SOFT TISSUE CALCIFICATION AND OSSIFICATION

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HETROTROPHIC CALCIFICATION

Deposition of calcium salts in unorganized fashion in soft tissues.

Heterotopic calcifications may be divided into three categories:

- Dystrophic calcification
- Idiopathic calcification
- Metastatic calcification

HETROTROPHIC OSSIFICATION

Minerals deposited in bone as organized, well formed bone.

- Posttraumatic ossification
- Progressive myositis ossificans
- Ankylosing spondylitis

Dystrophic calcification

- Calcification that occurs in degenerating, diseased and dead tissue despite normal serum calcium and phosphate levels.

Dystrophic calcification

- Long standing cysts
- Calcified lymph nodes
- Calcifications in tonsils
- Cysticercosis
- Arterial calcification

  - Monckebergs medial calcinosis (arteriosclerosis)

  - Calcified atherosclerotic plaque

General dystrophic calcifications of the oral lesions

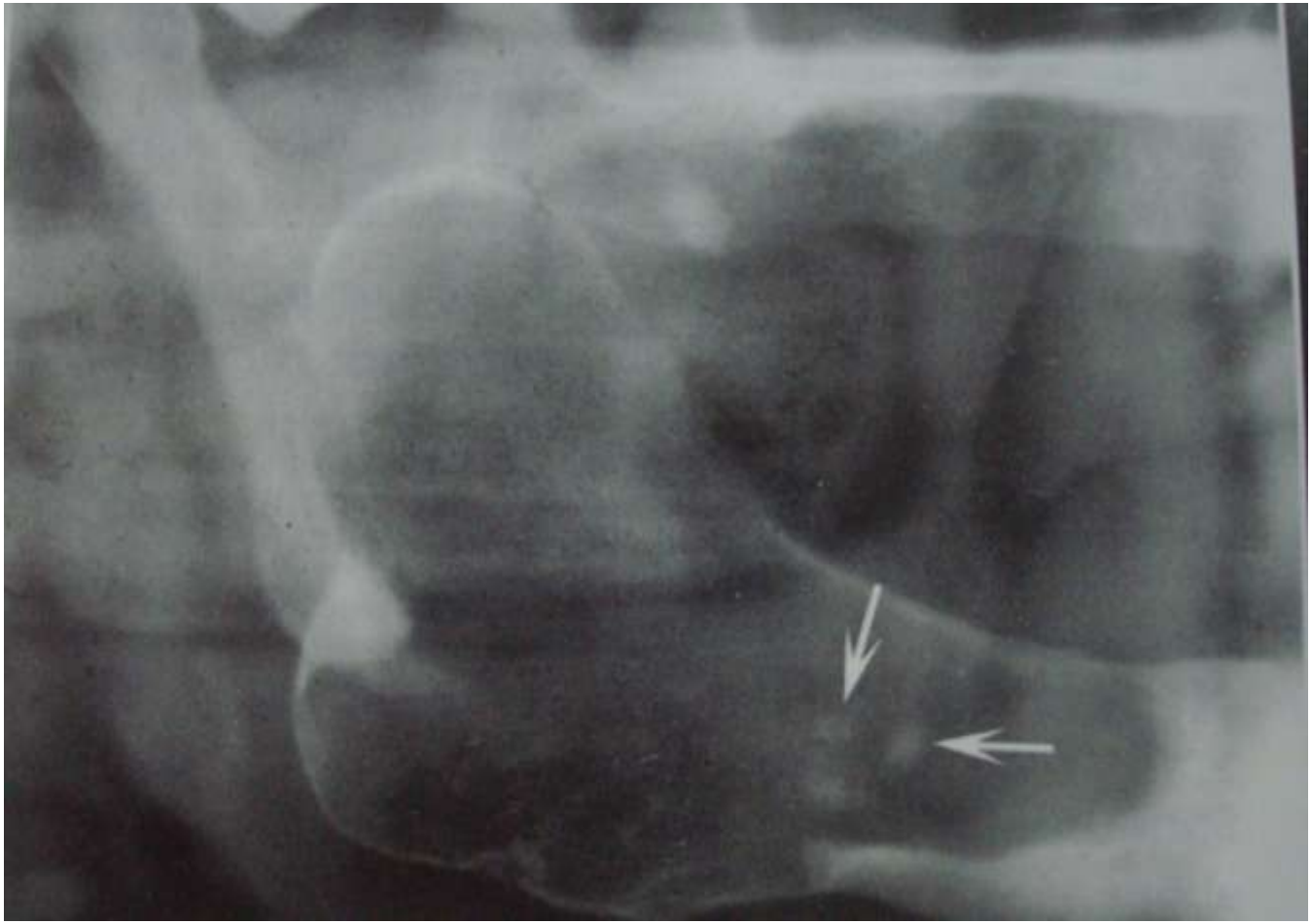
Clinical features-

- Site-gingiva, tongue, lymph nodes and cheek
- No signs or symptoms
- Occasional enlargement and ulceration of overlying soft tissues and
- calcium salts might be palpated

Radiographic features

- Barely perceptible, fine grains of radiopacities to…….larger ,irregular radiopaque particles which rarely exceed 0.5cm in diameter.
- Calcification- homogenous or may contain punctate areas.
- Outline- irregular or indistinct

Dystrophic calcification



Dystrophic calcification

Dystrophic calcification

Calcified lymph nodes

Diseases causing calcified lymph nodes-

- TB
- Sarcoidosis
- Cat-scratch disease
- Lymphoma previously treated with radiotherapy
- Fungal infections
- Metastates from distant calcifying neoplasm

Calcified lymph nodes

Clinical features-

- Mostly incidental findings
- Submandibular and cervical lymph nodes commonly involved
- Hard round and oblong masses

Calcified lymph nodes

Radiographic features

Location-

- Submandibular region-at or below inferior border of mandible near angle
- Between posterior border of ramus and cervical spine
- Single node or series of nodes may be affected-lymph node chaining

