牙體形態學 Dental morphology

Morphology of the Permanent Incisors

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學習目標

能辨識及敘述牙齒之形態、特徵與功能意義，並能應用於臨床診斷與治療

1. 牙齒形態相關名辭術語之定義與敘述
2. 牙齒號碼系統之介紹
3. 牙齒之顎間關係與生理功能形態之考慮
4. 恒齒形態之辨識與差異之比較
5. 乳齒形態之辨識與差異之比較
6. 恒齒與乳齒之比較
7. 牙髓腔形態
8. 牙齒之萌出、排列與咬合
9. 牙體形態學與各牙科臨床科目之相關
10. 牙科人類學與演化發育之探討

參考資料

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2. Jordan, R.E. and Abrams, L.: Kraus' Dental Anatomy and Occlusion, ed. 2, Mosby Year Book, St. Louis,1992.
3. Ash, M.M.and Nelson, S.J.: Wheeler's Dental Anatomy, Physiology and Occlusion, ed. 8, W.B. Saunders Co., 2003.

Summary

The course of Dental Morphology provides the student with knowledge in the morphological characteristics of the teeth and related oral structures upon which a functional concept of intra-arch relationships may be based for the clinical application to patient assessment, diagnosis, treatment planning, and oral rehabilitation.

Topics

I. General description of incisors
   - A. Functions of incisors
   - B. Morphology of incisors
   - C. Class traits for all incisors
   - D. Arch traits that distinguish maxillary from mandibular incisors

Topics

II. Maxillary incisor type traits: similarities and differences useful to distinguish maxillary central incisors from maxillary lateral incisors (From all views)
   - A. Maxillary incisors From the labial view
   - B. Maxillary incisors From the lingual view
   - C. Maxillary incisors From the proximalviews
   - D. Maxillary incisors from the incisal view
   - E. Variations in maxillary incisors

Topics

III. Mandibular incisor type traits: similarities and differences useful to distinguish mandibular central incisors from mandibular lateral incisors (from all views)

A. Mandibular incisors from the labial view
B. Mandibular incisors From the lingual view
C. Mandibular incisors From the proximal views
D. Mandibular incisors From the incisal view
E. Variations in mandibular incisors

Using the maxillary right lateral incisor as a presentative example for all incisors, refer to of the Appendix 1 while reading Section I of this chapter. Within this text, the word "Appendix" followed by a number and letter (e.g., Appendix la) is used to denote the appendix page (number 1) and item (letter a) being referenced. The appendix pages are designed to be torn out to facilitate study and minimize page turns as you read the main text. Other appendix pages will be referred to throughout this and several chapters that follow. Notice that the trait being demonstrated by each letter on the appendix pages is described on the back of each appendix page.

Section I. General description of incisors

OBJECTIVES

This section is designed to prepare the learner to perform the following:

~ Describe the functions of incisors.

~ List class traits common to all incisors.

~ List arch traits that can be used to distinguish maxillary From mandibular incisors.

~ From a selection of 'all teeth, select and separate out the incisors.

~ Divide a selection of all incisors into maxillary and mandibular (using arch traits).

Refer to Figure 4-1 or, better yet, to a model of the complete set of permanent teeth while becoming familiar with the location and universal number of each incisor. There are four maxillary incisors: two central incisors (first maxillary incisors: universal numbers 8 and 9) and two lateral incisors (second maxillary incisors: numbers 7 and 10). There are four mandibular incisors: two central incisors (first mandibular incisors: numbers 24 and 25) and two lateral incisors (second mandibular incisors: numbers 23 and 26).

Section I. General description of incisors

Central incisors are located on either side in their respective arch (maxillary or mandibular) with their mesial surfaces next to one another at the midline, usually in contact. (If there is a space between these or other teeth, it is called a diastema [die a STEE mah] .) Their distal surfaces contact the mesial surfaces of the lateral incisors. Lateral incisors are therefore just distal to central incisors, while their mesial surfaces are in contact with the distal surfaces of the adjacent c entral incisors. Their distal surfaces contact the canines. (Did you know that the tusks on an elephant are maxillary central incisors? [Recall Table 1-1.] Elephants have the largest diastema in the world, large enough for the massive trunk between their central incisors.)

Section I. General description of incisors

A. FUNCTIONS OF INCISORS

The mandibular incisors function with the maxillary incisors to (a) cut food (mandibular incisors are moving blades against the stationary maxillary incisors), (b) enable articulate speech (consider the pronunciation of a toothless person), and (c) help to support the lip and maintain an esthetic appearance. By current standards, a person lacking one or more incisors bas an undesirable appearance. (Did you ever hear the song "All I want for Christmas are my two front teeth"?) Their fourth function, by fitting the incisal edges of the mandibular incisors against the lingual surfaces of the maxillary incisors, is to (d) help guide the mandible posteriorly during the final phase of closing just before the posterior teeth contact.

Section I. General description of incisors

B. MORPHOLOGY OF INCISORS

The morphology, or anatomy, of a tooth can best be studied by considering the shape (outline) and con tours (ridges and grooves) visible on each tooth surface. All tooth crowns have five surfaces, that is, four side surfaces plus a chewing or cutting surface or edge, depending on whether it is a posterior tooth (chewing in the back part of the mouth) or an anterior tooth (cutting in the front of the mouth), In the study of tooth morphology, the description and location of the ridges, grooves, convexities, and concavities on each tooth surface should be well fixed in your mind in order to describe and identify teeth by arch, class, type, and side of the mouth; to reproduce tooth contours when constructing crowns, bridges, and fillings; to remove deposits (tartar and calculus) skillfully from crowns and roots; or to finish and polish existing restorations.

B. MORPHOLOGY OF INCISORS

When discussing traits, the external morphology of an incisor is customarily described from each of five views: (a) facial (or labial), (b) lingual (tongue side), (c) mesial, (d) distal, and (e) incisal.

Due to similarities between the mesial and distal, these surfaces will be discussed together in this text under the heading of proximal surfaces.

