphology

- Buccal surface is convex at its cuspal portion from middle $\frac{1}{3}$ rd of crown till the cervical line it is flat with developmental groove separating the cusps.

- However just beneath the termination of two developmental grooves, a developmental depression can be noted running in mesiodistal direction above the buccal cervical ridge.



Dr. Harish Kulkarni M.D.S.
K.D.C. & Research Centre
New Pargaon, Tal. Hattar

① ROOT

- From buccal aspect two roots namely mesial and distal can be seen. Mesial root is more cervical than distal root. Mesial root first curves mesially below the cervical line till middle $\frac{1}{3}^{\text{rd}}$ but later it curves distally till the root apex. The mesial root apex is located below the mesio-buccal cusp. The distal outline of mesial root apex.

- The distal root is less curved and shows curvature at its apical $\frac{1}{3}^{\text{rd}}$, in either mesial or distal direction. The distal root apex is more pointed than mesial root apex and located below the distal contact area.

LINGUAL ASPECT

① Number and size of cusp

- From this aspect three cusp can be seen mesio-lingual and disto-lingual and lingual portion of distal cusp. Out of three cusp mesiolingual cusp is largest and tallest cusp.

② LINGUAL developmental groove

- This groove separates the two lingual cusps that is mesiolingual and distolingual cusp and extends downwards on lingual surface of crown for short distance.

③ Mesial and distal outline

- From cervical line to mesial contact area mesial outline is convex. Distal outline from cervical line till distal contact area is straight. At this point, there is a junction between



Dr. Harish Kulkarni M.D.S
Principal
T.K.D.C. & Research Centre
New Pargaon, Tal. Hatkanangle
Dist. Kolhapur 416 177

the distolingual cusp ridge and distal marginal ridge.
The junction is sometimes marked by shallow developmental groove.

④ Lingual surface morphology

- The lingual surface is smoothly convex at its cuspal portion and union of two cusp i.e. area of developmental groove is convex till centre of crown from here onwards till the cervical line, the lingual surface is flat. Crown tapers from buccal to lingual.

⑤ Root

- From lingual aspect both roots appear to be longer than the buccal aspect. This is because the cusp ridges and cervical line are at higher level. Therefore bifurcation point is also located at higher level.

PROXIMAL ASPECT

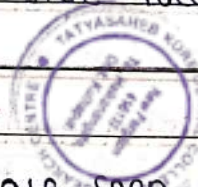
MESIAL ASPECT

① Shape and size

- It is rhomboidal in shape with largest uneven side located cervically and shortest uneven side located occlusally.

② Number and size of cusp

- From mesial aspect two cusp are seen mesio-buccal and mesio-lingual cusp and one mesial root can be seen.



Dr. Harish Kulkarni M.D.S.
Principal
J.K.D.C. & Research Centre
New Pargaon, Tal. Hatkanangle
Dist. Kolhapur - 416 001

③ Buccal Outline

- Buccal outline is convex from cervical line till middle of cervical one third. This convexity forms the buccal cervical ridge. This ridge is prominent on first molar. From buccal cervical ridge, till the mesiobuccal cusp tip. Outline is either straight or slightly convex.

④ Lingual outline

- It is straight from cervical line till crest of curvature from here onwards outline is convex till mesiolingual cusp tip.

⑤ Marginal Ridges

- Mesial marginal ridge is bigger and it is concave buccolingually and it is continuous with mesial cusp ridges of mesiobuccal and mesiolingual cusp. Mesial marginal ridge is located about 1mm below the cusp tip.

⑥ Crest of curvature

Buccal - Middle of cervical third.

Lingual - Middle of middle third.

⑦ Root

- Buccal outline of both roots are straight from cervical line till the junction of cervical and middle $\frac{1}{3}$ rd. After which it gently curves lingually till root apex. The root apex located below the mesio-buccal cusp. Lingual outline is straight till junction of middle and apical $\frac{1}{3}$ rd here after it curves buccally till the root apex. Mesial surface of root is convex

⑥ Root

- Buccal outline of both roots are straight from cervical line till the junction of cervical and middle $\frac{1}{3}$ rd after which it gently curves lingually till root apex. The root apex is located below the mesiobuccal and distobuccal cusp. Lingual outline is straight till junction of middle and apical $\frac{1}{3}$ rd hereafter it curves buccally till the root apex.

