



Oral Radiograph Anatomical landmarks

A number of **anatomic landmarks** are visible in dental radiographs.

Knowledge of the location and normal appearances of these landmarks is important in identification and orientation of radiographs.

This knowledge is valuable to the dental officer in determining whether the area is normal or abnormal.

Radiolucent vs. Radiopaque

Structures that are cavities, depressions or openings in bone such as a sinus, fossa, canal or foramen will allow x-rays to penetrate through them and expose the receptor (dental film).

******These areas will appear **radiolucent** or **black** on radiographic images.

Structures that are bony in origin absorb or stop the penetration of the x-rays and, therefore, do not reach the receptor.

******These areas appear **radiopaque** or **white** on radiographic images. **Some structures partially absorb radiation and are represented in varying degrees of radiopacity.**

NORMAL TOOTH ANATOMY

Tooth structures that can be viewed on dental images include the following: enamel, dentin, the dentino-enamel junction, and the pulp cavity.

*******Cementum is not usually apparent radiographically because cementum layer is so thin.

Enamel is the most dense structure found in the human body.

Enamel is the outermost **radiopaque** layer of the crown of a tooth

Dentin is found beneath the enamel layer of a tooth and surrounds the pulp cavity .

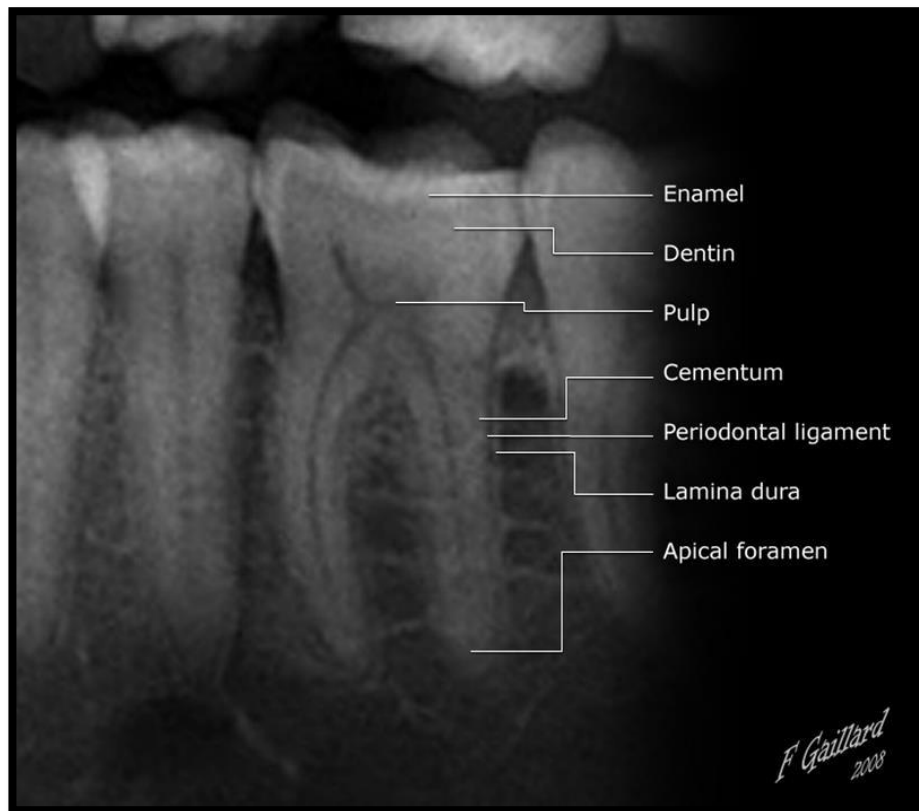
Dentin appears **radiopaque** and makes up the majority of the tooth structure.

Dentin is not as radiopaque as enamel.

Dentino-Enamel Junction (DEJ) is the junction between the dentin and the enamel of a tooth.

The DEJ appears as a line where the enamel (very radiopaque) meets the dentin (less radiopaque) .

Pulp Cavity The pulp cavity consists of a pulp chamber and pulp canals. It contains blood vessels, nerves, and lymphatics and appears relatively **radiolucent** on a dental image



Supporting Structures

The alveolar process, or alveolar bone, serves as the supporting structure for teeth.

Anatomy of Alveolar bone The anatomic landmarks of the alveolar process include the **lamina dura**, the **alveolar crest**, and the **periodontal ligament space** .

Lamina Dura Description. The lamina dura is the wall of the tooth socket that surrounds the root of a tooth.

The lamina dura is made up of dense cortical bone.

Appearance. On a dental image, the lamina dura appears as a **dense radiopaque line that surrounds the root of a tooth** .

Alveolar Crest Description. The alveolar crest is the most coronal portion of alveolar bone found between teeth.

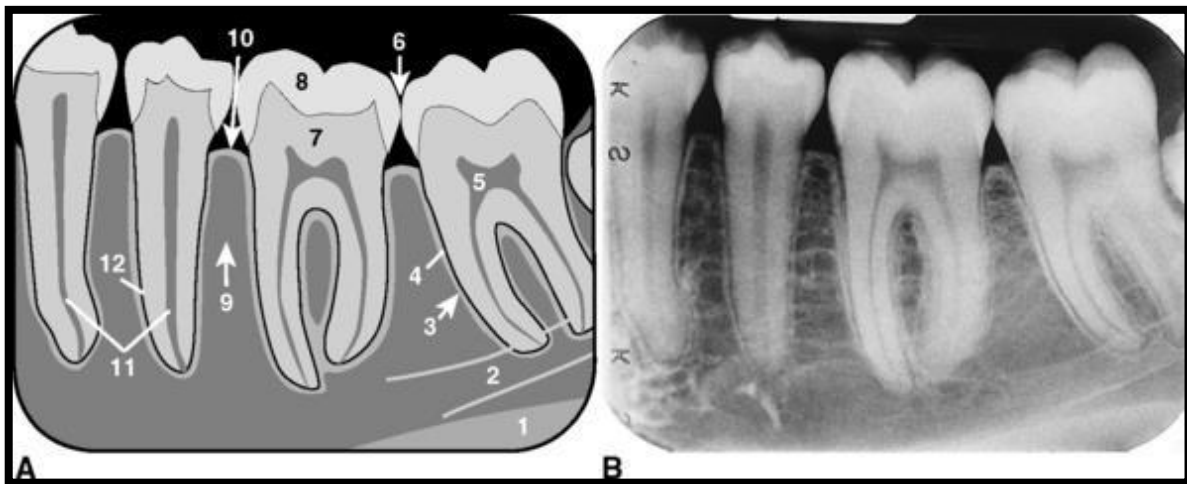
The alveolar crest is made up of dense cortical bone and is continuous with the lamina dura.

Appearance. On a dental image, the alveolar crest appears **radiopaque** and is typically located 1.5 to 2.0 mm below the junction of the crown and the root surfaces (the cementoenamel junction).

Periodontal Ligament Space Description. The periodontal ligament space (PDL space) is the space between the root of the tooth and the lamina dura. The PDL space contains connective tissue fibers, blood vessels, and lymphatics.

Appearance. On a dental image, the PDL space **appears as a thin radiolucent line around the root of a tooth.**

In the healthy periodontium, the PDL space appears as a continuous radiolucent line of uniform thickness.



10=Alv. Crest

3=lamina dura

4=PDL

Types of Bone

The composition of bone in the human body can be described as either **cortical or cancellous**

Cortical bone, also referred to as compact bone, is the dense outer layer of bone

Cancellous bone (also called trabecular bone) is the soft, spongy bone located between two layers of dense cortical bone the trabeculae in the **anterior maxilla** are typically thin and numerous in the **posterior maxilla** the trabecular pattern is usually quite similar to that in the anterior maxilla, although the marrow spaces may be slightly larger.