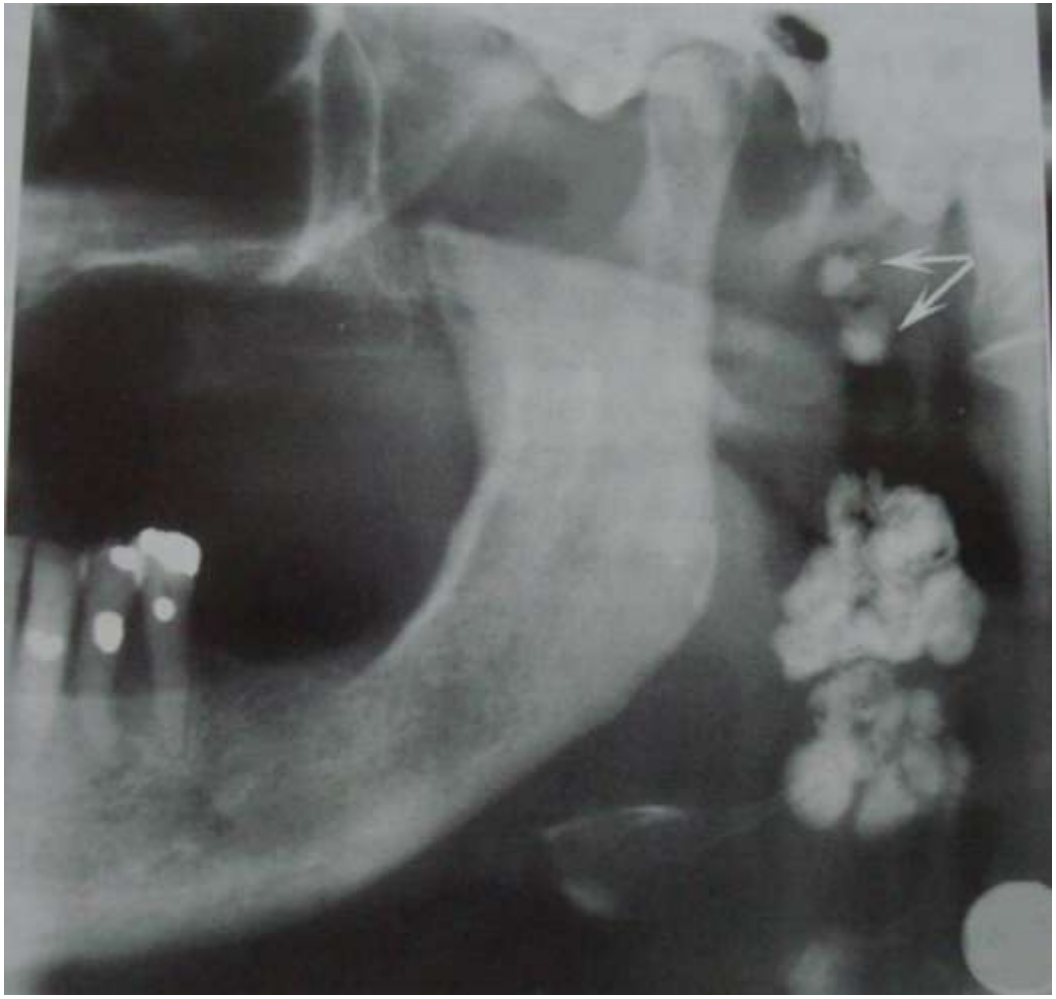
Calcified lymph nodes

Radiographic features…

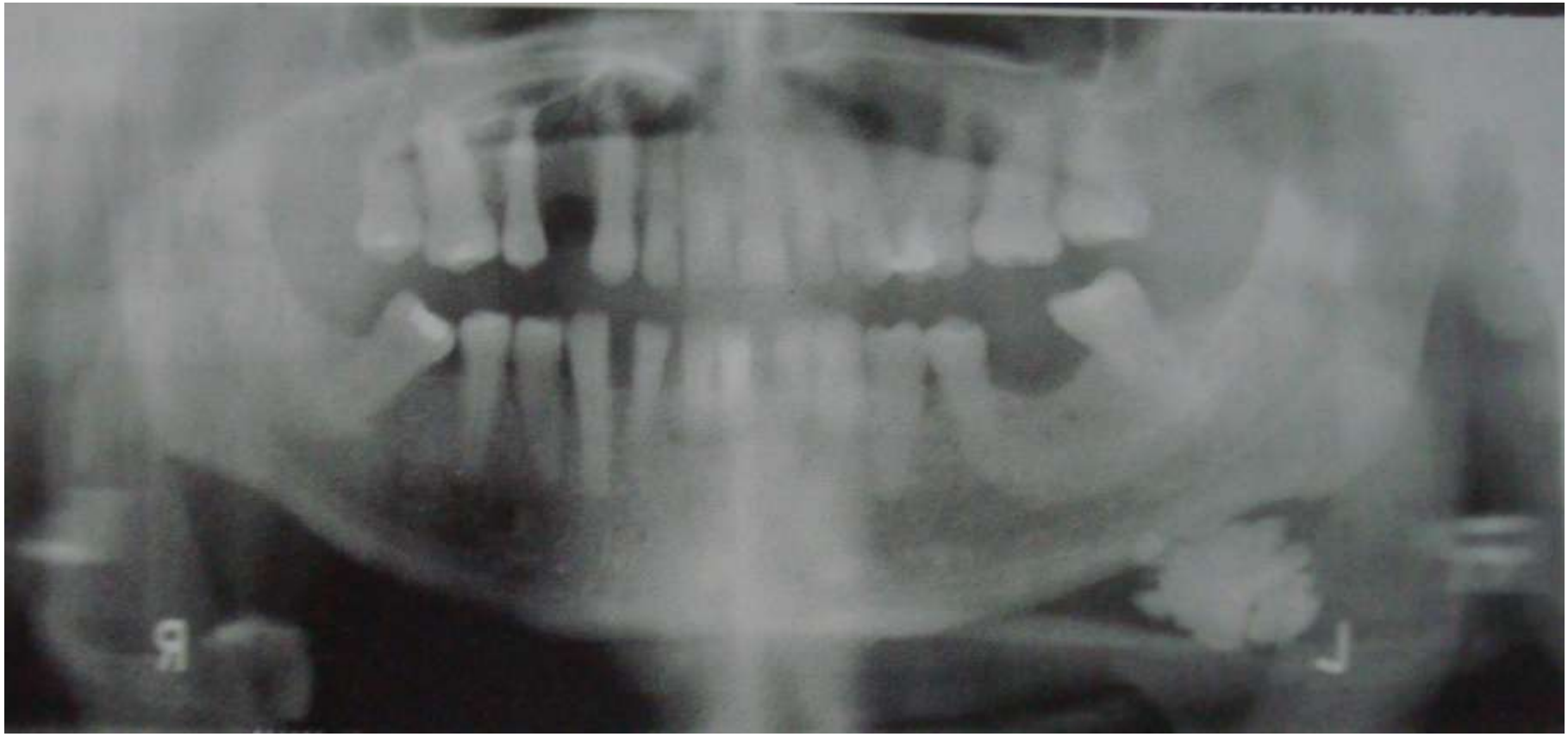
- **Periphery-** Well –defined, irregular, lobulated
- **Internal structure-** vary in degree of radiopacity
- **Differential diagnosis**-Sialolith
  Phlebolith

Management- No treatment required

Calcified lymph nodes



Calcified lymph nodes



Calcified lymph nodes

Dystrophic calcification in the tonsils

- Tonsillar calcification forms when repeated bouts of inflammation enlarge the tonsillar crypts .

