It's time for...

Intraoral Radiographic Anatomy

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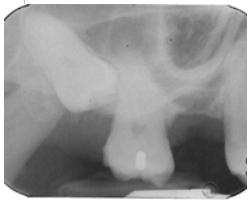
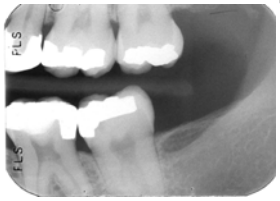
"Alas, poor Yorick!"

Radiographic Contrast

- The difference in densities between adjacent areas of the image
- Influenced by:
  - Subject contrast
  - Film contrast
  - Beam energy and intensity
  - Fog and scatter radiation

Radiographic Contrast





Radiographic Contrast

- By adjusting kVp, contrast can be varied
  - **High contrast films** can enhance detection of lesions where subject contrast between the lesion and healthy tissue is low
  - Examples include:
    - Caries
    - Apical lucencies

Radiographic Contrast

- By adjusting kVp, contrast can be varied
  - **Low contrast films** can enhance detection of subtle findings.
  - Examples include:
    - Calculus
    - Soft tissue outlines
    - Small changes in crestal bone

Radiographic Density

- The overall degree of darkening of the radiographic image. Three factors which determine radiographic density are:
  - Exposure
  - Subject thickness
  - Object density

Radiographic Density

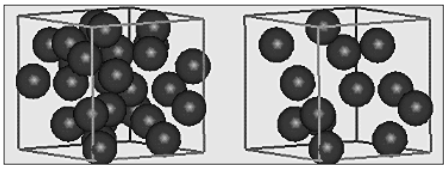
- Exposure
  - Determines the # of photons that are absorbed by the emulsion
  - Four exposure factors
    - kVp
    - ma
    - Impulses (time)
    - Source to film distance

Radiographic Density

- Subject thickness

Radiographic Density

- **Object Density**. The denser the object and higher the atomic #, the better the absorption of photons.



Radiographic Density

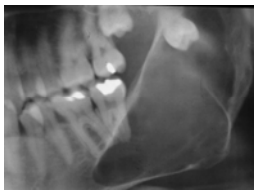
- In decreasing order of density:
  - Metallic restorations
  - Enamel
  - Dentin
  - Bone
  - Fat/fluid
  - Air

Subject Contrast

- Influenced by:
  - Thickness
  - Density
  - Atomic #

- Relatively large differences in Subject Contrast of oral structures allow the image to be seen

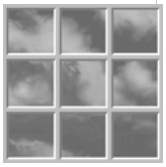
Subject Contrast



Definitions

- Radiodensity: The degree to which the subject attenuates the x-ray beam
- Radiopacity: An area of the image where the beam has been relatively highly attenuated
- Radiolucency: An area of the image where the beam has been relatively minimally attenuated

Radiolucencies



- Marrow spaces
- Foramina
- Canals (N.B. the walls of the canal are opaque)
- Fissures
- Fossae
- Meati
- Sinuses
- Sutures
- Dental pulp

Radiopacities

Bone 

- Condyles
- Eminences
- Processes
- Tuberosities
- Walls of canals
- Tubercles
- Ridges
- Trabeculae

Teeth 

- Enamel
- Dentin
- Cementum

The Teeth

- Enamel 90% mineralized
- Dentin 75% mineralized
- Cementum 50% mineralized
- Pulp Soft tissue