B. MORPHOLOGY OF INCISORS

In the study of any single type of human tooth, such as the maxillary central incisor, it is necessary to realize that this tooth varies in form in different people as much as facial features vary from one person to another. One study of a collection of 100 maxillary central incisors showed considerable difference in such characteristics as size, relative proportions, and color.~ Information in this text on crown length, crown width, and root length is taken from measurements of extracted teeth by Dr. Woelfel and his dental hygiene students at Ohio State University between 1974 and 1979. Teeth were collected from dentists in Ohio. The ranges indicate how greatly the same tooth can vary in size.

B. MORPHOLOGY OF INCISORS

Study Table 4-lA and B to compare average measurements. Notice that the crown of the maxillary central incisor is longer than all other incisor crowns, and the mesiodistal width of the roots of mandibular incisors are considerable narrower (ribbon-like) compared to maxillary incisors. Also, notice the range of difference between measurements for the same tooth type. For example, among the 398 maxillary central incisors measured, one central incisor was 16 mm longer than the shortest one. There was a lesser, but still considerable, range in crown length (6 mm) and in crown width (3 mm) from the smallest to the largest tooth found in this sample. 5pecific data collected from Dr. Woelfel's studies are presented throughout the text in brackets [like this].

Section I. General description of incisors

C. CLASS TRAITS FOR ALL INCISORS

First, consider the class traits of incisors, that is, traits that apply to all incisors. Developmental lobes: Recall from Chapter 3 that the facial surface of all anterior teeth forms from three labial portions called the mesial, middle, and distal lobes. Incisors usually have two shallow vertical developmental depressions separating the parts of the facial surface formed by these three lobes. These depressions are denoted by the subtle shading on the drawings in Figure 4-4. The three lobes also contribute to three rounded "bumps" on the incisal edge called mamelons, located on the incisal edges of newly erupted incisor teeth (Fig. 4-2). Finally, remember that a fourth (lingual) lobe forms the lingual bulge called a cingulum. See Table 4-2 for a summary of the number of lobes forming each type of incisor.

C. CLASS TRAITS FOR ALL INCISORS

1. CHARACTERISTICS OF ALL INCISORS FROM THE FACIAL VIEW

Refer to Appendix 1 while studying the similarities of all incisors. (Note that there may be exceptions to the general incisor traits presented here, and these are noted in capital letters.) All incisor crowns, when viewed from the facial, have a relatively straight or slightly curved incisal edge (versus all other teeth that have one or more pointed cusp tips). Their crowns are relatively rectangular, longer incisogingivally than wide mesiodistally (Appendix la).

1. CHARACTERISTICS OF ALL INCISORS FROM THE FACIAL VIEW

They taper (narrower) from the widest mesiodistal areas of proximal contact toward the cervical line and are therefore narrowest in the cervical third and broader toward the incisal third (Appendix lb). Incisor crown outlines are more convex on the distal than on the mesial sides EXCEPT the mandibular central, which is symmetrical (Appendix lc). Incisor mesioincisal angles are more acute (sharper) than distoincisal angles EXCEPT on the symmetrical mandibular central incisors, where the angles are not noticeably different (Appendix ld).

1. CHARACTERISTICS OF ALL INCISORS FROM THE FACIAL VIEW

Incisor crown contact areas (greatest height of contour proximally) on mesial surfaces are located in the incisal third. On the distal surfaces, the contact areas are more cervical than the mesial EXCEPT on the distal of the mandibular central, which is at the same level as the mesial due to its symmetry (Appendix le). Before wear, the incisal edge of all incisors EXCEPT the symmetrical mandibular central slopes cervically (appears shorter) toward the distal. Finally, the cervical line curves toward the apex in the middle of the facial (and lingual) sides (Appendix 1l).

1. CHARACTERISTICS OF ALL INCISORS FROM THE FACIAL VIEW

Incisor roots, when viewed from the facial, taper become more narrow) from the cervical line to the apex (Appendix lf). They are wider faciolingually than mesiodistally EXCEPT that maxillary central incisors, where the mesiodistal width is approximately the same as the laciolingual thickness (compare the widths of facial and mesial root surface by viewing the facial and mesial root views in Appendix lg). Incisor roots may bend in the apical one-third EXCEPT maxillary central incisor roots, which are not as likely to bend; this bend is more often toward the distal (Appendix lb). Incisor roots are longer than the crowns (Appendix li).

C. CLASS TRAITS FOR ALL INCISORS

2. CHARACTERISTICS OF ALL INCISORS FROM THE LINGUAL VIEW

Incisor crowns, when viewed from the lingual, have a narrower lingual surface because the mesial and distal sides converge lingually (best appreciated from the incisal view, Appendix lj). The mesial and distal marginal ridges converge toward the lingual cingulum (Appendix lk).

C. CLASS TRAITS FOR ALL INCISORS

3. CHARACTERISTICS OF ALL INCISORS FROM THE PROXIMAL VIEWS

Incisor crowns, when viewed from the proximal, are wedge shaped or triangular (Appendix lm). They have a facial height of contour (greatest bulge) that is in the cervical third just incisal to the cervical line and are therefore more convex cervically than incisally on their labial surfaces (Appendix ln). The lingual height of contour is also in the cervical third on the cingulum, but the contour of the incisal two-thirds of the lingual surface is concave from cingulum area to the incisal edge.

3. CHARACTERISTICS OF ALL INCISORS FROM THE PROXIMAL VIEWS

Therefore, the lingual outline is S-shaped, being convex over the cingulum and concave from the cingulum nearly to the incisal edge (Appendix lp). The lingual concavity on the maxillary anterior teeth is a most important guiding factor in the closing movements of the lower jaw because the mandibular incisors fit into this concavity and against marginal ridges of the maxillary incisors as maximum closure or occlusion is approached. The cervical line proximally curves toward the incisal edge. The resultant curve is greater on the mesial surface than on the distal (compare the mesial and distal views in Appendix lo).