- Incomplete resolution of dead bacteria and pus serve as nidus for dystrophic calcification.

Dystrophic calcification in the tonsils

Clinical features-

- 20-68 yrs age group
- Hard , round ,white or yellow objects projecting from tonsillar crypts.
- Pain
- Swelling
- Fetor orisdysphagia
- Foreign body sensation on swallowing

Dystrophic calcification in the tonsils

Radiographic features-

- **Location -**Single or multiple radiopacities
  -Overlap the midportion of the mandibular ramus
  -in the region where the image of the dorsal surface of the tongue crosses the ramus in the palatoglossal or glossopharyngeal air spaces

- **Periphery-** Cluster of multiple ill-defined radiolucencies

- **Internal structure**- Slightly more radiopaque than cancellous bone and approximately same as cortical bone

Dystrophic calcification in the tonsils

- **Differential diagnosis**

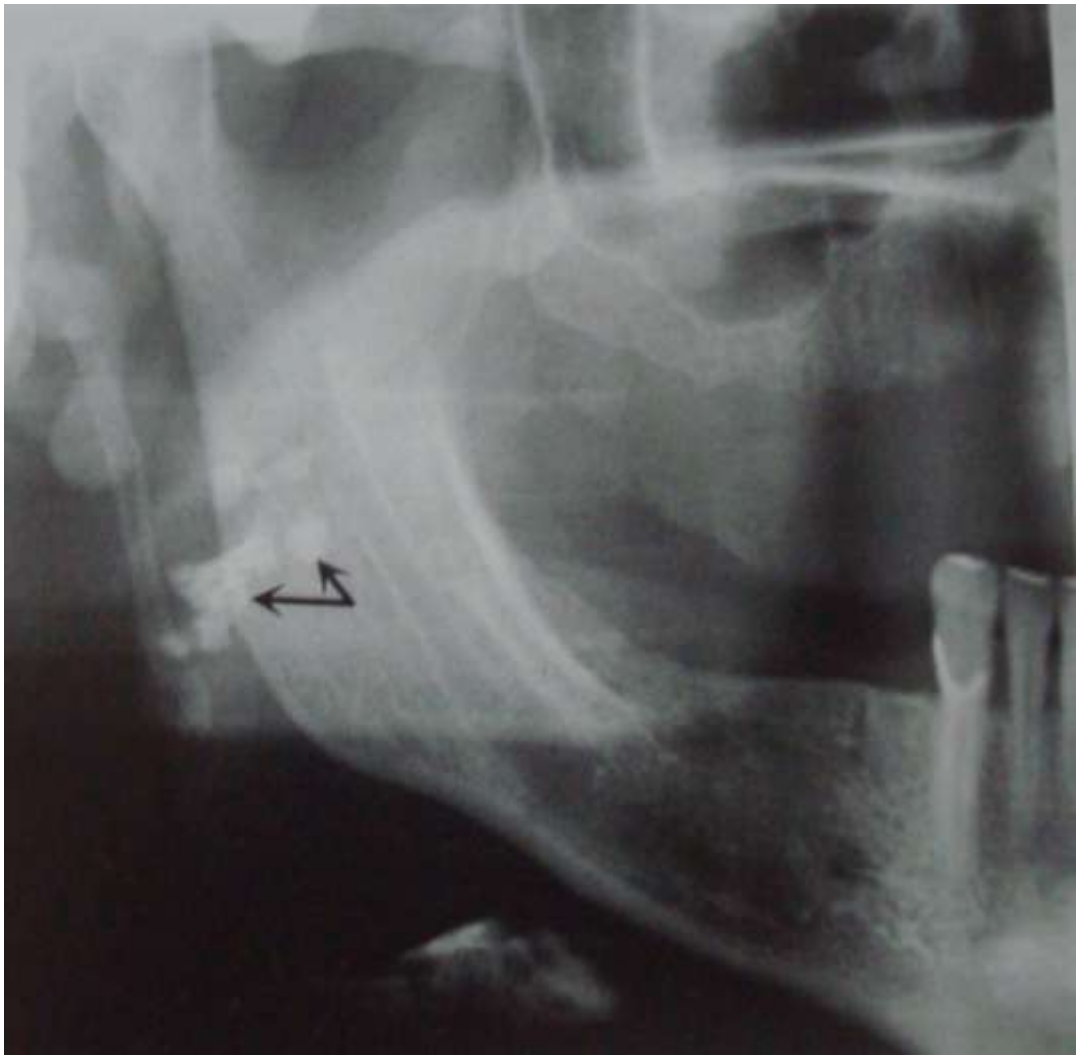
  Clinical Differential diagnosis- Calcified granulomatous disease, syphillis, mycosis or lymphoma

  Radiographic Differential diagnosis- Dense bone islands

- **Treatment-** No treatment is required for most tonsillar calcifications. However, large calcifications with associated symptoms are removed surgically

Dystrophic calcification in the tonsils

Dystrophic calcification in the tonsils



CYSTICERCOSIS

- Eggs from taenia solium ingested
- Eggs digested in stomach
- Larval form-cystecercus cellulose hatches
- Penetrate the mucosa , enter the blood vessels and lymphatics and distributed in tissues all over the body
- Brain ,heart, muscle and skin, oral and peri-oral region

CYSTICERCOSIS

Clinical features

- **GI-** mild GI upset, nausea, vomitting
- **Brain-** seizure, headache, visual disturbances, acute obstructive hydrocephalus, Irritability and loss of consciousness
- **Head and neck-** palpable, soft fluctuant swellings resembling mucocele

  -multiple small nodules in masseter, suprahyoid muscles, buccal mucosa, lip

CYSTICERCOSIS

Radiographic features

- **Location-** muscles of mastication,and facial expression,the suprahyoid muscle and the posterior cervical musculature

- **Periphery-** multiple well-defined ,elliptical radiopacities resembling grains of rice

- **Internal structure-** homogenous and radiopaque

CYSTICERCOSIS

- **Differential diagnosis-**

  Sialolith

- **Management-**

  Prevention-Antihelminthic

  Once calcified -harmless

Arterial calcifications

- Arteriosclerosis
- Calcified atherosclerotic plaque

Arteriosclerosis

- Fragmentation, degeneration and eventual loss of elastic fibres followed by the deposition of calcium within the medial coat of the vessel.