The Teeth

- Enamel
- Dentin
- Pulp

The Teeth

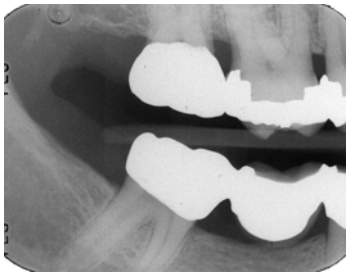
- Cervical burnout

The Teeth

- Concavities

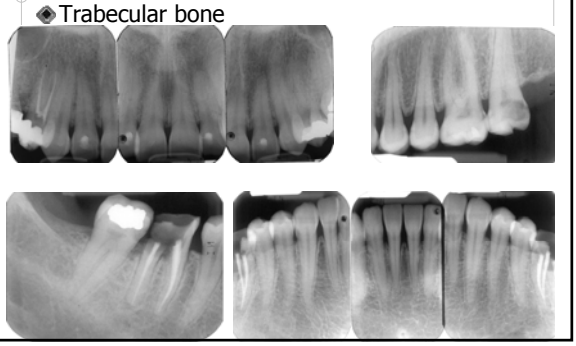
The Teeth

- Fluting of root surfaces

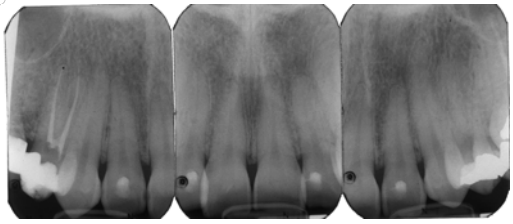


Supporting Structures of the Teeth

- Trabecular bone



Bone in the Anterior Maxilla

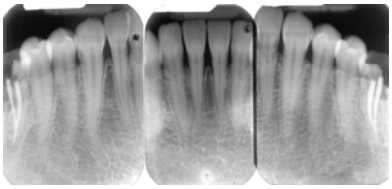


- Trabeculae are thin and numerous
- Small marrow spaces

Bone in the Posterior Maxilla

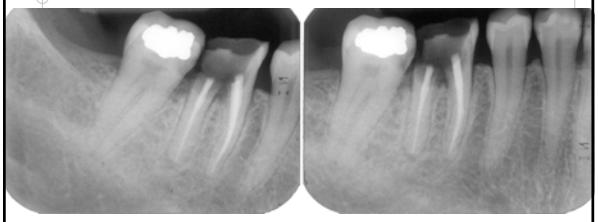
- Similar pattern to anterior maxilla
- Slightly larger marrow spaces

Bone in the Anterior Mandible



- Trabeculae are somewhat thicker than in the maxilla
- Plates are in a horizontal pattern

Bone in the Posterior Mandible

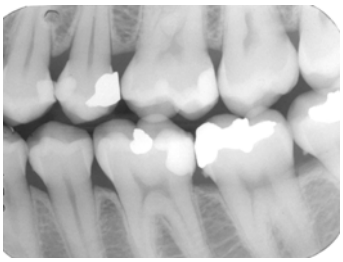


- Horizontal Plates
- Larger marrow spaces than anterior mandible

Supporting Structures of the Teeth

Supporting Structures of the Teeth

- Crestal bone



Supporting Structures of the Teeth

- Lamina dura
- Periodontal ligament space

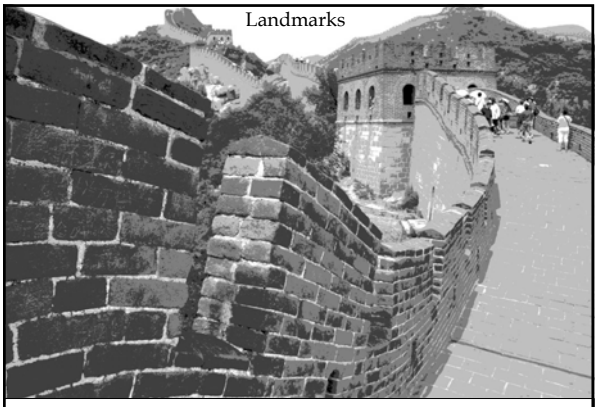
Supporting Structures of the Teeth

The joint between the tooth and the bone is a **gomphosis**. The periodontal ligament allows for movement around a center of rotation.