OCCLUSAL ASPECT

① Crown outline

- It appears roughly hexagonal in shape mesio-distal dimension appears more than buccolingual dimension. Crown tapers to distally as well as lingually. The lingual taper of crown is more rounded and pronounced. Due to lingual inclination of crown much of buccal aspect is seen than the lingual aspect.

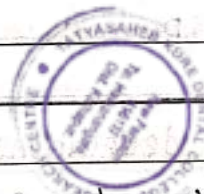
② Number and size of cusp

- Five cusp can be seen mesiobuccal cusp is larger followed by mesiolingual, distobuccal and distolingual cusp while the distal cusp is smallest.

③ RIDGES

a) Transverse Ridge

It is formed by union of triangular ridge of mesiobuccal and distobuccal cusp and other by union of triangular ridge of mesiolingual and distolingual cusp.



Dr. Harish Kulkarni M.D.S
Principal
T.K.D.C. & Research Centre
New Pargan, Tal. Malkanangli
Dist. Kolhapur, 416 122

b) Marginal Ridges.

It turns the proximal surface of occlusal surface and are more or less rounded border of enamel and are formed by the confluent of mesial and distal cusp ridges of cusps.

④ GROOVES

① Central developmental groove.

- It originates at central pit in central fossa. It takes zig-zag path mesio-distally and terminates at mesial and distal triangular fossa.

② Mesiobuccal developmental groove

- It originates from central developmental grooves at short distance mesially to the central pit. This groove separates mesiobuccal and distobuccal cusp and extends posteriorly over the two cusp.

③ Distobuccal developmental groove

- It originates from central developmental groove at short distance distally to central pit. This groove separates the distobuccal and distal cusp and extends posteriorly over the two cusp.

④ Lingual developmental groove

- This groove separates two lingual cusp i.e. mesiolingual and distolingual cusp and extends posteriorly over 2 cusp.



Dr. Harish Kulkarni M.D.S.
Principal
T. K. D. C. & Research Centre
New Pargaon, Tal. Hatkanangale
Dist. Kolhapur 416 122

⑤ Fossa

- 1 major and 2 minor fossa are present. Major fossa is central fossa. It is roughly circular and it is centrally placed on occlusal surface between the buccal and lingual cusp ridges. Mesial triangular fossa and distal triangular fossa are 2 minor fossa.

⑥ Pit

- In the center of central fossa is central pit. Mesial pit is present at the base of mesial triangular fossa. Distal pit is present at the base of distal triangular fossa.

ENDODONTIC ANATOMY

① Buccolingual section

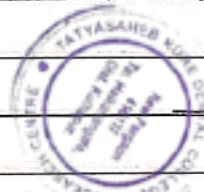
- Pulp chamber appears larger sometimes extending down into the root. The pulp horns are quite prominent in first molar. One mesial and one distal root can be seen. The mesial root often has two root canals.

② Mesio-lingual section

- Pulp chamber appears rectangular and largest in size. Pulp horns are usually quite prominent. Mesial root and its canal are significantly curved.

③ Cervical cross section

- Pulp chamber has 2 funnel shaped opening into the mesial root canal namely buccal and lingual. The opening of distal root



Dr. Harish Kulkarni M.D.S.
Principal

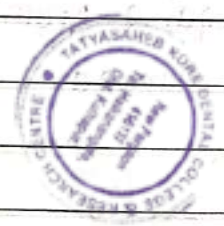
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canal is wider.

VARIATIONS

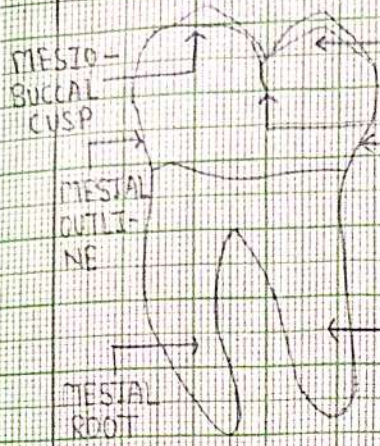
- Root extremely long, Crown small
- Mesial root longer than average rounded apex.
- Crown very wide bucco-lingually root short.
- Crown has no buccal developmental groove.
- Crown and root poorly formed.
- Roots dwarfed.
- Crown and root oversized bucco-lingually.