Arteriosclerosis

- **Clinical features**-cutaneous gangrene
  - peripheral vascular disease
  - myositis due to vascular insuficiency
- **Sturge weber syndrome**-intracranial calcifications

Arteriosclerosis

Radiographic features

- **Location-** facial artery ,carotid artery

- **Periphery and shape** -pipe-stem or tram –track appearance

Arteriosclerosis

Calcified Atherosclerotic plaque

Location- Develops at arterial bifurcations
-greater cornu of the hyoid bone and the cervical vertebrae C3, C4, or the intervertebral space between them

Periphery and shape-multiple
- irregular in shape
- sharply defined
-vertical linear distribution.

Internal structure-heterogeneous radiopacity

Calcified Atherosclerotic plaque

- **Differential Diagnosis-** Calcified triticeous cartilage

- **Management-** should refer to their physician for cerebrovascular and cardiovascular workup.

IDIOPATHIC CALCIFICATIONS

Idiopathic calcification (or calcinosis) results from deposition of calcium in normal tissue despite normal serum calcium and phosphate levels.

Sialolith

Clinical Features-

- Age-middle and later years
- Sex-male
- Gland –submandibular gland (swelling in floor of mouth)

Sialolith

Radiographic features

- **Location-**submandibular gland-83-94%
  parotid gland-4-10%
  sublingual gland-1-7%

Submandibular-50% in distal portion of whartons duct
20%-proximal
30%-in the gland

Periphery and shape- cylindric

Internal structure- homogenously radiopaque or multiple layers of calcification

Sialolith

- **Applied Radiology-**
- IOPA
- OCCLUSAL
- Lateral oblique and OPG

- **DD-**lymph nodes-asymptomatic

- **Management-**
  - milked out by bimanual palpation
  - Piezoelectric extracorporeal shock wave lithotripsy
  - Surgical removal

