

Osseous Pathology of the Mandible

Chino

5/5/10

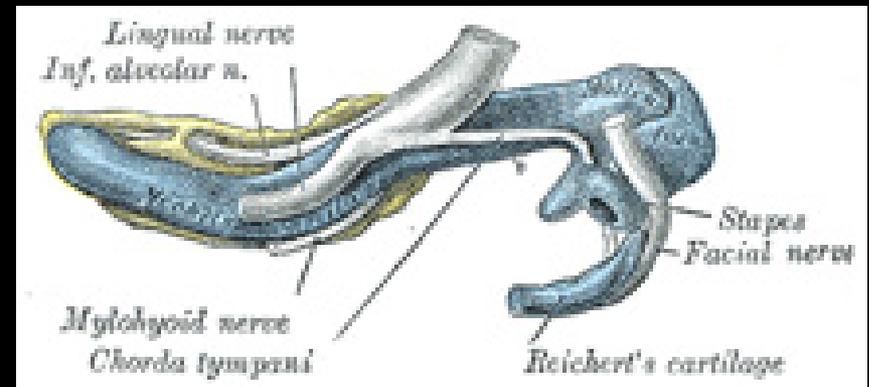
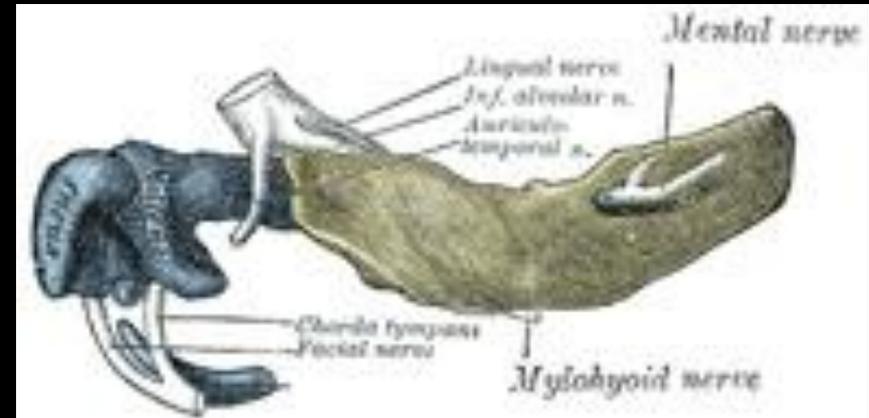
Outline

- Embryology
- Anatomy
- Dentition
- Trauma
- Tumors

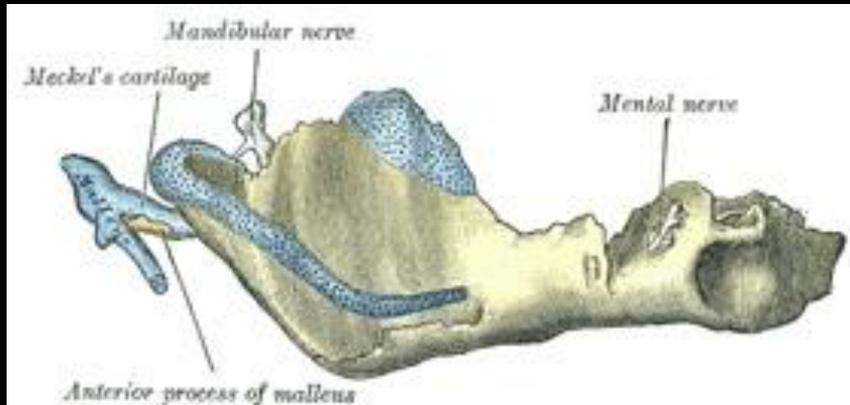
Embryology

Development

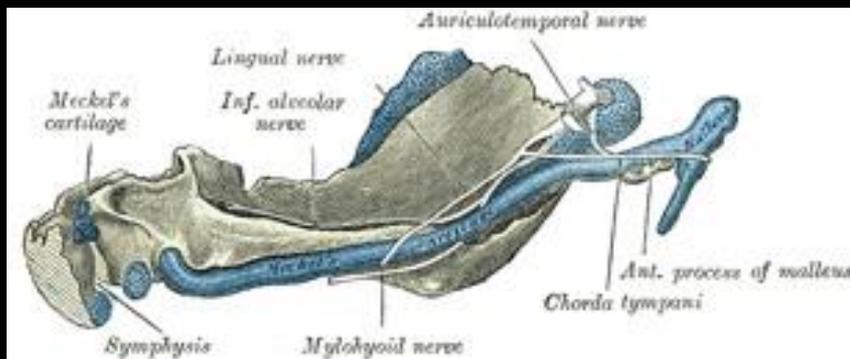
- mandible arises from neural crest tissue structures early in 4th week of development
- forms from enlargement and fusion of paired mandibular prominences
- mandibular skeleton develops from cartilaginous derivative of 1st branchial arch called *Meckel's cartilage*



Ossification



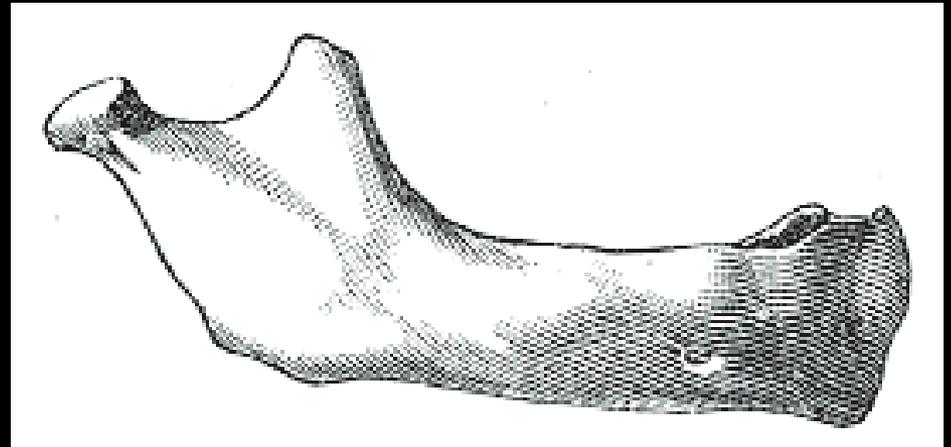
- ossifies in fibrous membrane covering outer surface of ventral end of Meckel's cartilage
- each half of bone is formed from single center, the cartilaginous bar of mandibular arch



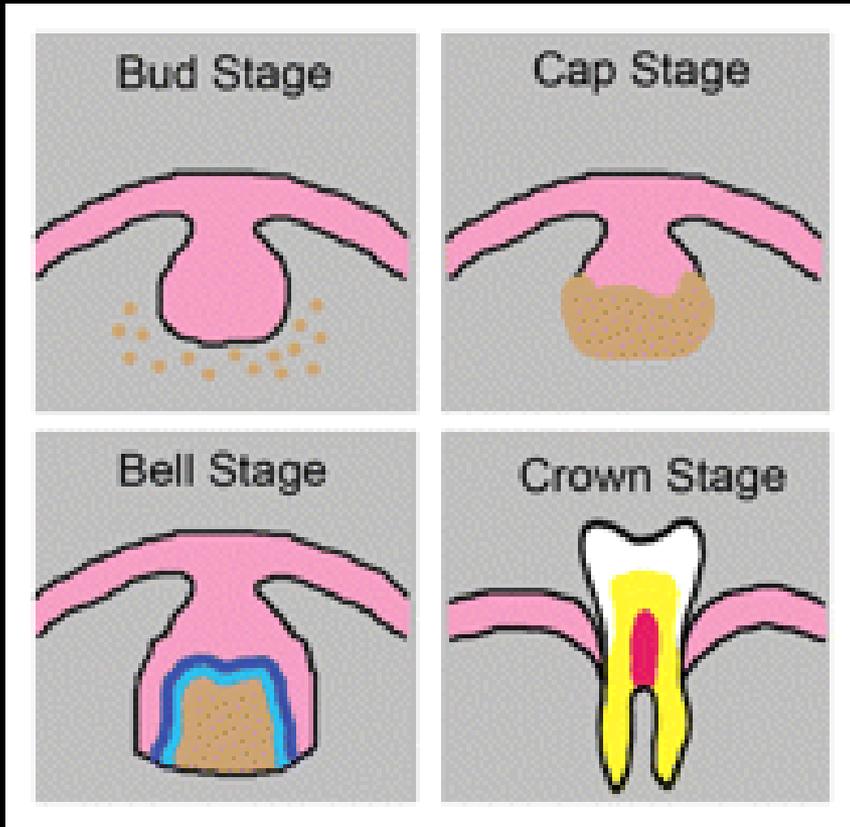
- appears at 6th week of fetal life, near mental foramen
- proximal portions connected w/ ear capsule
- distal portions are connected at symphysis by mesodermal tissue

Appearance at birth

- two mandibular halves united by fibrous symphysis which ossifies during 1st yr of life
- coronoid process is relatively large compared to condyle



Odontogenesis



4 stages of odontogenesis

- each tooth develops from:
 - 1) ectodermal cells that develop into ameloblasts and other outer tooth regions
 - 2) ectomesenchymal cells that form odontoblasts and dental papillae
- by 20th week, tooth bud appears bell shaped with active:
 - ameloblastic cells forming enamel
 - odontoblastic cells forming dentin
- both processes completed during crown stage and embryonic cells die
- any remnants of embryonic cells may give rise to benign or malignant lesions later in life

Mandibular aging

During childhood

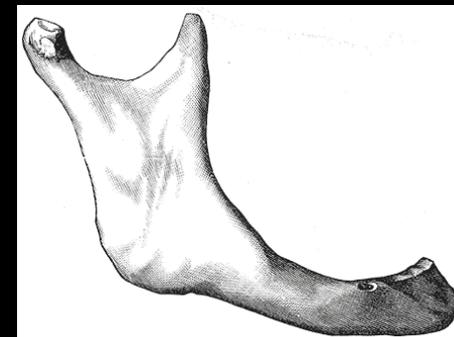
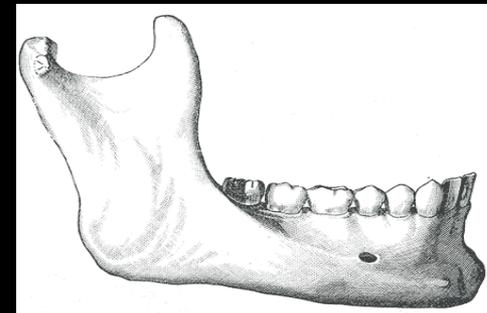
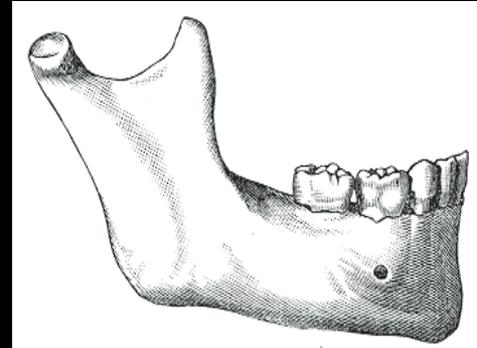
- body elongates and deepens to accommodate teeth
- angle becomes less obtuse due to separation of jaws by teeth

In adult

- mental foramen opens midway between upper and lower borders of bone
- ramus is almost vertical

In old age

- bone becomes greatly reduced in size secondary to loss of teeth and absorption of alveolar process
- mental foramen is close to alveolar border
- ramus is oblique
- neck of condyle is directed more posteriorly

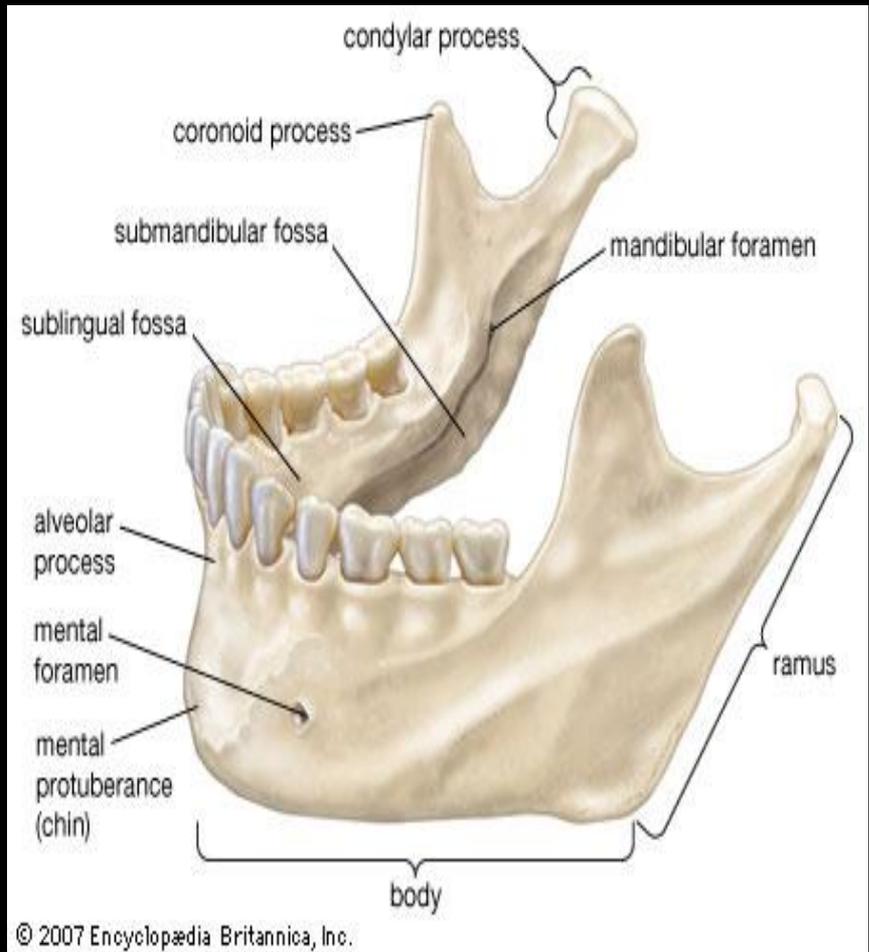


Gray's Anatomy of the Human Body

Anatomy

Mandibular anatomy

- mandible + maxilla = jaw
- mandible is largest and strongest bone of face
- consists of:
 - **body** (curved, horizontal portion)
 - **rami** (two perpendicular portions)



