

IMAGING NONDONTOGENIC TUMORS OF THE JAWBONES

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W. & P Ch. 20 + 21. Stafne & Gibilisco Ch 15

Oral and Maxillofacial diagnostic Imaging Ch. 8

The majority of lesions discussed here do not produce pathopneumonic radiographic features that will allow one to use the radiograph as the sole basis for making a diagnosis. But then again, there is seldom such thing as only a radiographic diagnosis, implying that the findings observed on a radiograph always need to be correlated and interpreted **with** the clinical evaluation and other diagnostic aids

If the radiograph reveals agenesis and non eruption of teeth in the region of a lesion, it generally can be assumed that the lesion had its onset prior to the normal time for development and eruption of these teeth

A benign tumor is -

1. a new growth resembling the tissue of origin
2. has an insidious onset
3. grows slowly
4. has a smooth outline
5. may displace adjacent structures such as teeth.
6. is usually painless
7. does not metastasize
8. is not life threatening
9. or forms septae or compartments
10. does not invade adjacent tissue - ameloblastoma the exception

TECHNICAL PROCEDURES: Intra oral ? : Occlusal radiographs
 Extra oral : Pan. P.A.; O.M.;
 Tomographic radiographs,
 CT - hard tissue
 MRI - soft tissue

Growth disturbances lacking the capacity for limitless growth proliferation are not true neoplasms but *hyperplasias* or *hamartomas*.

CLASSIFICATION.

1. Tori and exostoses
2. Enostosis
3. Osteoma
4. Osteoid osteoma
5. Benign osteoblastoma
6. Chondroma
7. Neurogenic tumors
8. Calcifying peripheral fibroma
9. Central / Peripheral giant cell tumor
10. Central hemangioma
11. Arteriovenous shunt
12. Aneurysmal bone cyst
13. Dermoid cyst. Thyroglossal cyst Branchial cleft cyst.

I. **BENIGN TUMORS**

1. EXOSTOSES AND TORI

DEFINITION: Exostoses are developmental, localized overgrowths of bone seen more often in older people.

Radiographically, exostoses seen as areas of increased opacity that conform in shape to the outline and form of the particular overgrowth. May be well OR poorly demarcated.

A. EXOSTOSES that appear on the alveolar processes, tend to be bilateral and multiple and often produce a nodular protuberance. When multiple, they may coalesce to form an irregular, linear horizontal elevation. They are almost always limited to the **buccal** surface, **posterior** to the canines in the mandible. In the maxilla they may be seen posteriorly, **palatally** to the second or third molar teeth or **buccally** to all the molars.

B. TORUS PALATINUS

Torus palatinus is an exostosis that arises at the margins of the palatal processes at the median suture of the palate. Both sides of the suture line are almost always involved and tend to divide it into right and left portions. The presence of a torus of appreciable size often presents a problem in making a satisfactory intraoral radiographic examination of the maxillary teeth. [or a denture].
NOTE - this is a developmental anomaly

C. TORUS MANDIBULARIS OR LINGUAL TORUS

Torus mandibularis occurs on the lingual surface of the mandible, in the premolar regions. It may occur singly; however, there is a marked tendency to multiple and **bilateral** occurrence, and the lesion is not necessarily confined to the premolar region. These tori arise above the mylohyoid ridge. Their size varies, some reaching such size that tori from opposite sides come in contact with each other and occupy a large portion of the floor of the mouth.

Radiographically mandibular tori are more readily demonstrated by the standard dental as well as by the occlusal film as round radiopacities. Seen as fairly well demarcated radiopacities at the apices of premolar teeth.

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Exostoses that are present on the alveolar process become increasingly prominent after extraction of the teeth because they do not resorb and are seen more clearly radiographically.

2. ENOSTOSIS

Definition: A bony formation on the inner surface of the periosteum extending into the medullary spaces.

Radiographically some of the opacities within the jaws that are diagnosed as osteosclerosis actually represent enostoses.

