Radiology for stomatologists
Lecture

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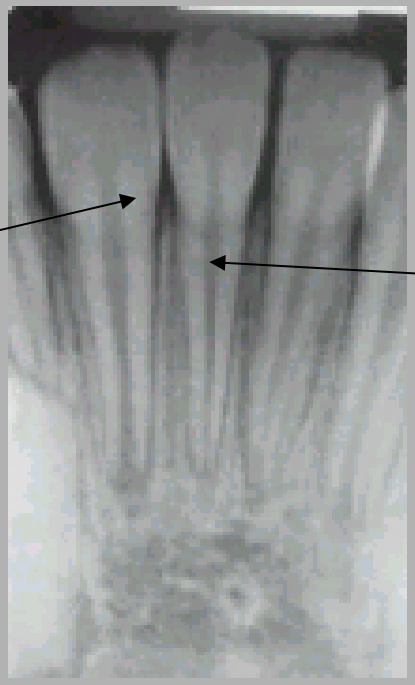
FAKULTNÍ NEMOCNICE BRNO

IMAGING MODALITIES in stomatology

- Plain X–ray image
- Contrast studies
- Computed tomography
- Ultrasoud
- Magnetic Resonance

X-ray - attributes

- Electromagnetic radiation of short wavelength produced when high-speed electrons strike a solid target
- Ability to pass through tissues where is partially absorbed



Plain X ray imaging

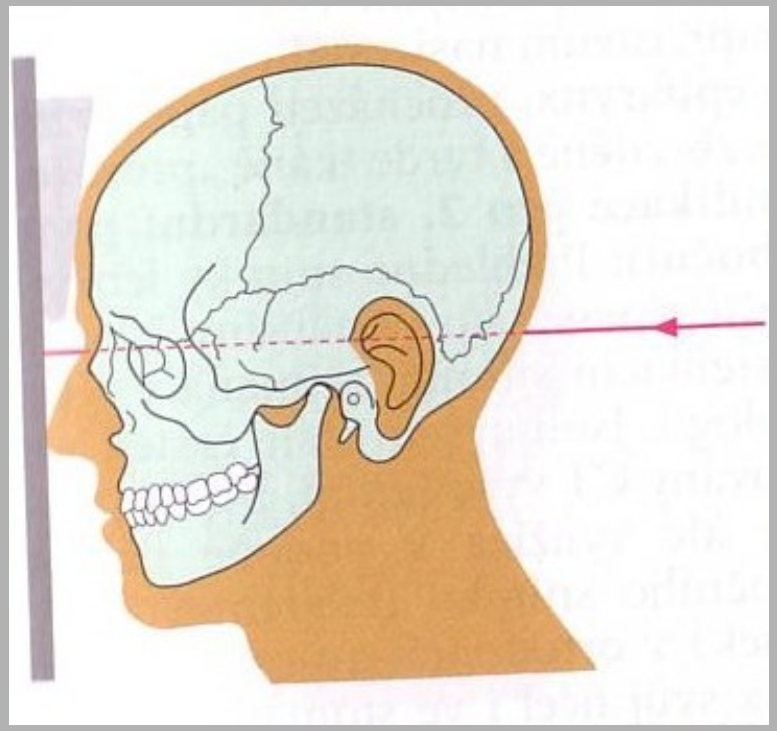
- 1) Imaging of skull

- 2) Dental radiographs
  - A) Intraoral imaging
  - B) Extraoral imaging

1) Skull skiagrams

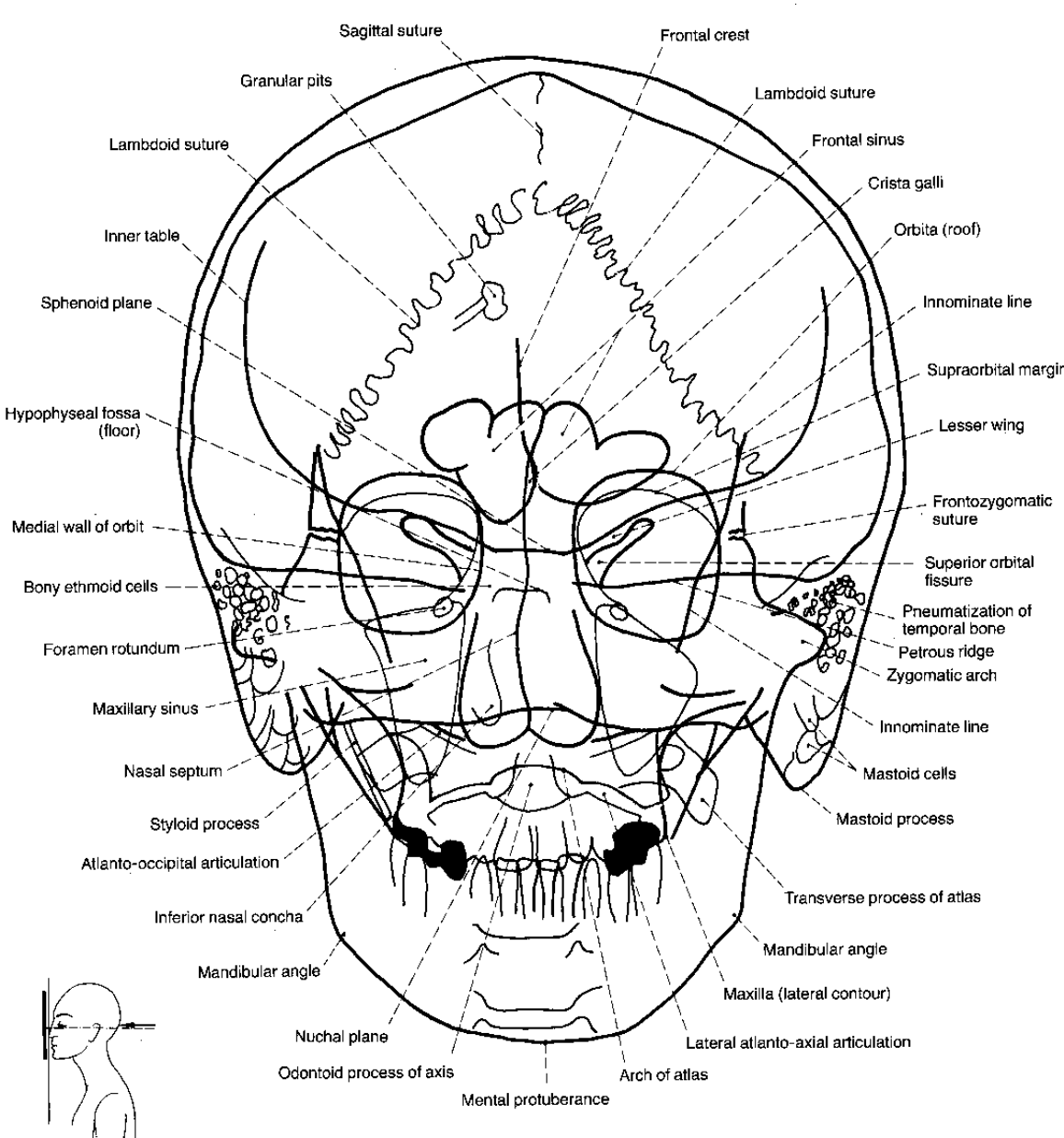
- Picture of the cranium
- Projection of paranasal sinuses
- Orbits
- Skull base
- Panoramatic: Upper and Lower jaw
- Os temporale
- Temporo-Mandibular Joint