Lateral surface

Body

- Symphysis
- Incisive fossa
 - attachment of mentalis and portion of orbicularis oris muscles
- Mental foramen
 - passage of mental vessels and nerve
- Oblique line
 - attachment of quadratus labii inferioris and triangularis muscles

Ramus

- attachment of masseter muscle

Coronoid process

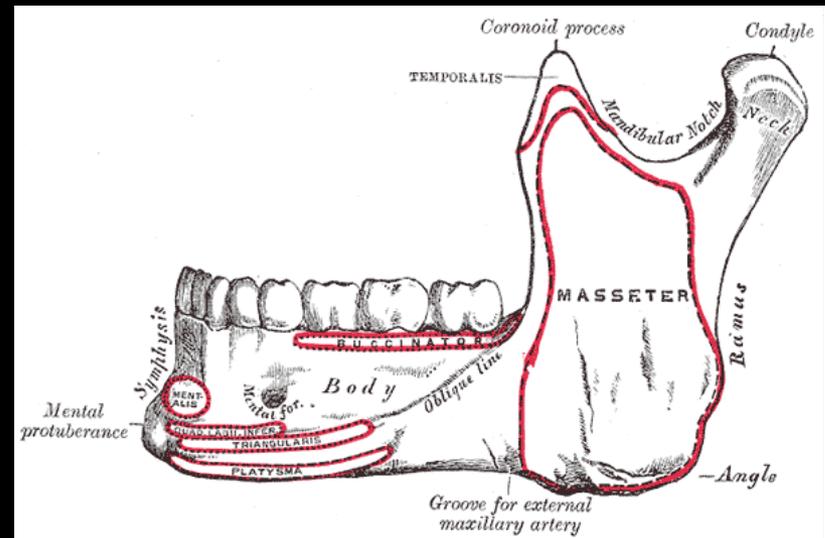
- attachment of temporalis and masseter muscles

Condylod process (condyle + neck)

- attachment of temporomandibular ligament

Mandibular notch

- passage of masseteric vessels and nerve



Medial surface

Body

- **Mental spines**
 - attachment of genioglossus, geniohyoid, and anterior belly of digastric muscles
- **Mylohyoid line**
 - attachment of mylohyoid and constrictor pharyngis superior muscles and pterygomandibular raphe
 - sublingual gland lies anterosuperiorly
 - submaxillary gland lies posteroinferiorly

Ramus

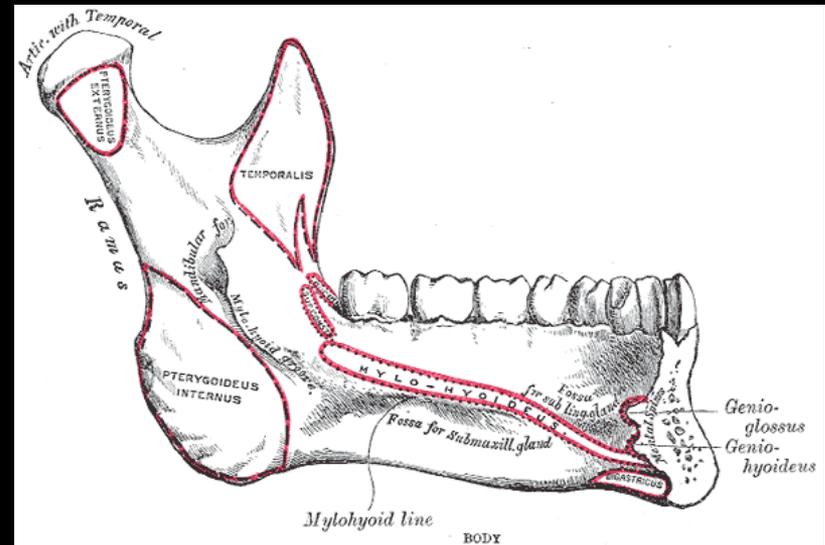
- attachment of medial pterygoid muscle
- mandibular foramen
 - passage of inf. alveolar vessels and nerve

Coronoid process

- attachment of temporalis muscle

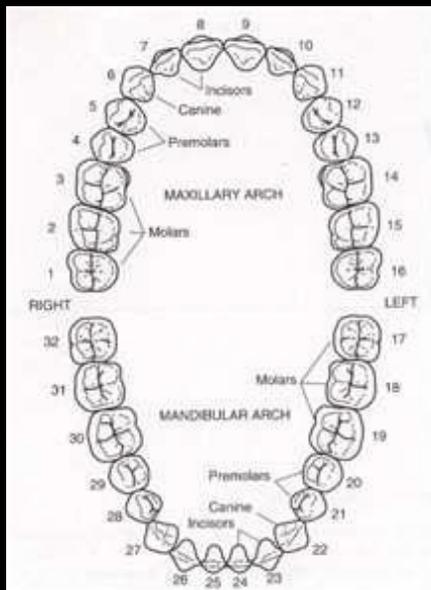
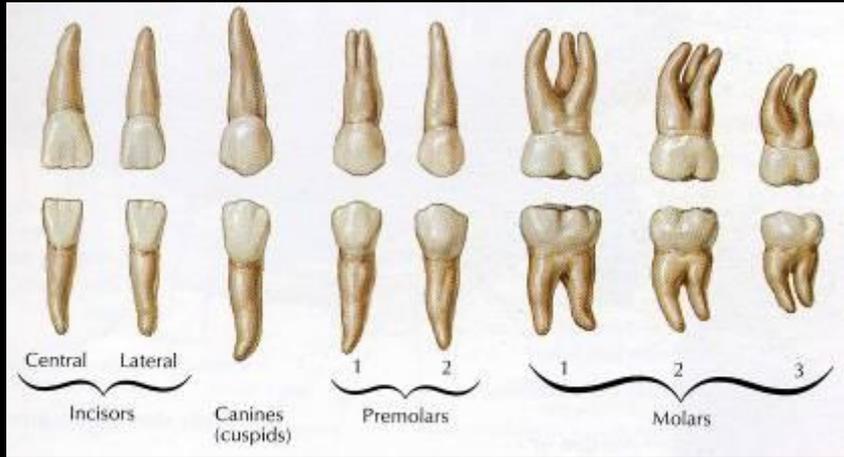
Condylod process (condyle + neck)

- attachment of lateral pterygoid muscle

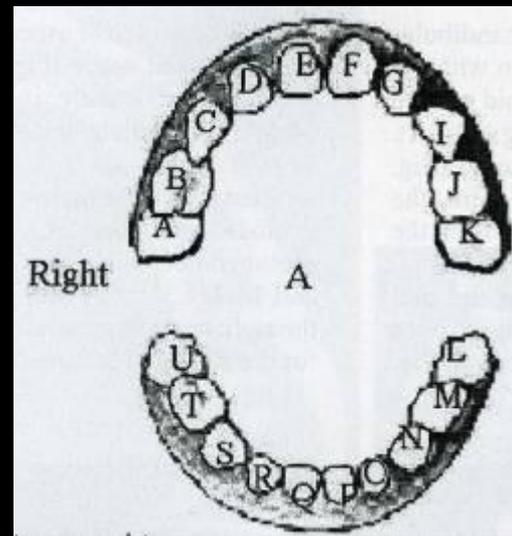


Dentition

Tooth nomenclature

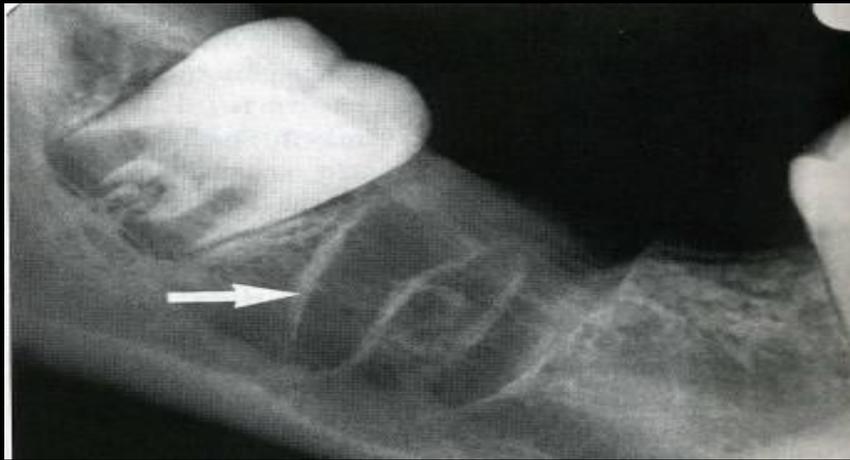
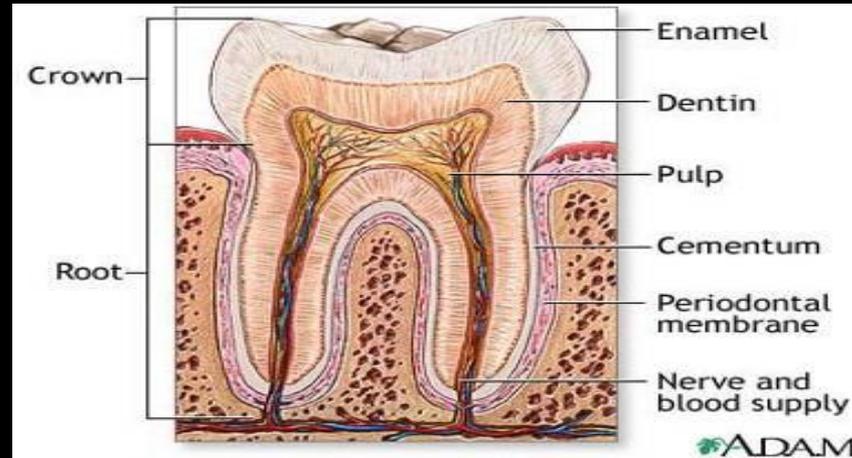


Permanent
Teeth (32)

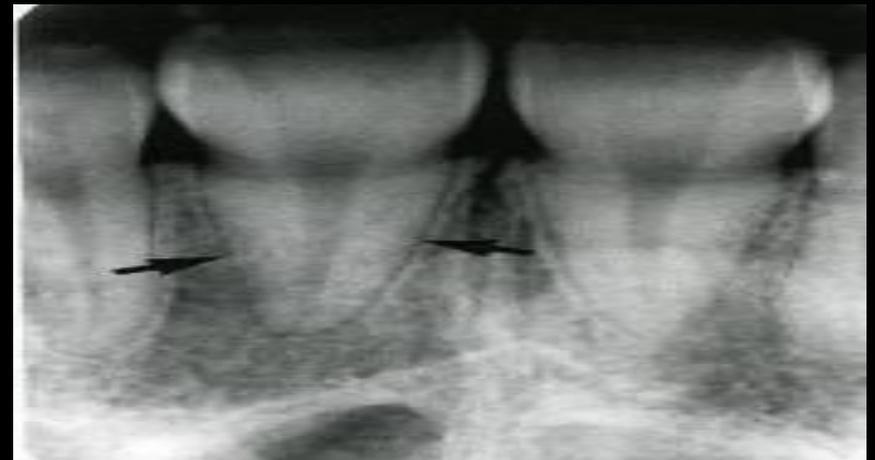


Deciduous
Teeth (20)

Tooth anatomy



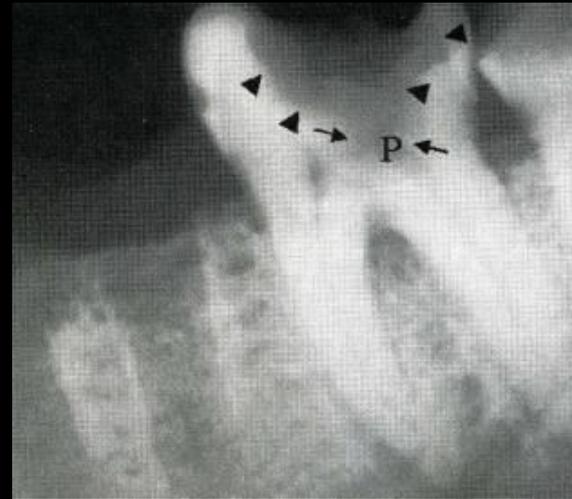
Lamina dura



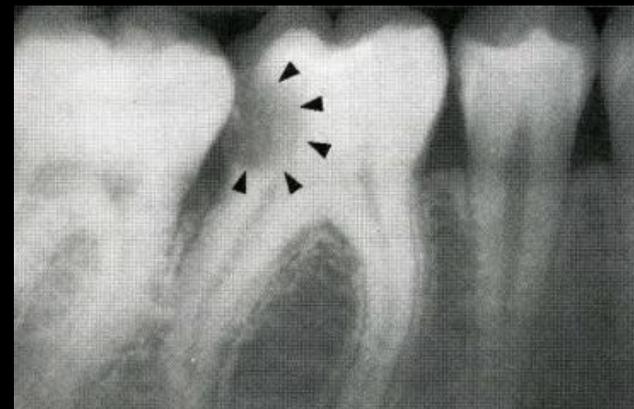
Periodontal ligament

Dental caries

- outcome of mineral dissolution of dental hard tissues by acidic byproducts of bacterial CHO metabolism
- types based on location
 - pit and fissure (occlusal surface)
 - smooth surface (non-occlusal surface)
 - root (assoc. w/ periodontal disease)
 - recurrent (around a dental restoration)