Supporting Structures of the Teeth

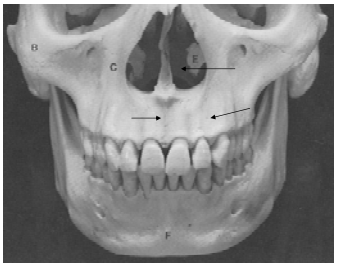
- Lamina dura and PDL

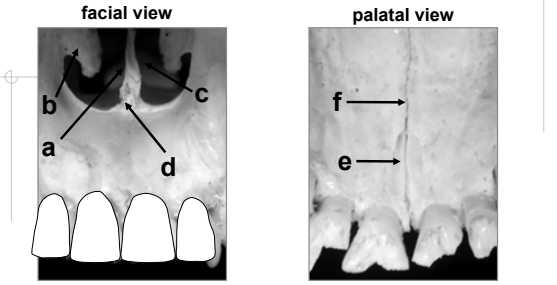
Landmarks



Landmarks in the Maxilla

- Intermaxillary suture
- Nasal Fossa
- Nose
- Lateral fossa



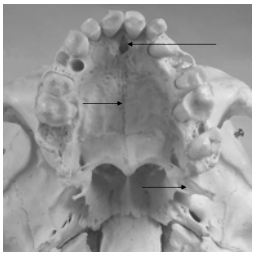


a = nasal septum
b = inferior concha
c = nasal fossa
d = anterior nasal spine

e = incisive foramen
f = median palatal suture

Landmarks in the Maxilla

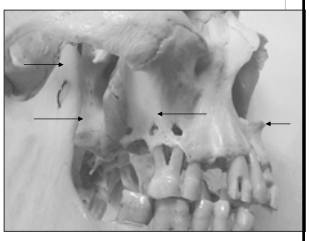
- Incisive foramen
- Median palatine suture
- Pterygoid plates



Pterodactyl gr. *pteron*, wing

Landmarks in the Maxilla

- Anterior nasal spine
- Zygomatic process
- Pterygoid plates
- Coronoid process of the **mandible**
- Nasolabial fold

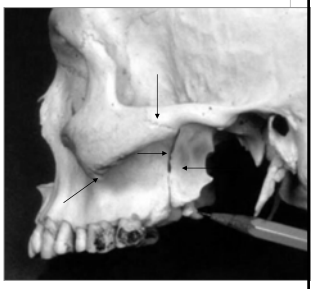


Coronoid Process

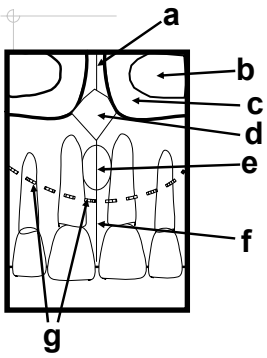
- From the Greek word for "Crow's Beak"

Landmarks in the Maxilla

- Latyeral pterygoid plate
- Pterygo-maxillary fissure
- Zygomatico-temporal suture
- Zygomatic process of the maxilla

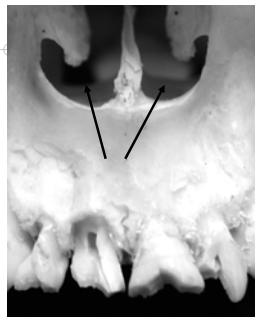


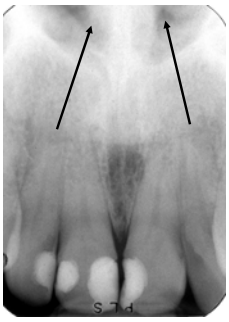
Maxillary Incisor



a = nasal septum
b = inferior concha
c = nasal fossa
d = anterior nasal spine
e = incisive foramen
f = intermaxillary suture
g = soft tissue of nose

facial view





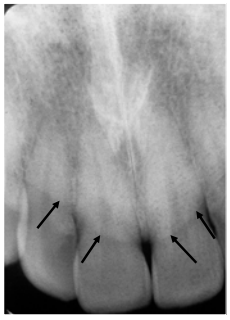
Nasal fossa

Landmarks in the Maxilla

- Intermaxillary suture
- Soft tissue of the nose
- Incisive foramen

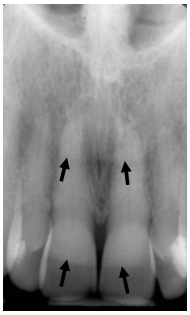
Landmarks in the Maxilla

- Soft tissue of the nose



Landmarks in the Maxilla

- The red arrows point to the soft tissue of the nose. The green arrows identify the lip line.