ATP

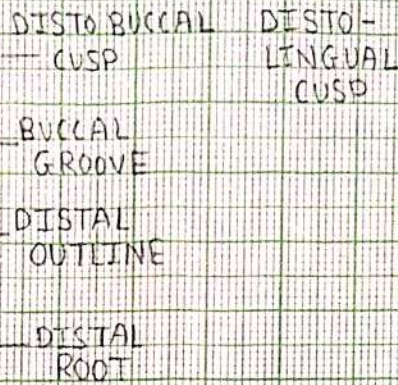


Dr. Harish Kulkarni M.D.S
Principal
T. K. D. C. & Research Centre
New Pargaon, Tal. Hatkanangle
Dist. Kolhapur 416 122

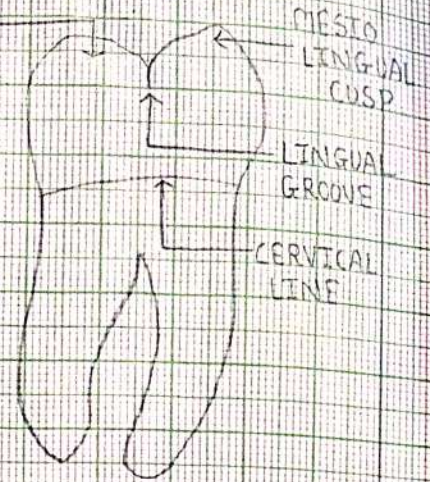
PERMANENT MANDIBULAR SECOND MOLAR



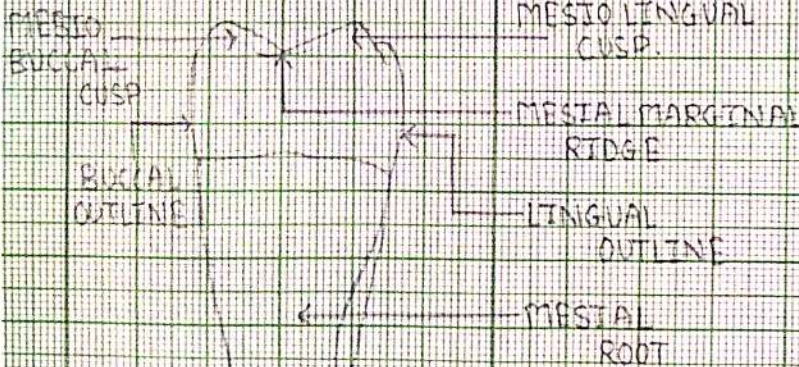
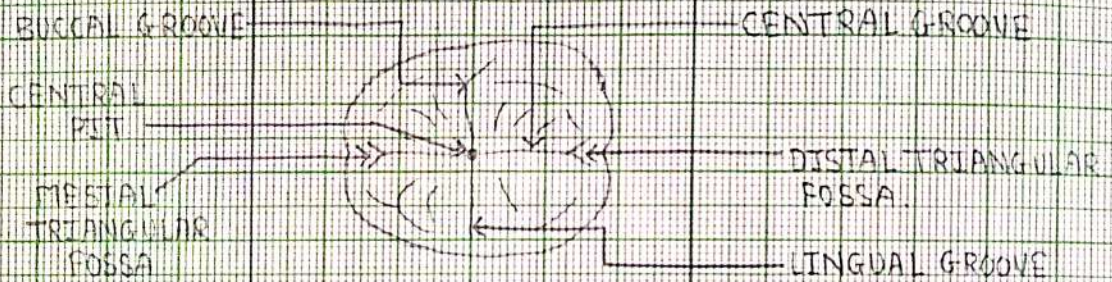
BUCCAL ASPECT



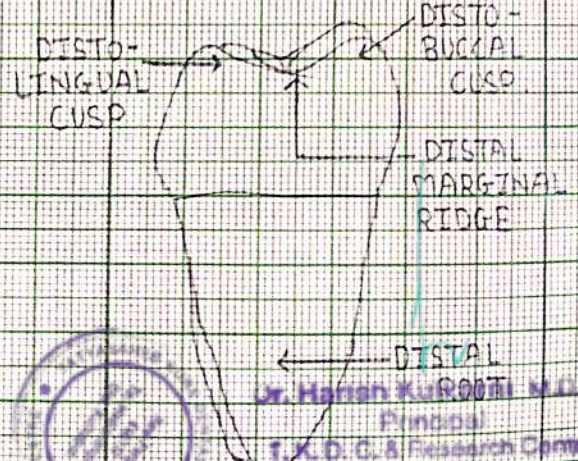
OCCUSAL ASPECT



LINGUAL ASPECT



MESIAL ASPECT



DISTAL ASPECT



Dr. Harish Kumar M.D.S.
Principal
I.T.D. C. & Research Centre
New Palson, Tarikaranga
Kollapa 511

PERMANANT MANDIBULAR SECOND MOLAR.