Pit and fissure



Smooth surface

Dental caries

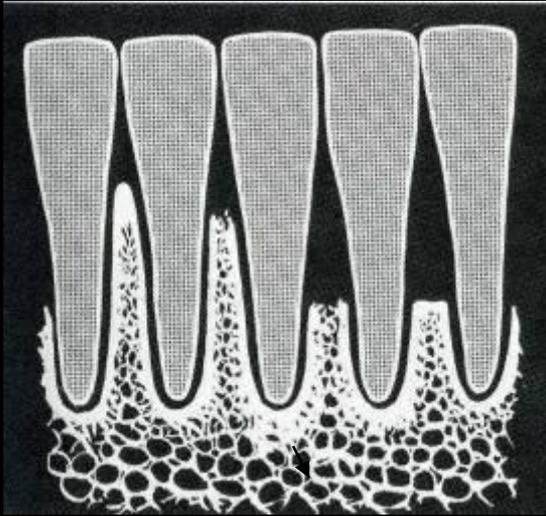


Pit and fissure



Smooth surface

Periodontal disease



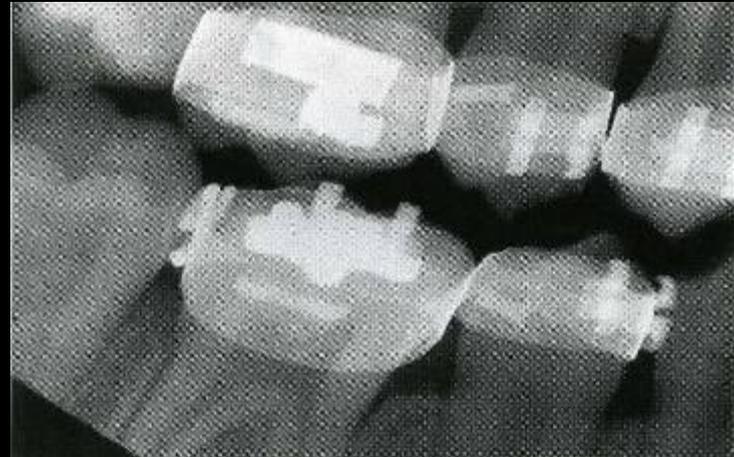
- chronic inflammatory process that may result in edentulism
- plaque-> calculus-> gingivitis-> periodontitis-> alveolar bone loss-> tooth loss
- normal alveolar crest lies 1-1.5mm below cementoenamel junction



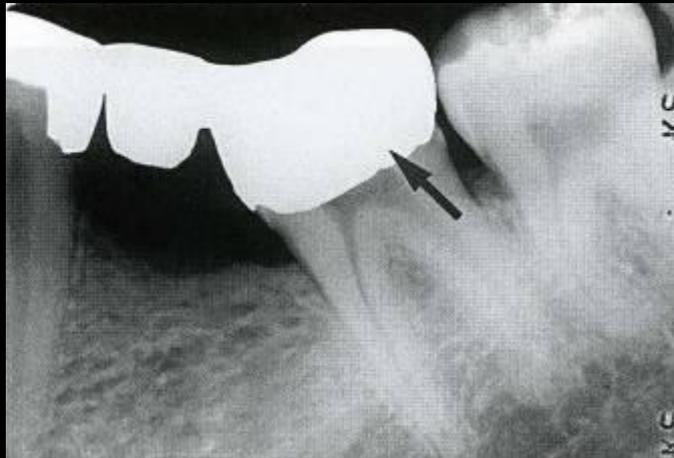
Dental restoration hardware



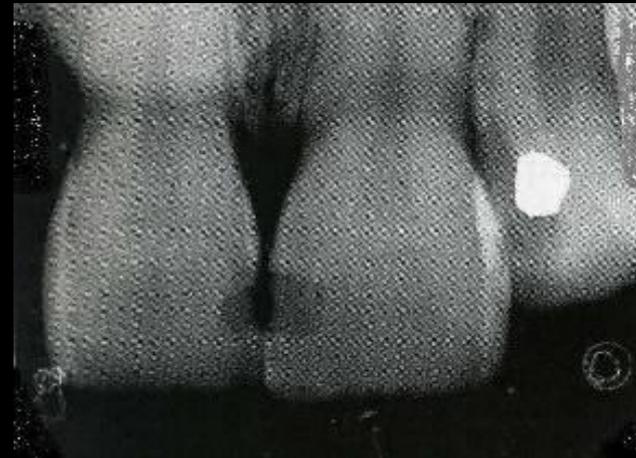
Gutta percha and amalgam



Orthodontic appliance



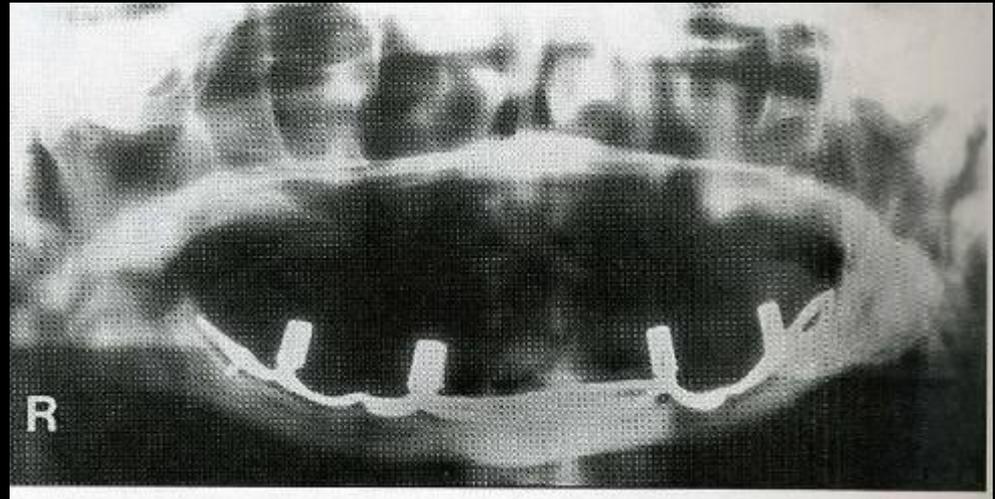
Crown and bridge



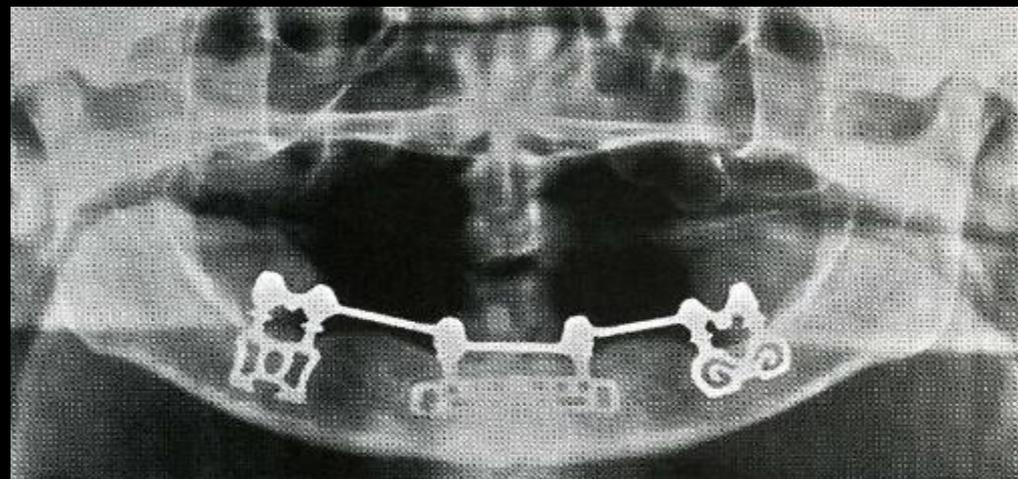
Composite restorations

Dental implants

- 2 stage surgery:
 - initial implant placement
 - fixture installation 4-6 months later
- pre-operative CT (DentaScan) performed on patients considered for multiple implants to evaluate jaw dimensions, degree of bone mineralization, and for prosthesis construction
- preferred implant is root form

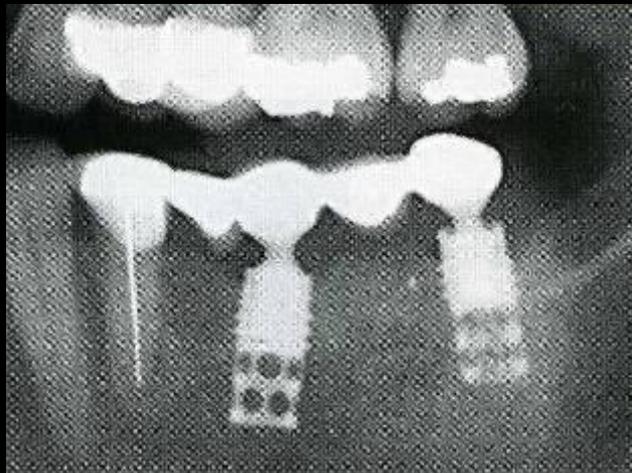
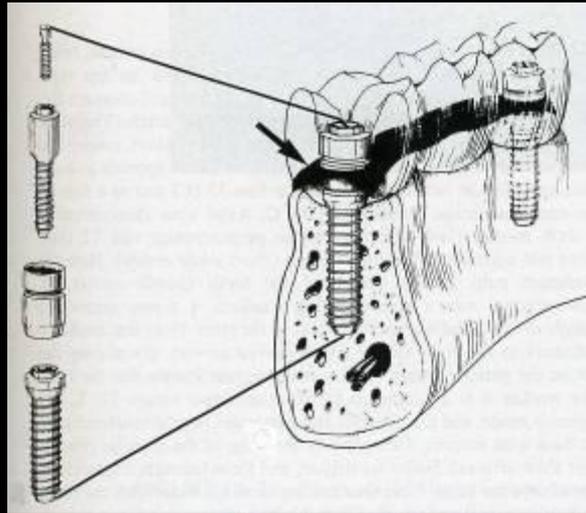