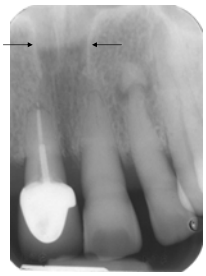


Landmarks in the Maxilla

- Foramina of von Ebner

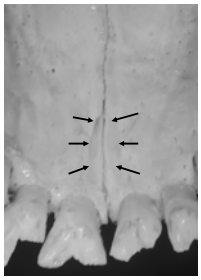
Landmarks in the Maxilla

- Nasopalatine canal



Landmarks in the Maxilla

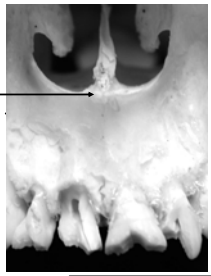
- Incisive foramen



Landmarks in the Maxilla

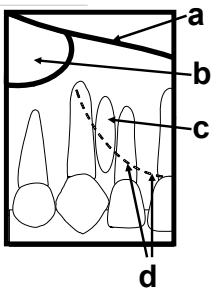
- Incisive foramen

Landmarks in the Maxilla



Anterior nasal spine

Maxillary Canine



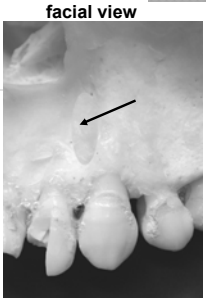
a = floor of nasal fossa

b = maxillary sinus

c = lateral fossa

d = soft tissue of the nose

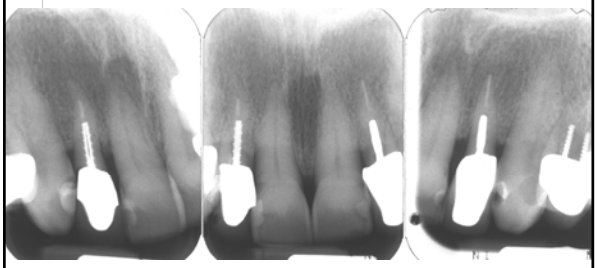
facial view



Lateral fossa. The radiolucency results from a depression above and posterior to the lateral incisor. To help rule out pathoses, look for an intact lamina dura surrounding the adjacent teeth.

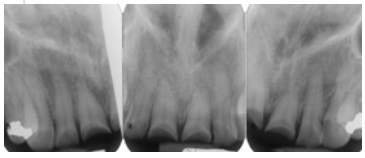
Landmarks in the Maxilla

- Lateral fossa

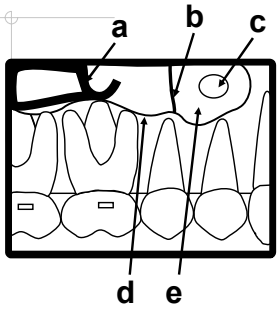


Landmarks in the Maxilla

- Nasal Fossa



Maxillary Premolar



a = zygomatic process of maxilla

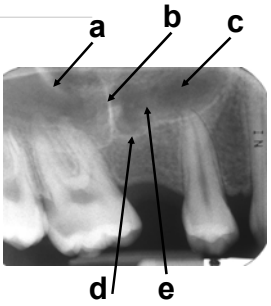
b = sinus septum

c = sinus recess

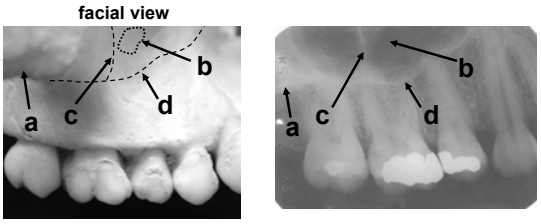
d = floor of the maxillary sinus

e = maxillary sinus

Maxillary Premolar



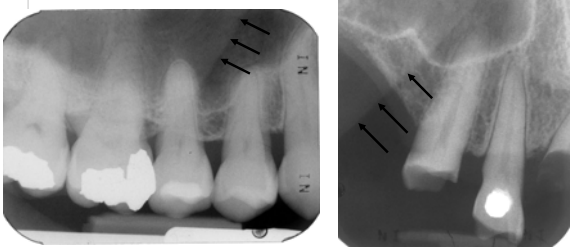
a = zygomatic process of maxilla
b = sinus septum
c = sinus recess
d = floor of the maxillary sinus
e = maxillary sinus



a = zygomatic process
b = sinus recess
c = sinus septum
d = floor of the maxillary sinus