INTRODUCTION -

- Just like maxillary molars, mandibular molars are also largest class of teeth in mandibular arch. Three molars are located on each side, namely first, second and third molar. Crown outline of all mandibular molars are similar and each molar has 2 roots i.e. mesial and distal.

FUNCTIONS -

1. Plays major role in mastication specially in grinding
2. Maintain verticle dimension of face.
3. Play important role in maintaining continuity and integrity of dental arches
4. Plays role in facial aesthetics by keeping the cheeks pull down.

CHRONOLOGICAL DATA -

- | | |
|-------------------------------|------------------------------|
| 1st evidence of calcification | - 2 $\frac{1}{3}$ to 3 years |
| Enamel completion | - 7 to 8 years |
| Eruption | - 1 to 3 years |
| Root completion | - 14 to 15 years. |



Dr. Harish Kulkarni M.D.S.
Principal
T.K.D.C. & Research Centre
New Pargson, Tal. Hatkanangle
Dist. Kolhapur 416 122

ODONTOMETRIC DATA

cervico-incisal length of crown	- 7mm
Length of root	- 8-11, 1-12mm
Mesio-distal diameter of crown	- 9mm
Mesio-distal diameter of crown at cervix	- 7mm
Bucco-lingual diameter of crown	- 11mm
Bucco-lingual diameter of crown at cervix	- 10mm
curvature of cervical line - Mesial	- 1mm
curvature of cervical line - Distal	- 0mm

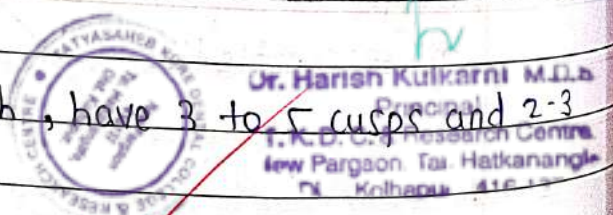
TRAITS

1. Set Trait

- Permanent mandibular 2nd molar is larger in overall size
- Permanent teeth are more yellowish in color.
- Permanent molars are less constricted at cervical part
- Permanent 2nd molar is smaller than the 1st molar.
- Permanent molar have long apex, more pronounced ridges and deeper occlusal surface.
- Roots of permanent molars are thick, short and less spread.

2. Class Trait

- Molars are largest teeth in arch, have 3 to 5 cusps and 2-3 roots.
- Molars are wide mesiodistally and shorter cervico-occlusally than all crowns.
- All molars tapers from buccal to lingual side except permanent



maxillary 1st molar.

3. Arch Trait

- Mandibular molar have 5 or 4 cusp and 2 roots
- Crown wider mesiodistally than faciolingually.
- Buccal crown surface convex and tipped lingually.
- Two nearly equal sized lingual cusp.
- No oblique ridge and no cusp of Carabelli.
- Occlusally rectangular or pentagonal crown shape.

TYPE TRAIT

BUCCAL ASPECT

1. Outline and Size

- It is trapezoidal in shape with shortest uneven side located cervically and longest uneven side located occlusally. Crown of 2nd molar is short and narrow mesiodistally.

2. Number and size of cusp

- In mandibular 2nd molar only 4 cusps can be seen. Two buccal cusp in the foreground while only part of other 2 lingual cusp are seen in background. The mesiobuccal cusp appear largest followed by distobuccal cusp.

3. Mesial and distal outline

- Both outlines are concave from cervical line to their respective contact area and from here onwards it becomes convex.



Dr. Harish Kulkarni M.D.S.
Principal
J.K.D.C. Dental Centre
New Parganah, Tal. Hatkanangla
Dist. Kolhapur 416 122

4. Contact Areas -

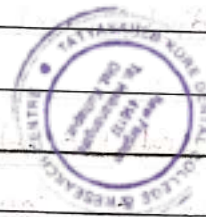
Mesial - Junction of occlusal surface and middle $\frac{1}{3}$ rd.
 Distal - Middle of middle $\frac{1}{3}$ rd.

5. Buccal surface morphology -

- Buccal surface is convex at its cuspal portion with developmental groove separating the two buccal cusp. However just beneath the termination of buccal developmental groove. A developmental depression can be noted running in mesiodistal direction above the buccal cervical ridge.