Subperiosteal

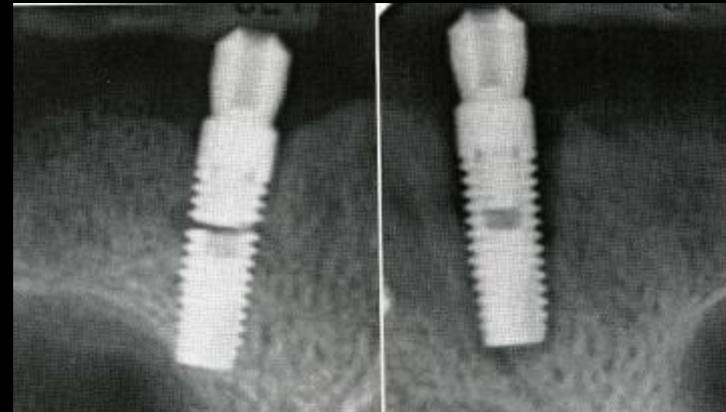


Blade

Dental implants – root form



Root form



Fracture

Loosening

Dental anomalies

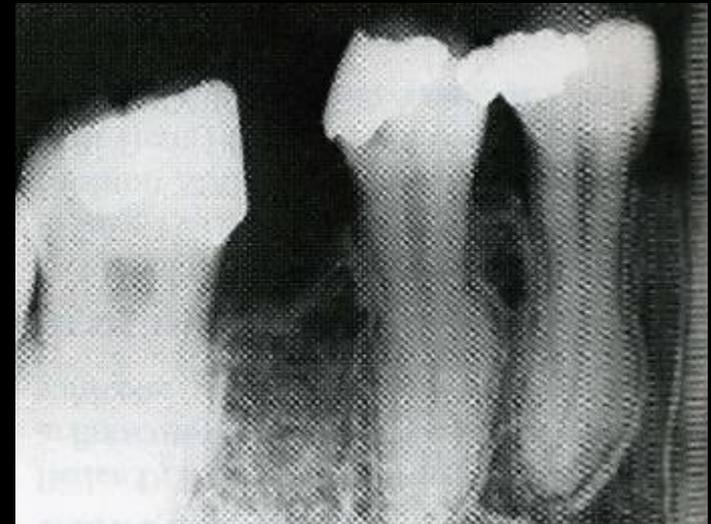
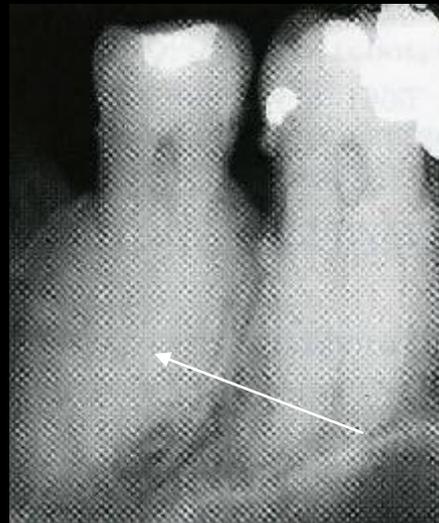
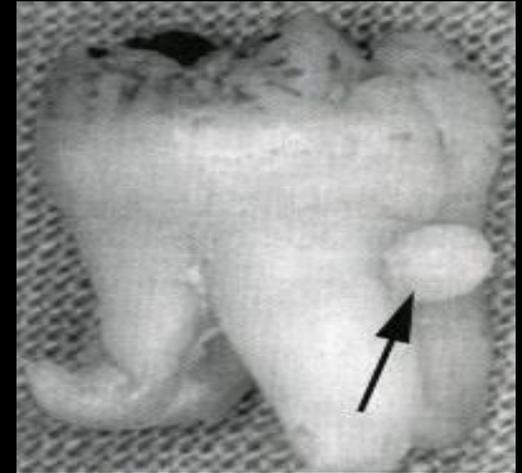
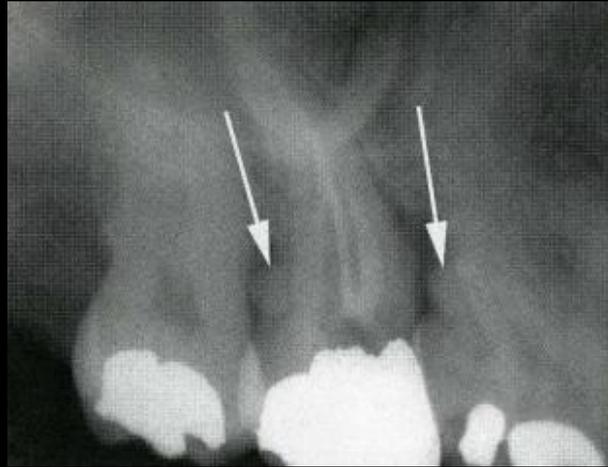


- Supernumerary teeth
 - anomalies exist in size, shape, and number of teeth
 - most often occur in maxilla
 - hypodontia (absence of one or more teeth)
 - micro and macrodontia
- Pulp stones
 - idiopathic calcific foci in dental pulp

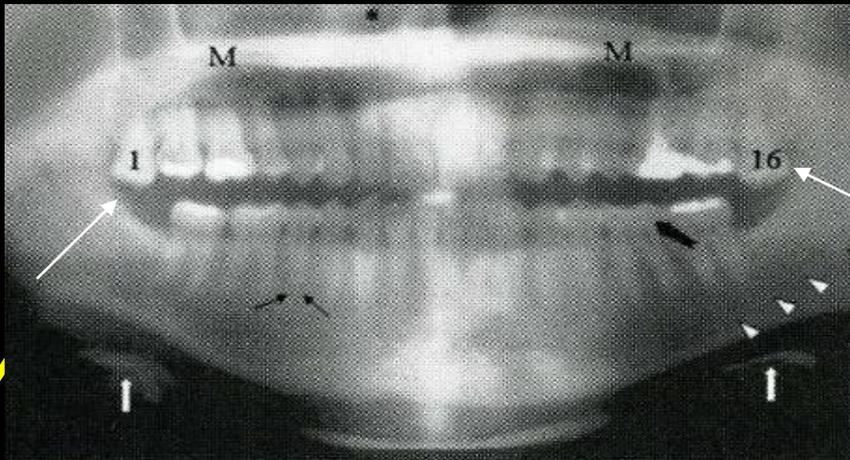


Dental anomalies

- Enamel pearls
 - small foci of enamel that occur at molar roots
 - a risk factor for periodontal disease
- Hypercementosis
 - largely idiopathic but associated w/ Paget's, prior inflammation, hyperpituitarism



Dental anomalies



- Impaction
 - most commonly involves 3rd molar
 - unerupted or partially erupted tooth obstructed by another tooth, bone, or soft tissue
 - often painless
 - pose a risk for periodontal disease
- Supereruption
 - migration of occlusal surface from lack of contact with an opposing tooth

Dental trauma

- classified into categories based on treatment protocols
 - dental avulsion
 - crown fracture
 - root fracture
 - dental luxation
 - dental concussion and subluxation

Dental trauma

- Crown fracture
 - comprise ~ 75% of injuries to permanent teeth
 - classified based on location of fracture relative to enamel, dentin, or pulp tissue
- Root fracture
 - horizontal fracture caused by direct trauma (usually anterior teeth)
 - vertical fracture caused by clenching or trauma to mandible (usually molars)



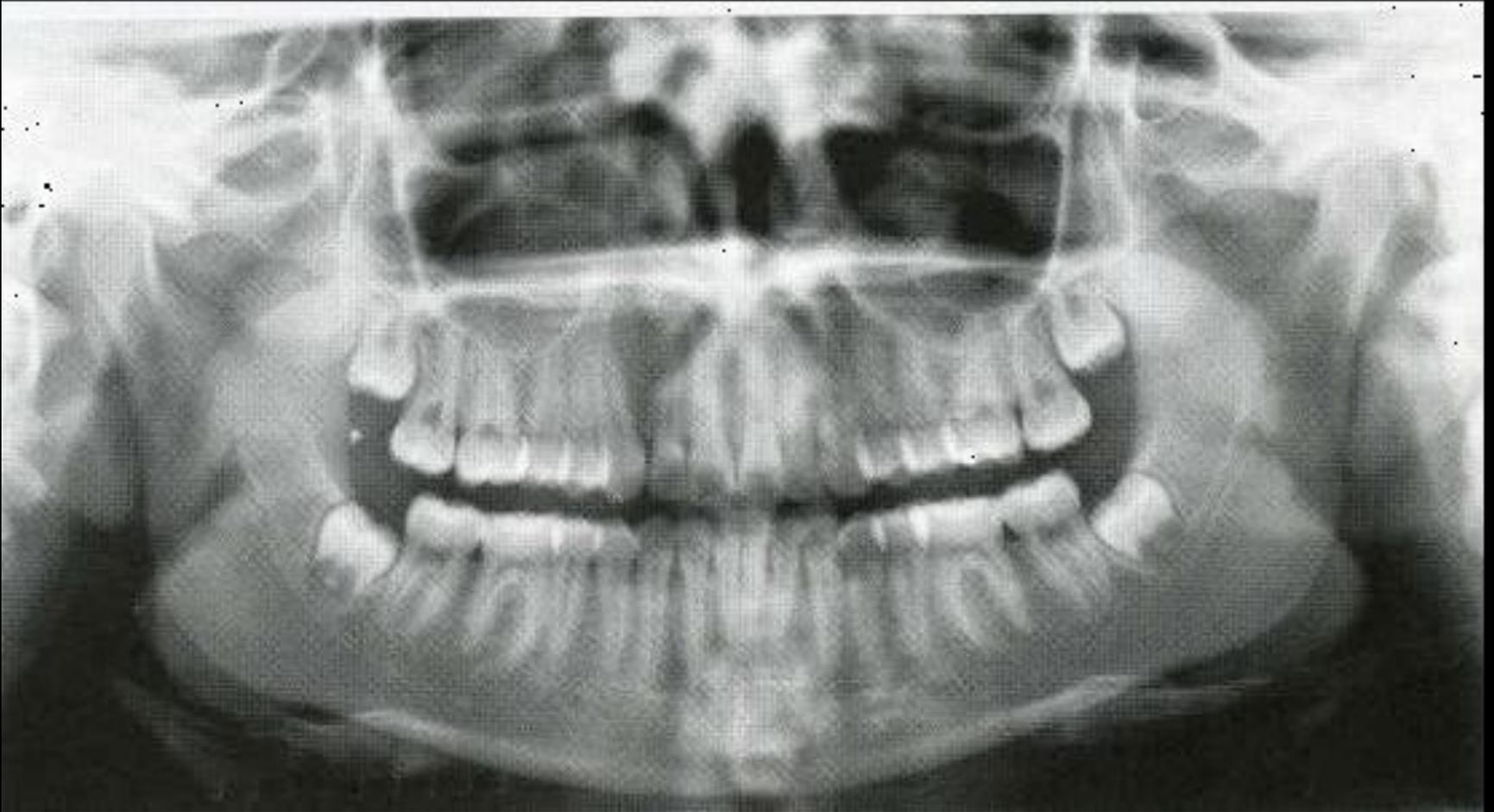
Dental trauma



- Concussion and subluxation
 - result from crushing trauma and injury to periodontal ligament
 - concussion may cause pain and sensitivity but no mobility or displacement
 - subluxation causes bleeding at gingival margin, tooth tenderness to percussion, and mobility
- Luxation
 - lateral luxation involves angular displacement peripherally
 - tooth remains w/in socket
 - intrusive luxation involves displacement into alveolar bone w/ fracture of alveolar socket

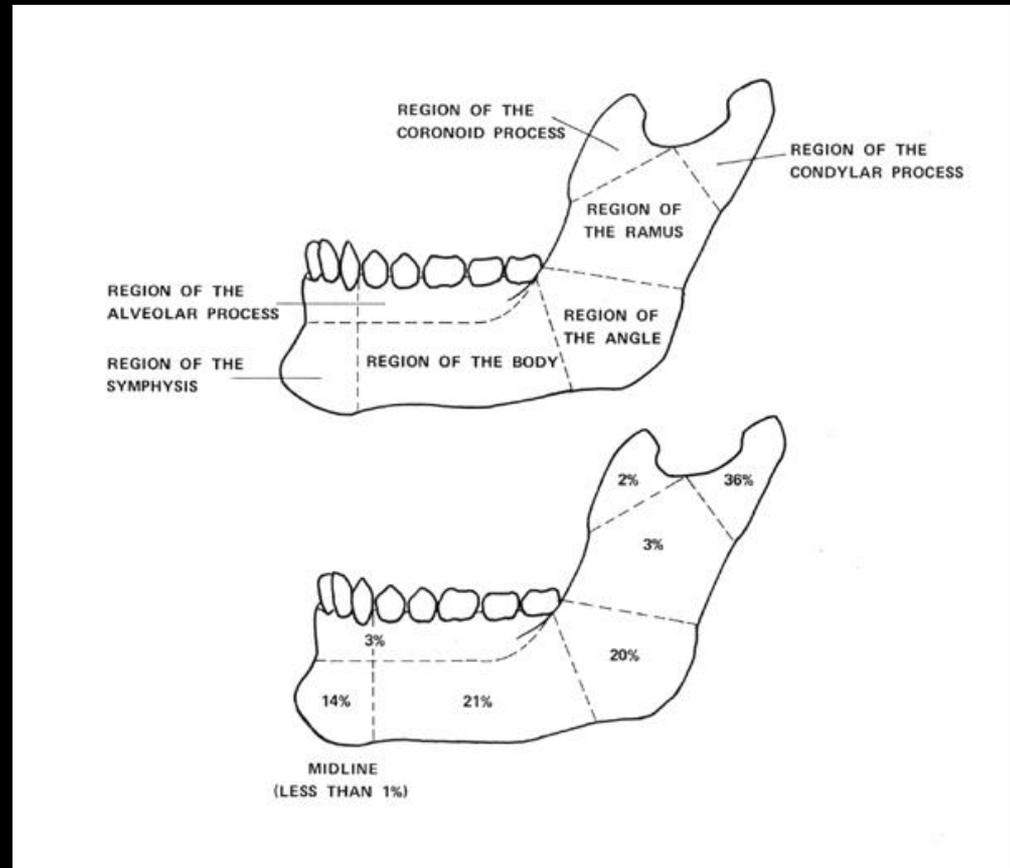


Mandibular trauma



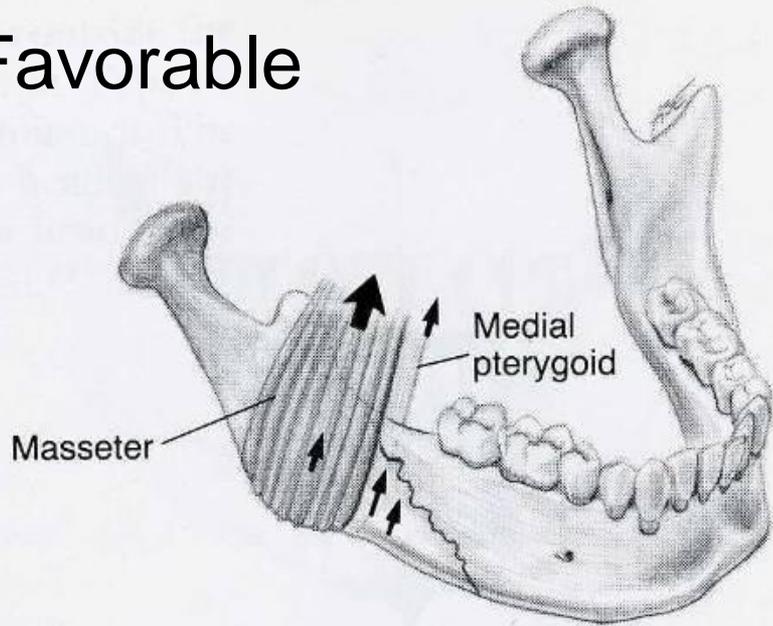
Mandibular fractures

- 2nd most commonly fractured bone of face
- most mandibular fractures occur at a single location
- multiple fractures and/or TMJ dislocations are common
- majority occur in body
 - often associated w/ a contralateral condylar process fracture