Cranium – dorso-ventral and lateral projection

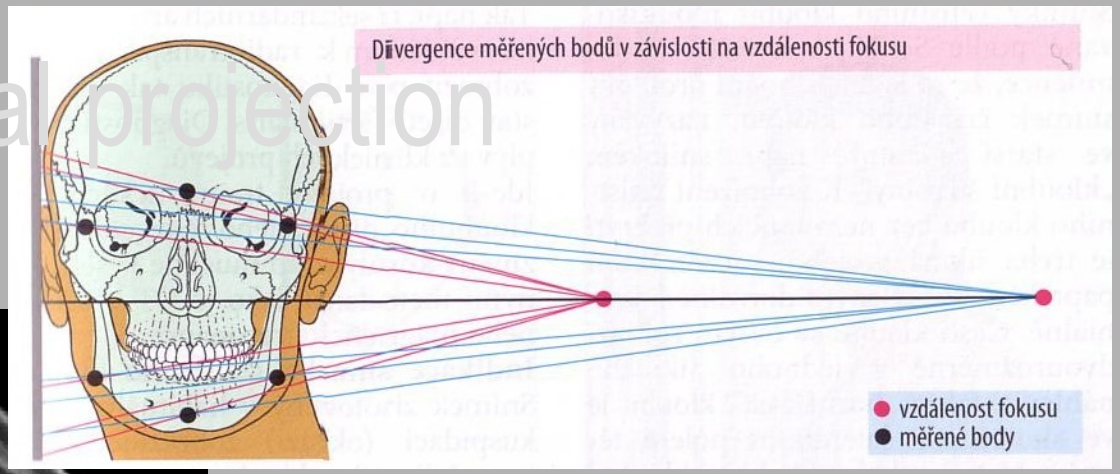


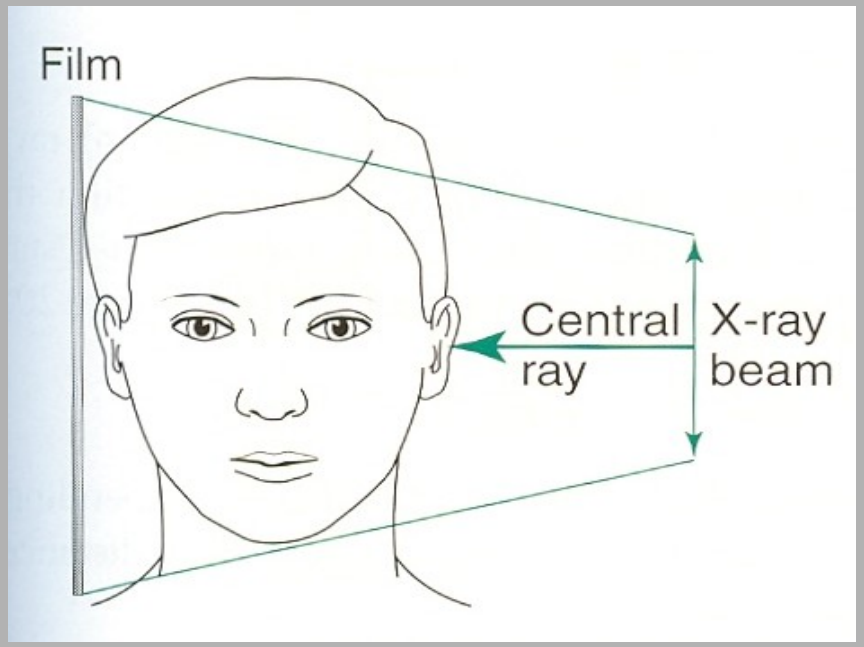
- Nose and forehead touch the cassette
- X-ray pass through the protuber. occipitalis perpendicularly to cassete