In the **anterior mandible** the trabeculae are somewhat thicker than in the maxilla, resulting in a coarser pattern, with trabecular plates that are oriented more horizontally

In the **posterior mandible** the periradicular trabeculae and marrow spaces may be comparable to those in the anterior mandible but are usually somewhat larger.



Some terms of dental radiographs

Prominences of Bone

Prominences of bone are composed of dense cortical bone and appear radiopaque on dental images.

***Process:** A marked prominence or projection of bone; an example is the coronoid process of the mandible

***Ridge:** A linear prominence or projection of bone; an example is the external oblique ridge of the mandible.

***Spine:** A sharp, thorn-like projection of bone; an example is the anterior nasal spine.

***Tuberosity:** A rounded prominence of bone; an example is the maxillary tuberosity

Spaces and Depressions in Bone

Spaces and depressions in bone do not resist the passage of the x-ray beam and appear radiolucent on dental images.

Four terms can be used to describe the spaces and depressions in bone viewed in maxillary and mandibular periapical images, as follows:

Canal: A tube like passageway through bone that contains nerves and blood vessels; an example is the mandibular canal

Foramen: An opening or hole in bone that permits the passage of nerves and blood vessels; an example is the mental foramen of the mandible.

Fossa: A broad, shallow, scooped-out or depressed area of bone; an example is the submandibular fossa of the mandible.

Sinus: A hollow space, cavity, or recess in bone; an example is the maxillary sinus

Miscellaneous Terms

Two other general terms can be used to describe normal landmarks viewed on a dental image, as follows:

Septum: A bony wall or partition that divides two spaces or cavities. An example is the nasal septum.

Suture: An immovable joint that represents a line of union between adjoining bones of the skull. An example is the median palatine suture of the maxilla

Normal anatomical landmarks

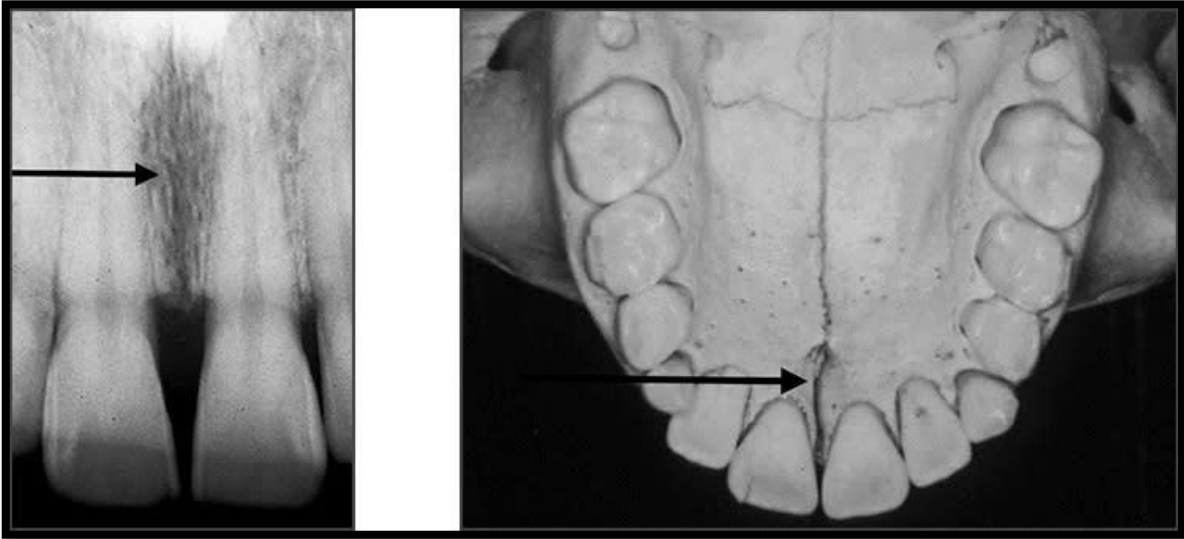
Bony Landmarks of the Maxilla

Incisive Foramen

Description. The incisive foramen (also known as the nasopalatine foramen) is an opening or hole in bone located at the midline of the anterior portion of the hard palate.

The nasopalatine nerve exits the maxilla through the incisive foramen.

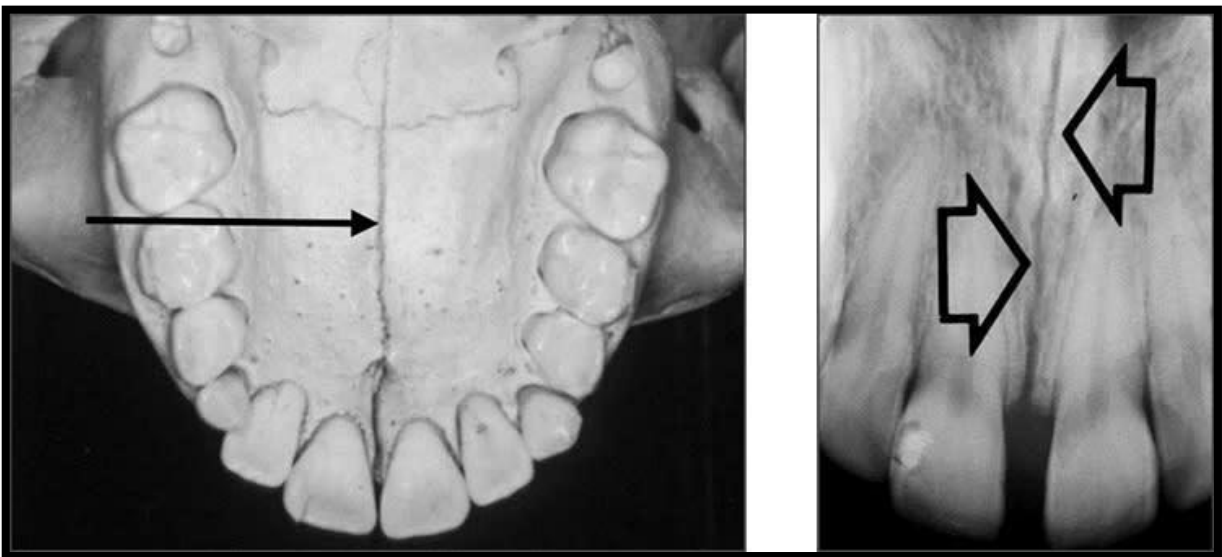
Appearance. On an anterior maxillary periapical image, the incisive foramen appears as a small, ovoid or round **radiolucent** area located between the roots of the maxillary central incisors.



Median Palatal Suture (inter maxillary suture)

Description. The median palatal suture is the immovable joint between the two palatine processes of the maxilla.

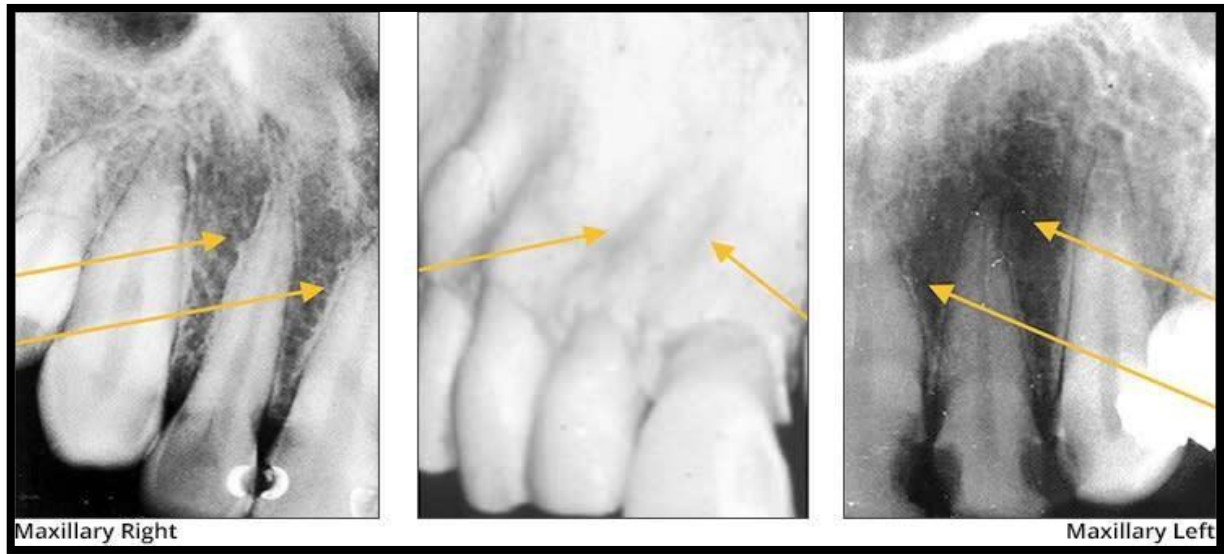
Appearance. On an anterior maxillary periapical image, the median palatal suture appears as a **thin radiolucent line** between the maxillary central incisors