6. Root

- From buccal aspect 2 roots are seen i.e. mesial and distal roots. Mesial root is more curved than distal root. Mesial outline of mesial root curves mesially below the cervical line till the root apex. The mesial root apex is located below mesiobuccal cusp. The distal outline of mesial root is concave from bifurcation point till the root apex. The distal root is less curved and shows curvature at its apical $\frac{1}{3}$ rd. Distal root apex is more pointed than mesial root apex and located below the distal contact area. The bifurcation point located at 3mm below the cervical line or deep developmental root of second molar appears shorter with long axis nearly parallel.



Dr. Harish Kulkarni M.D.S.
 Principal
 T. K. D. C. & Research Centre
 Jawahar Nagar, Tal. Hatkanangla
 Dist. Kolhapur 416 122

LINGUAL ASPECT

1. Number and Size of cusp.

- 2 cusp can be seen mesiolingual and distolingual cusp out of 2 lingual cusp mesiolingual cusp is largest and tallest. Both cusp ridges of mesiolingual cusp meet at an obtuse angle (less pointed cusp).

2. Lingual Developmental Groove

- This groove separates the 2 lingual cusp i.e. mesiolingual and distolingual cusp and extends downwards on to the lingual surface of crown at a short distance.

3. Mesial and distal outline

- Mesial outline from cervical line till mesial contact area is convex. Distal outline from cervical line till distal contact area is straight.

4. Cervical Line

- It appears irregular and curves apically.

5. Root

- From this aspect 2 roots appear to be longer than buccal aspect this is because cusp ridges and cervical line are at higher level. therefore the bifurcation point is also located about 1 mm cervical than on buccal aspect.

MESIAL ASPECT

1. Outline and shape

- It is rhomboidal in shape with shortest uneven side located occlusally and longest uneven side located cervically. This is the characteristic feature of all posterior mandibular teeth mesiodistal width is greater than buccolingual width.

2. Number and size of cusp

- From mesial aspect only 2 cusps i.e. mesiolingual and mesiobuccal cusp and one mesial root can be seen only. Mesiolingual cusp appears taller among all the cusps.

3. Buccal outline

- Buccal outline above cervical line is convex till middle of cervical $\frac{1}{3}$ rd. This convexity from buccal ridge which is not so prominent is second molar.

4. Lingual outline

- It is straight from cervical line till crest of curvature from here onwards it is convex till mesiolingual cusp tip.

5. Marginal Ridges

- Mesial marginal ridge is concave buccolingually and it is continuous with mesial cusp ridges of mesiobuccal and the mesiolingual cusp.



Dr. Harish Kulkarni M.D.S.
Principal
J.K.D.C. & Research Centre
Jai Pargaon, Tal. Hatkanangla

6. Crest of curvature

Buccal - Middle of cervical $\frac{1}{3}$ rd

Lingual - Middle of middle $\frac{1}{3}$ rd.

7. Cervical line

- It curves occlusally by above 1mm.

8. Root

- Buccal outline of both roots are straight from cervical line till junction of cervical and middle $\frac{1}{3}$ rd after which it curves lingually till the root apex lingual outline is straight till the junction of middle and apical $\frac{1}{3}$ rd here after it curves buccally till the root apex.

DISTAL ASPECT

1. Outline and shape

- It is rhomboidal in shape with shortest uneven side located occlusally and longest uneven side located cervically. The entire crown shows a lingual tilt to root axis. Mesiodistal width is greater than its buccolingual width.

2. Number and size of cusps

- From distal aspect 2 cusp i.e. distolingual and distobuccal cusp and one distal root can be seen.



Dr. Harish Kulkarni M.D.S.
Principal
T.K.D.C. & Research Centre
New Pargson, Tal. Hatkanangle
Dist. Kolhapur 416 127

3. Buccal Outline

- Buccal outline above cervical line is convex till middle of cervical $\frac{1}{3}^{\text{rd}}$ this convexity from buccal ridge which is not so prominent in 2^{nd} molar.

4. Lingual Outline

- It is straight from cervical line till crest of curvature from here onwards it is convex till distolingual cusp tip.

5. Marginal Ridge

- Distal marginal ridge is shorter bucco-lingually. (Distal taper) and it is continuous with distal cusp ridge of distobuccal cusp and distolingual cusp.

6. Cervical line

- It curves occlusally by above 1 mm.

7. Crest of curvature

Buccal - Middle of cervical third

Lingual - Middle of middle third.

8. Root

- Buccal outline of both roots are straight from cervical line till junction of cervical and middle $\frac{1}{3}^{\text{rd}}$ after which it curves lingually till the root apex. Lingual outline is straight till the junction of middle and apical $\frac{1}{3}^{\text{rd}}$ here after it curves buccally till root apex.