3. CHARACTERISTICS OF ALL INCISORS FROM THE PROXIMAL VIEWS

The incisor roots, when viewed from the proximal, are widest at the cervical and gradually taper to a rounded apex (Appendix lf). All may have a longitudinal depression in the middle third of the mesial root surface, but the mesial root depression is most evident on mandibular incisors, and is minimal or not present on the mesial root surface of a maxillary incisor. (Only mandibular central and lateral incisors also have a prominent longitudinal depression on the distal root surface.)

C. CLASS TRAITS FOR ALL INCISORS

4. CHARACTERISTICS OF ALL INCISORS FROM THE INCISALVIIZW

The crowns, when viewed from the incisal, have a lingual fossa that is concave just incisal to the cingulum. They have an incisal ridge that terminates mesiodistally at the widest portion of the crown (Appendix Iq). The labial outline is broader and less curved than the convex lingual outline (Appendix Ir). Marginal ridges converge toward the cingulum (Appendix Ik), and the crown outline tapers from proximal contact area toward the cingulum (Appendix Ij), resulting in a narrower lingual than labial side.

D. ARCH TRAITS THAT DISTINGUISH MAXILLARY FROM MANDIBULAR INCISORS

Refer to Appendix 2 while reading about these arch traits that can be used to distinguish mandibular incisors from maxillary incisors. The mandibular incisors (relative to the maxillary incisors) are generally smaller than maxillary incisors. Mandibular central and lateral incisors look more alike and are more nearly the same size in the same mouth, compared to greater differences between maxillary central and lateral incisors. Mandibular incisor crowns are flatter than maxillary incisor crowns on the mesial and distal sides (Appendix 2q) and have contact areas located nearer the incisal ridge than maxillary incisors (Appendix 2r and 2i).

D. ARCH TRAITS THAT DISTINGUISH MAXILLARY FROM MANDIBULAR INCISORS

Mandibular incisor crowns are relatively wider faciolingually than mesiodistally compared to maxillary central incisors, which are wider mesiodistally (Appendix 2h). Mandibular incisor crowns also have smoother lingual surfaces with less prominent anatomy than maxillary crowns, (which have deeper fossae and more pronounced marginal ridges Appendix 2m). Finally, mandibular incisor roots are longer in proportion to their crowns than are maxillary incisors.

D. ARCH TRAITS THAT DISTINGUISH MAXILLARY FROM MANDIBULAR INCISORS

Incisal edges of mandibular incisors are usually positioned lingual to the root axis line, whereas the incisal edges of maxillary incisors are more often on or labial to the root axis line (best seen from the proximal views on Appendix 2o). Attrition on the incisal edges of incisors that occurs when shearing or incising food results in tooth wear that is in a different location on maxillary incisors compared to mandibular incisors (Fig. 4-3). This wear occurs when the labial part of the incisal edges of mandibular incisors slides forward and downward while contacting the lingual surface and part of the incisal edge of opposing maxillary incisors.

D. ARCH TRAITS THAT DISTINGUISH MAXILLARY FROM MANDIBULAR INCISORS

The wear results in a shiny, fiat, polished surface of enamel on the incisal edge called a facet [FAS it]. Assuming a normal tooth relationship, facets that commonly form on mandibular incisors are more on the labial slope of the incisal edge, sloping cervically toward the labial. In contrast, facets on maxillary incisors occur more on the lingual slope of the incisal edge, sloping cervically toward the lingual fossa and may occur on the lingual marginal ridges.

Section II. Maxillary incisors type traits

OBJECTIVES

~ Describe the type traits that can be used to distinguish the permanent maxillary central incisor from the maxillary lateral incisor.

~ Describe and identify the labial, lingual, mesial, distal, and incisal surfaces for all maxillary incisors.

~ Assign a universal number to maxillary incisors present in a mouth (or on a model) with complete dentition. If possible, repeat this on a model with one or more maxillary incisors missing.

~ Select and separate maxillary incisors from a selection of all teeth on a bench top.

~ Holding a maxillary incisor, determine whether it is a central or a lateral and right or left. Then assign a universal number to it.

Section II. Maxillary incisors type traits

A. MAXILLARY INCISORS FROM THE LABIAL VIEW LEARNING EXERCISE

Examine several extracted maxillary central and lateral incisors and/or tooth models as you read. Hold these teeth root up and crown down, as they are positioned in the mouth. Also, tear out and refer to Appendix 2 and refer to Figure 4-4 as you study about the labial traits of incisors.

A. MAXILLARY INCISORS FROM THE LABIAL VIEW LEARNING EXERCISE

1. CROWN SHAPE OF MAXILLARY INCISORS FROM THE LABIAL VIEW

The crown of the maxillary central incisor is the longest [average: 11.2 mm] of all human tooth crowns (although maxillary canines are the longest teeth overall) and is also the widest of all incisors. (One text states that the mandibular canine crown is the longest crown overall?) The crown is usually longer (incisogingivally) than wide (mesiodistally) [averaging 2.6 mm longer] (Appendix 2a). The crown is narrowest in the cervical third and becomes broader toward the incisal third.

1. CROWN SHAPE OF MAXILLARY INCISORS FROM THE LABIAL VIEW

There is great morphologic variation in the maxillary lateral incisor. It may be missing altogether; it may resemble a small slender version of a maxillary central incisor; it may be quite asymmetrical; or it may be peg shaped. Normally, the labial surface of the maxillary lateral incisor is much like that of the central incisor, but it is more convex or less flat mesiodistally and over all it appears narrower mesiodistally. Mamelons, and particularly labial depressions, are less prominent and less common than on the central incisor. The crown of the average maxillary lateral incisor is narrower [about 2 mm] than the crown of the central incisor, and the root is longer [about 0.5 mm], giving this entire tooth a long, slender look (Appendix 2a and 2d). The crown outline is less symmetrical than the central incisor.

A. MAXILLARY INCISORS FROM THE LABIAL VIEW LEARNING EXERCISE

2. MAXILLARY INCISOR INCISAL-PROXIMAL CROWN ANGLE FROM THE LABIAL VIEW

On maxillary central incisors, the corner or angle formed by the mesial and incisal surfaces (called the mesioincisal angle) forms nearly a right angle. The distoincisal corner is more rounded, and the angle is slightly obtuse or greater than a right angle (Appendix 2b).