Since the advent of CT a difference is recognized between an enostosis [growing inward from the periodontium] and an enostosis [opacity] within the spongy bone.

3. OSTEOMAS Rare in the jaws.

Definition: Osteomas are benign tumors composed of bone. The bones of the face are subject to a variety of bony overgrowths that are difficult to classify. Osteomas vary greatly in size. May be attached by a pedicle; or may grow from a wide base. The pedunculated type occurs more frequently in the mandible. The skull is the most common site for the development of an osteoma, with the calvarium and frontal sinus areas being affected most frequently.

Radiographically provides information concerning the shape and size and its relationship and attachment to the bone. If the tumor consists chiefly of dense, laminated bone with a few Haversian canals, the radiographic density is much greater than that of a tumor containing spongy bone and abundant marrow space.

Osteomas of the mandible are rare. When found with associated supernumerary teeth and sometimes with compound odontomas and hypercementosis may develop in patients with **Gardner syndrome**. Impacted supernumerary and permanent teeth seen with multiple polyposis of large intestine and **epidermoid cysts** of skin. Malignant change can occur in these polyps and the syndrome is transmitted as an **autosomal dominant** trait. Thus, relatives of patients with the disease should be investigated

4. OSTEOID OSTEOMA -Rare

Small, oval or roundish tumor-like nidus which is composed of osteoid and trabeculae of newly formed bone deposited within a substratum of highly vascularized osteogenic connective tissue.

Clinically often severe pain

Radiographically: A radiopaque nidus surrounded by a diffuse and irregular radiolucency, surrounded in turn by bone of increased radiographic density

5. **BENIGN OSTEOLASTOMA - RARE**

Some features distinguish the lesion from an apparently close relative, the osteoid osteoma but they are very similar. The benign osteoblastoma has the potential for becoming moderately large, whereas the osteoid osteoma usually is 1 cm or less in diameter.

Radiographically well circumscribed radiolucent or mixed appearance. Sometimes large.

6. CHONDROMA - Rare in jaws

Definition: A benign tumor composed of mainly of cartilage. The chondroma may become partially ossified and is then called as osteo-chondroma. Theoretically, complete replacement of the cartilage by bone could occur - producing an osteoma. Any cartilaginous lesion of the jaws must be treated as potentially malignant. A chondrosarcoma may arise from pre-existing chondromatous tumors

Radiographically. Irregular radiolucent or mottled area of bone. NON specific appearance.
A **destructive** lesion. May cause root resorption

7. NEUROGENIC TUMORS (NEURILEMMA, NEUROFIBROMA)

Benign neurogenic tumors are occasionally found centrally within the jaws. The neurilemma (Schwannoma) is usually encapsulated (lucency). The neurofibroma is not capsulated. Neurofibromas may occur as solitary nodules or they may be associated with von Recklinghausen's disease, in which there are multiple cutaneous and subcutaneous tumors, cafe-au-lait spots of melanin pigmentation, and occasional skeletal deformities. With von Recklinghausen's disease there may be widening of the mandibular canal unilaterally.

Clinically. Occur at any age, and there appears to be no sex predilection. The majority of these lesions occur in the mandible. The lesions are relatively slow growing, and pain or parasthesia may be associated symptoms.

Radiographically -findings vary considerably. May present as a solitary radiolucency associated with the inferior alveolar canal, or as a cystic multilocular radiolucency with extensive bone damage, cortical expansion, and perforation

A neurofibroma adjacent to bone may produce a **saucer-shaped erosive** defect on the surface of the bone similar in appearance to other benign tumors. Malignant peripheral nerve tumors are impossible to distinguish radiographically from other malignancies

TRAUMATIC NEUROMA (AMPUTATION NEUROMA)

A traumatic neuroma is initiated by trauma to a nerve trunk, most commonly amputation (amputation neuroma). The tumor appears on the torn or cut end of the nerve, where it forms a ball or swelling varying in size, on the proximal termination of the nerve fiber

Radiographically. This tumor within bone produces a radiolucent defect of varied shape, but it has well-defined borders- non specific appearance. If small may not be seen.