Cranium – dorso-ventral and lateral projection



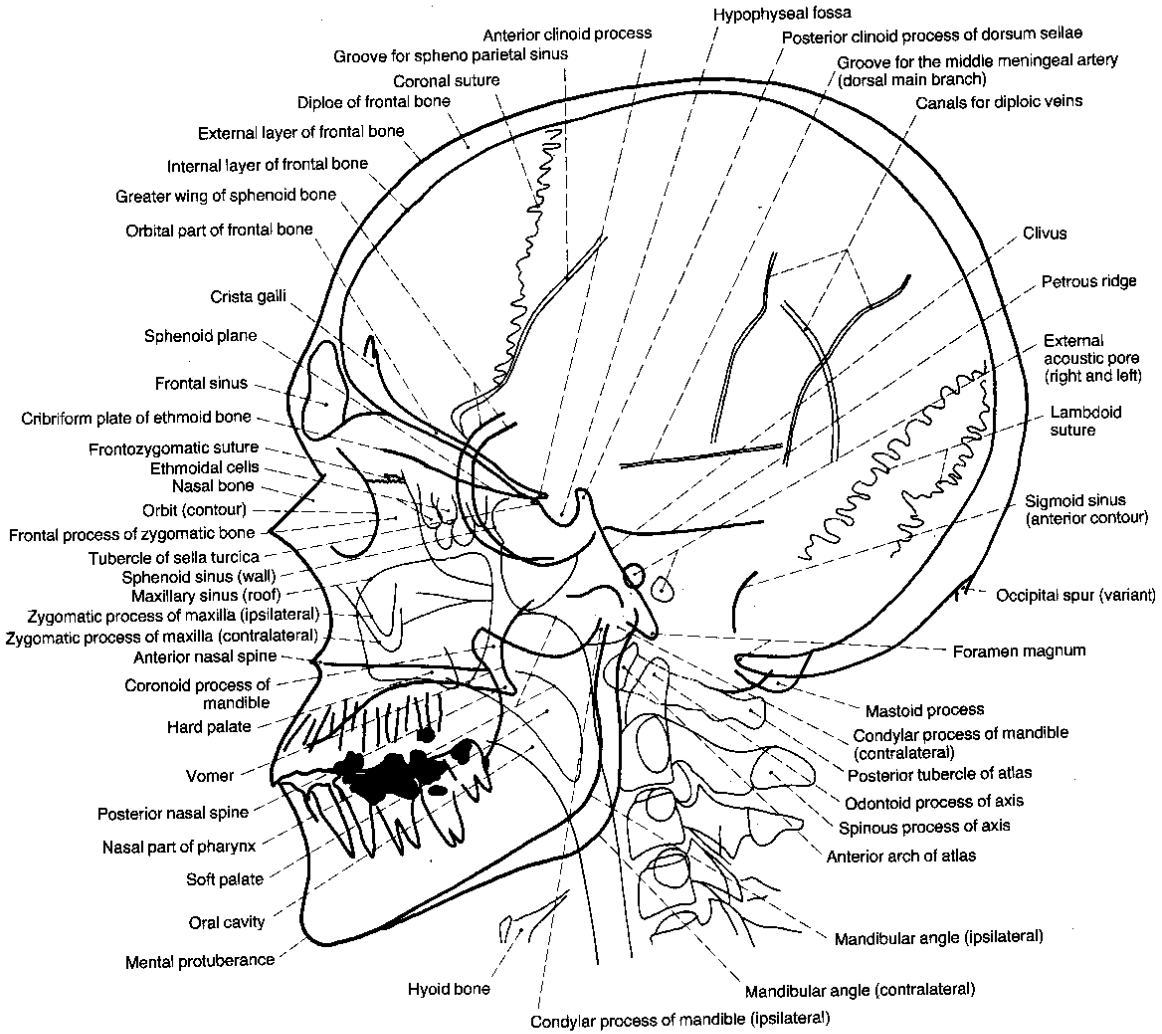
Cranium – lateral projection

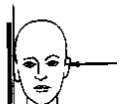




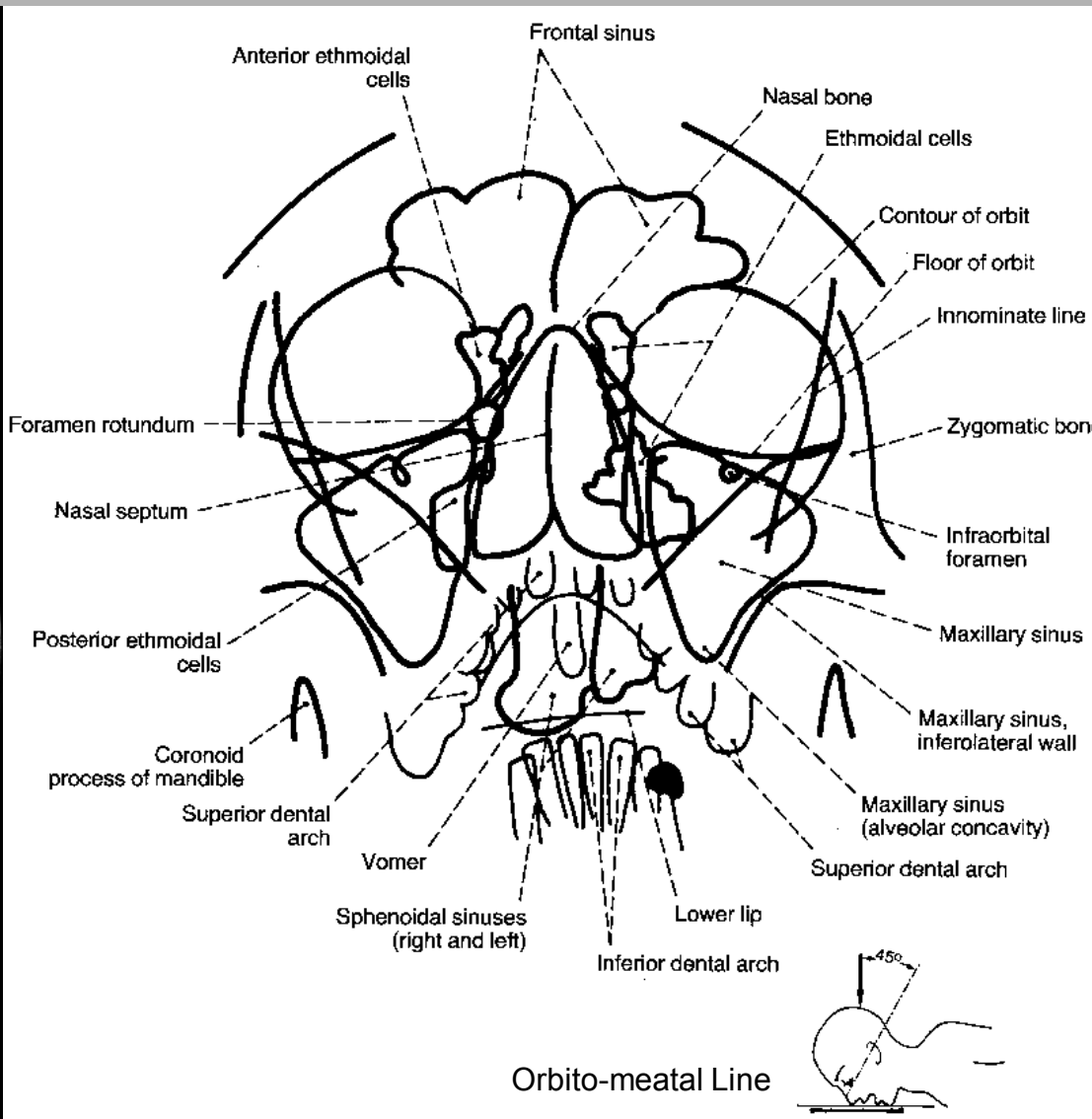
- Central beam goes through the acustic meatus
- Perpendicular to the cassette