Lateral Fossa

Description. The lateral Fossa (also known as the canine fossa) is a smooth, depressed area of the maxilla located between maxillary canine and lateral incisors.

Appearance. On an anterior maxillary periapical image, the lateral fossa appears as a **radiolucent area** between the maxillary canine and lateral incisor



Nasal Cavity

Description. The nasal cavity (also known as the nasal fossa) is a pear-shaped compartment of bone located superior to the Maxilla

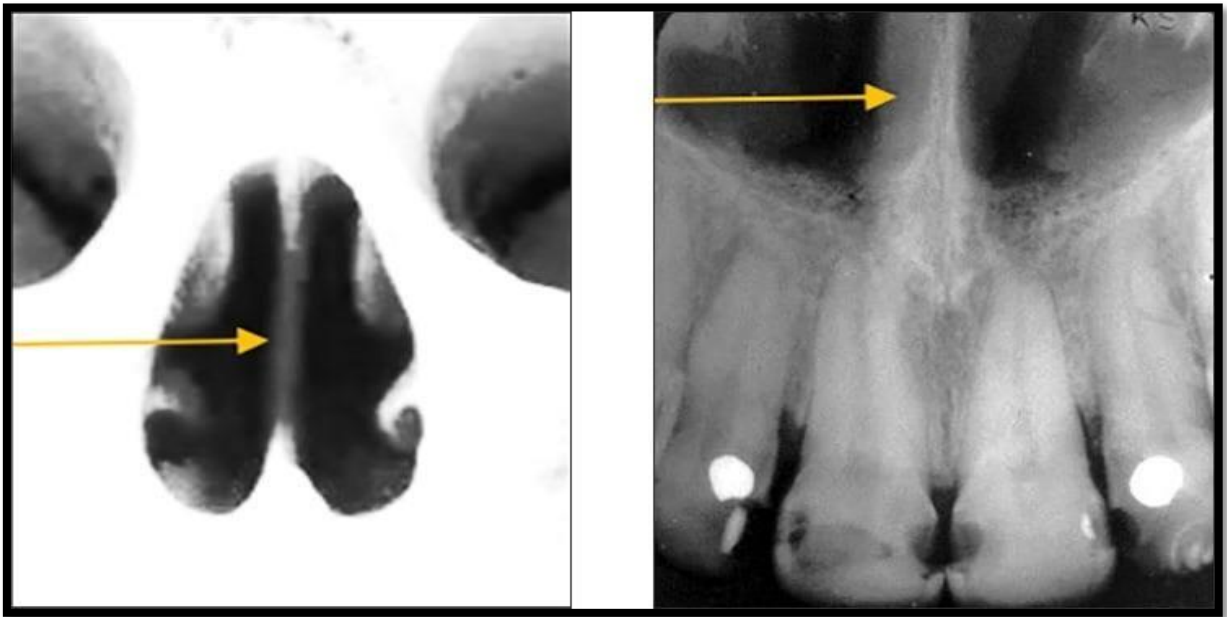
Appearance. On an anterior maxillary periapical image, the nasal cavity appears as a large, **radiolucent area** superior to the maxillary incisors



Nasal Septum

Description. The nasal septum is a vertical bony wall or partition that divides the nasal cavity into the right and left nasal fossae (fossae is the plural of fossa)

Appearance. On an anterior maxillary periapical image, the nasal septum appears as a **vertical radiopaque** partition that divides the nasal cavity.



Floor of Nasal Cavity

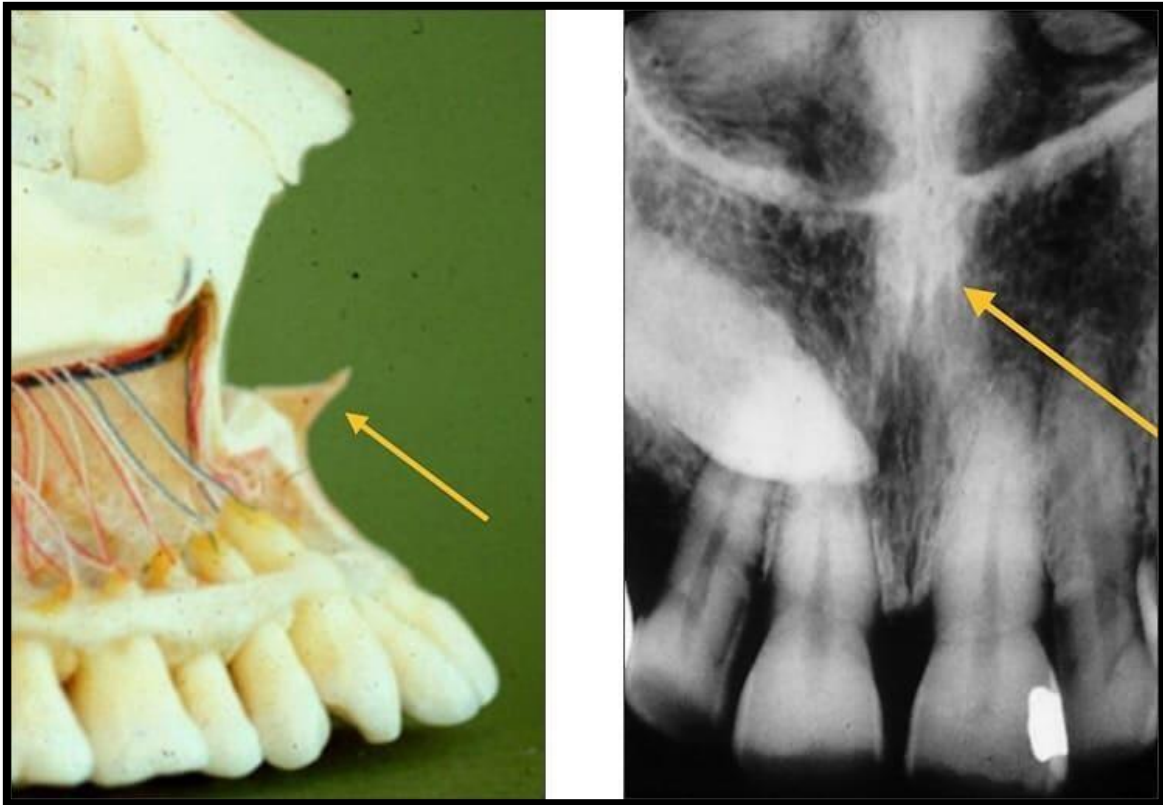
Description. The floor of the nasal cavity is a bony wall **Appearance.** On an anterior maxillary periapical image, the floor of the nasal cavity appears as a **dense radiopaque** band of bone superior to the maxillary incisors .



Anterior Nasal Spine

Description. The anterior nasal spine is a sharp projection of the maxilla located at the anterior and inferior portion of the nasal cavity.