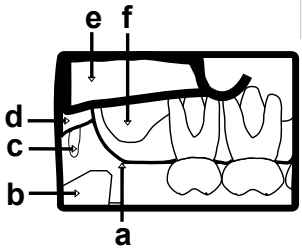
Landmarks in the Maxilla

- Nasolabial fold



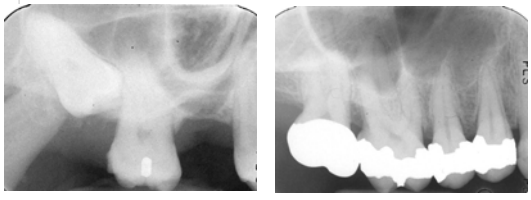
Maxillary Molar

a = maxillary tuberosity
b = coronoid process
c = hamular process
d = pterygoid plates
e = zygoma
f = maxillary sinus



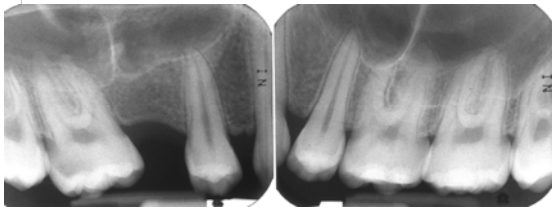
Landmarks in the Maxilla

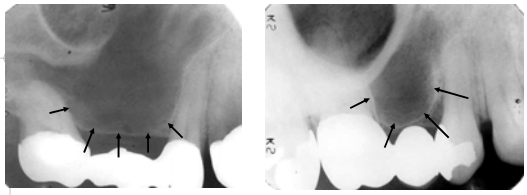
- Zygomatic Process and Maxillary Sinus



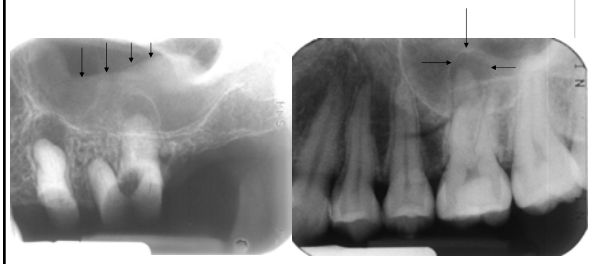
Landmarks in the Maxilla

- Zygomatic Process and Maxillary Sinus





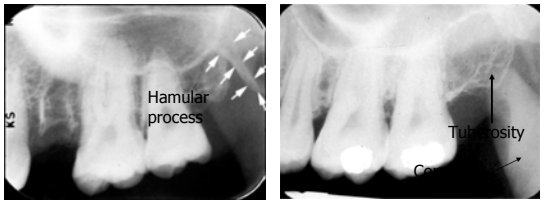
Pneumatization. From the Latin "filled with air" Expansion of sinus wall into surrounding bone, usually in areas where teeth have been lost prematurely. Increases with age.



Mucositis Halo effect

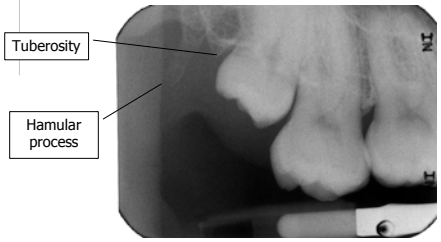
Landmarks in the Maxilla

- Maxillary tuberosity
- Coronoid process of the mandible
- Hamular process

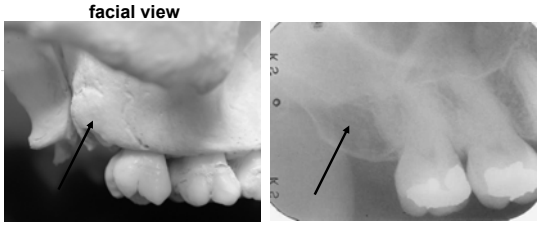


Landmarks in the Maxilla

- Hamular process



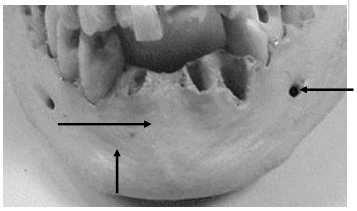
facial view



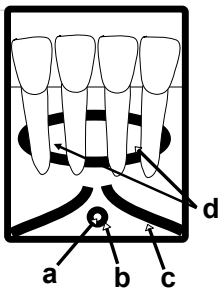
Maxillary Tuberosity. The rounded elevation located at the posterior aspect of both sides of the maxilla.

