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
Radiolucenties

- 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
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
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
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.
Landmarks in the Maxilla

- Maxillary tuberosity
- Coronoid process of the mandible
- Hamular process
Landmarks in the Maxilla

- Hamular process
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
Landmarks in the Mandible

a = Lingual foramen
b = Mental ridge
a = lingual foramen
b = genial tubercles
c = mental ridge
d = mental fossa
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
a = mental ridge
b₁ = genial tubercles
b₂ = lingual foramen
c = mental foramen
Lingual foramen/ genial tubercles.
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
a = external oblique ridge
b = mylohyoid ridge
c = mandibular canal
d = submandibular gland fossa
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)
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
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
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Questions
Thank you!