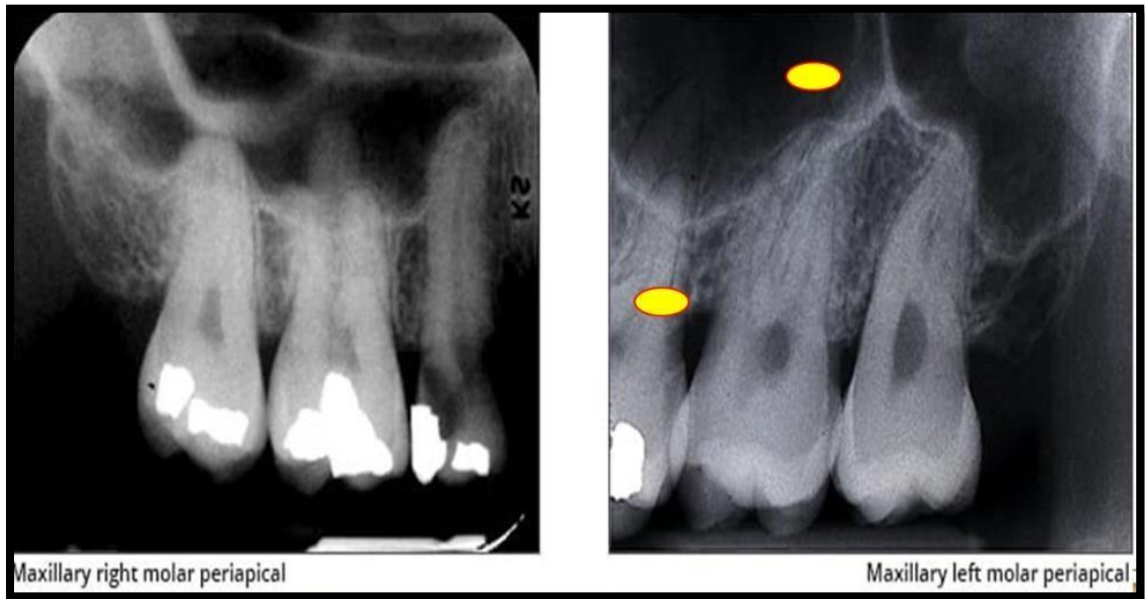
Appearance. On an anterior maxillary periapical image, the anterior nasal spine appears as a **V-shaped radiopaque area** located at the intersection of the floor of the nasal cavity and the nasal septum.



Maxillary Sinus

Description. The maxillary sinuses are paired cavities or compartments of bone located within the maxilla

Appearance. On a posterior maxillary periapical image, the maxillary sinus appears as a **radiolucent area** located superior to the apices of maxillary premolars and molars. It is bounded by a thin radiopaque line (thin layer of cortical bone)



Septa Within Maxillary Sinus

Description. Bony septa (septa is the plural of septum) may be seen within the maxillary sinus. Septa are bony walls or partitions that appear to divide the maxillary sinus into compartments.

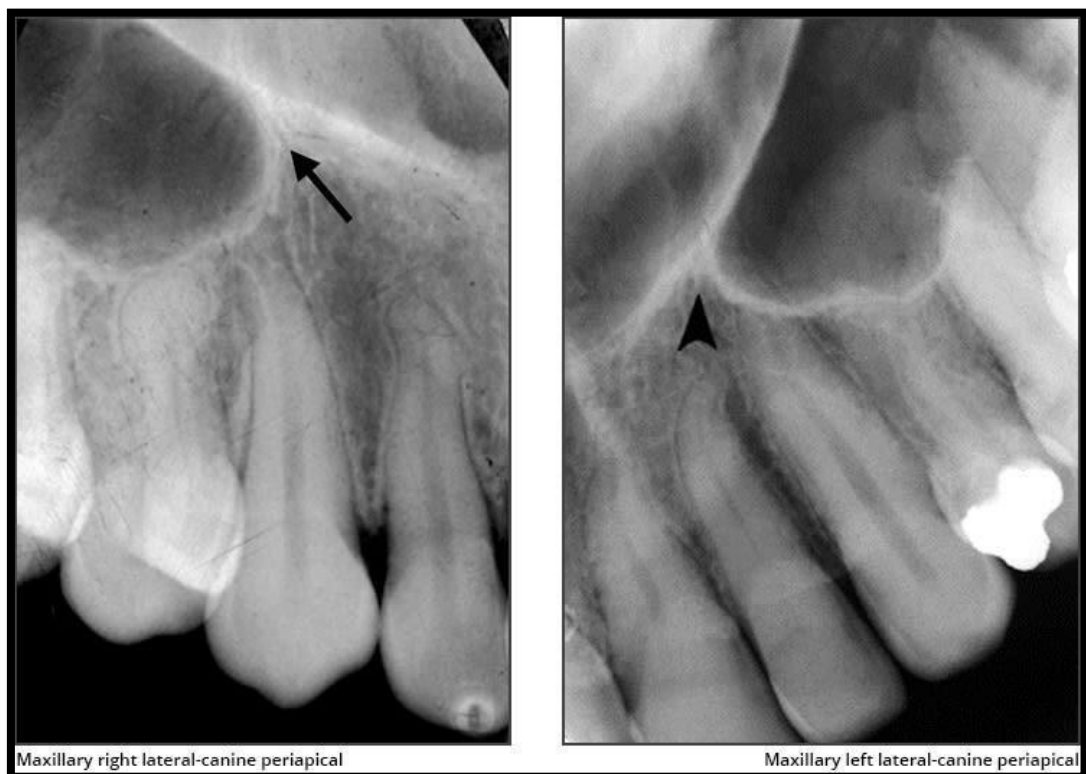
Appearance. On a posterior maxillary periapical image, the septa **appear as radiopaque lines** within the maxillary sinus with variable length.



Inverted Y

Description. The term inverted Y refers to the intersection of the maxillary sinus and the nasal cavity as viewed on a dental image.

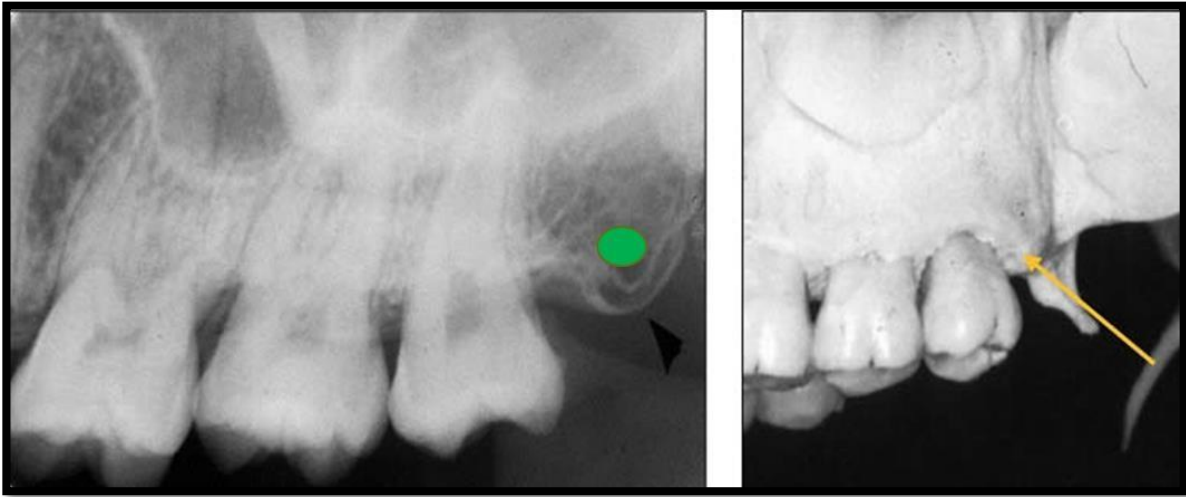
Appearance. On a maxillary canine periapical image, the inverted Y appears as **a radiopaque upside-down Y** formed by the intersection of the lateral wall of the nasal fossa and the anterior border of the maxillary sinus.