Cranium – lateral projection

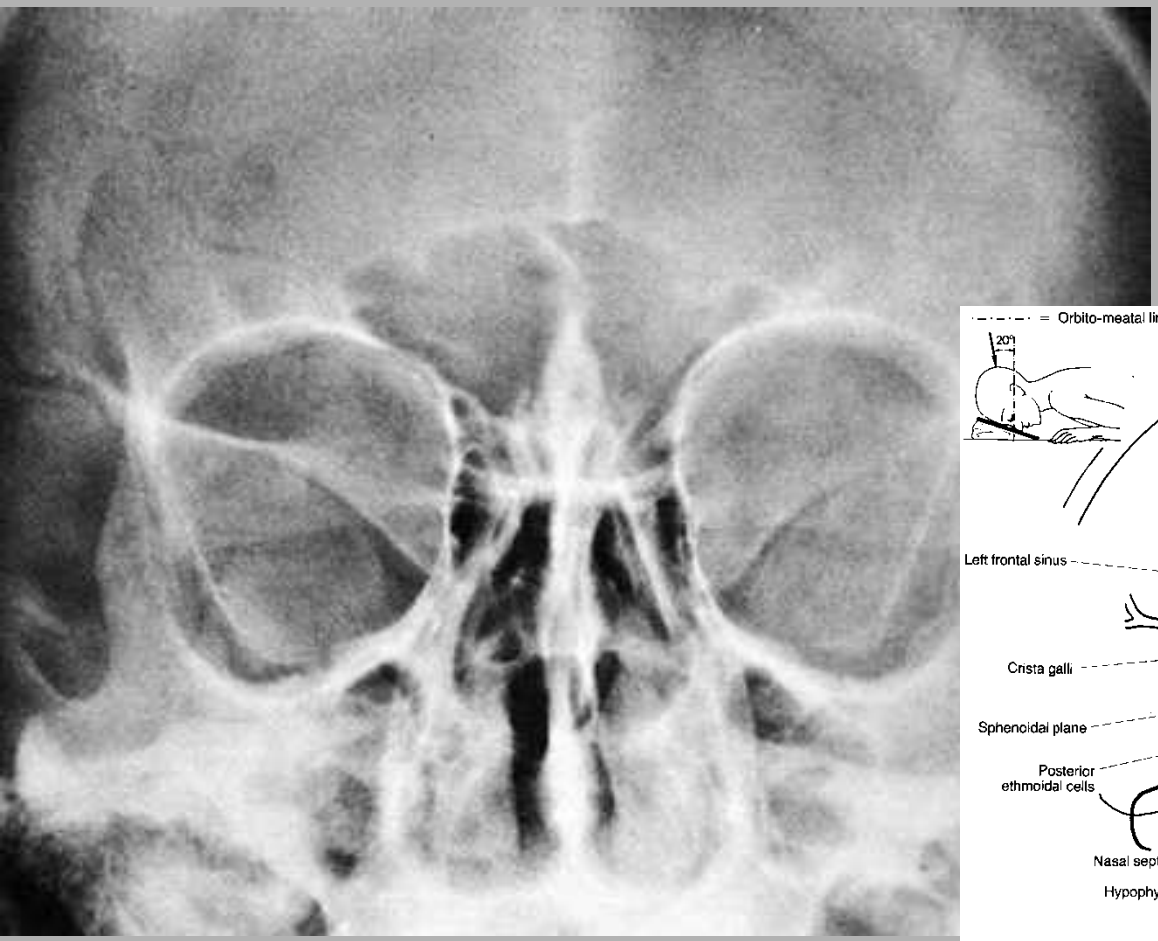


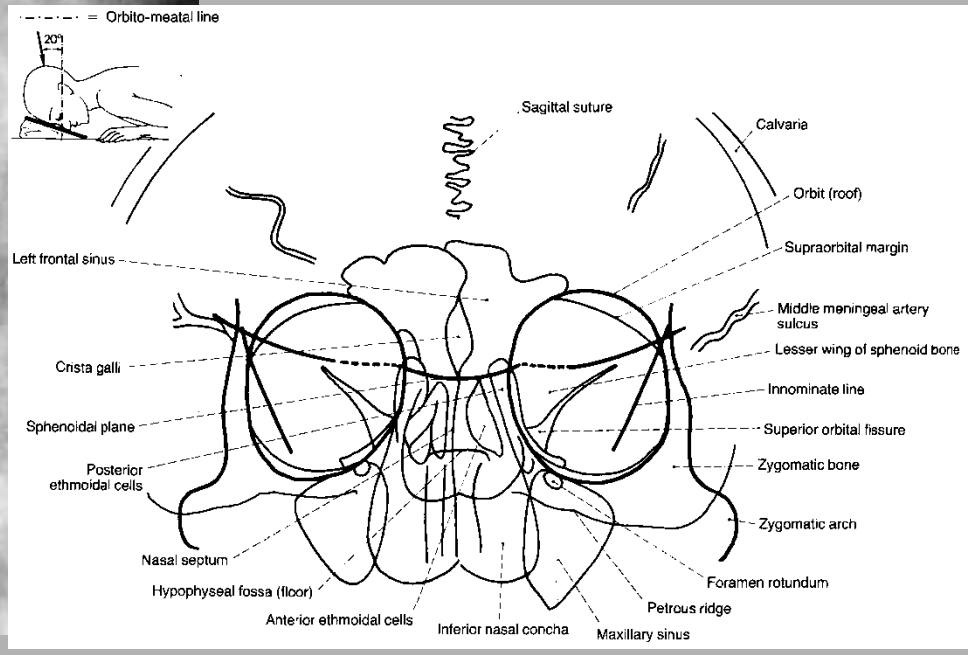


Paranasal sinuses – Water´s projection

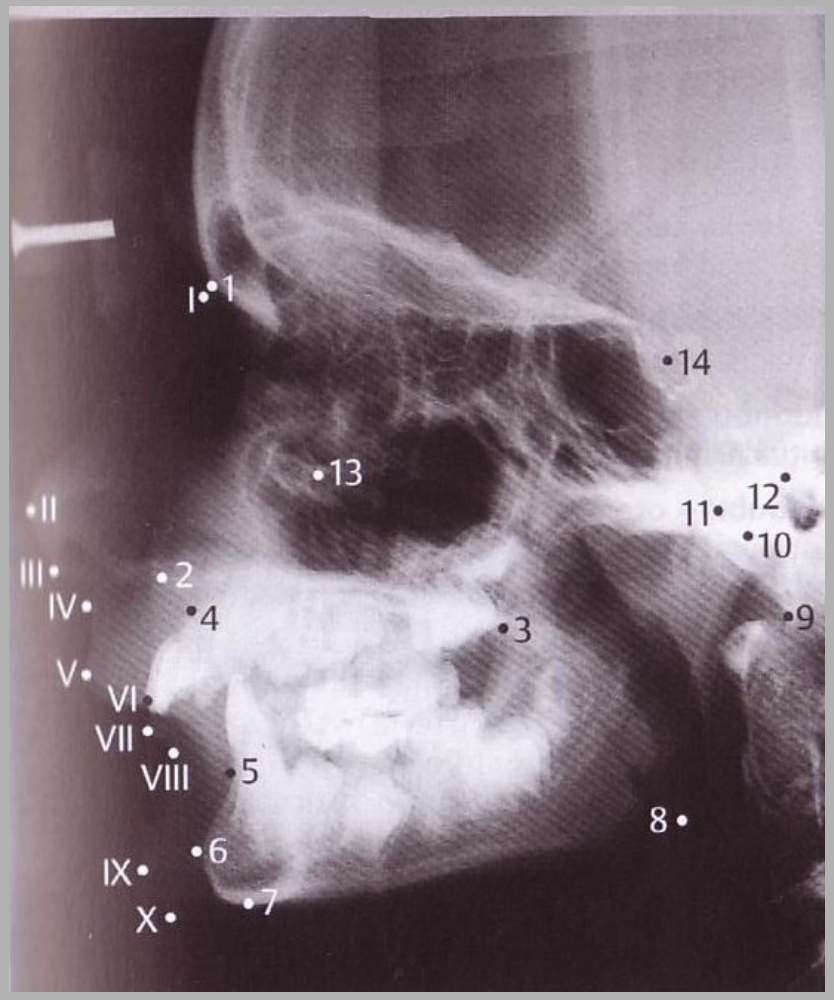


Orbits – dorso-ventral projection





Orbits – lateral projection



Skeleton Points

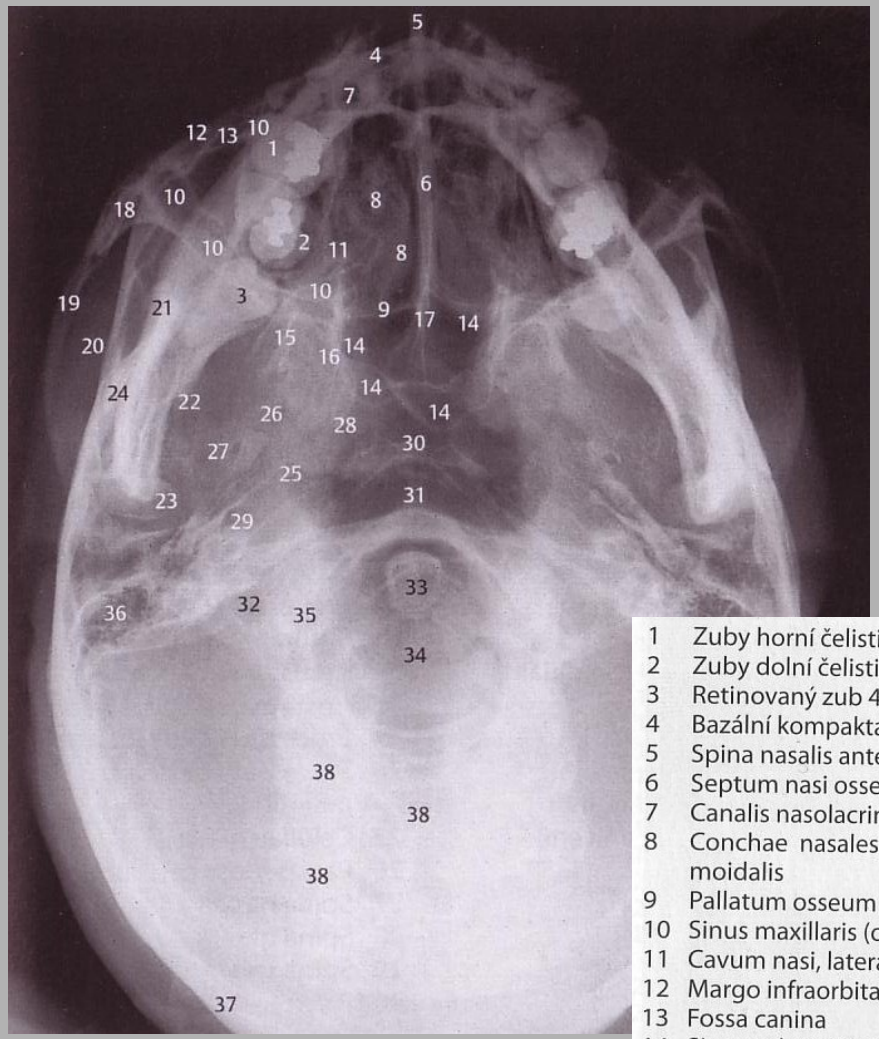
1	Nasion
2	Spina nasalis anterior
3	Spina nasalis posterior
4	Bod A
5	Bod B
6	Pogonion
7	Menton
8	Gonion
9	Basion
10	Articulare
11	Condylion
12	Porion
13	Orbitale

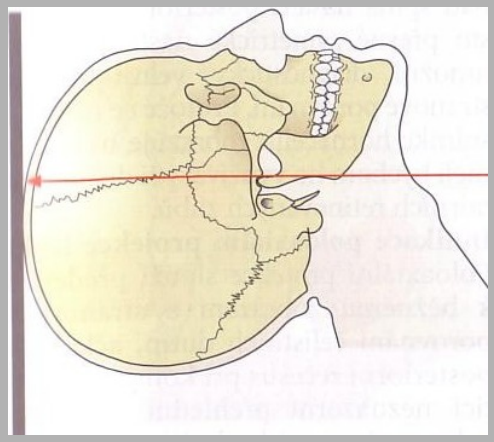
14 sella

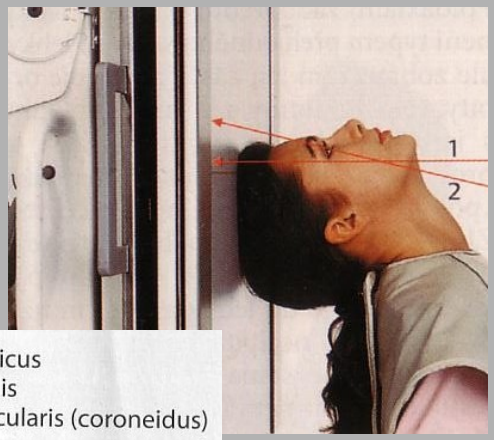
Soft Tissue Points

I	Kožní nasion
II	Špička nosu
III	Subnasale
IV	Subspinale
V	Labrale superius
VI	Stomion
VII	Labrale inferius
VIII	Submentale
IX	Kožní pogonion
X	Kožní gnathion