Landmarks in the Mandible

- Mental ridges
- Mental foramen
- Mental fossa



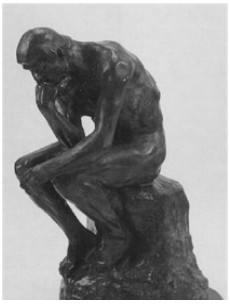
Mandibular Incisor



a. lingual foramen
b. genial tubercles
c. mental ridge
d. mental fossa

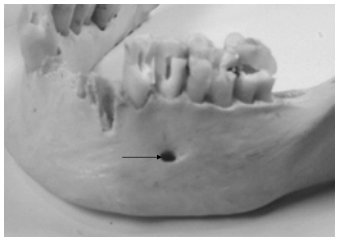
The Thinker

Auguste Rodin, 1881



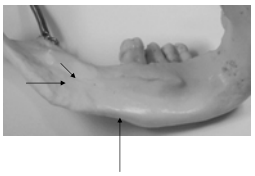
Landmarks in the Mandible

- Mental foramen
- Inferior alveolar (Mandibular) canal



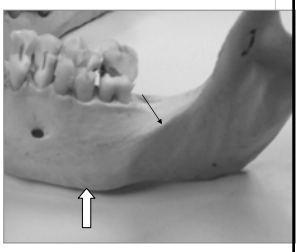
Landmarks in the Mandible

- Mylohyoid (Internal oblique) ridge
- Submandibular gland fossa
- Inferior border of the mandible



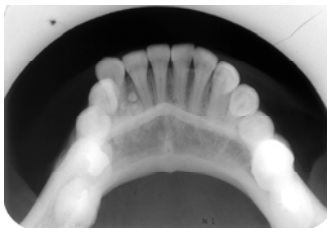
Landmarks in the Mandible

- External oblique ridge
- Inferior border of the mandible



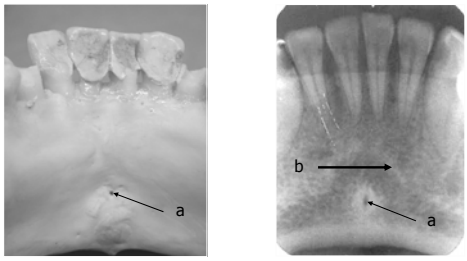
Landmarks in the Mandible

- Genial tubercles
- Mental Ridge



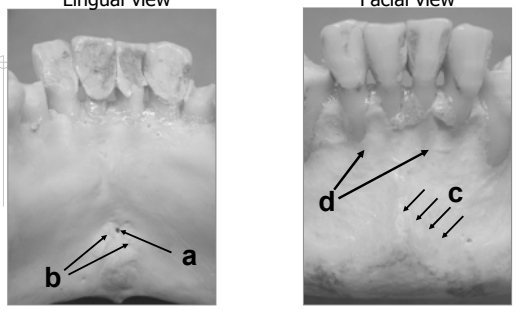
lingual view

Landmarks in the Mandible



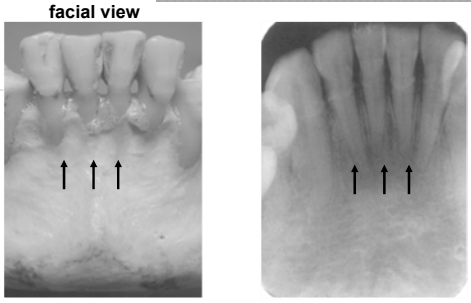
a = Lingual foramen
b = Mental ridge

lingual view
Lingual view
facial view
Facial view



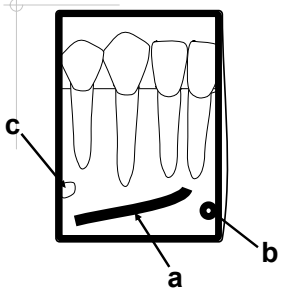
a = lingual foramen
b = genial tubercles
c = mental ridge
d = mental fossa

facial view



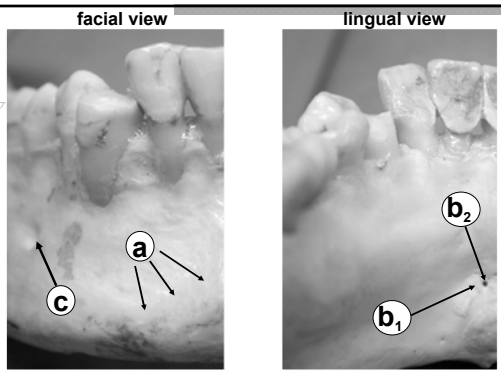
Mental fossa. This represents a depression on the labial aspect of the mandible overlying the roots of the incisors. The resulting radiolucency may be mistaken for pathosis.