Maxillary Tuberosity

Description. The maxillary tuberosity is a rounded prominence of bone that extends posterior to the third molar region .

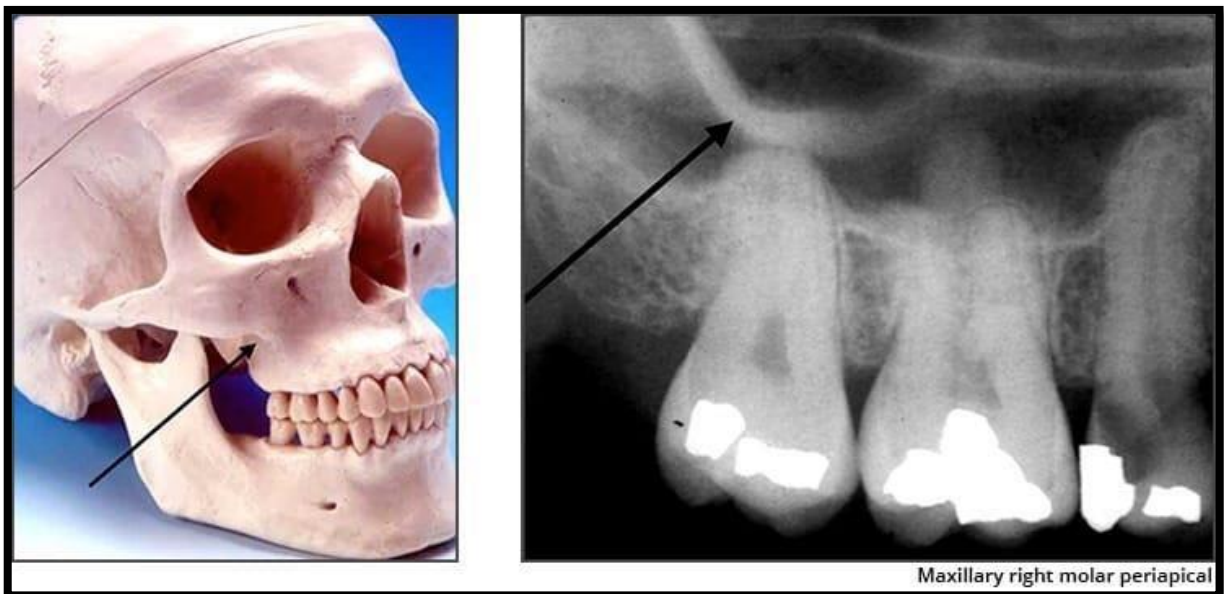
Appearance. On a posterior maxillary periapical image, the maxillary tuberosity appears **as a radiopaque bulge distal to the third molar region.**



Zygomatic Process of Maxilla

Description. The zygomatic process of the maxilla is a bony projection of the maxilla that articulates with the zygoma, or malar bone. The zygomatic process of the maxilla is composed of dense cortical bone.

Appearance. On a posterior maxillary periapical image, the zygomatic process of the maxilla appears as a **J-shaped or U-shaped radiopacity** located superior to the maxillary 1st molar region.



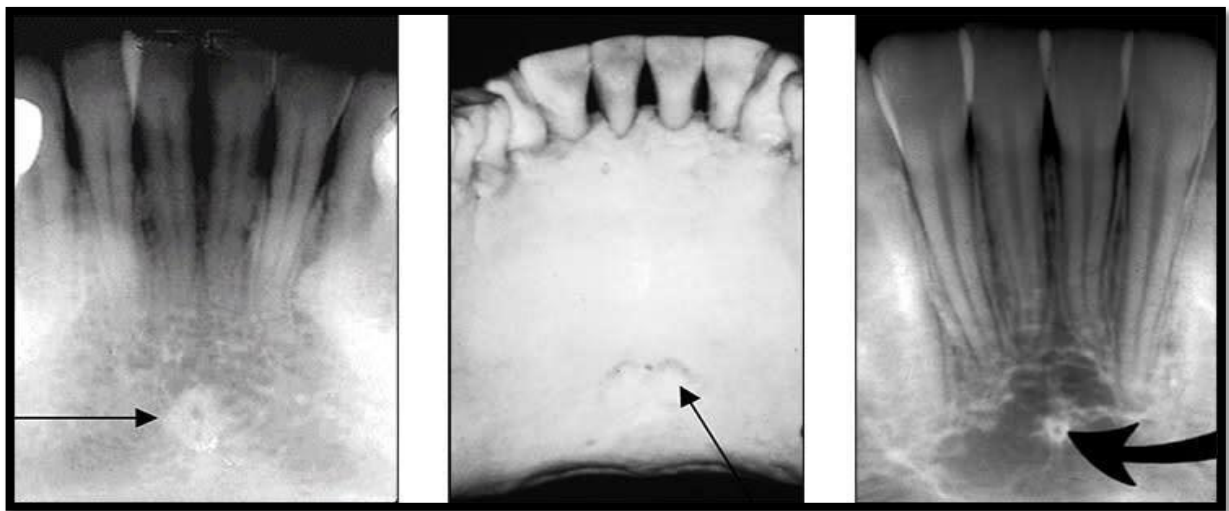
Bony Landmarks of the Mandible

Genial Tubercles (mental spine):

Description. Genial tubercles are tiny bumps of bone that serve as attachment sites for the genioglossus and geniohyoid muscles.

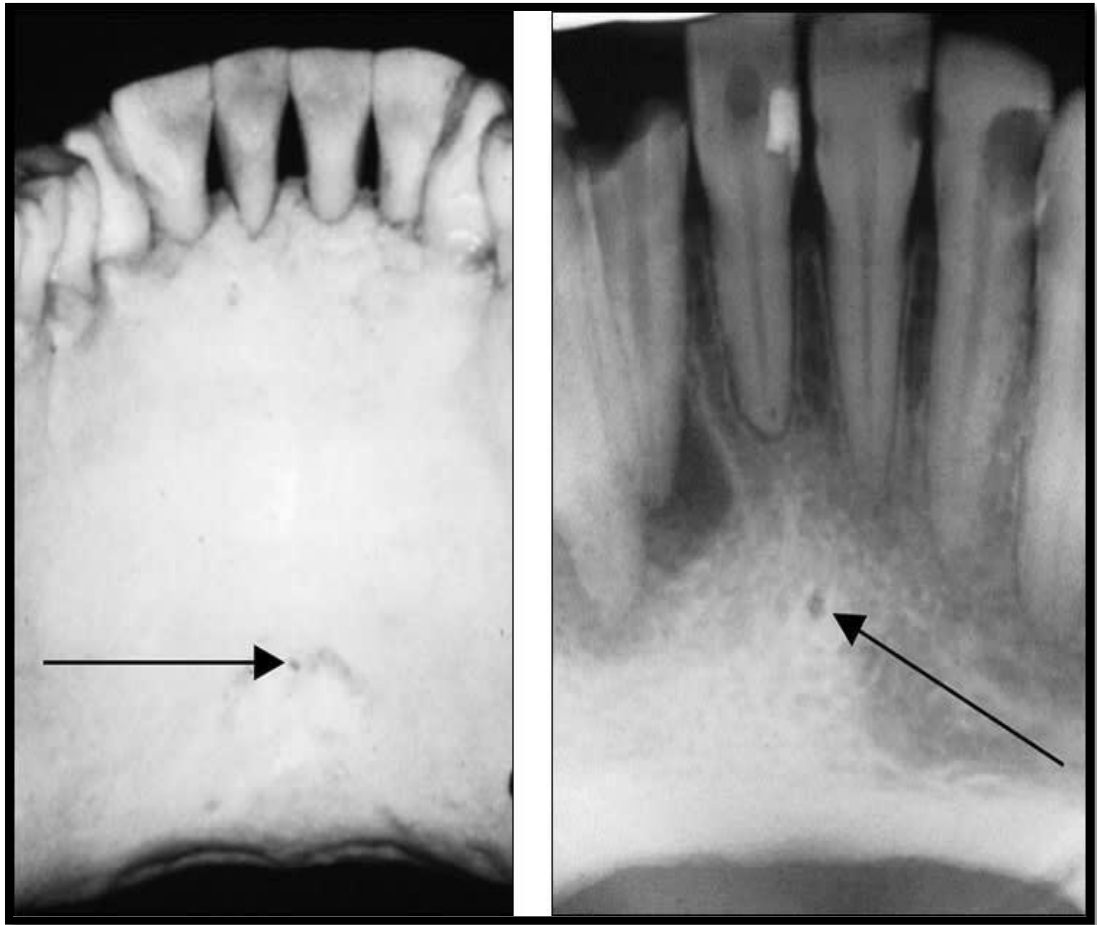
Appearance. On a mandibular periapical image, genial tubercles appear as a radiopaque mass or **ring-shaped radiopacity** or as a radiopaque mass (3-4mm) inferior to the apices of the mandibular incisors.