Skull base – axial projection

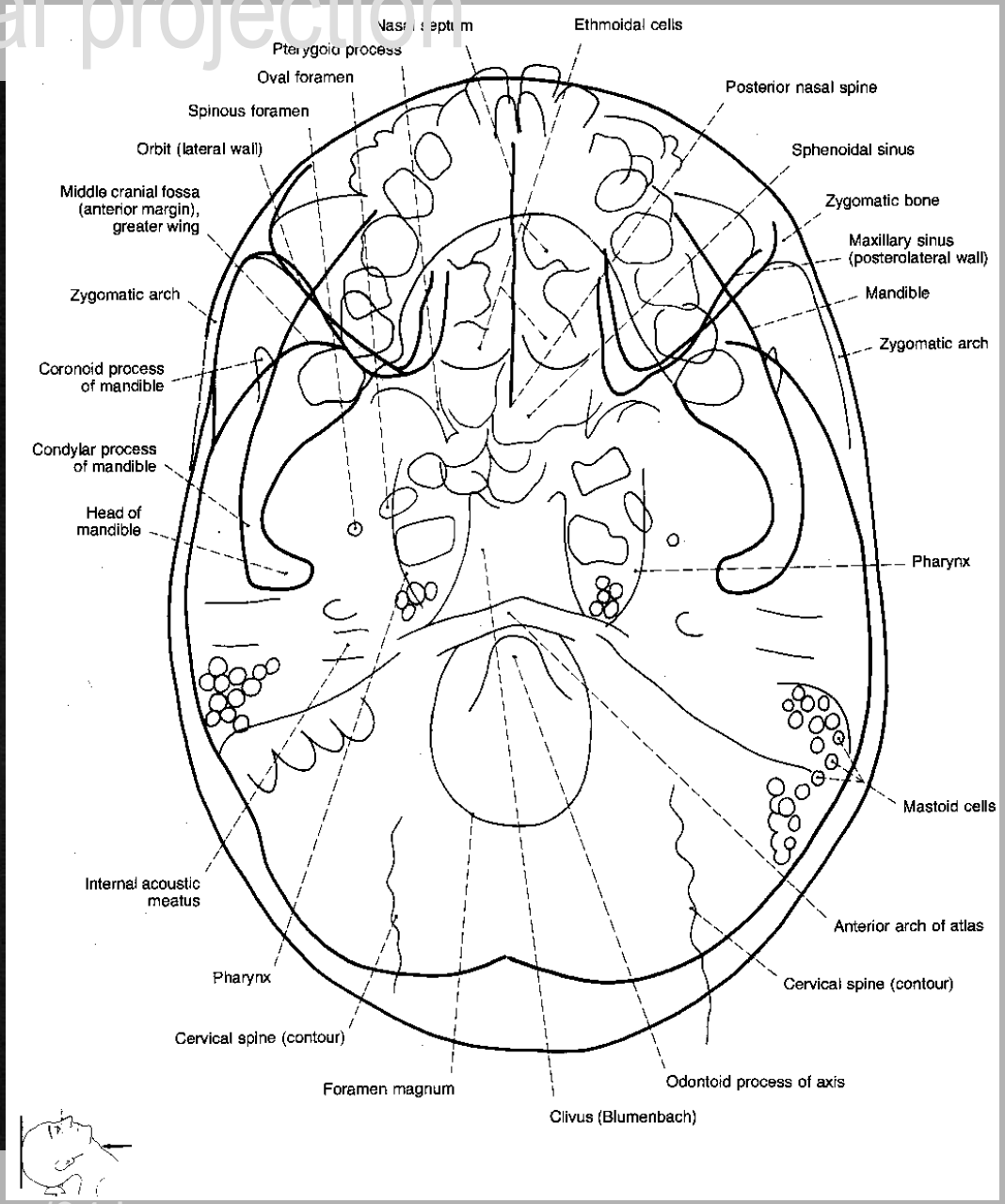






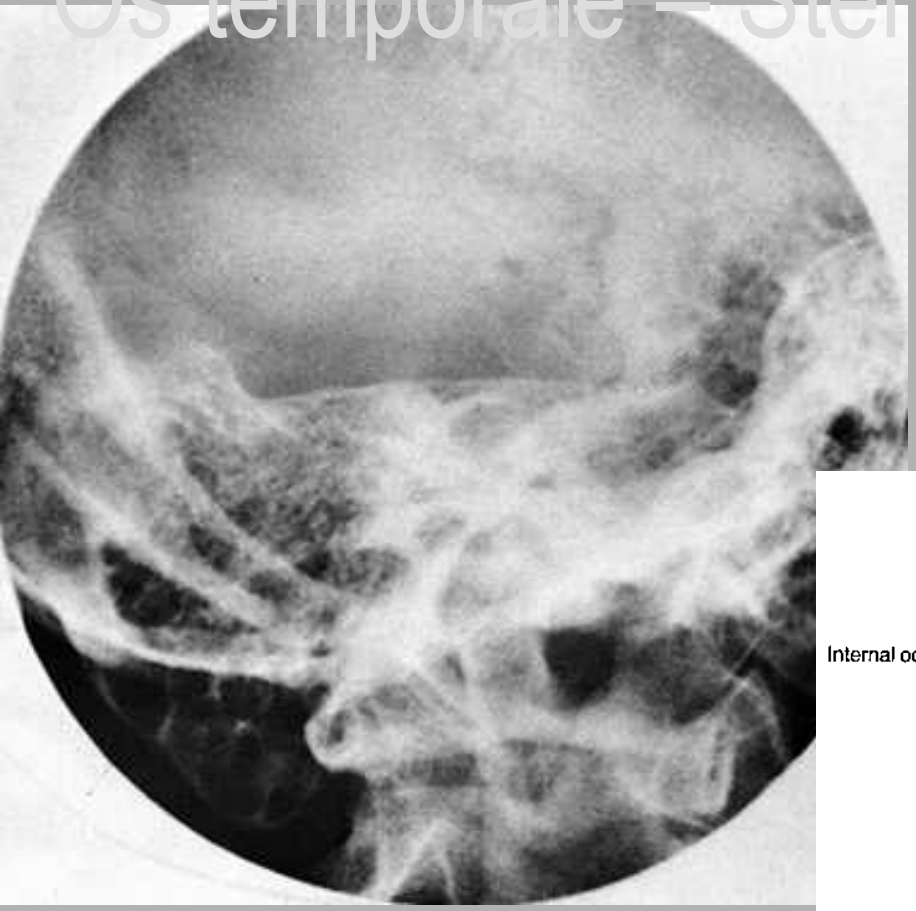
1 Zuby horní čelisti
2 Zuby dolní čelisti
3 Retinovaný zub 48
4 Bazální kompakta mandibuly
5 Spina nasalis anterior
6 Septum nasi osseum
7 Canalis nasolacrimalis
8 Conchae nasales et labyrinthus ethmoidalis
9 Pallatum osseum (dorzální hranice)
10 Sinus maxillaris (ohraničení)
11 Cavum nasi, laterální stěna
12 Margo infraorbitalis
13 Fossa canina
14 Sinus sphenoidalis
15 Processus pterygoideus, lamina lateralis
16 Processus pterygoideus, lamina medialis
17 Spina nasalis posterior
18 Os zygomaticum
19 Arcus zygomaticus
20 Fossa temporalis
21 Processus muscularis (coroneidus) mandibulae
22 Lingula
23 Condylus mandibulae
24 Angulus mandibulae
25 Sutura coronalis
26 Foramen ovale
27 Foramen spinosum
28 Foramen lacerum
29 Canalis caroticus
30 Dorsum sellae
31 Tuberculum anterius atlantis
32 Foramen transversarium atlantis
33 Dens axis (epistrophei)
34 Foramen magnum
35 Condylus occipitalis
36 Celullae mastoideae
37 Os occipitale
38 Obratle krční páteře