OCCLUSAL ASPECT

1. Crown Outline

- Crown outline appears roughly rectangular. Mesiodistal dimension appears more than of buccolingual dimensions. Crown tapers distally as well as lingually due to lingual inclination of crown much of buccal surface can be seen.

2. Number and Size of Cusp

- 4 cusp can be seen mesiobuccal is largest cusp followed by mesiolingual, distobuccal and distolingual cusp.

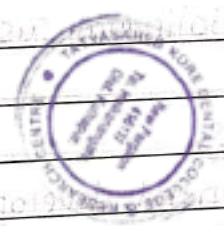
3. FOSSA

1. Central Fossa

- It is concave and bounded by
 - Distal slope of mesiobuccal cusp.
 - Mesial and distal slope of distobuccal cusp.
 - Mesial slope of distobuccal cusp.
 - Distal slope of mesiobuccal cusp.

2. Mesial Triangular Fossa

- Located distal to mesial marginal ridge
 - Mesial slope of mesiobuccal cusp.
 - Mesial marginal ridge
 - Mesial slope of mesiolingual cusp.



Dr. Harish Kulkarni, M.D.S.
Principal
T.K.D.C. & Research Centre
New Pargaon, Tal. Hatkanangale
Dist. Kolhapur 416 122

3. Distal Triangular Fossa

- It is located mesial to distal marginal ridge
- It is bounded by distal slope of distobuccal and distolingual cusp and distal marginal ridge.

4. Mesial Triangular Fossa

1. central pit - In the center of central fossa.
2. Mesial pit - At the base of mesial triangular fossa.
3. Distal pit - At the base of distal triangular fossa.

5. Distal Triangular Fossa

- Transverse ridge
- It is formed by union of triangular ridge of mesiobuccal cusp and mesiolingual cusp and other by union of distobuccal and distolingual cusp.
- Marginal ridge
 - Mesial marginal ridge is concave buccolingually and it continuous with mesial cusp ridge of mesiobuccal cusp and mesiolingual cusp.
 - Distal marginal ridge is shorter and placed more cervically and it is continues with distal cusp ridge of distobuccal and distolingual cusps.

6. Pits.

1. Central developmental groove
 - It originates in central pit in central fossa.



Dr. Harish Kulkarni, M.D.S.
Principal
T. K. D. C. & Research Centre
New Pargaon, Tal. Hatkanangle
Tal. Kolhapur 416 122

- It takes zig-zag path mesiodistally and terminates at mesial and distal triangular fossae.

2. Buccal Developmental Groove

- It originates from central developmental groove

- This groove separates two buccal cusps i.e. mesiobuccal cusp and distobuccal cusp and extends posteriorly over two cusps.

3. Lingual Developmental Groove

- It also originates from central developmental groove.

- This groove separates two lingual cusps i.e. mesiolingual and distolingual cusps and extends posteriorly over two cusps.

ENDODONTIC ANATOMY

1. Buccolingual Section

- Pulp chamber appears large

- Sometimes it extends down into the root

- The pulp horns are quite prominent to both molars

- One mesial and one distal root canal is covered with apical foramen usually extending to root tip.

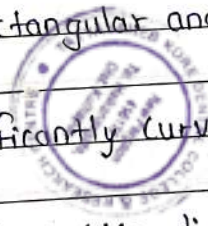
2. Mesiodistal Section

- Pulp chamber of both molars appear rectangular and larger.

- Pulp horns usually quite prominent

- Mesial root and root canals are significantly curved with apical foramen extending at root tip.

- Mesial root generally shows two canals while distal root



Dr. Harish Kulkarni M.D.S.
Principal
Research Centre
New Pargaon, Tal. Hatkanangli
Dist. Kolhapur 416

3. Cervical cross section

- Pulp chamber has two funnel shaped openings in root canals they are buccal and lingual.
- Opening of distal root is wider.

VARIATIONS

- Mesiodistal measurements at contact areas are less.
- Root twisted, extra length.
- Root short for longer crown
- Very small specimen root short
- Root thick and malformed.
- Dwarfed crown and root extraordinarily long.
- Crown wide mesiodistally at cervix, short root.

ACTH



Dr. Harish Kulkarni M.D.S
Principal
T. K. D. C. & Research Centre,
New Pargaon, Tal. Hatkanangle,
Dist. Kolhapur 416 127