8. CALCIFIED PERIPHERAL FIBROMA

A peripheral fibroma arising from the fibrous connective tissue of the periodontium may demonstrate the odontogenic potential of that tissue. It rarely reaches a diameter of more than 2 cm. Calcified substances form in many of these tumors and may be bone, cementum, amorphous and nonspecific calcifications, or a combination of these.

Clinically - seen on gingiva as a **hard** swelling, often between the teeth. Those in which extensive calcifications have taken place may become sufficiently radiopaque to permit visualization in the radiograph

9. CENTRAL OR PERIPHERAL GIANT CELL GRANULOMA (BENIGN GIANT CELL TUMOR: GIANT CELL REPARATIVE GRANULOMA)

It is not certain what the relationship is between the central and the peripheral type of jaw lesions and those found elsewhere. Giant cell granulomas are designated as peripheral or central in origin. The peripheral lesions occur equally in the maxilla or mandible and are located **on the gingiva or alveolar process**; have a predilection for edentulous areas, but may be located in dentate areas.

Color : Deep red to blue. **Age** : plus or minus 30 years

Sex : Female: Male 2 :1 **Site** : Mandible : maxilla 2:1

Radiographically Peripheral lesion may or may not involve the underlying bone. A superficial erosion or saucer-shaped concavity on the alveolar ridge is rarely seen. The central giant-cell granuloma occurs more often in children and young adults. The majority of these lesions occur in the region formerly occupied by deciduous teeth - that is, anterior to the molars. Frequently they cross the midline. Swelling may be the only presenting symptom

Radiographically. CENTRAL LESION may be noted as an incidental finding on routine radiographic screening. Demonstrates two variations. One is osteolytic, unilocular lesion in which the cortex may be partially destroyed. The other type exhibits multiple osteolytic foci with bone trabeculations within the tumor [**soapbubble** appearance]; it may produce thinning and expansion of the cortex when it has become very extensive. In both types, malposition of teeth and **resorption** of the **roots** of the teeth upon which the lesion encroaches are not unusual findings

Diff Diag. Ameloblastoma, Myxoma, cyst or central hemangioma.

It is important to suspect parathyroid abnormality whenever a patient develops giant-cell lesions of the jaw, particularly if they are multiple or bilateral. There will then be a loss of the lamina dura radiographically to assist in differentiation..

10. CENTRAL HAEMANGIOMA OF BONE. Rare in jaws

They are composed of blood channels of varied patterns that can be classified histologically as cavernous, capillary, or mixed

Clinically - Usually no symptoms. May present as hard, non-tender swelling that slowly enlarges over months or years. Haemorrhaging around the necks of the teeth in the involved region or severe bleeding after extraction may give a clue to the nature of the lesion; clinical findings frequently encountered are mobility of the teeth, hyperthermia of the affected side, bruit and, less frequently, pain and parasthesia

Females : Males 2 : 1 Age : Under 20 years
Site : Usually Mandible

Radiographically Large radiolucent lesions in the mandible, often reveal cystic spaces interspaced with trabecular patterns and thinned, expanded, cortices. Bone spicules

may extend at right angles from the bone into the lesion, a feature that is pathognomonic of hemangioma. Sometimes a **honeycomb** appearance is seen.