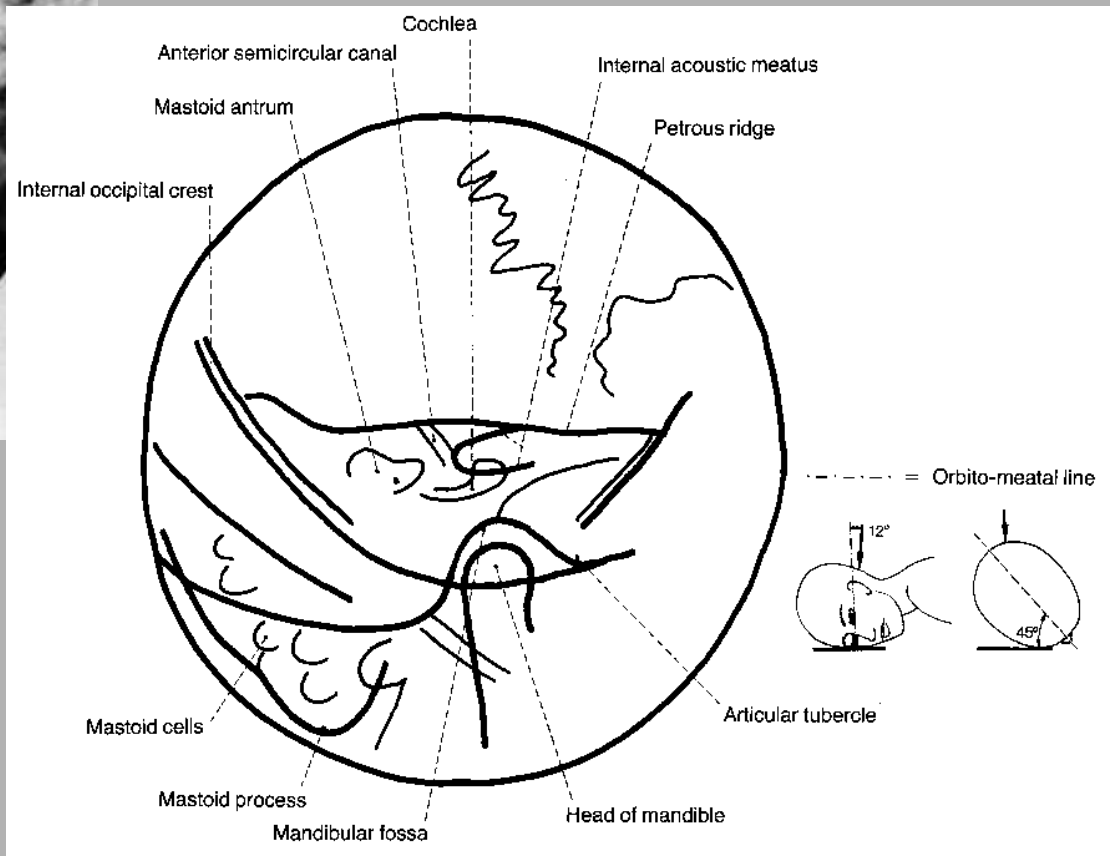
Skull base – axial projection



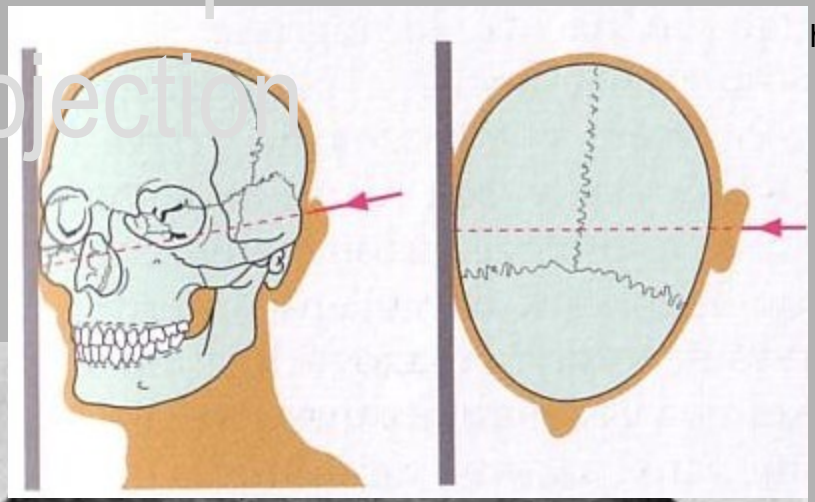
- http://rtg.misto.cz/_MAIL_/hlava/04.jpg

Os temporale – Stenver´s – semisagital pr.





Os temporale – Schüller´s – semilateral projection



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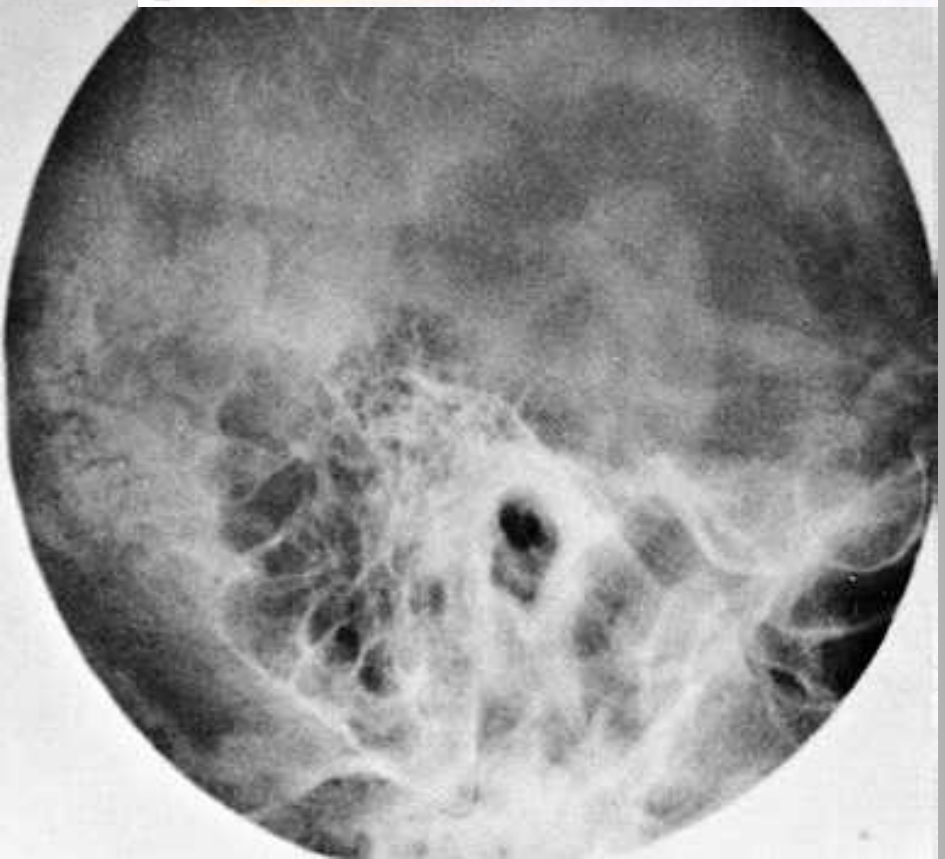
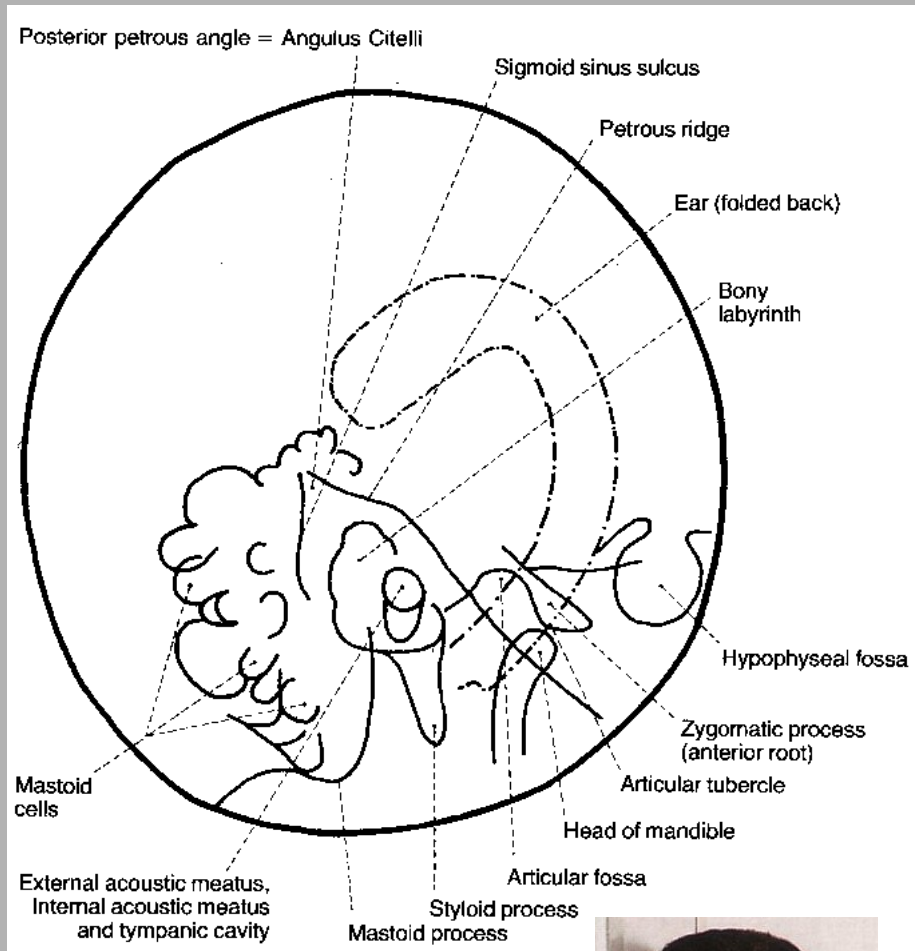
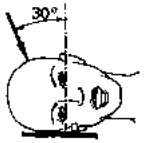
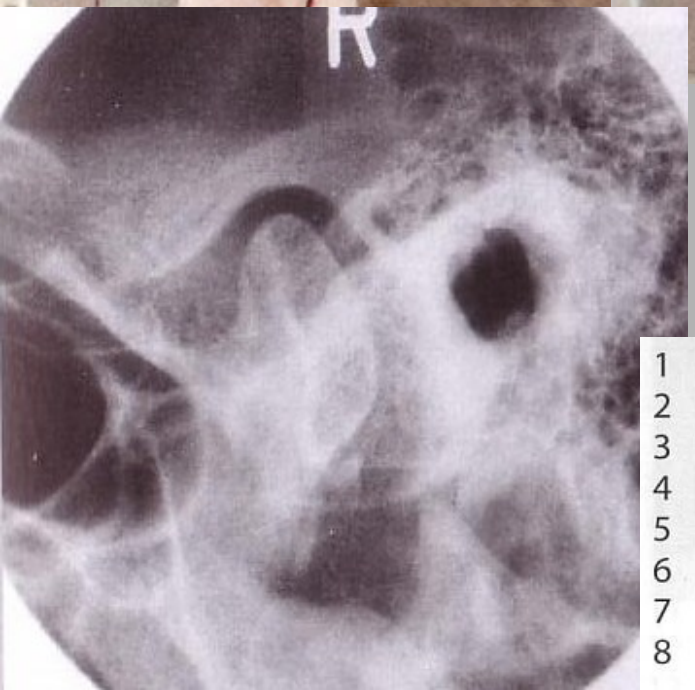