On maxillary lateral incisors, both the mesioincisal and distoincisal angles are more rounded than on the central incisor (Appendix 2b). The mesioincisal angle is more acute than the distoincisal angle, accentuated by the incisal edge sloping cervically toward the distal (more so than on the maxillary central incisor) (Appendix 2c).

A. MAXILLARY INCISORS FROM THE LABIAL VIEW LEARNING EXERCISE

3. PROXIMAL CONTACT AREAS OF MAXILLARY INCISORS FROM THE LABIAL VIEM

For all human teeth, contact areas are located in one of three places: in the incisal (occlusal) third, at the junction of the incisal and middle thirds, or in the middle third of the crown. Tooth contact areas are not normally located in the cervical third of teeth. The mesial contacts of both a maxillary central and lateral incisor are in the incisal third, very near the incisal edge for the central and slightly more cervical for the lateral. The distal contacts of both incisors are more cervical than the mesial: for a maxillary central incisor, it is near the junction of the incisal and the middle thirds; for the maxillary lateral incisor it is even more cervical, sometimes in the middle third (making this contact the most cervical for any incisor).

A. MAXILLARY INCISORS FROM THE LABIAL VIEW LEARNING EXERCISE

4. ROOT-TO-CROWN PROPORTIONS OF MAXILLARY INCISORS FROM THE LABIAL VIEW

On a maxillary central incisor, the root is only slightly longer than the crown [root-to-crown ratio is 1.16:1] (Appendix 2d). The maxillary lateral incisor root is longer than on the central [by 0.4 mm with a root-to-crown ratio of 1.37, comparing measurements of 398 maxillary central incisors and 295 lateral incisors]. This results in a root that appears longer in proportion to the crown than on the maxillary central incisor.

A. MAXILLARY INCISORS FROM THE LABIAL VIEW LEARNING EXERCISE

5. ROOT SHAPE OF MAXILLARY INCISORS FROM THE LABIAL VIEW (COMPARED WITH THE PROXIMAL VIEW)

The root of the maxillary central incisor is thick in the cervical third and narrows through the middle to a blunt apex. Its outline and shape is much like an ice cream cone. An apical bend is not common in the maxillary central incisor. The central incisor root is the only maxillary tooth that is as thick at the cervix mesiodistally as faciolingually [6.4 mm]. Compare the root width seen on the proximal view to the root width seen on the labial view in Appendix 2n.

The seven other types of maxillary teeth have roots that are thicker faciolingually than mesiodistally [ranging from 1.1 to 3.4 mm thicker for the lateral incisors and premolars, respectively]. Because of its shortness and conical shape, the maxillary central incisor root may be a poor risk to support a replacement tooth as part of a dental bridge (that is, a replacement tooth crown attached to, and supported by, two adjacent teeth). The root of a maxillary lateral incisor tapers evenly toward the rounded apex, and the apical end is commonly bent distally [12 of the 14 maxillary lateral incisors in Fig. 4-4, lower row].

B. MAXILLARY INCISORS FROM THE UNGUAL VIEW

Refer to Figure 4-5 while studying about the lingual traits of maxillary incisors.

1. LINGUAL FOSSAE OF MAXILLARY INCISORS FROM THE LINGUALVIEW

The large lingual fossa is located immediately incisal to the cingulum and bounded by two marginal ridges. The fossae of both maxillary incisors may be either shallow or deep, but either way they are usually deeper than fossae in mandibular incisors. Maxillary incisors with a deep lingual fossa and prominent mesial and distal marginal ridges are called "shovel-shaped incisors" (as seen in Fig. 4-2).

1. LINGUAL FOSSAE OF MAXILLARY INCISORS FROM THE LINGUALVIEW

[Dr. Woelfel examined the maxillary incisors on casts of 715 dental hygiene students and found that 32% of the central incisors and 27% of the lateral incisors have some degree of shoveling. The rest had smooth concave lingual surfaces without prominent marginal ridges or deep fossae.] The lingual fossa of the maxillary lateral incisor, although smaller in area, is often even more pronounced than on the central incisor. Note the deeper lingual fossae on many maxillary lateral incisors compared to central incisors in Figure 4-5.

B. MAXILLARY INCISORS FROM THE UNGUAL VIEW

2. CINGULUM OF MAXILLARY INCISORS FROM THE LINGUAL VIEW

The cingulum on the maxillary central incisor is usually well developed and is located off-center, distal to the root axis line that bisects the root longitudinally. (This can also be seen from the incisal view.) The cingulum of the maxillary lateral incisor is narrower than on the central, and it is almost centered on the root axis line (Appendix 2e).

B. MAXILLARY INCISORS FROM THE UNGUAL VIEW

3. MARGINAL RIDGES OF MAXILLARY INCISORS FROM THE LINGUAL VIEW

The mesial and distal marginal ridges vary in prominence on all maxillary incisors from one person to another. They may be prominent or inconspicuous. They may also have been worn smooth (forming facets) from attrition or chewing by the mandibular incisors. Due to the distal placement of the cinguhim and incisal edge slope cervically toward the distal, the mesial marginal ridge of the maxillary central incisor (from proximal contact area to cingulum) is longer than its distal marginal ridge.

On the maxillary lateral incisor, the distal marginal ridge is also shorter than the mesial, because the incisal edge slopes cervically from mesial to distal, even more so than on the central (Appendix 2f). The longer mesial marginal ridge of the maxillary lateral incisor outline is nearly straight, while the shorter distal marginal ridge outline is curved cervicoincisally, as on the central incisor. Note the shorter, more rounded distal marginal ridges compared to mesial marginal ridges in most lateral incisors in Figure 4-5.

B. MAXILLARY INCISORS FROM THE UNGUAL VIEW

4. MAXILLARY INCISOR PITS AND ACCESSORY RIDGES FROM THE LINGUAL VIEW

The lingual anatomy of the maxillary central incisor is variable. Its fossa may be deep but smooth, that is, with no lingual ridges bordering the fossa. Accessory lingual ridges, if present, are small or narrow, and extend vertically from the cingulum toward the center of the fossa. Accessory ridges may be one, two, three, or four in number (on Fig. 4-6 tooth #9 shows these accessory ridges most clearly). Tiny grooves separate these ridges. [Inspection of 506 maxillary central incisors by Dr. Woelfel revealed 36% with none of these ridges, 27% with one small ridge, 28% with two accessory ridges, 9% with three ridges, and only three teeth with four small ridges.]