Diff Diagnosis: Ameloblastoma, myxoma, central giant cell granuloma, aneurysmal bone cyst

11. **ARTERIOVENOUS FISTULA / SHUNT**

An arteriovenous fistula is a direct communication between an artery and a vein, through which the blood bypasses the capillary circulation

Early diagnosis and proper treatment of an arteriovenous fistula of the jaws is important to the dentist because of a simple extraction of a tooth could cause uncontrollable and fatal hemorrhage

Clinically: Enlargement and abnormal warmth of the part, a palpable thrill, and an audible bruit are salient features. Also, there may be loosening of teeth at the site of the fistula and spontaneous hemorrhage from the mouth

Radiographically: Peripheral - nothing unless radiopaque material injected.
Central - honeycomb appearance or large radiolucency with trabeculations

12. ANEURYSMAL BONE CYST

Aneurysmal bone cysts occur most frequently in the spinal column and long bones. Very rare in the mandible and maxilla. Occur during the first and second decades mainly in mandible. No sex predilection. An aneurysmal bone cyst may result from an overzealous attempt at repair in bone marrow

Clinically: Progressive swelling of the jaw that may be associated with pain or tenderness. Teeth adjacent to the lesion may be deflected but remain **vital**. Often history of trauma. Lesion **grows rapidly**.

Radiographically a well- circumscribed unilocular or **multilocular** cystic lesion. As the lesion increases in size, there is marked expansion and thinning of the cortex, resulting in a ballooning that distends the jaw

Differential diagnosis: central myxoma, giant-cell lesion, odontogenic cysts or tumors. Central hemangioma. Too young for ameloblastoma

13. DERMOID CYSTS

Definition: Dermoid cysts contain elements of dermis, such as epidermal tissue, hair, nails, sebaceous and sweat glands. They are benign, congenital tumors that may occur in the region near the pituitary gland, in the submaxillary region and in the sex glands, particularly the **ovary**. Many contain teeth, which permits a fairly reliable diagnosis to be made from the radiographic examination alone. Primary as well as permanent teeth may be present but are smaller than normal and jawbones may be seen as small rudimentary fragments.

II. **MALIGNANT TUMORS.**

The two main types of malignant tumors are carcinoma and sarcoma. However, the most common malignancy seen in the bones of the jaws **metastatic**.

CARCINOMA

A carcinoma is a malignant tumor of **epithelial** origin.

1. SQUAMOUS-CELL carcinoma occurs most frequently in the oral cavity, and the sites of origin are the lip, tongue, floor of the mouth, palate, buccal surfaces, and gingivae. In rare instances the tumor may arise within the jaws from cell rests remaining from the enamel organ and sheath of Hertwig

Radiographically : Early stage - often N.A.D.
 Later stage - radiolucency with **irregular** and **ill defined** borders. Cortical **destruction**. Tilting / movement of teeth. Any ulcerated growth of the soft tissue beneath which there is radiographic evidence of **destruction** of bone should be suspected of being malignant. Moth eaten appearance.

Differential diagnosis: simulates severe infection - osteomyelitis

Carcinomas that occur in the jaws as a result of metastases from lesions elsewhere most often arise in the central portion of the jaws, because red bone marrow appears to be the most frequent site of metastases to bone. The first evidence of metastasis may be radiographic signs of an **osteolytic** lesion in a jaw that, appears clinically to be normal. Seen as a **poorly demarcated lucency**. The lesions in the mandible may cause **parasthesia** of the lip; when this symptom is present, one should suspect that the lesion is malignant

2. MUCOEPIDERMOID CARCINOMA.

Definition: Arises frequently in the salivary glands. The tumor may be found as a central lesion within the jaws. Either the maxilla or the mandible may be involved; the molar-premolar area is the usual site. Central lesions appear twice as frequently in women as in men, and the average age at diagnosis is 46 years

Radiographically: A multilocular radiolucency similar to ameloblastoma; however, wide variations occur. Nothing will be seen where the lesion is limited to the soft tissue

Clinically a slowly enlarging mass with or without pain

3. **SARCOMA.**

Definition: A sarcoma is a malignant tumor of connective tissue origin. May originate in fibrous tissue, cartilage, bone, muscle, fat, or endothelial tissue.