Sialolith

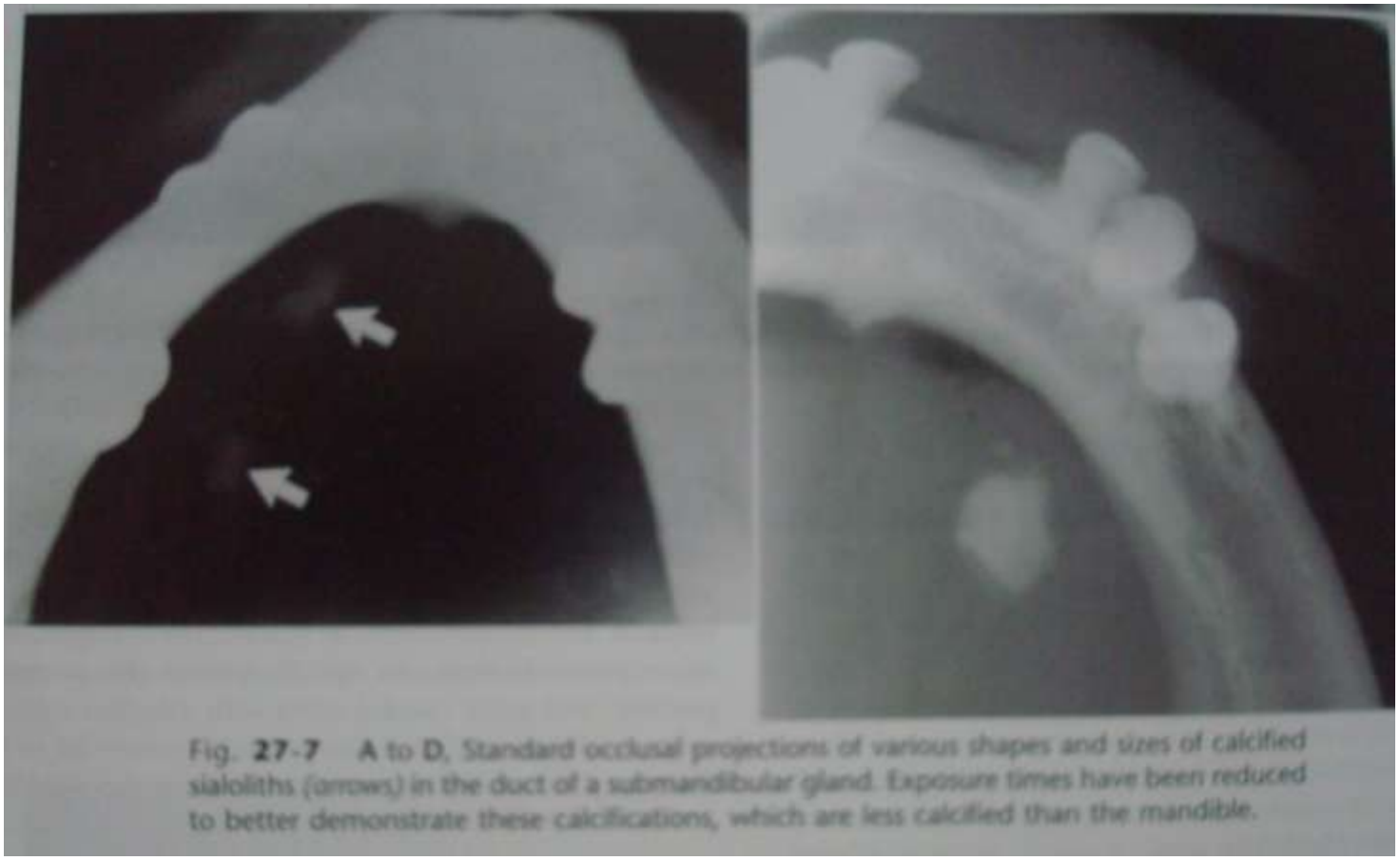
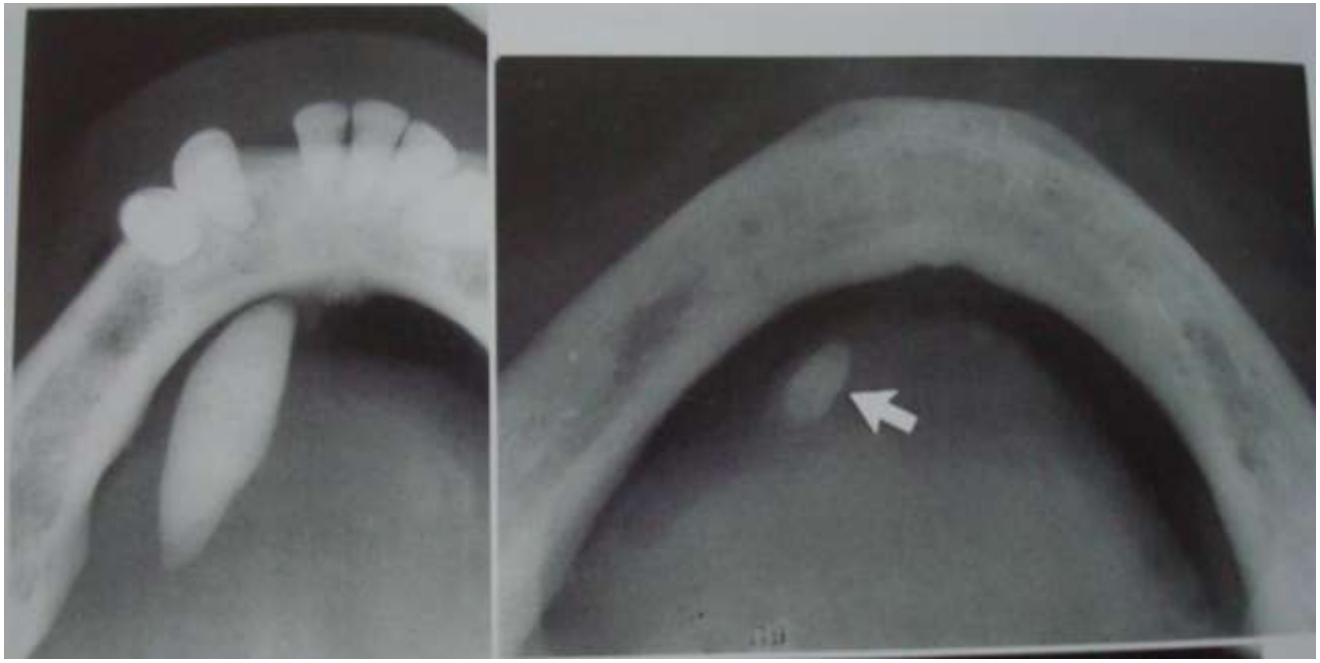
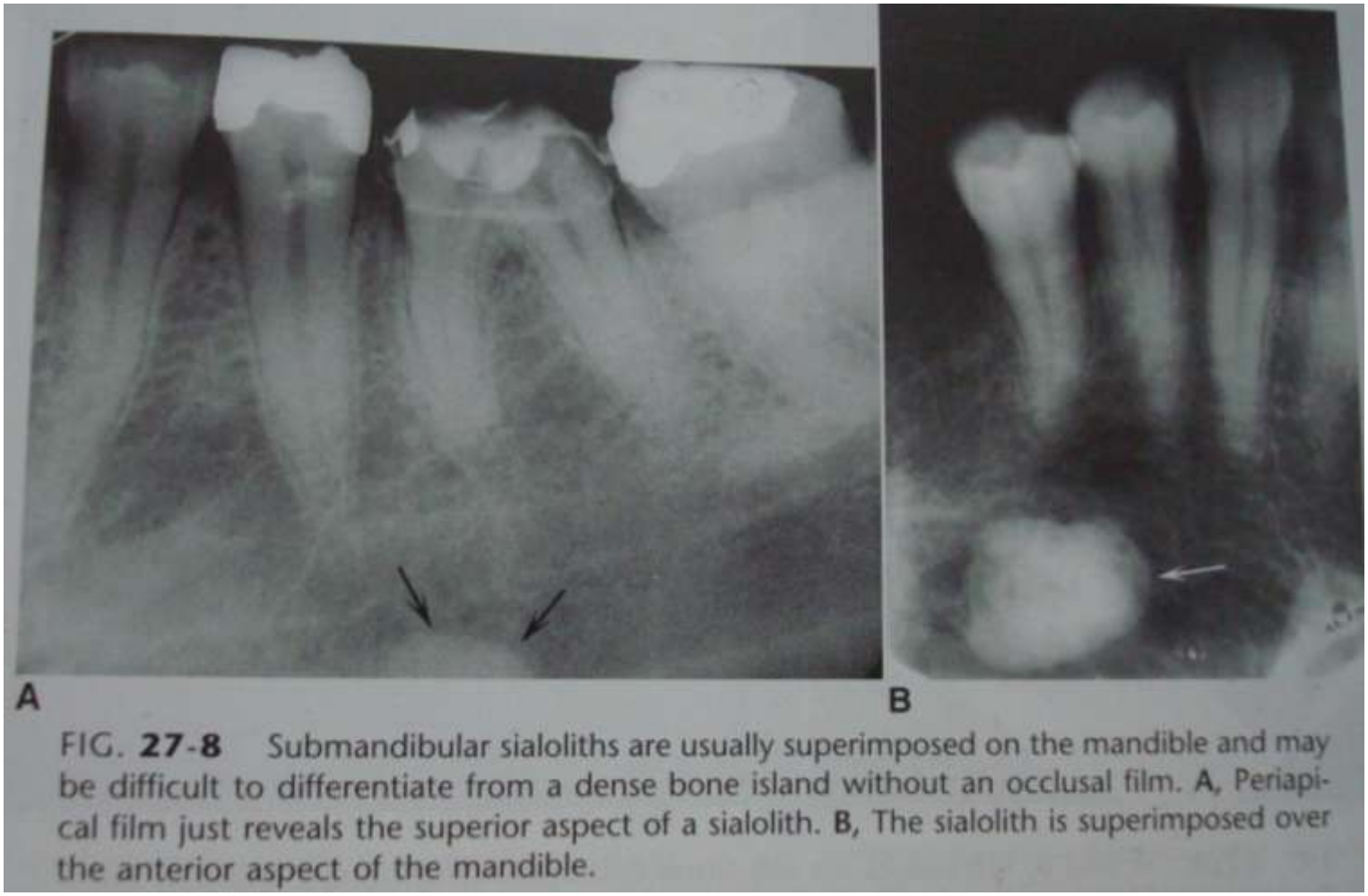


Fig. 27-7 A to D, Standard occlusal projections of various shapes and sizes of calcified sialoliths (arrows) in the duct of a submandibular gland. Exposure times have been reduced to better demonstrate these calcifications, which are less calcified than the mandible.

Sialolith



Sialolith



A B

FIG. **27-8** Submandibular sialoliths are usually superimposed on the mandible and may be difficult to differentiate from a dense bone island without an occlusal film. **A**, Periapical film just reveals the superior aspect of a sialolith. **B**, The sialolith is superimposed over the anterior aspect of the mandible.

Phleboliths

C/F- swollen, throbbing, discoloured
-diascopy positive

R/F-location- common in hemangiomas

Periphery and shape- In cross-section round or oval-upto6mm in diameter viewed from side-straight or slightly curved sausage

Internal structure- homogenous or bulls eye

DD- sialolith

Phleboliths

FIG. **27-9** A and B, Phleboliths are soft tissue dystrophic calcifications found in veins. They are usually associated with hemangiomas.