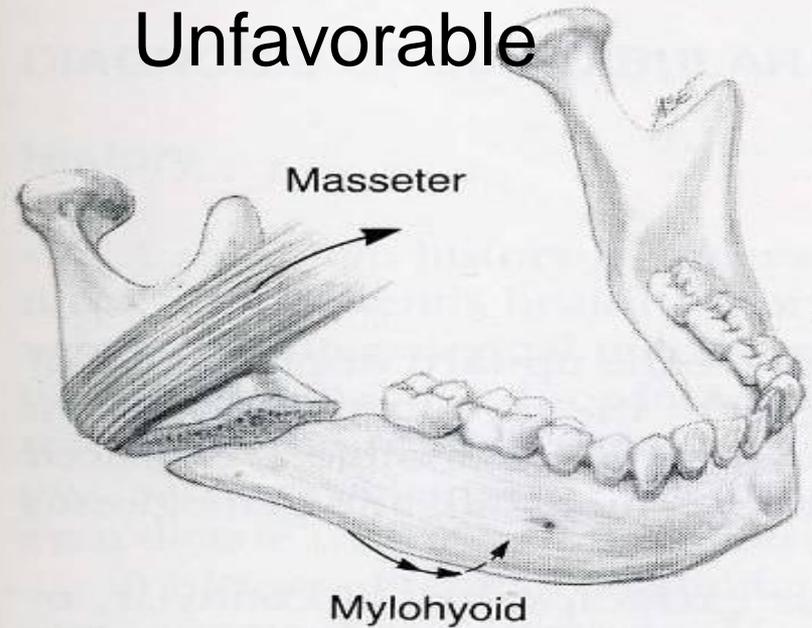


Mandibular fractures

Favorable



Unfavorable



Mandibular fracture hardware



Erich arch bars frequently used for closed reduction and fixation

Titanium bars are fixed w/ screws and allow jaw to function much earlier



Mandibular fracture hardware



TITANIUM MESH PLATES

Quick Details

- Properties: Implant Materials & Artificial Organ
- Type: Organ Assist Device
- Model Number: 1.5mm micro plate
- Place of Origin: Shanghai China (Mainland)

Specifications

- Orbit fracture
- Cranio-base fracture
- Maxillary fracture

Thickness of Mesh Plates: 0.6mm&1.0mm.

Titanium implants may be fixed into place in a variety of ways. Cement or screws may be used to anchor them, or they may be held in position by the pressure of their surroundings.

Titanium Mesh Plates for neurosurgery

Titanium bone plates and screws for maxillofacial surgery

Tumors

WHO Classification

WHO HISTOLOGIC CLASSIFICATION OF JAW TUMORS AND CYSTS

The classification is provided for completeness. Classifications of jaw lesions vary, and this chapter does not follow this classification exactly.

Histologic Classification of Odontogenic Tumors

Neoplasms and Other* Tumors Related to the Odontogenic Apparatus

Benign

Odontogenic epithelium without odontogenic ectomesenchyme*

Ameloblastoma

Squamous odontogenic tumor

Calcifying epithelial odontogenic tumor (Pindborg tumor)

Clear cell odontogenic tumor

Odontogenic epithelium with odontogenic ectomesenchyme, with or without dental hard-tissue formation*

Ameloblastic fibroma

Ameloblastic fibrodentitionoma (dentitionoma) and ameloblastic fibrodentoma

Odontomastoblastoma

Adenosarcomatous odontogenic tumor

Calcifying odontogenic cyst

Complex odontoma

Compound odontoma

Odontogenic ectomesenchyme with or without included odontogenic epithelium*

Oxymatous fibroma

Myxoma (odontogenic myxoma, myxofibroma)

Benign cementoblastoma (cementoblastoma, true cementoma)

Malignant

Odontogenic carcinomas

Malignant ameloblastoma

Primary intraosseous carcinoma

Malignant variants of other odontogenic epithelial tumors

Malignant changes in odontogenic cysts

Odontogenic sarcomas

Ameloblastic fibrosarcoma (ameloblastic sarcoma)

Ameloblastic fibrosarcomatous and ameloblastic fibrosarcomatous

Odontogenic carcinosarcoma

Neoplasms and Other Lesions Related to Bone

Osteogenic neoplasms

Cemento-ossifying fibroma (cementifying fibroma, ossifying fibroma)

Nonneoplastic bone lesions

Fibrous dysplasia of the jaws

Cementomatous dysplasias

Periapical cemental dysplasia (periapical fibrous dysplasia)

Familial cementomatous dysplasia (gigantiform cementoma, familial multiple cementomas)

Other cementomatous dysplasias

Cherubism (familial multilocular cystic disease of the jaws)

Central giant cell granuloma

Anaplasial bone cyst

Solitary bone cyst (traumatic, simple, haemorrhagic bone cyst)

Other Tumors

Melanotic neuroectodermal tumor of infancy (melanotic progesteroma)

Epithelial Cysts

Developmental

Odontogenic

"Gingival cysts" of infants (Epstein pearls)

Odontogenic keratocyst (keratinized cyst)

Dentigerous (follicular) cyst

Eruption cyst

Lateral periodontal cyst

Gingival cyst of adults

Glandular odontogenic cyst, sialobodontogenic cyst

Nonodontogenic

Nasopalatine duct (incisive canal) cyst

Nasal bulb (nasolabial) cyst

Inflammatory

Radiolar cyst

Apical and lateral

Residual

Parodontal (inflammatory collateral, mandibular infected buccal) cyst

*The mesenchymal origin derives from the odontogenic epithelium developing from the ectoderm of the oral cavity. The dental papilla and follicle are considered ectomesenchyme, derivatively from the neural crest. Lesions that contain odontogenic ectomesenchyme, as well as the odontogenic epithelium, have the capability of producing dentin and enamel. Those without ectomesenchyme cannot. Some lesions arise primarily from the mesenchyme and appear to incidentally include "odontogenic epithelium," but the odontogenic epithelium does not play a key role in producing the lesion.

From Krause RH, Furlong JJ, Shear M. *Histological Typing of Odontogenic Tumours*, 2nd ed. Berlin and New York: Springer-Verlag, 1992:7-8.

**Jaw lesions
covered in
this lecture**

**Mostly cystic or
radiolucent**

**Mixed
Appearance**

**Mostly
radiopaque**

Epithelial cysts

- Inflammatory
 - Radicular cyst
- Odontogenic
 - Dentigerous cyst
 - Odontogenic keratocyst

Neoplasms & other related to bone

- Giant cell granuloma
- Osteoclastoma
- ABC/Simple cyst

Odontogenic neoplasms/other

- Ameloblastoma

Other

- Osteomyelitis (early)
- Vascular lesions
- Salivary inclusion gland defect
- Histiocytosis X

Neoplasms & other related to bone

- Ossifying fibroma (early)
- Cementoosseous dysplasia
- Cherubism
- Fibrous dysplasia

Osteomyelitis

Odontogenic neoplasms/other

- Odontogenic myxoma
- Pindborg tumor

Malignant neoplasms

- Sarcomas
- Lymphoma/leukemia
- Locally invasive carcinomas
- Etc.

Tori

Osteoma

Neoplasms & other related to bone

- Ossifying fibroma (mature)

Odontogenic neoplasms/other

- Odontoma
 - Complex
 - Compound

Jaw lesions covered in this lecture

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Mostly radiopaque

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Tori

Osteoma

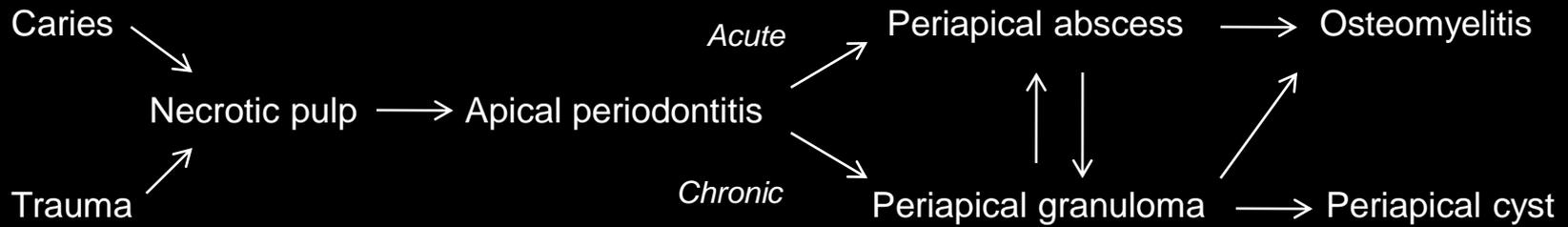
Neoplasms & other related to bone

- Ossifying fibroma (mature)

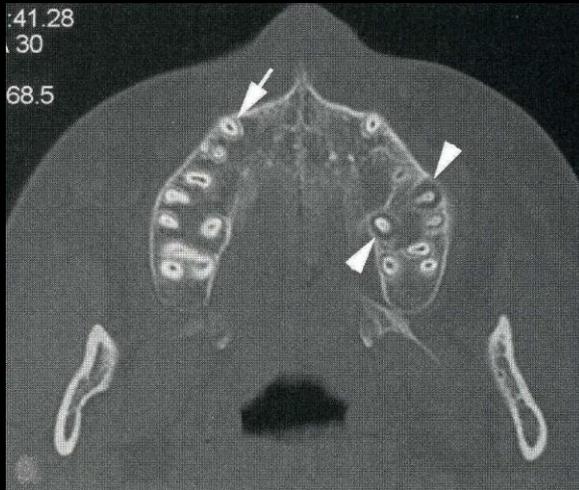
Odontogenic neoplasms/other

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Periapical inflammatory process



Inflammatory epithelial cyst – *Periapical cyst*



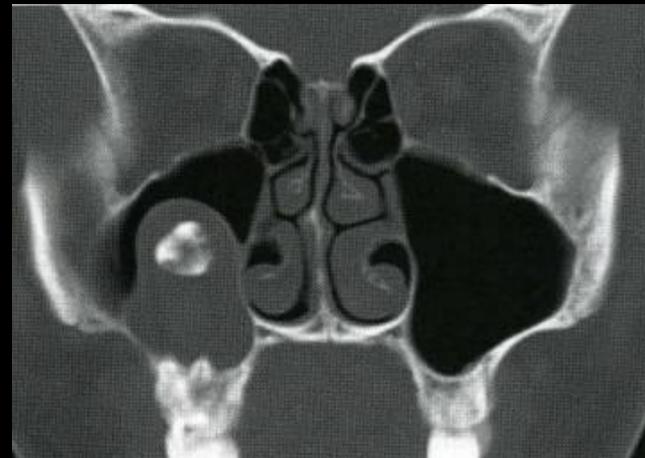
- synonym: *radicular cyst*
- most common jaw cyst
- quiescent, end stage form of underlying tooth infection
- geographic, periapical, unilocular, often >1 cm
- may displace teeth and cause recurrent sinusitis
- treatment: most resolve w/ endodontic therapy of tooth
- DDX: *periapical rarefying osteitis, early periapical cemental dysplasia*

Odontogenic tumors

- neoplasms originating from tooth-forming epithelium, mesenchymal tissue, or both
- benign tumors characterized by imaging findings of expanding growth and well defined margins w/ smooth borders
- CT demonstrates extent of osteolysis, osteosclerosis, cortical thickening, and calcification
- MRI differentiates between cysts and tumors and evaluates infiltration of tumors in bone and surrounding soft tissues

Odontogenic epithelial cyst - *Dentigerous cyst*

- synonym: *follicular cyst*
- most common non-inflammatory odontogenic cyst
- geographic, pericoronal, unilocular lesion w/ acute angle to cervical area of tooth and occasional sclerotic margin
- develops w/in normal dental follicle surrounding unerupted tooth, typically mandibular 3rd molar
- can be large and expansile, most often small
- treatment: tooth and cyst extraction
- DDx: *unilocular odontogenic keratocyst*



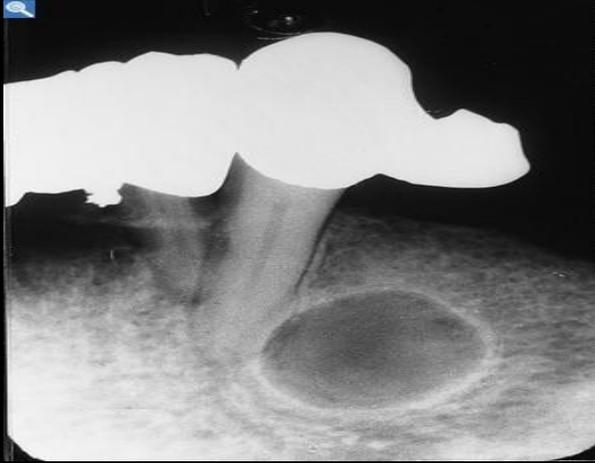
Odontogenic epithelial cyst - *Odontogenic keratocyst*