They are well visualized on mandibular occlusal radiograph as one or more spine in the midline.



Lingual Foramen Description. The lingual foramen is a tiny opening or hole in bone located on the internal surface of the mandible. The lingual foramen is located near the midline and is surrounded by genial tubercles.

Appearance. On a mandibular periapical image, the lingual foramen appears as a **small, radiolucent dot located inferior to the apices of the mandibular incisors.**

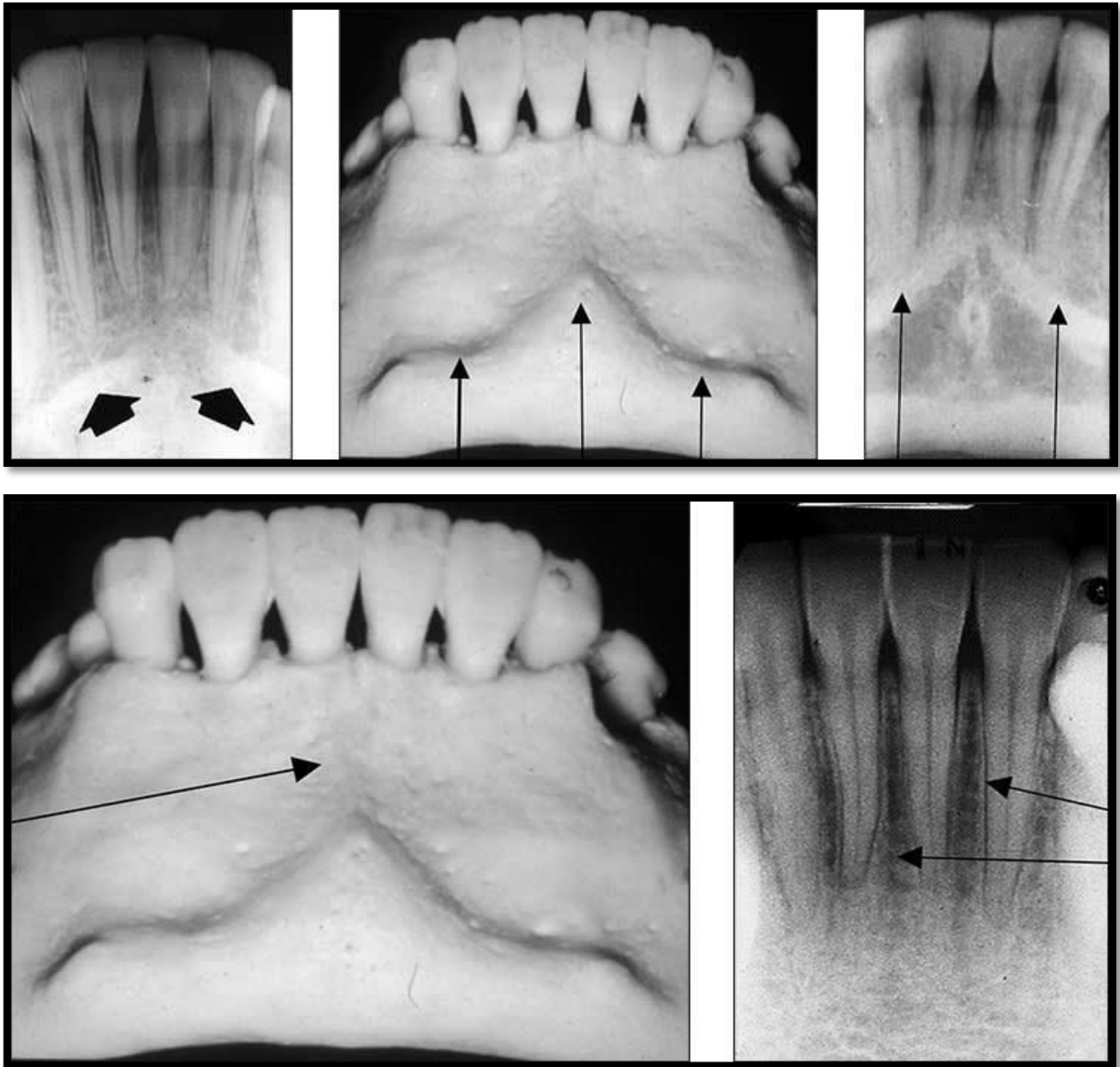


Mental Ridge Description. The mental ridge is a linear prominence of cortical bone located on the external surface of the anterior portion of the mandible

Appearance. On a mandibular periapical image, the mental ridge appears as a thick radiopaque band that extends from the premolar region to the incisor region

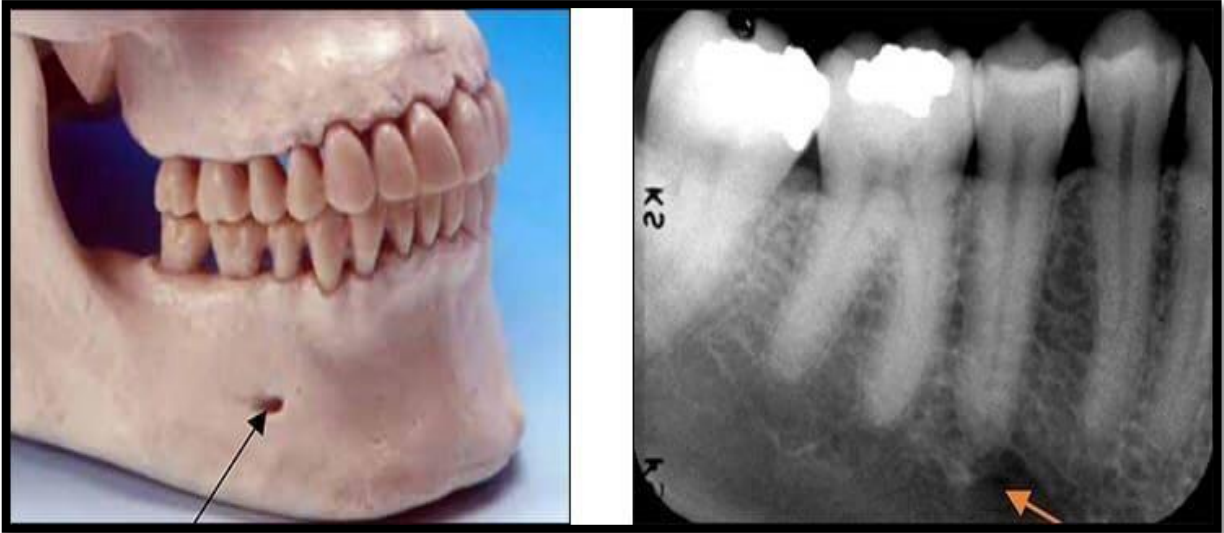
Mental Fossa Description. The mental fossa is a scooped-out, depressed area of bone located on the external surface of the anterior mandible above the mental ridge.