Laryngeal Cartilage Calcifications

The small, paired triticeous cartilages are found within the lateral thyrohyoid ligaments. Both the thyroid and triticeous cartilages consist of hyaline cartilage, which has a tendency to calcify or ossify with advancing age.

Clinical Features-incidental radiographic finding with no clinical features.

Radiographic Features

Location. within the pharyngeal airspace inferior to the greater cornu of the hyoid bone and adjacent to the superior border of C4.

FIG. **27-10** Lateral cephalometric film revealing calcification of the thyroid cartilage *(arrow)*.

Calcified triticeous cartilage

Radiographic Features cont..

- **Periphery and shape.** The word triticeous means "grain of wheat," and the cartilage measures 7 to 9mm inlength and 2 to 4 mm in width.

  The periphery is well-defined and smooth.

- **Internal structure.'**homogeneous radiopacity

Differential Diagnosis

Calcified atheromatous plaque in the carotid bifurcation

- Solitary nature and extremely uniform size and shape of calcified triticeous cartilage should be discriminatory.

Rhinolith/Antrolith

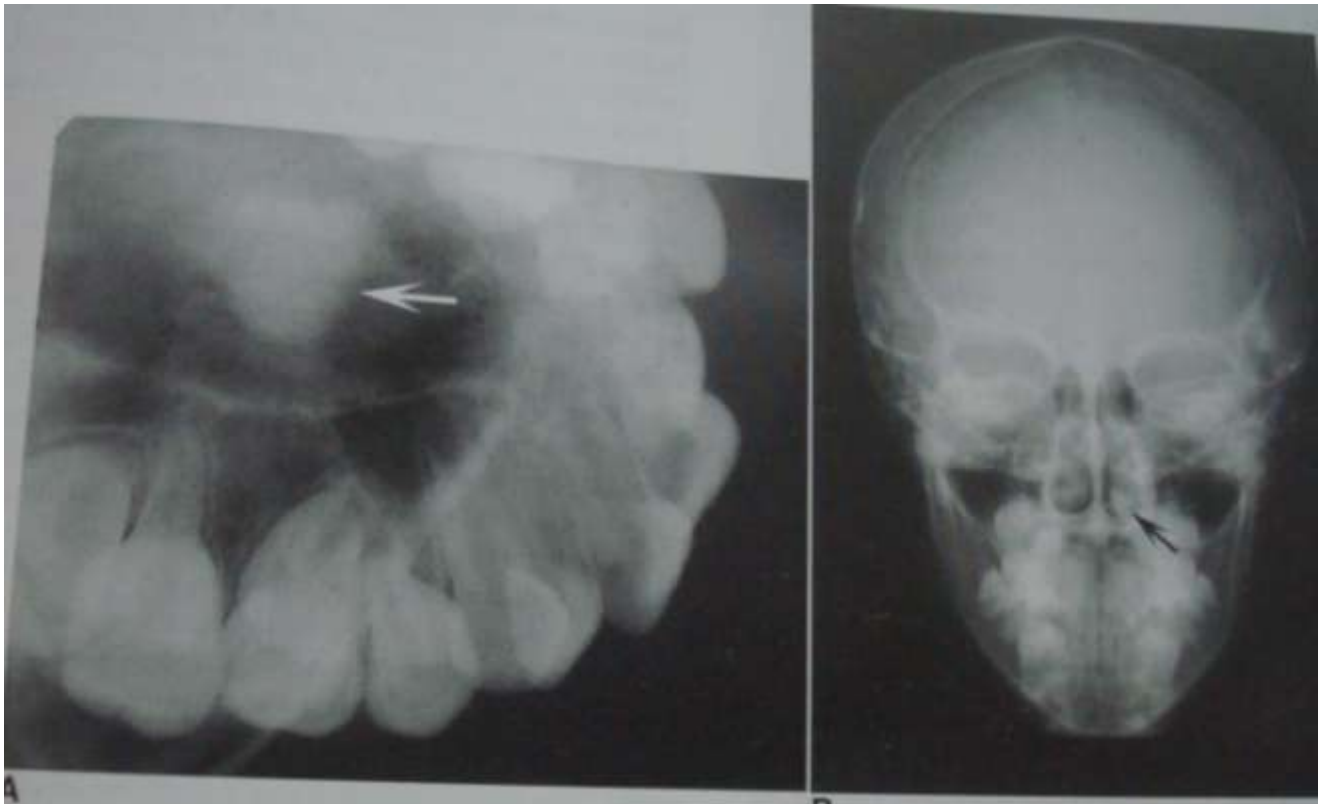


FIG. **27-11** A, Lateral occlusal film shows a rhinolith *(arrow)* positioned above the floor of the nose. B, Posterior-anterior skull film of the same case demonstrating that the rhinolith is positioned within the nasal fossa *(arrow)*.

Rhinolith/Antrolith

Clinical features-

- Pain
- Congestion
- Ulceration
- Purulent rhinorrhea
- Sinusitis

- Headache
- Epistaxis
- Anosmia
- Fetor
- Fever

Rhinolith/Antrolith

Radiographic Features

- **Location.** Rhinoliths develop in the nose whereas antroliths develop in the antrum of the maxillary sinus

- **Periphery and shape.** These stones have a variety of shapes and sizes.

- **Internal structure.** They may present as homogeneous or heterogeneous radiopacities, depending on the nature of the nidus and sometimes have laminations. Occasionally the density will exceed the surrounding bone.

Metastatic calcifications

Metastatic calcification results when minerals precipitate into normal tissue as a result of higher than normal serum levels of calcium

- Hyperparathyroidism
- Hypercalcemia of malignancy

Hyperparathyroidism

- Pathologic calcifications in soft tissues have a punctate or nodular appearance and occur in the kidneys and joints.