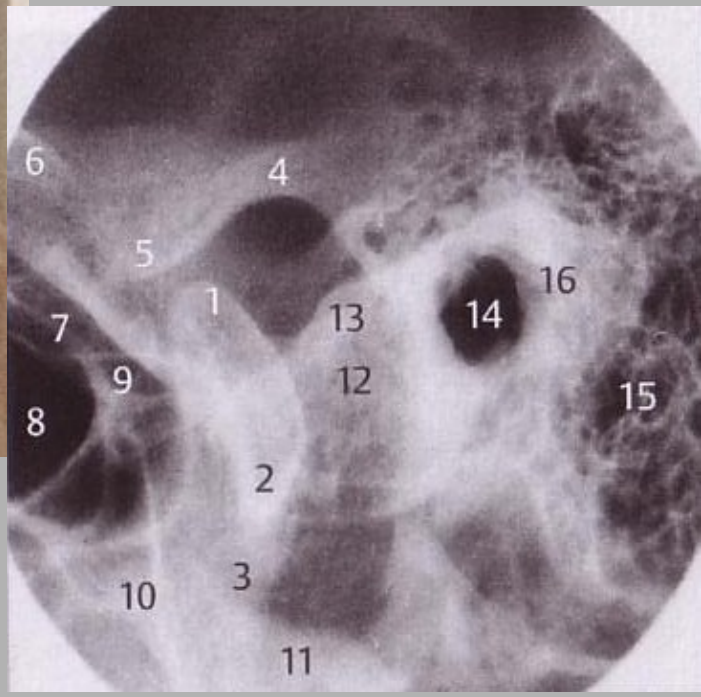




= Orbito-meatal line

Os temporale – Schüller´s – semilateral projection

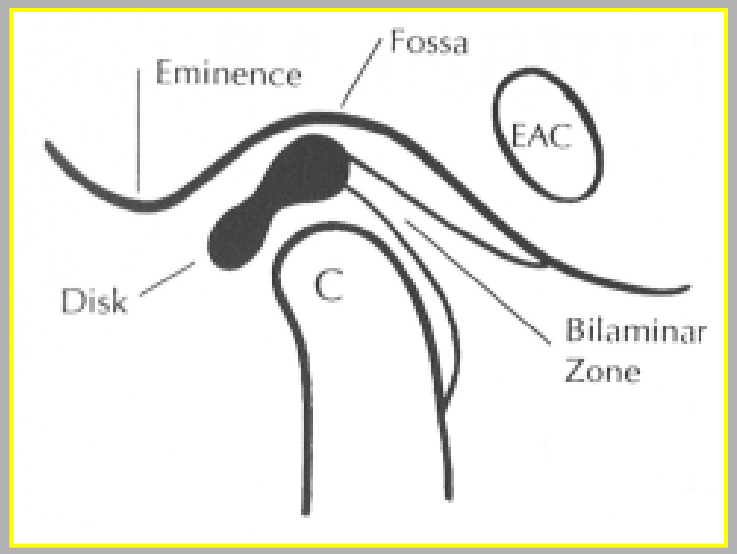




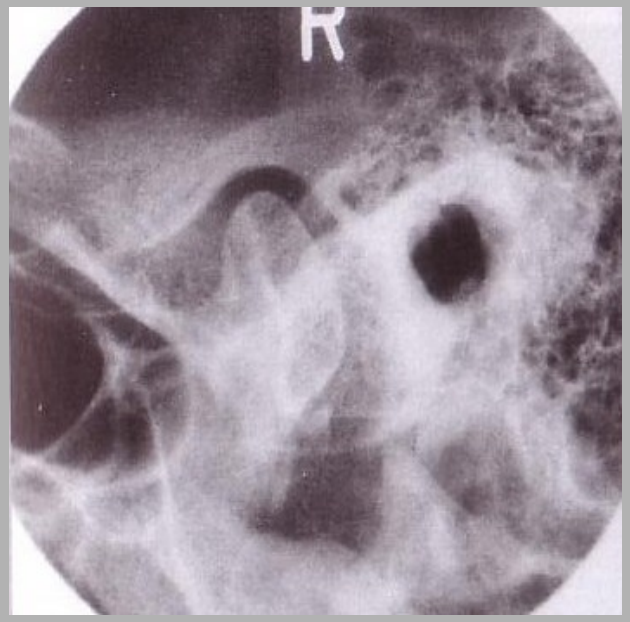
1	Kondylus, laterální pól
2	Kondylus, mediální pól
3	Processus condylaris mandibulae
4	Fossa glenoidalis, laterální části
5	Eminentia articularis, laterální části
6	Arcus zygomaticus
7	Sella turcica
8	Sinus sphenoidalis
9	Processus clinoideus posterior
10	Clivus
11	Pars petrosa (vzdálenější)
12	Pars petrosa (přilehlá)
13	Horní hrana pyramidy (přilehlá)
14	Porus acusticus externus
15	Celullae mastoideae
16	Pars tympanica ossis temporalis

Temporomandibular joint (TMJ)

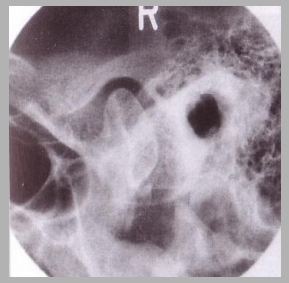
- Intracapsul. dissease = diskopathy- we can see calcifications

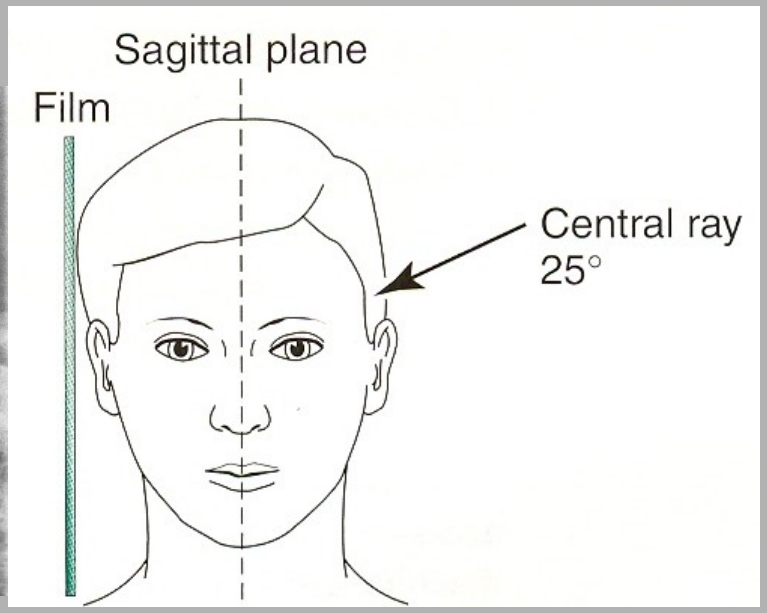


- Correct position of temporo mandible joint (TMJ)