Sarcomas tend to occur in a **younger age** group, have a greater propensity to metastasize via the bloodstream rather than the lymphatics; thus, distant sites of secondary tumor are observed more frequently

Radiographically: Early detection important. Produces changes in bone in the early stage of development. Irregular and diffuse destruction of bone and a patchy appearance at an early stage and there may be no line of demarcation from the normal surrounding bone.

A. **FIBROSARCOMA**

The incidence of fibrosarcoma is less than that of osteosarcoma. In contrast to osteosarcoma, they are found uniformly in both young and older age groups.

B. **OSTEOSARCOMA** (Osteogenic Sarcoma)

The osteosarcomas may present a wide range of microscopic and radiographic findings. Divided into osteoblastic, osteoclastic, chondroblastic, and fibroblastic tumors, depending on the dominating element

The mean age at the time of the first-noted symptom related to the tumor is significantly greater (about a decade) than for osteosarcoma of other bones. Haematogenous metastasis less frequently observed

Clinically: Swelling of the involved area, with or without associated pain. Parasthesia, loose teeth, and bleeding. Nasal obstruction may be noted with maxillary lesions

Radiographically: Destructive lesion with indistinct borders, may appear sclerotic or lytic, or there may be a combination of these findings. There may be a **symmetrically widened** periodontal membrane space associated with a **few** teeth. The osteoblastic variety may produce a **sunburst / sunray** affect

C. **CHONDROSARCOMA** - Rare in jaws. Predilection for adulthood and older age groups

Radiographically: Suggestive of malignancy, but no characteristic features that allow differentiation. Seen in head of condyle.

D. **MALIGNANT LYMPHOMA.**

The malignant lymphomas are a group of neoplasms that are derived from lymphocytes and reticulum cells in any of their developmental stages

Clinically: Present with swelling and pain of the involved area. Parasthesia is a frequent finding. No significant sex predilection, and all age groups are involved.

Radiographically - usually nothing as it is usually limited to soft tissue

E. **MULTIPLE MYELOMA.**

Myeloma is a tumor of bone that arises from bone marrow constituents resembling plasma cells. These neoplasms are almost always multiple and may be widely distributed throughout the skeleton.

Radiographically The lesion is seen most commonly in the skull on a **lateral skull** view. Fairly large, well demarcated radiolucencies describe as "punched out" lesions.

Very rare in mandible or maxilla. There may be spotty distribution of lesions throughout the maxilla and the mandible. Tend to appear in the posterior regions, where the marrow spaces are largest. Tend to be multiple.

The diagnosis of multiple myeloma is often aided by laboratory procedures. Many patients exhibit a hyperglobulinemia and an increase in serum protein. **Bence Jones** protein is noted in urine in patients with multiple myeloma.

F. HISTIOCYTOSIS X.

Related conditions of the reticulo-endothelial system.

LETTERER-SIWE. Acute form occurring in infants and is rapidly fatal. Radiographically large poorly demarcated lucencis seen on lateral skull view.

HAND-SCHULLER-CHRISTIAN Chronic form affecting infants and young children. Radiology - as above

EOSINIPHILIC GRANULOMA **Localized** condition affecting children and young adults with a predilection for males

Radiographically - sometimes poorly demarcated OR punched-out lesions in skull in young people; often multiple In the jaws non-specific lytic lesions may be seen in the bone or at the apices of the teeth that may resemble a peri-apical area or localized, advanced periodontal condition. The eosinophilic granuloma may appear as a poorly demarcated periapical lucency or a localized severe periodontal problem in young persons.

G. Sickle cell anemia.

Found mainly in young black males [early twenties]. Bleeding gingiva

Radiographically - enlarged marrow spaces.

Thalasemia. / Mediterranean disease : Fetal hemoglobin with short life span.

Radiographically - large marrow spaces

Metasteses - from prostate, ovaries, kidneys, stomach, breast etc. Commonly seen in the posterior region of the mandible in the region of the mandibular canal as a poorly demarcated lucency.