The maxillary lateral incisor may also have small vertical accessory lingual ridges on and incisal to the cingulum, only they are fewer in number and less common. [Inspection of 488 maxillary lateral incisors by Dr. Woelfel revealed 64% with none of these small ridges, 32% with one small accessory ridge, and only 4% with two ridges.] On both maxillary incisors, but more frequently in lateral incisors, a lingual pit may be detectable at the incisal border of the cingulum where the mesial and distal marginal ridges converge. This pit may need to be restored or filled by the dentist to arrest decay, especially on maxillary lateral incisors. (Notice the deep lingual pits in several maxillary lateral incisors in Fig. 4-5.)

B. MAXILLARY INCISORS FROM THE UNGUAL VIEW

5. ROOT SHAPE OF MAXILLARY INCISORS FROM THE LINGUAL VIEW

The root contour of all maxillary incisors, like all anterior teeth, is convex and tapers, becoming narrower toward the lingual side (Fig. 4-5).

C. MAXILLARY INCISORS FROM THE PROXIMALVIEWS

Refer to Figure 4-7 while studying about the proximal traits of maxillary incisors.

1. INCISAL EDGE OF MAXILLARY INCISORS FROM THE PROXIMAL VIEWS

On both maxillary incisors, the incisal edge is commonly just labial to the root axis line or may be on the root axis line (Appendix 2o). When viewed from the distal, the distoincisal edge (comer) of the maxillary central incisor is on or just lingual to the axis line because of a slight distolingual twist of the incisal edge (seen incisally in Appendix 2g).

C. MAXILLARY INCISORS FROM THE PROXIMALVIEWS

2. CERVICAL LINE OF MAXILLARY INCISORS FROM THE PROXIMAL VIEIWS

As on all anterior teeth, the cervical line of all maxillary incisors curves incisally on the mesial and distal tooth surfaces, and this curvature is greater on the mesial surface than on the distal surface (as seen in Fig. 4-8 where a drawing of a mandibular canine is used to demonstrate this concept for all anterior teeth). This difference is most pronounced on the anterior teeth. The mesiai curvature of the cervical line of the maxillary central incisor is larger than for any other tooth [average: 2.8 mm] extending incisally one-fourth of the crown length, whereas the distal cervical line curves less [on average 2.3 mm]. The curvature of the mesial cervical line of the maxillary lateral incisor is also considerable but slightly less than on the central [averaging 2.5 mm or one-fourth of the crown length].

C. MAXILLARY INCISORS FROM THE PROXIMALVIEWS

3. HEIGHT (CREST) OF CONTOUR OF MAXILLARY INCISORS FROM THE PROXIMAL VIEWS

On the labial outline, the height of contour on all maxillary incisors is in the cervical third, just incisal to the cervical line. The outline becomes nearly flat in the middle and incisal thirds. On the lingual, the height of contour is also in the cervical third, on the cingulum.

C. MAXILLARY INCISORS FROM THE PROXIMALVIEWS

4. MAXILILARY INCISOR ROOT AND ROOT DEPRESSIONS FROM THE PROXIMAL VIEWS

The root of the maxillary central incisor is wide faciolingually at the cervix and tapers to a rounded apex. The lingual outline is nearly straight in the cervical third, then curves labially toward the tip in the middle and apical thirds. The labial outline is less convex (more nearly straight). In contrast, the root of the maxillary lateral incisor tapers more evenly throughout the root toward the blunt apex. From the proximal view, this flatter facial root outline and more convex lingual root outline is evident in many incisors (especially the central incisors) in Figure 4-7.

The mesial root surface of all maxillary incisors is likely to have a slight depression or be nearly flat, but the distal root surface is likely to be convex, without a longitudinal depression. The mesial longitudinal depression, when present, is in the middle third cervicoapically and slightly lingual to the center faciolingually. This mesial root depression is discernible in the shaded line drawings in Figure 4-7.

D. MAXILLARY INCISORS FROM THE INCISAL VIEW

Refer to Figure 4-9 when studying the incisal view. To follow this description, a maxillary incisor should be held in such a position that the incisal edge is toward you, the labial surface is at the top, and you are looking exactly along the root axis line. You should see slightly more lingual surface than labial surface if the incisal ridge is located somewhat labial to the root axis line (as in many teeth, especially the lateral incisors, in Fig. 4-9).

D. MAXILLARY INCISORS FROM THE INCISAL VIEW

1. MAXILLARY INCISOR CROWN PROPORTION FACIOLINGUALLY VERSUS MESIODISTALLY FROM THE INCISAL VIEW

The crown outline of the maxillary central incisor is noticeably wider mesiodistally than faciolingually [by an average of 1.5 mm] (Appendix 2h). The mesiodistal measurement of the lateral incisor crown is also greater than the labiolingual measurement but less so than on the central incisor [averaging only 0.4 mm greater]. On some lateral incisors, the two dimensions of the crown are almost the same size faciolingually as mesiodistaUy (Appendix 2h). Notice this difference in the proportion of maxillary central incisors (relatively wider mesiodistally) compared to lateral incisors in Figure 4-9.

D. MAXILLARY INCISORS FROM THE INCISAL VIEW

2. OUTLINE SHAPE OF MAXILLARY INCISOR CROWNS FROM THE INCISALVIEW

The crown shape of the maxillary central incisor is roughly triangular, with a broadly curved labial outllne forming the base that converges toward the cingulum. As was seen from the lingual view, the cingulum of the maxillary central incisor is slightly off-center to the distal, resulting in the mesial marginal ridge measuring longer than the distal marginal ridge (seen best from the lingual view in Appendix 2f).