Heterotopic Bone

The term heterotopic indicates that bone
has formed in an abnormal (extraskeletal) location

Ossification of Stylohyoid ligament

- **C/F**- can be palpated over the tonsil as a hard ,pointed structure.
- Vague ,nagging to intense pain in the pharynx on swallowing, turning the head, or opening the mouth,especially on yawning.
- Eagle's syndrome
- Stylohyoid syndrome
- Otalgia, tinnitus, temporal headache and vertigo or transient syncope

Ossification of Stylohyoid ligament

Radiographic Features-

- *Incidental feature on panaromic*

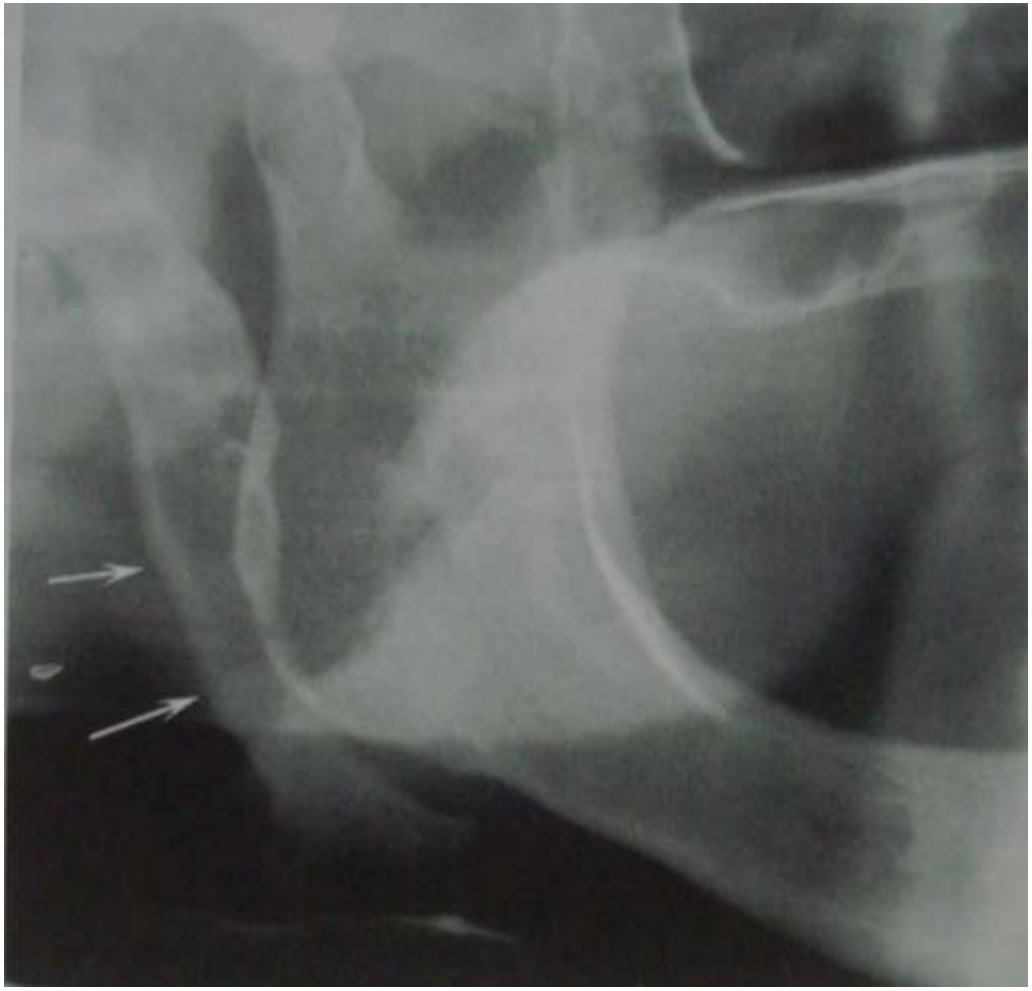
- **Location**-mastoid process-posterio-inferior aspect of the ramus towards the hyoid bone.

- **Shape-**long, tapering,thin,radiopaque process
  -thicker at it's base projects downwards and forwards
  -0.5-2.5cm in length.

- **Internal structure**-homogenously radiopaque

Ossification of Stylohyoid ligament

Ossification of Stylohyoid ligament



Osteoma Cutis

- Rare soft tissue ossification in the skin.
- **C/F-** face, tongue
  - occasionally appears yellowish white otherwise no visible change
  -multiple miliary osteoma cutis

- **R/F-** location-cheek and lip region
  -may get superimposed over tooth root or alveolar process-dense bone area
  -periphery and shape-smoothly outlined, radiopaque,washer shaped (0-1-5cm in size)