Mandibular Canine



a = mental ridge
b = genial tubercles/ lingual foramen
c = mental foramen

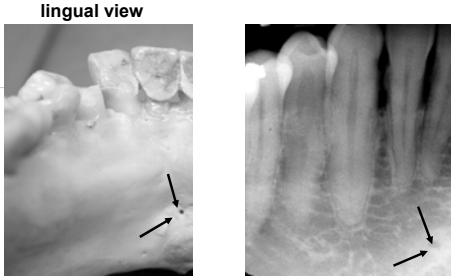
facial view
lingual view



a = mental ridge
c = mental foramen

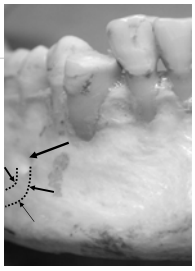
b_1 = genial tubercles
b_2 = lingual foramen

lingual view



Lingual foramen/ genial tubercles.

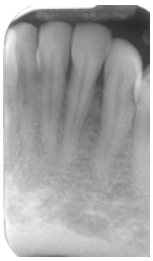
facial view



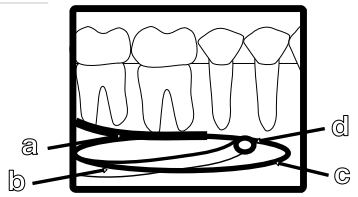
The red arrows identify the mandibular canal and the blue arrow points to the mental foramen.

Landmarks in the Mandible

- Inferior border of the mandible



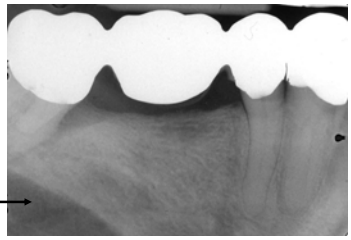
Mandibular Premolar



a = mylohyoid ridge
b = mandibular canal
c = submandibular gland fossa
d = mental foramen

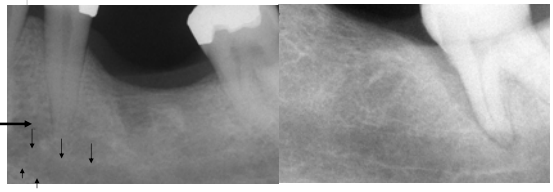
Landmarks in the Mandible

- Submandibular gland fossa

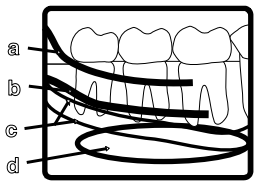


Landmarks in the Mandible

- Mental Foramen and Inferior Alveolar Canal

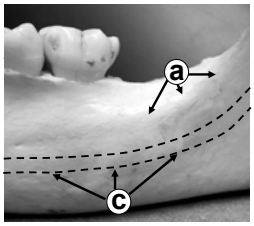


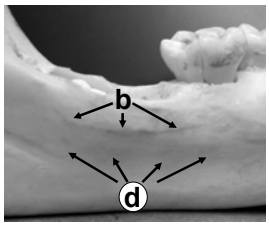
Mandibular Molar



a = external oblique ridge
b = mylohyoid ridge
c = mandibular canal
d = submandibular gland fossa

facial view



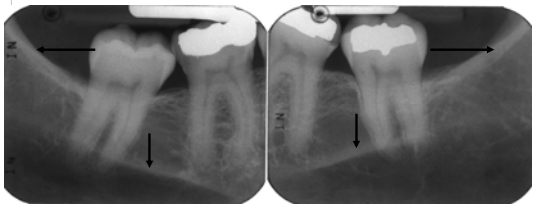


a = external oblique ridge
c = mandibular canal

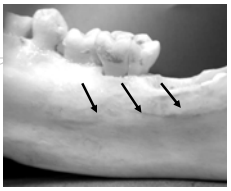
b = mylohyoid ridge
d = submandibular gland fossa