The crown of the lateral incisor resembles the central incisor from this aspect, but its outline is more round or oval than triangular. The cingulum of the lateral incisor is nearly centered mesiodistally. Compare the triangular shape of the maxillary central incisor to the more round or slightly oval shape of the maxillary lateral incisor in Figure 4-10. These dilferences in outline shape are evident when comparing many central incisors (triangular) with lateral incisors (oval or round) in Figure 4-9.

D. MAXILLARY INCISORS FROM THE INCISAL VIEW

3. INCISAL RIDGE CONTOUR OF MAXILLARY INCISORS FROM THE INCISALVIEW

The incisal ridge or edge of the maxillary central incisor is 1.5-2 mm thick faciolingually and is slightly curved from mesial to distal, the convexity being on the labial side. It terminates mesially and distally at the widest portion of the crown (Appendix lg). The position of the distoincisal angle is slightly more lingual than the position of the mesioincisal angle, which then gives the incisal edge its slight distolingual twist as though someone took the distal half of the incisal edge and twisted it to the lingual (Appendix 2g). The incisal ridge of the lateral incisor is straighter mesiodistally than on the central incisors.

Be aware that for maxillary central incisors, the two traits just discussed (the cingulum displaced to the distal and the distolingual twist of the incisal edge) are dependent on how the tooth is held. When viewed from the incisal, the distolingual twist of the incisal edge is more obvious when the cingulum is aligned vertically (Appendix 2g), whereas the displacement of the cingulum to the distal is more obvious when the incisal edge is aligned horizontally (Appendix 2e). This is why these two traits are shown on the Appendix 2, showing two views of the same tooth, each having a slightly different alignment to accentuate the trait being discussed.

D. MAXILLARY INCISORS FROM THE INCISAL VIEW

4. LABIAL CONTOUR OF MAXILLARY INCISORS FROM THE INCISAL VIEW

The labial outline of the maxillary central incisor crown usually appears broadly convex, but on some teeth, the center portion may be nearly flat. The labial outline of the lateral indsor is noticeably more convex than that of the central incisor. This characteristic difference is clearly seen in many teeth in Figure 4-9.

E. VARIATIONS IN MAXILLARY INCISORS

Racial differences in the maxillary incisor teeth have been reported in dental literature. For example, a high incidence of shovel-shaped incisors has been observed in Mongoloid people, including many groups of American Indians. (Mongoloid pertains to a major racial division marked by a fold from the eyelid over the inner canthus, prominent cheekbones, straight black hair, small nose, broad face, and yellowish complexion. Included are Mongols, Manchus, Chinese, Koreans, Eskimos, Japanese, Siamese, Burmese, Tibetans, and American Indians.) White and black people are reported to have less frequent occurrences of this characteristic. Shovel-shape is the term commonly used to designate incisor teeth that have prominent marginal ridges and a deep fossa on their lingual surfaces (Fig. 4-11A).

E. VARIATIONS IN MAXILLARY INCISORS

A study of the skulls of American Indians who lived in Arizona about 1100 AD has disclosed the occurrence of incisor teeth that have a mesial marginal ridge on the labial surface and a depression, or concavity, on the mesial part of the labial surface just distal to this ridge. In these teeth, the distal part of the labial surface is rounded in an unusual manner. Such teeth have been referred to as "three-quarter double shovel-shaped," a descriptive, if ponderous, term. Labial "shoveling" has also been reported in some Eskimo people (see Figure 4-1 IB). Other anomalies will be presented in Chapter 12, such as palatal gingival grooves and peg-shaped lateral incisors.

Section III. Mandibular incisor type traits.

OBJECTIVES

This section is designed to prepare the learner to perform the following:

~ Describe the type traits that can be used to distinguish the permanent mandibular central incisor from the mandibular lateral incisor.

~ Describe and identify the labial, lingual, mesial, distal, and incisal surfaces for mandibular lateral incisors, and the labial, lingual, and incisal surfaces for the symmetrical mandibular central incisor (where the mesial may be difficult to distinguish from the distal).

~ Assign a Universal number to mandibular incisors present in a mouth (or on a model) with complete dentition. If possible, repeat this on a model with one or more mandibular incisors missing.

~ Select and separate mandibular incisors from a selection of all teeth on a bench top.

~ Holding a mandibular incisors, determine whether it is a central or lateral and right or left. Then assign a Universal number to it.

Section III. Mandibular incisor type traits.

A. MANDIBULAR INCISORS FROM THE LABIAL VIEW

Examine several extracted teeth and/or models as you read. Also, refer to the Appendix 2 and Figure 4-13 while you study the labial surface of mandibular incisors. Hold mandibular teeth with the root down and crown up, the position of the teeth in the mouth.

A. MANDIBULAR INCISORS FROM THE LABIAL VIEW

1. CROWN SHAPE OF MANDIBULAR INCISORS FROM THE LABIAL VIEW

Mamelons are usually present on newly emerged mandibular incisors and reflect the formation of the facial surface by three labial lobes (Fig. 4-12). Ordinarily, they are soon worn off by functional contacts against the maxillary incisors (attrition).

1. CROWN SHAPE OF MANDIBULAR INCISORS FROM THE LABIAL VIEW

All mandibular incisor crowns are quite narrow relative to their crown length, but the mandibular central incisor crown is the narrowest crown in the mouth and is considerably narrower than the maxillaly central incisor [on average only five-eighths, or 62%, as wide] (Appendix 2p). Unlike maxillary incisor crowns in the same mouth where the central is larger than the lateral, the mandibular lateral incisor crown is a little larger in all dimensions than the mandibular central incisor in the same mouth, as seen when comparing many central and lateral incisors in Figure 4-13.

1. CROWN SHAPE OF MANDIBULAR INCISORS FROM THE LABIAL VIEW

Further, the mandibular central incisor is so symmetrical that it is difficult to tell lefts from rights unless on full arch models or in the mouth. About the only difference to be found is the greater mesial than distal curvature of the cervical line (normally visible only on extracted teeth). This trait would not be helpful in identifying one remaining central incisor after an orthodontist has realigned the teeth and closed the spaces on either side. The fairly straight mesial and distal crown outlines taper, becoming narrower toward the convex cervical line.