Appearance. On a mandibular periapical image, the mental fossa appears as a radiolucent area overlying the roots of mandibular incisors



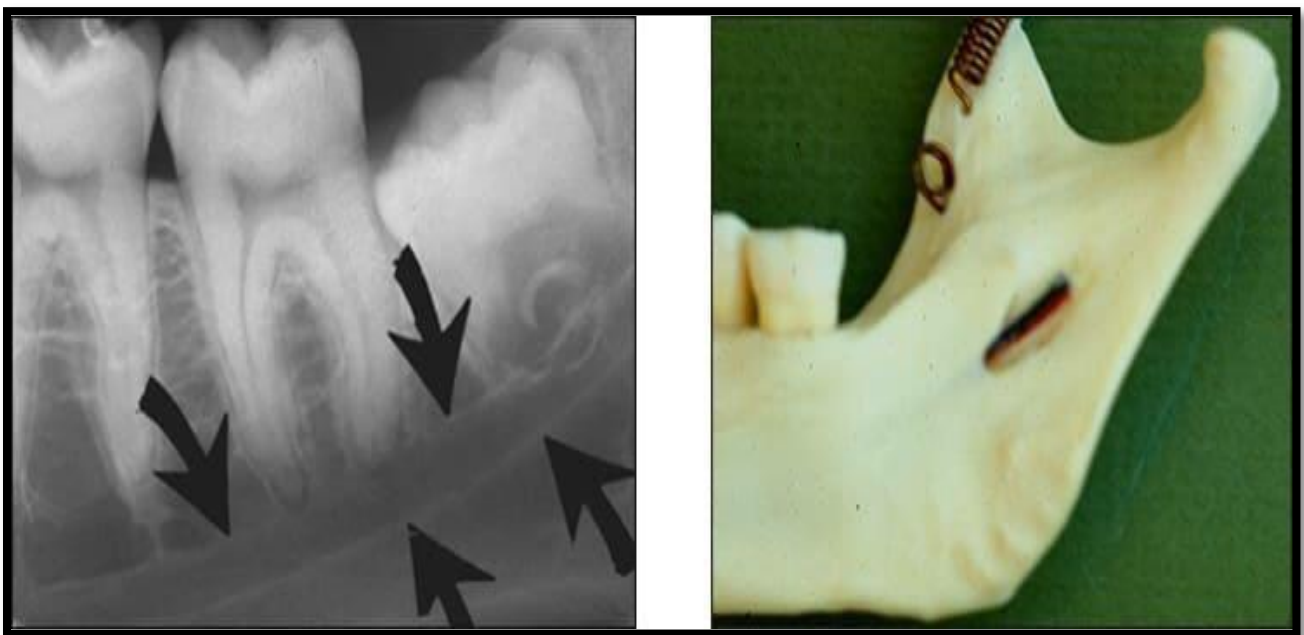
Mental Foramen Description. The mental foramen is an opening or hole in bone located on the external surface of the mandible in the region of the mandibular premolars. Blood vessels and nerves that supply the lower lip exit through the mental foramen.

Appearance. On a mandibular periapical image, the mental foramen appears as a small, ovoid or round radiolucent area located in the apical region of the mandibular premolars.



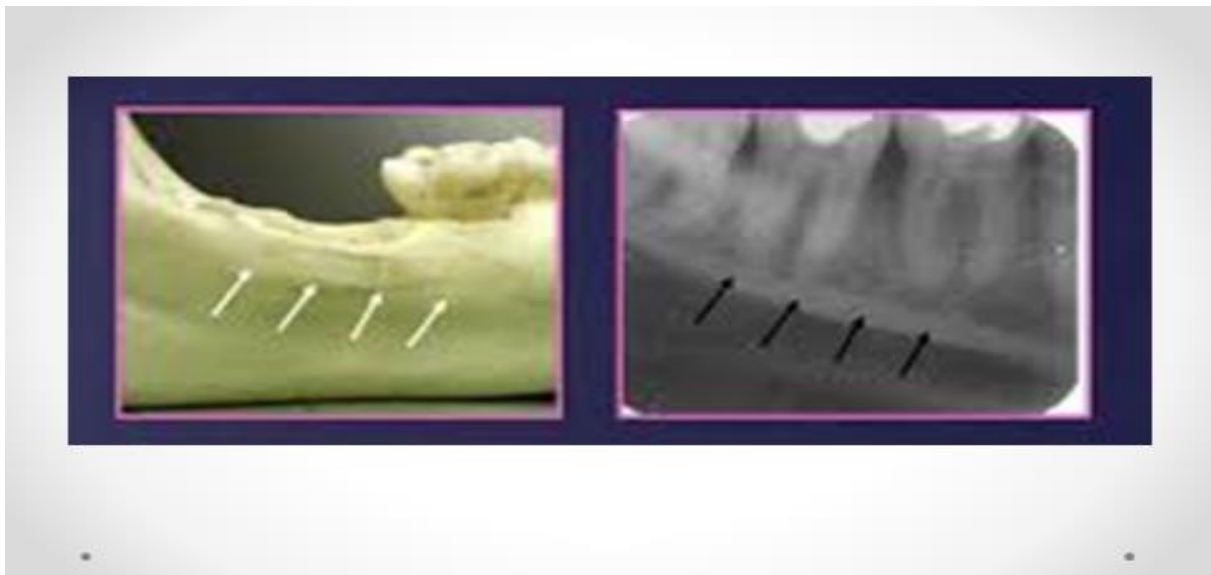
Mandibular Canal Description. The mandibular canal is a tube like passageway through bone that travels the length of the mandible. The mandibular canal extends from the mandibular foramen to the mental foramen and houses the inferior alveolar nerve and blood vessels.

Appearance. On a mandibular periapical image, the mandibular canal appears as a radiolucent band. Two thin radiopaque lines that represent the cortical walls of the canal outline the mandibular canal. The mandibular canal appears below or superimposed over the apices of the mandibular molar teeth.



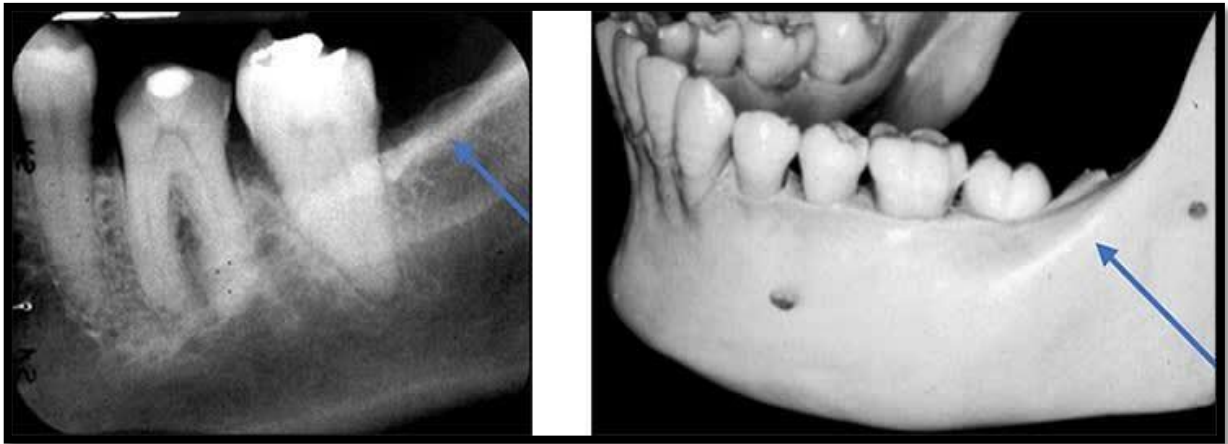
Mylohyoid Ridge Description. The mylohyoid ridge (also known as the internal oblique ridge) is a linear prominence of bone located on the internal surface of the mandible. The mylohyoid ridge extends from the third molar region downward and forward to the second premolar area. The mylohyoid ridge serves as an attachment site for a muscle of the same name.