Osteoma Cutis

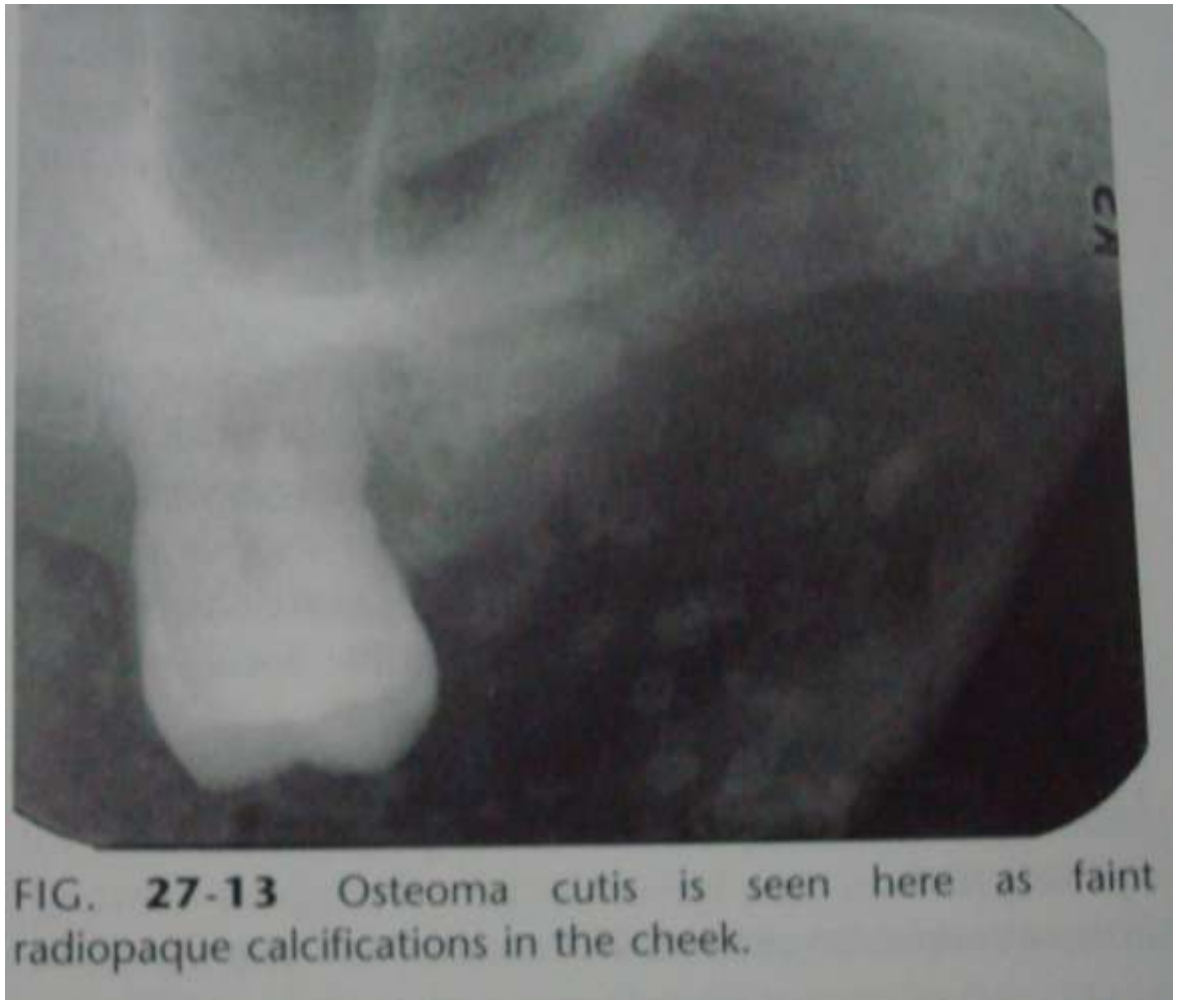


FIG. **27-13** Osteoma cutis is seen here as faint radiopaque calcifications in the cheek.

Myositis Ossificans

- Fibrous tissue and heterotopic bone form within the interstitial tissue of the muscle and associated tendons and ligaments.

- Secondary destruction and atrophy of the muscle occur as this fibrous tissue and bone interdigitate and separate the muscle fibres.

- There are two principal forms- **localized and progressive**

LOCALIZED (TRAUMATIC) MYOSITIS OSSIFICANS

Etiology

- Acute or chronic trauma
- Heavy muscular strain caused by certain occupations and sports.
- Muscle injury from multiple injections (occasionally from dental anesthetic)

- ➢ The injury leads to considerable hemorrhage into the muscle or associated tendons or fascia.
- ➢ This hemorrhage organizes and undergoes progressive scarring.
- ➢ During the healing process, heterotopic bone and in some cases cartilage is formed.

LOCALIZED (TRAUMATIC) MYOSITIS OSSIFICANS

Clinical Features-

- **Age-** Can occur in any age
- **Sex-** often in young men who engage in vigorous activity.
- **The site** -swollen, tender, and painful and the overlying skin may be red and inflamed
- If a muscle of mastication is involved, opening the jaws may be difficult.
- After about 2 or 3 weeks, the area of ossification becomes apparent in the tissues; a firm, intramuscular mass can be palpated.
- The localized lesion may enlarge slowly, but eventually it stops growing.
- The lesion may appear fixed, or it may be freely movable on palpation.

LOCALIZED (TRAUMATIC) MYOSITIS OSSIFICANS

Radiographic Features

Location. The most commonly involved muscles of the head and neck are the masseter and sternocleidomastoid.

A radiolucent band can be seen between the area of ossification and adjacent bone, and the heterotopic bone may lie along the long axis of the muscle

Periphery and shape. The periphery is more radiopaque than the internal structure.

Variation in shape from irregular, oval to linear streaks (pseudo trabeculae) running in the same direction as the normal muscle fibers.

FIG. **27-14** Soft tissue ossification extending from the coronoid process in a superior direction, following the anatomy of the temporalis muscle (arrow). This condition arose after several attempts were made to provide a submandibular nerve block, leaving the patient unable to open the mandible.

LOCALIZED (TRAUMATIC) MYOSITIS OSSIFICANS

Radiographic Features...

Internal structure

- The internal structure varies with time.
- Within the third or fourth week after injury- faintly homogeneous radiopacity.
- This organizes further, and by 2 months- a delicate lacy or feathery radiopaque internal structure
- These changes indicate the formation of bone; however, this bone does not have a normal appearing trabecular pattern.
- Gradually the image becomes denser and better defined, maturing fully in about 5 to 6 months.
- After this period the lesion may shrink.

LOCALIZED (TRAUMATIC) MYOSITIS OSSIFICANS

Differential Diagnosis

- Stylohyoid ligament and other soft tissue calcifications

- Bone-forming tumors such as osteogenic sarcoma-can form a linear bone pattern but the tumor is contiguous with the adjacent bone, and signs of bone destruction often are present.

LOCALIZED (TRAUMATIC) MYOSITIS OSSIFICANS

Management

- Rest and limitation of use are recommended to diminish the extent of the calcific deposit.
- Early surgical removal of the lesion usually stimulates rapid (within 1 month) and extensive recurrence (from origin to insertion of the affected muscle).
- Recurrence is not likely if removal of the involved area of muscle is postponed until the process has become stationary

PROGRESSIVE MYOSITIS OSSIFICANS

- Progressive myositis ossificans is a rare disease

- This condition may be inherited or may be a spontaneous mutation affecting the mesenchyma.

Clinical features

- Affects children before 6years of age, occasionally as early as infancy.

- More common in males.

PROGRESSIVE MYOSITIS OSSIFICANS

- Starts in the muscles of the neck and upper back and moves to the extremities.
- Soft tissue swelling that is tender and painful and may show redness and heat
- The acute symptoms subside, and a firm mass remains in the tissues.
- In some cases the spread of ossification is limited; in others it becomes extensive, affecting almost all the large muscles of the body.
- This condition may affect any of the striated muscles, including the heart and diaphragm.
- Stiffness and limitation of motion of the neck, chest, back, and extremities (especially the shoulders) gradually increase.

PROGRESSIVE MYOSITIS OSSIFICANS

- Advanced stages of the disease result in the "petrified man" condition.
- During the third decade the process may spontaneously arrest;
- However, most patients die during the third or fourth decade.
- Premature death usually results from respiratory embarrassment or from inanition through the involvement of the muscles of mastication.

PROGRESSIVE MYOSITIS OSSIFICANS

Radiographic Features

- The heterotopic bone more commonly is oriented along the long axis of the involved muscle

Differential Diagnosis

- Rheumatoid arthritis -may be difficult to distinguish between the two

- Calcinosis-the deposits of amorphous calcium salts frequently resorb, but in progressive myositis ossificans, the bone never disappears.

Management

- No effective treatment exists for progressive myositis ossificans.

PROGRESSIVE MYOSITIS OSSIFICANS

PROGRESSIVE MYOSITIS OSSIFICANS

PROGRESSIVE MYOSITIS OSSIFICANS

Conclusion

- Soft tissue opacities are fairly common, present on about 4% of panoramic radiographs.
- In most cases the goal is to identify the calcification correctly to determine whether treatment or further investigation is required.
- Some soft tissue calcifications require no intervention or long-term surveillance, whereas others may be life-threatening and the underlying cause requires treatment.
- When the soft tissue calcification is adjacent to bone, it sometimes is difficult to determine whether the calcification is within bone or soft tissue.
- In such cases another radiographic view at right angles is useful.