1. CROWN SHAPE OF MANDIBULAR INCISORS FROM THE LABIAL VIEW

The crown of the mandibular lateral incisor resembles that of the mandibular central incisor, but it is slightly wider and is not as bilaterally symmetrical. Its crown tilts distally on the root, giving the impression that the tooth has been bent at the cervix (Appendix 2l). This makes the curved distal outline of the crown (from proximal contact area to cervical line) shorter than the flatter mesial crown outline. Look at the incisors in Figure 4-13 and notice the lack of symmetry of most mandibular lateral incisors relative to the symmetry of the central incisors.

1. CROWN SHAPE OF MANDIBULAR INCISORS FROM THE LABIAL VIEW

The labial surface of the all mandibular incisors is nearly smooth, but about half may have two shallow developmental depressions in the incisal third if you examine the surface closely. [Dr. Woelfel found these depressions on 48% of 793 centrals and on 51% of 787 lateral incisors.] The labial contour of all mandibular incisor crowns is convex mesiodistally in the cervical third (best viewed from the incisal) but nearly flat in the incisal third (feel it).

A. MANDIBULAR INCISORS FROM THE LABIAL VIEW

2. INCISAL PROXIMAL ANGLES OF MANOIBULAR INCISORS FROM THE LABIAL VIEW

The crown of the mandibular central incisor is nearly bilaterally symmetrical, so the mesioincisal and distoincisal angles are very similar: very slightly rounded, forming nearly right angles (Appendix 2j). The distoincisal angle may barely be more rounded than the mesioincisa] angle. The distoincisal angle of the mandibular lateral incisor, however, is noticeably more rounded than the mesioincisal angle (Appendix 2j). This helps to distinguish rights from lefts prior to attrition (wear).

A. MANDIBULAR INCISORS FROM THE LABIAL VIEW

3. PROXIMAL CONTACTAREAS OF MANDIBULAR INCISORS FROM THE LABIALVIEW

The mesial and distal contact areas of the mandibular central incisor are at the same level: in the incisal third (Appendix 2i) almost level with the incisal edge. The mesial and distal contact areas of the lateral incisor ale not at the same level (Appendix 2i). Although both the mesial and distal contacts are in the incisal third fairly near the incisal edge, the distal contact is noticeably cervical to the level of the mesial contact on lateral incisors. Refer to Table 4-4 for a summary of the location of proximal contacts for all incisors.

A. MANDIBULAR INCISORS FROM THE LABIAL VIEW

4. ROOT-TO-CROWN PROPORTIONS OF MANDIBULAR INCISORS FROM THE LABIAL VIEW

Long incisocervically but thin mesiodistally, mandibular incisor roots appear proportionally longer compared to their crown length than the maxillary incisors. Therefore, the root-to-crown ratio is larger for both mandibular incisors [both ratios are 1.43] compared to maxillary central and lateral incisors [1.16 and 1.37, respectively].

A. MANDIBULAR INCISORS FROM THE LABIAL VIEW

5. ROOT SHAPE OF MANDIBULAR INCISORS FROM THE LABIAL VIEW

The roots of all mandibular incisors appear very narrow mesiodistally but wide faciolingually (ribbon-like) (compare proximal to labial surfaces in Appendix 2n) and taper uniformly on both sides from the cervical line to the apex. The apical end may curve slightly to the distal (seen in some incisors in Fig. 4-13).

B. MANDIBULAR INCISORS FROM THE LINGUALVIEW

Refer to Figure 4-14 white studying the lingual surface of mandibular incisors.

LINGUAL ANATOMY (MARGINAL RIDGES, FOSSAE, AND CINGULUM) OF MANDIBULAR INCISORS FROM THE LINGUAL VIEW

B. MANDIBULAR INCISORS FROM THE LINGUALVIEW

The lingual fossae of all mandibular incisors are barely visible, smooth (without grooves, accessory ridges, or pits), and shallow,just slightly concave in the middle and incisal thirds (Appendix 2m). The adjacent marginal ridges, if distinguishable, are scarcely discernible, unlike with the maxillary incisors, where they are more likely to be quite prominent.

B. MANDIBULAR INCISORS FROM THE LINGUALVIEW

CINGULUM OF MANDIBULAR INCISORS FROM THE LINGUAL VIEW

As seen from the lingual view (or from the incisal view in Appendix 2k), the cingulum of the mandibular central incisor is convex, small, and centered on the axis line of the root. The cingulum of the lateral incisor lies slightly distal to the axis line of the root (similar to the maxillary central incisor), making the mesial marginal ridge slightly longer than the distal marginal ridge.

B. MANDIBULAR INCISORS FROM THE LINGUALVIEW

3. ROOT SHAPE OF MANDIBULAR INCISORS FROM THE LINGUAL VIEW

As with other incisor roots, the roots of all mandibular incisors are in general convex and slightly narrower on the lingual side than on the labial side. There are longitudinal depressions on both the mesial and distal sides of mandibular incisor roots (unlike the maxillary incisors, which normally only have mesial root depressions).

C. MANDIBULAR INCISORS FROMTHE PROXIMALVIEWS

Refer to Figure 4-15 while studying the proximal surfaces of the mandibular incisors,

C. MANDIBULAR INCISORS FROMTHE PROXIMALVIEWS

1. INCISAL EDGE ON MANDIBULAR INCISORS FROM THE PROXIMAL VIEWS

The incisal edges of both types of mandibular incisors are normally located on or lingual to the mid-root axis (Appendix 20). From the mesial side, the distolingual twist of the incisal ridge of the mandibular lateral incisor places the distal portion at the ridge even somewhat more lingual than on the mesial, unlike the mandibular central, which has no twist. Recall that the maxillary central incisor also exhibits a slight distolingual twist of the incisal edge.

C. MANDIBULAR INCISORS FROMTHE PROXIMALVIEWS

2. CERVICAL LINE ON MANOIBULAR INCISORS FROM THE PROXIMAL VIEWS

The cervical line on the mesial of all mandibular incisors normally has a relatively large curvature of about 2 mm, extending incisally over one-fourth of the short crown length. As on other anterior teeth, the curvature on the distal is less [an average of 0.4 mm less on mandibular central incisors and 0.6 mm less on the mandibular lateral incisors for 234 teeth measured].