Appearance. On a mandibular periapical image, the mylohyoid ridge appears as a dense radiopaque band that extends downward and forward from the third molar region at the level of the apices of the posterior teeth.



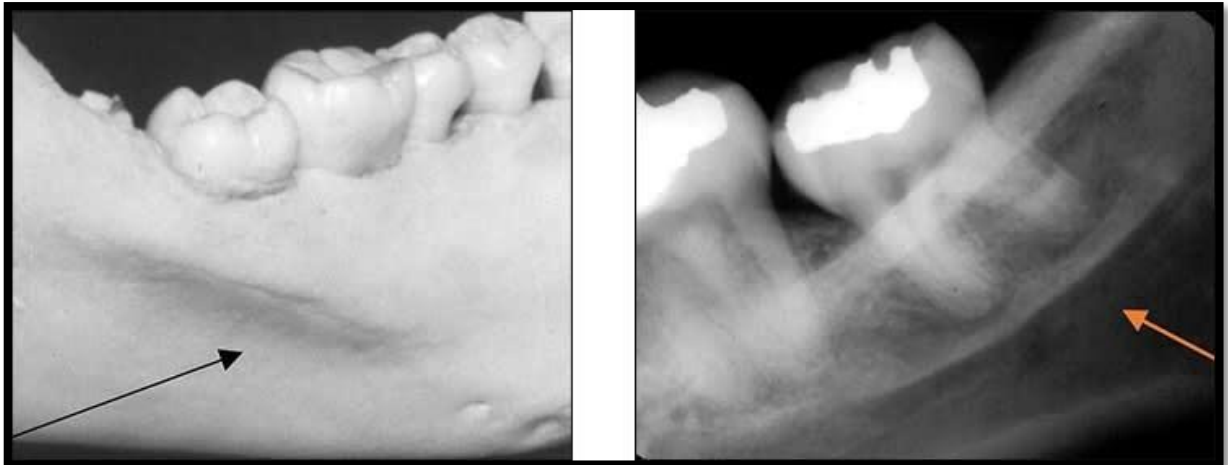
External Oblique Ridge Description. The external oblique ridge (also known as the external oblique line) is a linear prominence of bone located on the external surface of the body of the mandible. The anterior border of the ramus ends in the external oblique ridge, This bony elevation gradually flattened and disappeared at the first molar area

Appearance. On a mandibular molar periapical image, the external oblique ridge appears as a radiopaque band extending downward and forward from the anterior border of the ramus of the mandible. It runs superior to the mylohyoid ridge in a parallel course with it.



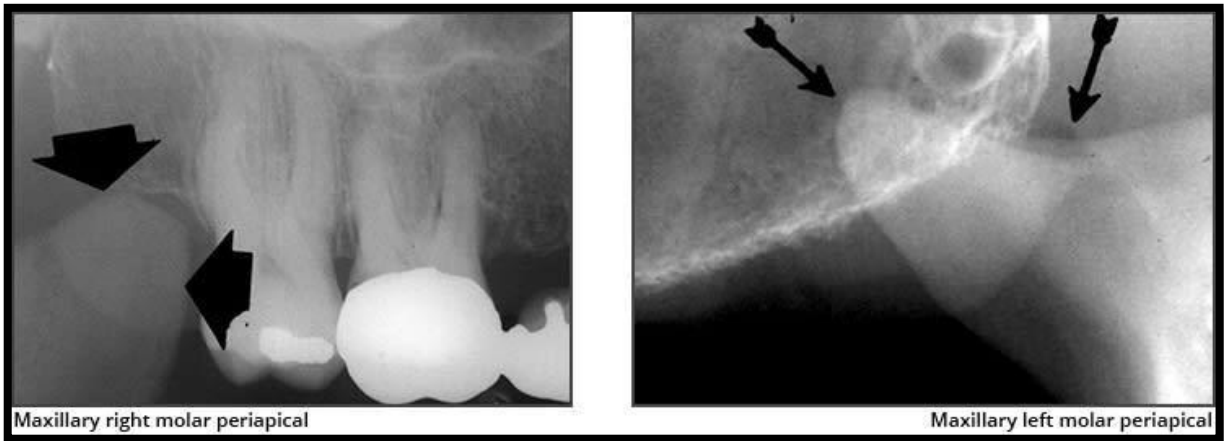
Submandibular Fossa Description. The submandibular fossa (also known as the mandibular fossa or submaxillary fossa) is a scooped-out, depressed area of bone located on the internal surface of the mandible inferior to the mylohyoid ridge. The submandibular salivary gland is found in the submandibular fossa.

Appearance. On a mandibular periapical image, the submandibular fossa appears as a radiolucent area in the molar region below the mylohyoid ridge.

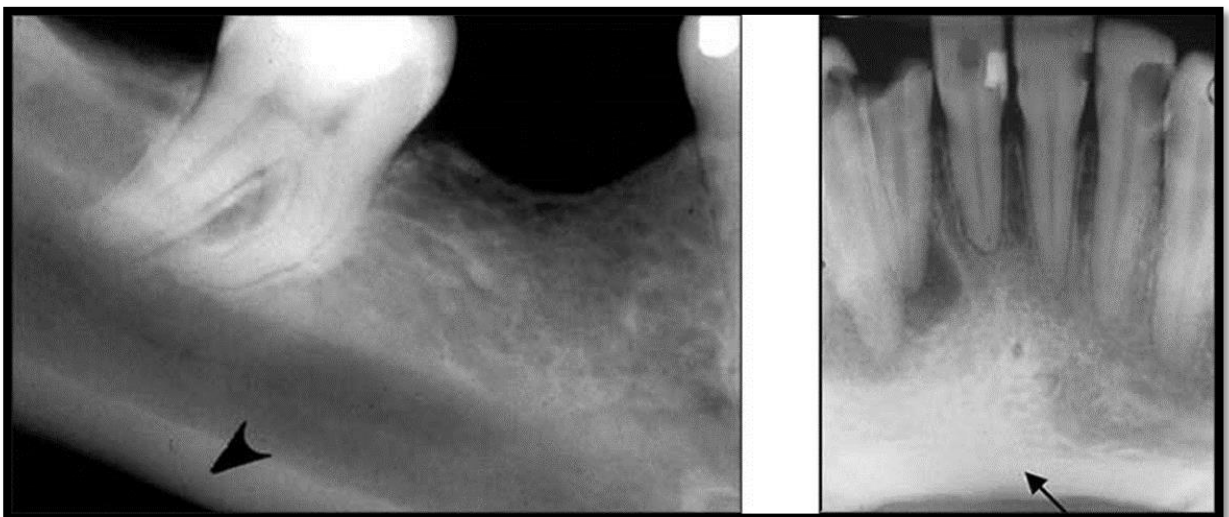


Coronoid Process Description. The coronoid process is a marked prominence of bone on the anterior ramus of the mandible . The coronoid process serves as an attachment site for one of the muscles of mastication

Appearance. The coronoid process is not seen on a mandibular periapical image but may appear on a maxillary molar periapical image. The coronoid process appears as a triangular radiopacity superimposed over, or inferior to, the maxillary tuberosity region.



Inferior border of mandible is the lower most part of the mandible. Appears as dense broad radiopaque band of bone.



Radiographic appearance of restorative materials:

Radiopaque restorative materials:

Gold , Silver amalgam , Zinc oxide – eugenol , Zinc phosphate cement , Gutta – percha , Silver points , Metal bands & crowns , Metal wires & dental implants

Radiolucent restorative materials:

Acrylic, Silicates, Calcium hydroxide pastes, & Porcelain.