- synonyms: *keratocystic odontogenic tumor*, *primordial cyst*
- 3rd most common odontogenic cyst
- geographic, often multilocular, minimally expansile, bosselated w/ daughter cysts
- mult. assoc. w/ basal cell nevus syndrome
- aggressive, fast growing, difficult to resect, w/ frequent recurrences
- frequently occur near 3rd molar and ascending ramus of mandible (90% posterior to canines)
- CT: high attenuation areas in cystic cavity
- MR: heterogeneous intermediate signal on T1WI and high signal on T2WI
- treatment: curettage
- DDx: *adamantinoma*; if pericoronaral-> indistinguishable from *dentigerous cyst*



Other odontogenic cysts

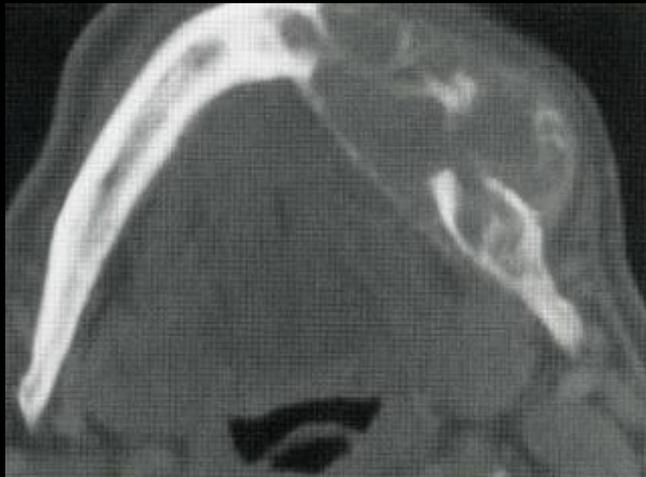


- *Residual cyst*
 - no tooth remains to identify lesion
 - likely retained periapical cysts from removed teeth
- *Primordial cyst*
 - rarest odontogenic cyst
 - develops instead of a tooth
 - cystic degeneration of dental follicle w/o completion of odontogenesis
 - may represent residual cysts
- *Lateral periodontal cyst*
 - radiolucent, small, always well marginated
 - majority in mandibular premolar area



Neoplasms & other related to bone -

Giant cell granuloma



- synonym: *central giant cell granuloma, giant cell reparative granuloma*
- majority in females <30 yo
- most frequent in posterior mandible
- slow growing and varied
- early lesions: usually small, unilocular may be expansile
- older lesions: geographic, multilocular, expansile, may have ground-glass matrix, may cross symphysis and displace/absorb teeth
- suspect brown tumor if recurrence
- MR: heterogeneous intermediate signal on T1 and T2WI, enhances
- treatment: enucleation
- DDx: *traumatic bone cyst, brown tumor, adamantinoma, odontogenic keratocyst*

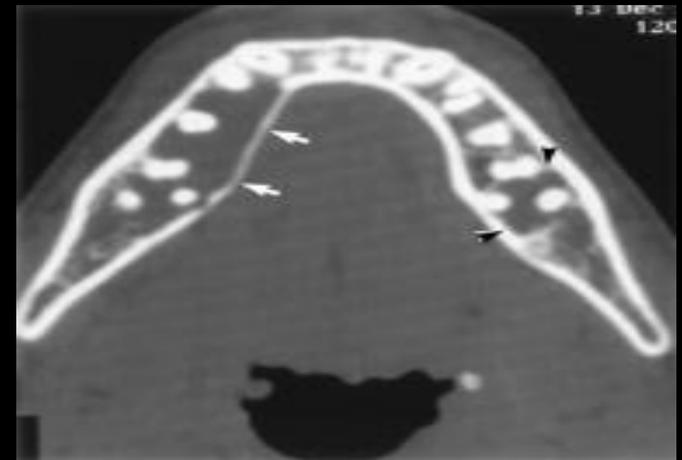
Neoplasms & other related to bone - *Osteoclastoma*



- synonym: *brown tumor*
- chronic hyperparathyroidism
- osteopenia and resorption of lamina dura differentiate from other processes
- confirmed w/ serum assays
- variable well or ill-defined margins
- treatment: can resolve w/ hyperparathyroidism tx
- DDX: *giant cell granuloma*

Neoplasms & other related to bone - *Traumatic bone cyst*

- synonyms: *solitary bone cyst, hemorrhagic cyst, extravasation cyst, unicameral bone cyst, simple bone cyst, idiopathic bone cavity*
- most incidental by 2nd decade
- most common in mandible near inferior alveolar canal
- geographic, lucent defect w/ characteristic scalloped superior margin extending between roots w/o resorption or displacement
- treatment: often unnecessary
- DDX: *vascular lesions, giant cell granuloma, ossifying fibroma*

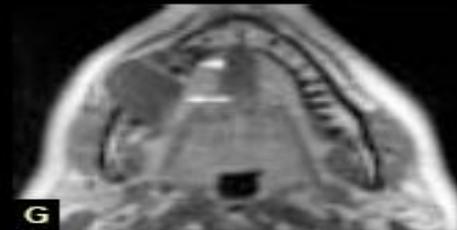
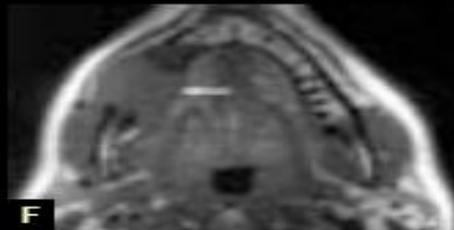
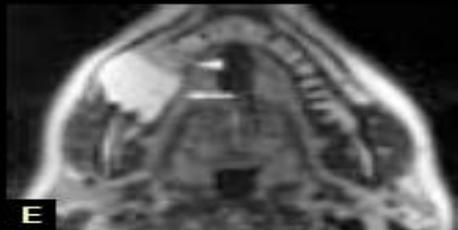
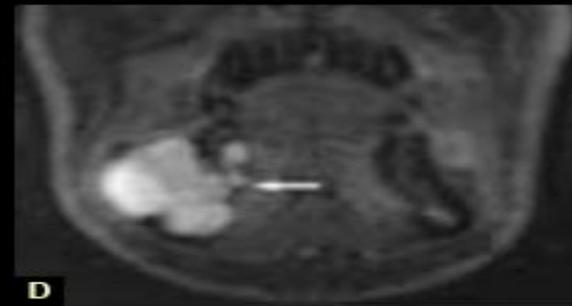
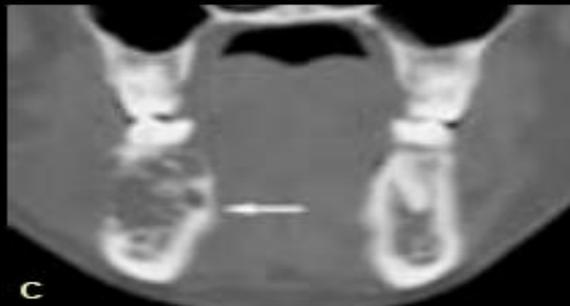
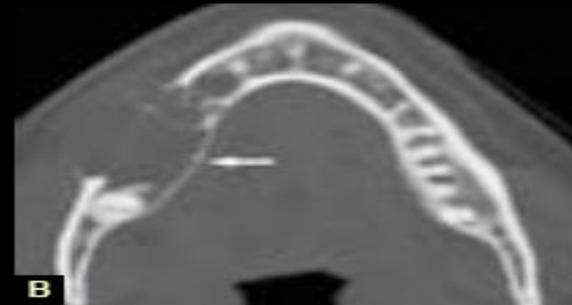


Odontogenic neoplasms - *Ameloblastoma*



- most common in 3rd to 5th decade
- ~10% of odontogenic tumors
- expansile, uni or multilocular, geographic, can extend into soft tissues
- slow growing, locally aggressive, painless lesion
- ~80% occur in ramus and body, often arising from dentigerous cyst (near impacted tooth)
- often absorbs apices of adjacent teeth
- high rate of recurrence, but w/ virtually no metastatic potential
- CT: well-corticated, unilocular radiolucent lesion vs. multilocular w/ internal septae and honeycomb/soap bubble appearance
- MR: multilocularity, mixed solid and cystic, irregularly thickened walls, papillary projections, marked enhancement of walls and septae
- treatment: wide surgical excision
- DDx: *odontogenic keratocyst, giant cell granuloma, dentigerous cyst*

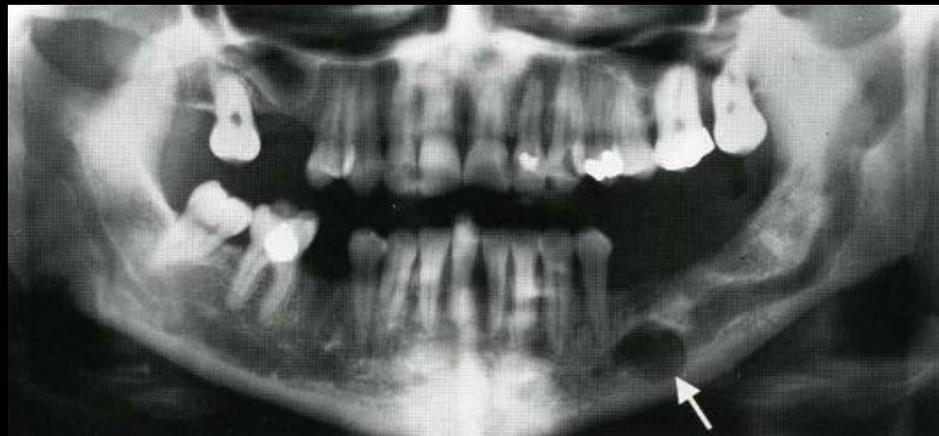
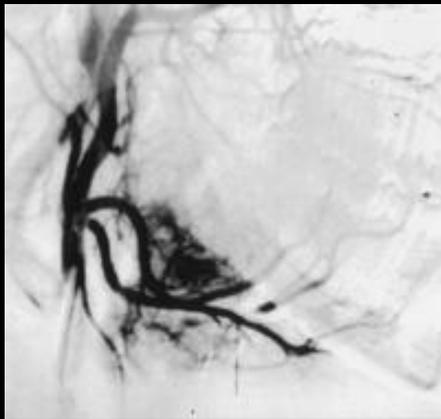
Odontogenic neoplasms - *Ameloblastoma*



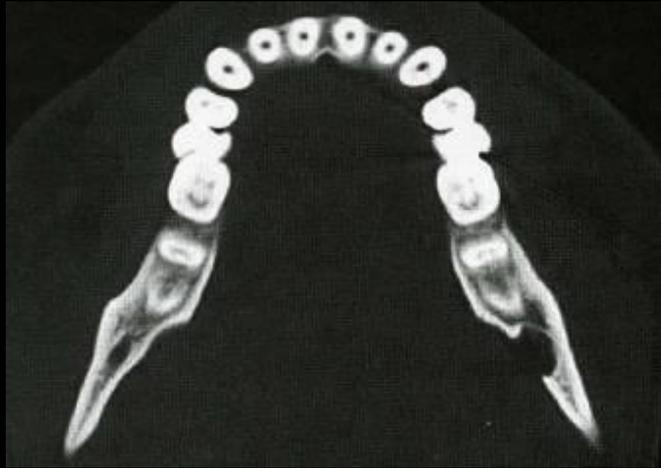
Other mostly radiolucent lesions - *AVM*



- radiolucent lesions involving mandibular canal
- can have an aggressive appearance
- most often in body or ramus
- treatment: embolization, surgery
- DDX: *traumatic bone cyst, giant cell granuloma, ossifying fibroma*



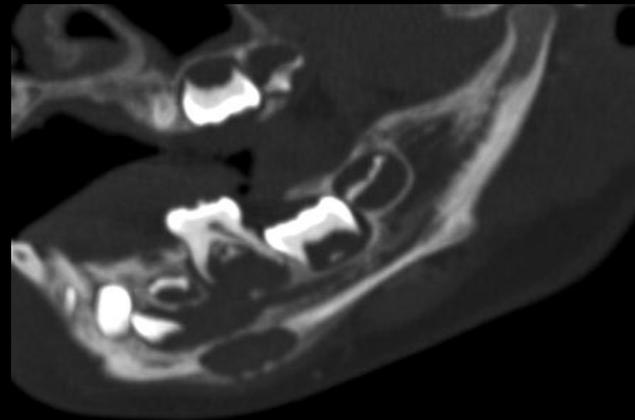
Other mostly radiolucent lesions - *Lingual salivary gland inclusion defect*



- synonym: *Stafne cyst*
- probably a congenital or developmental defect
- well defined ovoid radiolucency in lingual aspect of body anterior to angle
- no tooth contact
- may contain aberrant lobe of submandibular gland or fat
- treatment: unnecessary
- DDX: possibly *AVM*

Other mostly radiolucent lesions - *Langerhans cell histiocytosis*

- synonym: *eosinophilic granuloma*
- spectrum of diseases involving histiocyte proliferation and significant inflammation
- male predilection, 1-10 yo
- single or multiple geographic, non-sclerotic “punched out” lesions (floating tooth)
- have associated soft tissue mass
- treatment: steroids, XRT, surgery, cryoablation
- DDx: *periapical granulomas, other cysts*



Jaw lesions covered in this lecture

Mostly cystic or radiolucent

Mixed Appearance

Mostly radiopaque

Epithelial cysts

- Inflammatory
 - Radicular cyst
- Odontogenic
 - Dentigerous cyst
 - Odontogenic keratocyst

Neoplasms & other related to bone

- Giant cell granuloma
- Osteoclastoma
- ABC/Simple cyst

Odontogenic neoplasms/other

- Ameloblastoma

Other

- Osteomyelitis (early)
- Vascular lesions
- Salivary inclusion gland defect
- Histiocytosis X

Neoplasms & other related to bone

- Ossifying fibroma (early)
- Cementoosseous dysplasia
- Cherubism
- Fibrous dysplasia

Osteomyelitis

Odontogenic neoplasms/other

- Odontogenic myxoma
- Pindborg tumor

Malignant neoplasms

- Sarcomas
- Lymphoma/leukemia
- Locally invasive carcinomas
- Etc.