C. MANDIBULAR INCISORS FROMTHE PROXIMALVIEWS

HEIGHT (CREST) OF CONTOUR OF MANDIBULAR INCISORS FROM THE PROXIMAL VIEWS

Like the other anterior teeth, the heights of contour or greatest bulge on the labial surface of all mandibular incisors are in the cervical third, just incisal to the cervical line. The labial contour of the crown from the height of contour to the incisal edge is so slightly curved that it often appears nearly flat, especially in the incisal half.

C. MANDIBULAR INCISORS FROMTHE PROXIMALVIEWS

The lingual contours or outlines of all mandibular incisors are convex over the cingulum but concave in the middle third and straightening out in the incisal third (a shallow S outline), similar to all anterior teeth. The height of contour of the lingual surface is in the cervical third on the cingulum.

C. MANDIBULAR INCISORS FROMTHE PROXIMALVIEWS

ROOTS AND ROOT DEPRESSIONS OF MANDIBULAR INCISORS FROM THE PROXIMAL VIEWS

The relatively large faciolingual dimension of the root at the cervix is very apparent from the proximal view. The cervical portion of the roots on the mandibular incisors is 2 mm wider faciolingually than mesiodistally. The facial and lingual outlines of the roots of all mandibular incisors are nearly straight from the cervical line in the middle third; then the root tapers with its apex on the axis line (seen in most roots in Fig. 4-15).

C. MANDIBULAR INCISORS FROMTHE PROXIMALVIEWS

The root contours of all mandibular incisors are noticeably less convex on their mesial and distal sides than the maxillary incisors (arch trait). In fact, there is usually a slight longitudinal depression on the middle third of the mesial and distal root surfaces, with the distal depression somewhat more distinct. See Table 4-5 for a summary of incisor root depressions.

D. MANDIBULAR INOSORS FROM THE INCISAL VIEW

To follow this description, the tooth should be held in such a position that the incisal edge is toward the observer, the labial surface is at the top, and the observer is looking exactly along the root axis line as in Figure 4-16. You will see slightly more of the labial than the lingual surface if the incisal ridge is just lingual to the root axis line.

D. MANDIBULAR INOSORS FROM THE INCISAL VIEW

1. CROWN PROPORTIONS OF MANDIBULAR INCISORS FROM TH E INCISAL VIEW

The labiolingual measurements of all mandibular incisor crowns are greater than the mesiodistal measurement [by about 0.4 mm]. This is ditferent from the measurements of the maxillary incisors, especially maxillary central incisors, which are considerably wider mesiodistally than faciolingually.

D. MANDIBULAR INOSORS FROM THE INCISAL VIEW

2. CROWN OUTLINE OF MANOIBULAR INCISORS FROM THE INCISAL VIEW

The mandibular central incisor is practically bilaterally symmetrical with little to differentiate the mesial half from the distal half. The greatest height of contour labially and lingually is centrally located. The mandibular lateral incisor is not bilaterally symmetrical (the cingulum is located distal to the mesiodistal midline, Appendix 2k), and this asymmetry makes it easy to select rights from lefts and to distinguish mandibular centrals from laterals, especially from this view (Fig. 4-16).

D. MANDIBULAR INOSORS FROM THE INCISAL VIEW

3. INCISAL RIDGE CONTOUR (ALIGNMENT) OF MANDIBULAR INCISORS FROM THE INCISAL VIEW

The incisal ridge or edge of the mandibular central incisor is at right angles to the labiolingual root axis plane. It is nearly 2 mm thick and runs in a straight line mesiodistally toward the contact areas. The ridge is lingual to the midroot axis. If you hold an extracted mandibular incisor with the root facing directly away front your sight line, slightly more of the labial than lingual surface is visible because of the lingually positioned incisal ridge.

D. MANDIBULAR INOSORS FROM THE INCISAL VIEW

3. INCISAL RIDGE CONTOUR (ALIGNMENT) OF MANDIBULAR INCISORS FROM THE INCISAL VIEW

If you were to align a mandlbular lateral incisor with its lingual cingulum directly exactly downward or vertically (represented roughly by the dotted vertical line with the arrow in Appendix 2k), the distal half of the incisal edge would be perceived as twisted lingually (called a distolingual twist). The twist of the incisal edge corresponds to the curvature of the mandibular dental arch; a tooth on the right side of the arch is twisted clockwise; one on the left is twisted counterclockwise. This twist is evident in most mandibular lateral incisors in Figure 4-16 and is an excellent way to distinguish mandibular central from lateral incisors, and to distinguish the right from left mandibular lateral incisor.

D. MANDIBULAR INOSORS FROM THE INCISAL VIEW

4. CINGULUM OF MANDIBULAR INCISORS FROM THE INCISAL VIEW

If, instead of aligning the tooth with the labiolingual root axis exactly vertical you were to align the incisal edge of a lateral incisor exactly horizontal, the cingulum of the mandibular lateral incisor would be slightly off center to the distal (Appendix 2k). Recall that this was also seen on the maxillary central incisor. In comparison, the cingulum on the mandibular central incisor is centered, smooth, and makes a narrow convex outline.

D. MANDIBULAR INOSORS FROM THE INCISAL VIEW

5. LABIAL CONTOUR OF MANDIBULAR INCISORS FROM THE INCISAL VIEW

The labial surfaces of all mandibular incisors are only slightly convex in the incisa] third labial to the incisal edge, but the outline in the cervical third is decidedly convex.

E. VARIATIONS IN MANDIBULAR INCISORS

There is more uniformity of shape in the mandibular incisor teeth than in other teeth. In some Mongoloid people, the cingulum of mandibular incisors is characteristically marked by a short deep groove running cervicoincisally. This groove is often a site of dental caries. In Chapter 12 on anomalies, you will see fused mandibular incisors, missing central incisors, and even a lateral incisor emerged distally to the canine.