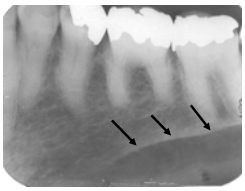
Landmarks in the Mandible

- External oblique ridge
- Internal oblique ridge (a.k.a mylohyoid ridge)

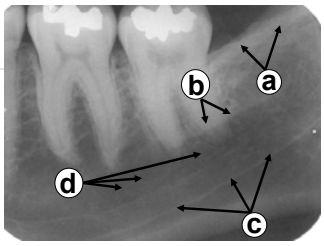


lingual view



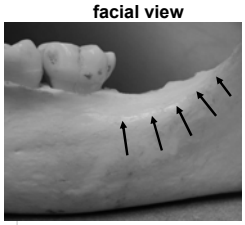


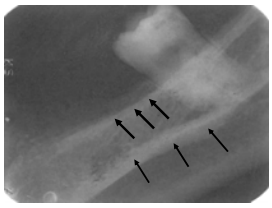
Mylohyoid (internal oblique) ridge. This radiopaque ridge is the attachment for the mylohyoid muscle. The ridge runs downward and forward from the third molar region to the area of the premolars.



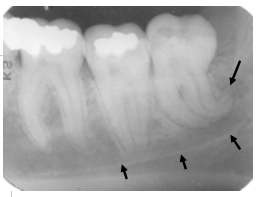
a = external oblique ridge
b = mylohyoid ridge
c = mandibular canal (inferior border)
d = submandibular gland fossa

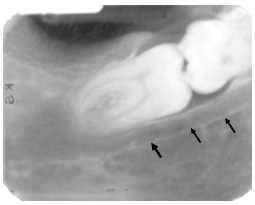
facial view





External oblique ridge. A continuation of the anterior border of the ramus, passing downward and forward on the buccal side of the mandible. It appears as a distinct radiopaque line which usually ends anteriorly in the area of the first molar. Serves as an attachment of the buccinator muscle. (The red arrows point to the mylohyoid ridge).





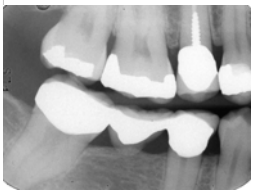
The mandibular canal (red arrows identify inferior border of canal) usually runs very close to the roots of the molars, especially the third molar.

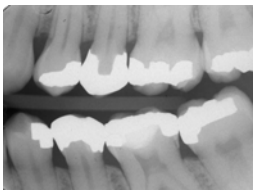
Restorations

- Gold
- Amalgam
- Titanium
- Stainless Steel
- Gutta Percha
- Porcelain
- Composites
- Cements and Liners

Restorations

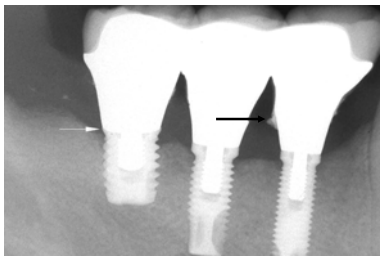
- Metallic Restorations
- Bases and liners





Restorations

- Implant restorations



Restorations

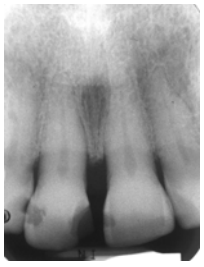
- Stainless steel post
- Root-end amalgam

Restorations

- Porcelain
- Gold
- Gutta percha
- Stainless steel

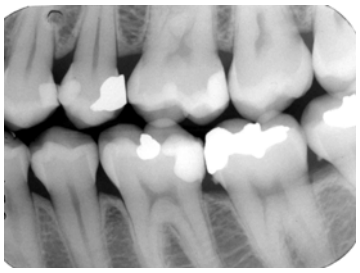
Restorations

- Composites: Radiolucent and Radiopaque



Restorations

- Posterior composites



Acknowledgement

- Thanks to OSU College of Dentistry for the use of some of the slides, diagrams, and radiographs.

Questions

Thank you!