Tori

Osteoma

Neoplasms & other related to bone

- Ossifying fibroma (mature)

Odontogenic neoplasms/other

- Odontoma
 - Complex
 - Compound

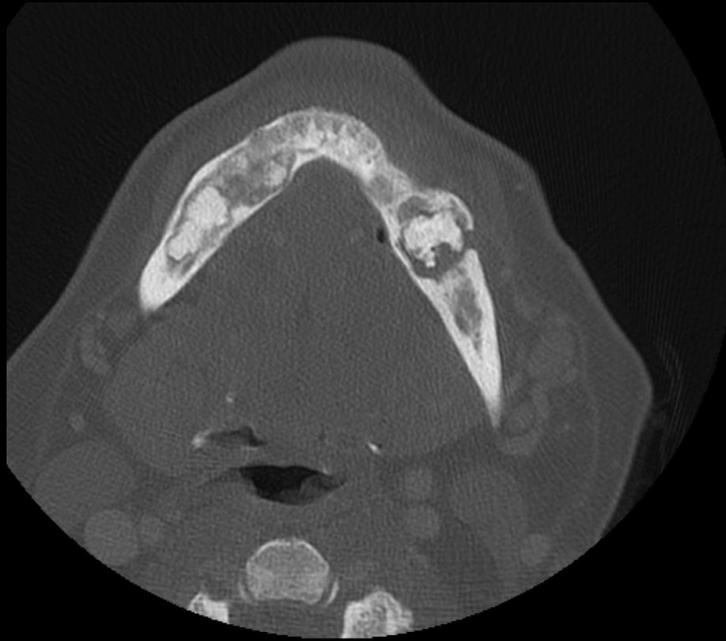
Neoplasms & other related to bone - *Cemental dysplasia*



- synonym: *cemento-osseous dysplasia*
- 9x more common in females
- replacement of periapical alveolar bone w/ cementoossous tissue
- 3 radiographic stages:
 - 1) *osteolytic*: well defined, periapical lucency associated w/ lamina dura loss
 - 2) *cementoblastic*: lesion of mixed mineralization
 - 3) *mature*: mineralized radiopaque mass w/ radiolucent rim
- frequently multiple, can be expansile
- treatment: follow-up imaging
- DDx: *Paget's*, *chronic sclerosing osteomyelitis*

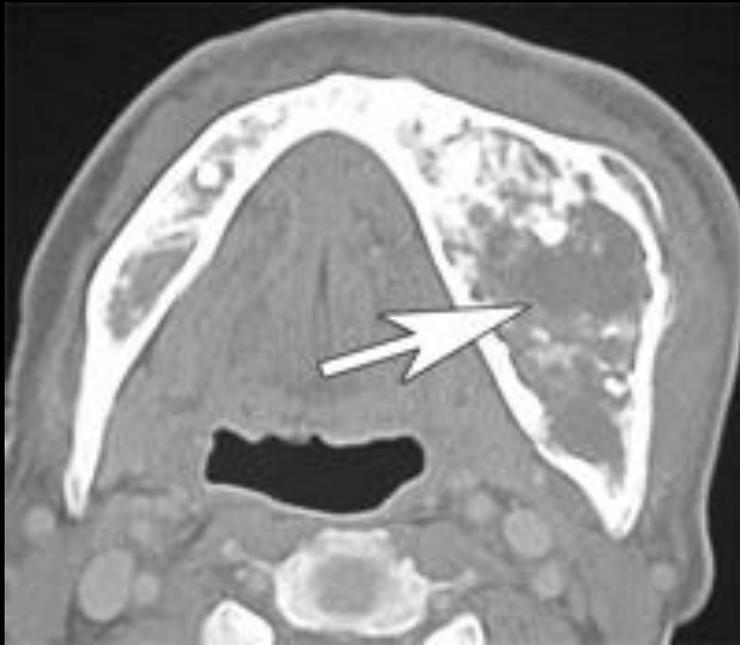


Neoplasms & other related to bone - *Cemental dysplasia*



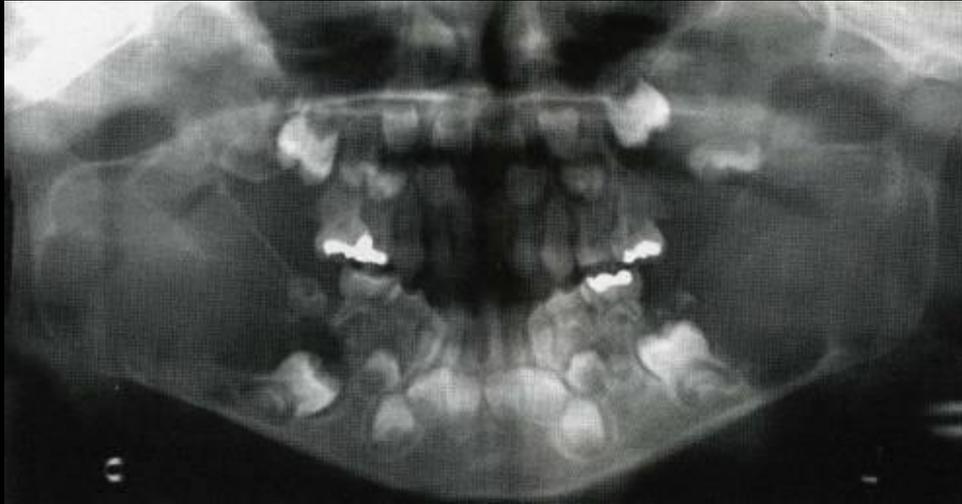
Courtesy of Dr. F. Rodriguez

Neoplasms & other related to bone - *Fibrous dysplasia*



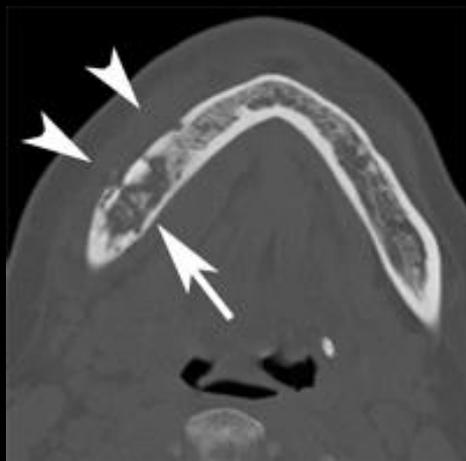
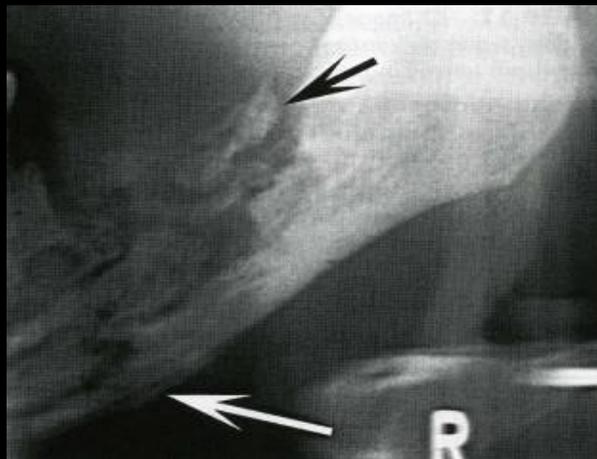
- most common in 2nd and 3rd decades
- monostotic: craniofacial bones account for 25%
- polyostotic: may be part of McCune-Albright Syndrome, mandibular involvement more frequent
- non-neoplastic, self limited, nonencapsulated lesion
- painless swelling, often unilateral and expansile
- CT: ill-defined, mixed sclerotic/lytic lesion (ground glass appearance) w/ bone expansion
- MR: intermediate signal on T1 and heterogeneous low signal on T2WI, enhances
- treatment:
 - polyostotic: facial symmetry, not total tumor resection
 - monostotic: mandibular lesions excised en-block and mandible reconstructed w/ vascularized bone graft

Neoplasms & other related to bone - *Cherubism*



- sporadic and autosomal dominant forms
- self-limited proliferation of fibrous tissue, rapidly progressive from 0.5 to 7 yo, gradually regresses following adolescence
- bilateral, expansile, multilocular cystic lesions of mandibular angles and rami, progresses to maxilla and often displaces teeth
- CT: well delineated, sclerotic margins, bilateral multiloculated radiolucencies; soap bubble appearance
- treatment: surgical (highly variable)
- DDx: *giant cell reparative granuloma*, *fibrous dysplasia* (both similar but not typically bilateral)

Other mixed appearance lesions - *Osteomyelitis*



- sources: periodontitis, iatrogenic, trauma, hematogenous spread
- most common in mandibular body
- symptoms and periosteal reaction help differentiate
- dual isotope bone scan can confirm
- DDx: *malignancy, osteonecrosis*

Other mixed appearance lesions - *Osteonecrosis*



- varied etiologies:
- XRT (for head and neck cancer)
 - range from small, stable, asymptomatic bone exposures that can heal to severe necrosis needing surgical intervention and reconstruction
- bisphosphonate therapy
 - one of world's most prescribed drug classes
 - mechanism unclear
 - variable appearance includes sclerotic, lytic, or mixed lesions w/ possible periosteal reaction, pathologic fractures, and extension to soft tissues

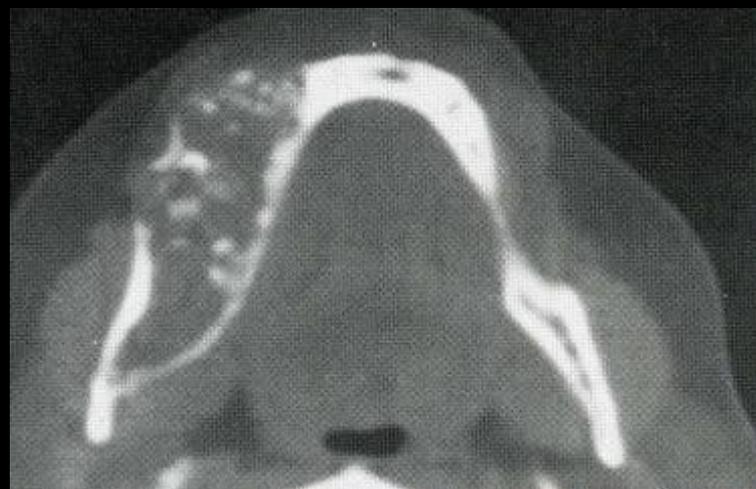
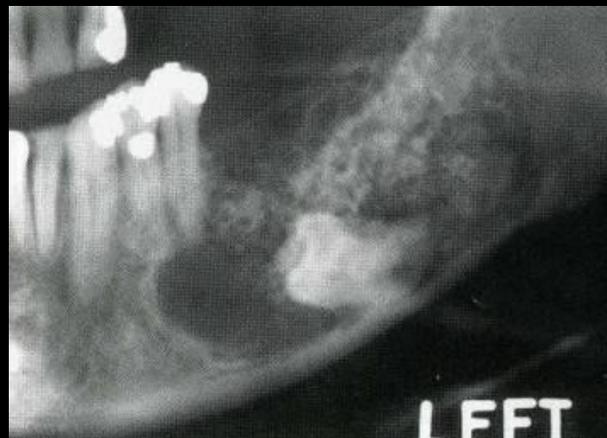
Odontogenic neoplasms - *Odontogenic myxoma*



- uncommon, benign neoplasm arising from mesenchymal odontogenic tissue
- most common in women, 3rd decade
- painless swelling or incidental finding
- mainly in mandibular molar area
- locally aggressive w/ bone destruction, potential soft tissue infiltration, high rate of local recurrence
- CT: often multilocular, mixed lucent and sclerotic, w/ trabeculae and well or ill-defined margins
- MR: low SI on T1WI and high SI T2WI, gradual contrast enhancement
- treatment: excision or partial resection of mandible
- DDx: broad, includes *malignancy*, *giant cell granuloma*

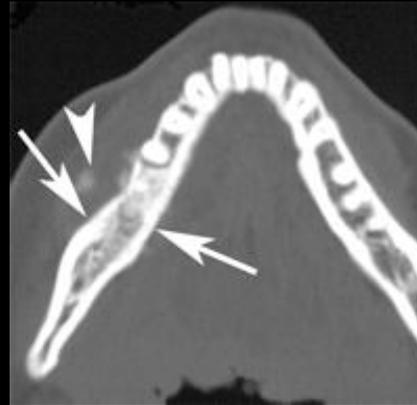
Odontogenic neoplasms - *Calcifying epithelial odontogenic tumor*

- synonym: *Pindborg tumor*
- occurs between 3rd and 7th decades
- benign, locally infiltrating epithelial tumor
- 50% develop around erupted/impacted tooth
- CT: mixed radiolucent/sclerotic, expansile lesion often multilocular with ill-defined, irregular borders
- treatment: enucleation
- DDx: *adamantinoma*, *odontoma*

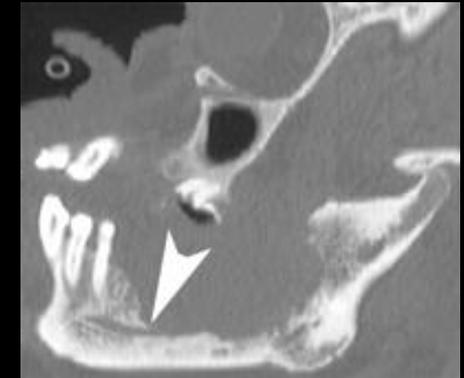


Malignant neoplasms -

- rarely a site for primary or secondary tumor
- majority are secondary to invasion from surrounding mucosa
- primary carcinomas are odontogenic versus nonodontogenic
- metastases most common in posterior body and angle (increased marrow vascularity)
- treatment: hemi-mandibulectomy w/ mandibular reconstruction by free iliac bone graft or vascularized fibula



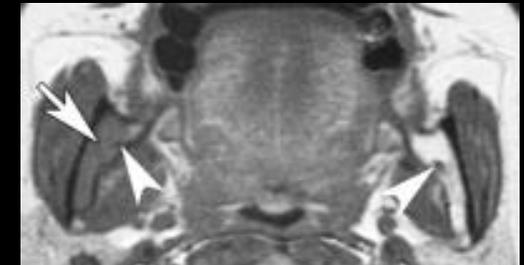
Osteosarcoma



Mucoepidermoid carcinoma



Metastatic HCC



Multiple myeloma

Malignant neoplasms -

Most common

Squamous cell carcinoma arising from adjacent mucosa*

Fairly common

Multiple myeloma and plasmacytoma*

Lymphoma*

Leukemia*

Metastasis*

Mucoepidermoid carcinoma arising from adjacent mucosa*

Adenoid cystic carcinoma arising from adjacent mucosa*

Rare

Nonodontogenic sarcoma*

Odontogenic carcinoma (ameloblastic carcinoma, etc)

Odontogenic sarcoma

Odontogenic carcinosarcoma

**Jaw lesions
covered in
this lecture**

**Mostly cystic or
radiolucent**

**Mixed
Appearance**

**Mostly
radiopaque**

Epithelial cysts

- Inflammatory
 - Radicular cyst
- Odontogenic
 - Dentigerous cyst
 - Odontogenic keratocyst

Neoplasms & other related to bone

- Giant cell granuloma
- Osteoclastoma
- ABC/Simple cyst

Odontogenic neoplasms/other

- Ameloblastoma

Other

- Osteomyelitis (early)
- Vascular lesions
- Salivary inclusion gland defect
- Histiocytosis X

Neoplasms & other related to bone

- Ossifying fibroma (early)
- Cementoosseous dysplasia
- Cherubism
- Fibrous dysplasia

Osteomyelitis

Odontogenic neoplasms/other

- Odontogenic myxoma
- Pindborg tumor

Malignant neoplasms

- Sarcomas
- Lymphoma/leukemia
- Locally invasive carcinomas
- Etc.

Tori

Osteoma

Neoplasms & other related to bone

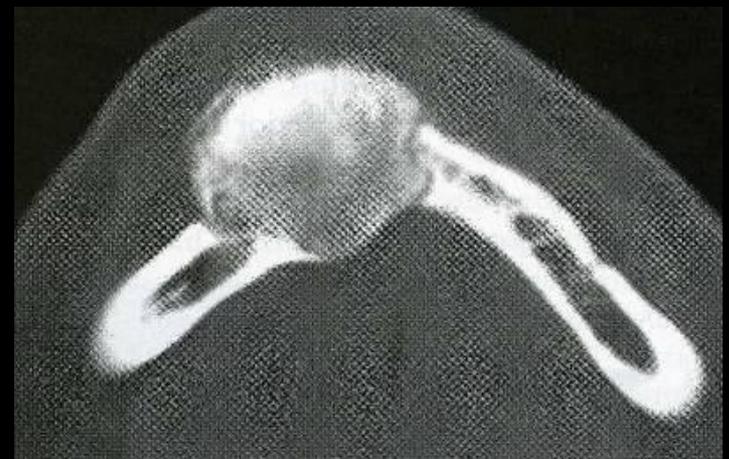
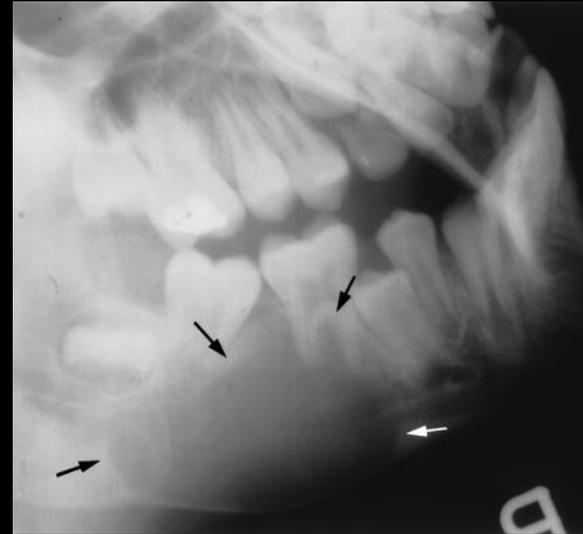
- Ossifying fibroma (mature)

Odontogenic neoplasms/other

- Odontoma
 - Complex
 - Compound

Neoplasms & other related to bone - *Ossifying fibroma*

- synonyms: cemento-ossifying fibroma, juvenile (aggressive) ossifying fibroma
- benign encapsulated neoplasm of fibrous tissue w/ irregular areas of ossification
- most common in 3rd-4th decades, F>M
- most common in posterior mandible
- early lesions: radiolucent
- mature lesions: dense, irregular matrix, thin lucent rim (capsule) w/ sclerotic margin
- often asymptomatic, can displace teeth
- treatment: enucleation, resection w/ bone grafting for larger lesions, rarely recur
- DDx: includes *fibrous dysplasia, Pindborg tumor, giant cell granuloma, malignancy*

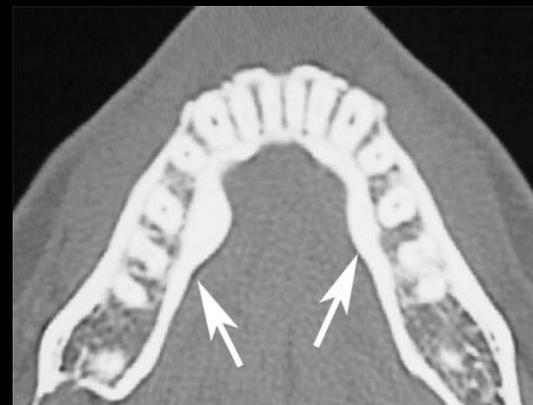


Other mostly radiopaque lesions - *Torus*

- synonym: exostosis
- named according to location: torus mandibularis < torus palatinus
- torus mandibularis usually near premolars above location of mylohyoid muscle attachment
- bilateral in 90% of cases
- prevalence ranges from 5% - 40%
- more common in Asians and Inuits, slightly more common in males, early adult life
- result of local stresses, bruxism, genetic factors
- painless, size may fluctuate throughout life, traumatic ulcers may form
- treatment: none or can be resected (can recur)

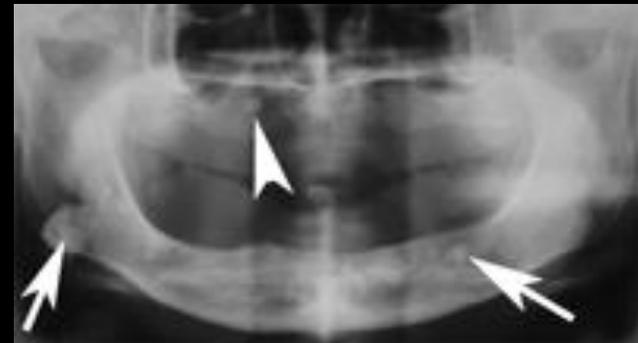
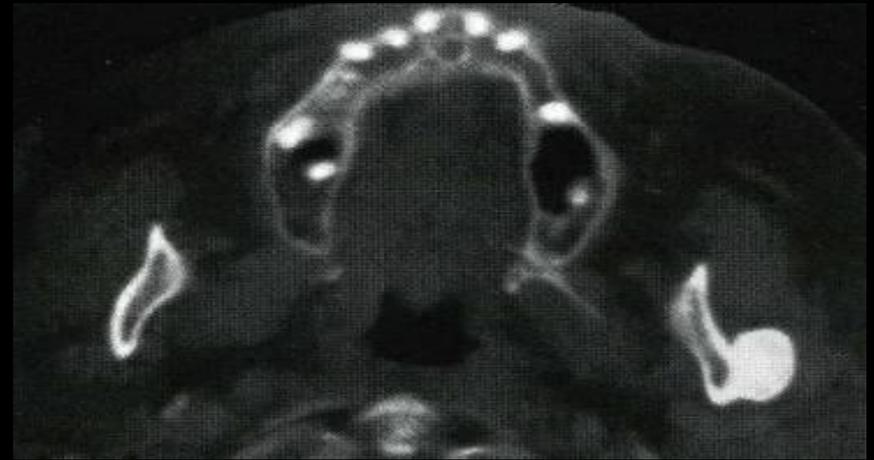


Wikipedia.com



Other mostly radiopaque lesions - *Osteoma*

- benign, slowly growing lesion composed of well differentiated mature bone w/ a predominant lamellar structure
- incidental finding or painless hard swelling
- mandible is 2nd most frequent location
- Gardner's syndrome: multiple osteomas, impacted teeth, multiple colonic polyps, epidermoid and sebaceous cysts, and desmoid skin tumors
- CT: sclerotic cortical bone
- treatment: resection/ablation if symptomatic



Odontogenic neoplasms - *Odontoma*

- most common odontogenic tumor
- hamartoma of odontogenic components (enamel, cementum, dentin, pulp) in various states of differentiation
- WHO classifies into 2 categories:
 - 1) complex: occur in 2nd and 3rd decades of life near mandibular molar and premolars
 - 2) compound: occur in younger individuals near maxillary anterior alveolar bone
- both frequently associated w/ unerupted teeth
- treatment: radiographic observation or simple excision, do not recur
- DDx: *focal cemental dysplasia, Pindborg tumor*

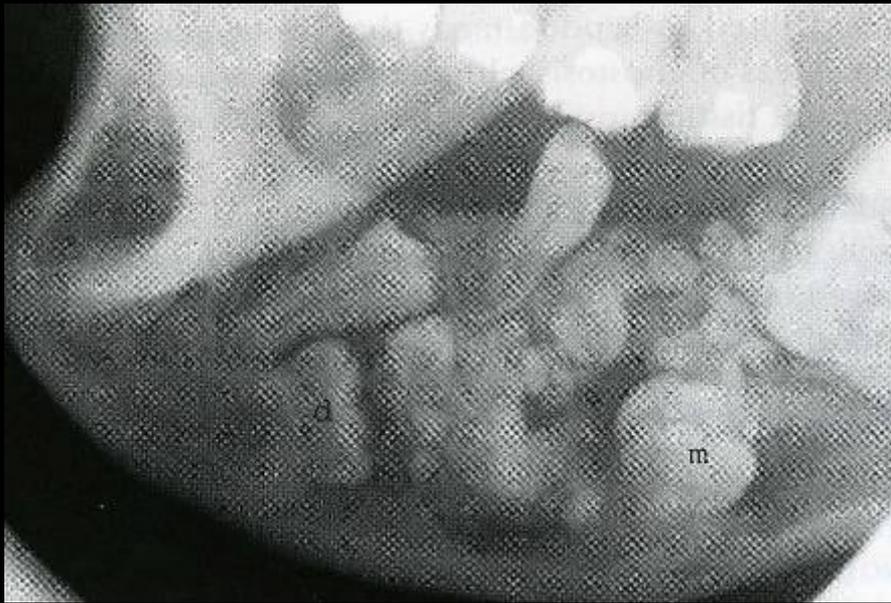
Odontogenic neoplasms - *Complex odontoma*

- well defined radiopaque mass of amorphous, disorganized odontogenic tissue bearing no morphological similarity to normal or rudimentary tooth
- often w/ lucent rim



Odontogenic neoplasms - *Compound odontoma*

- well defined radiopaque mass w/ radiolucent rim and appearance of multiple, miniature, or rudimentary teeth
- more common



Conclusion

- widespread, routine imaging of the face necessitates radiologists' familiarity with anatomy and pathology of the mandible
- predictable patterns of trauma to mandible and dentition exist
- tumors of the mandible are generally benign and have various appearances
 - identification dependent upon location, imaging characteristics, effects upon adjacent structures, patient demographics and history
 - can narrow differential diagnosis but most cases require excision and histologic evaluation

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