Temporomandibular joint - TMJ

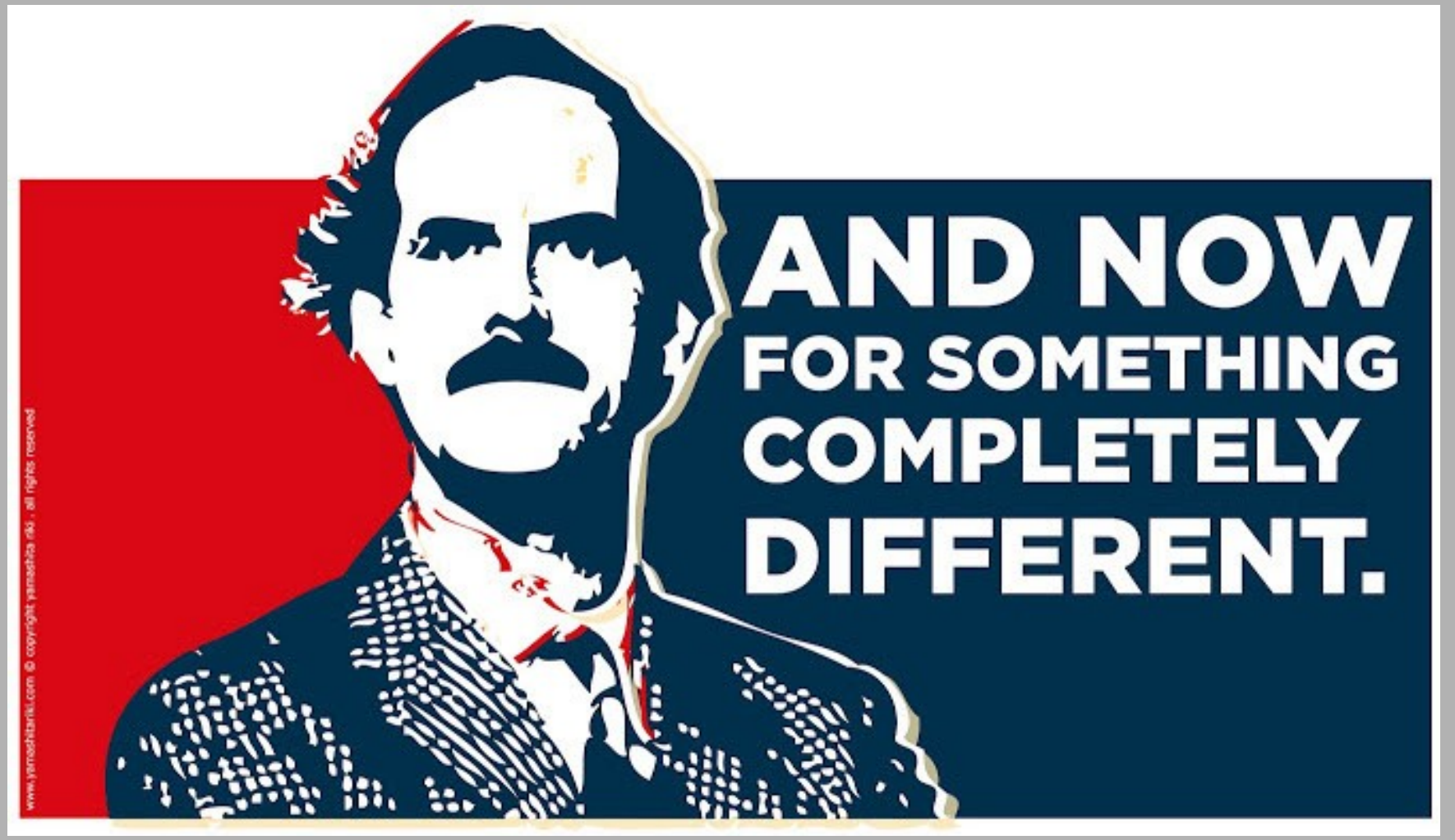




serial radiogram TMJ

- x-ray beam pass vertical +25° to center of film
- entering 6-7cm over meatus acusticus.

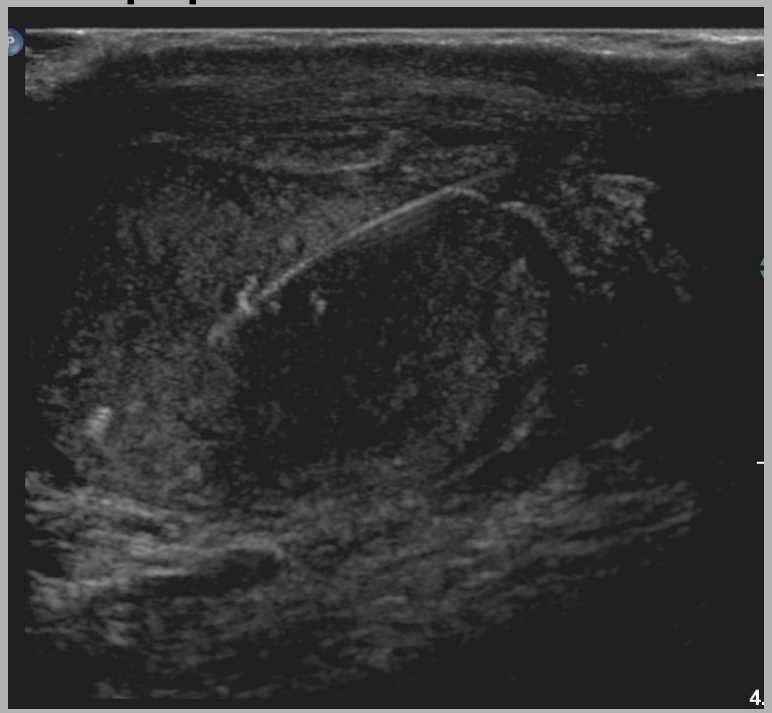
- condyl head
- fossa glenoidalis
- close mouth
- open mouth



Interlude I.

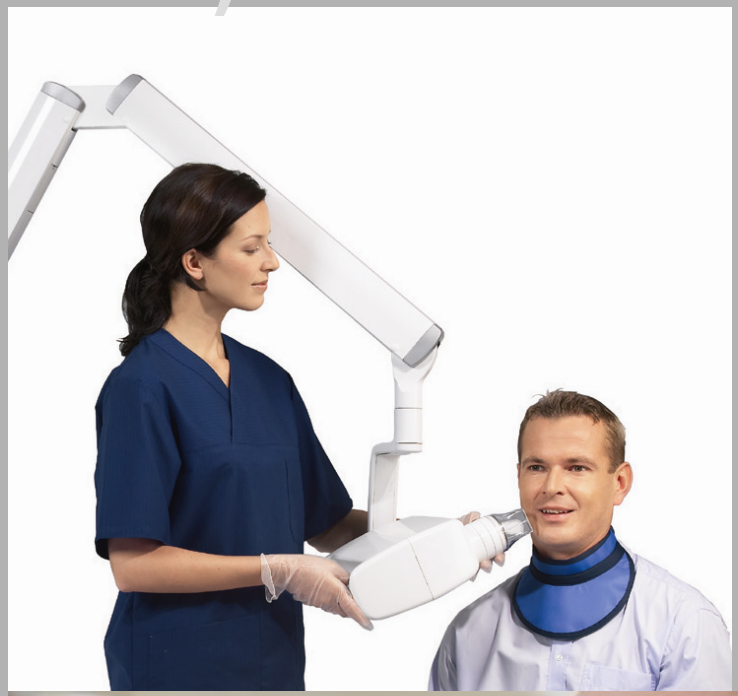
Man mending his pants

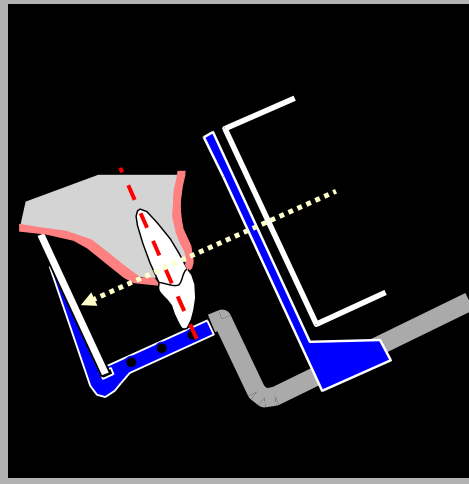
- Young man was stitching his trousers in the morning
- Then he went to the pub in the evening.
- After 4 beers he went home, sit on bed and feel sharp pain in his balls

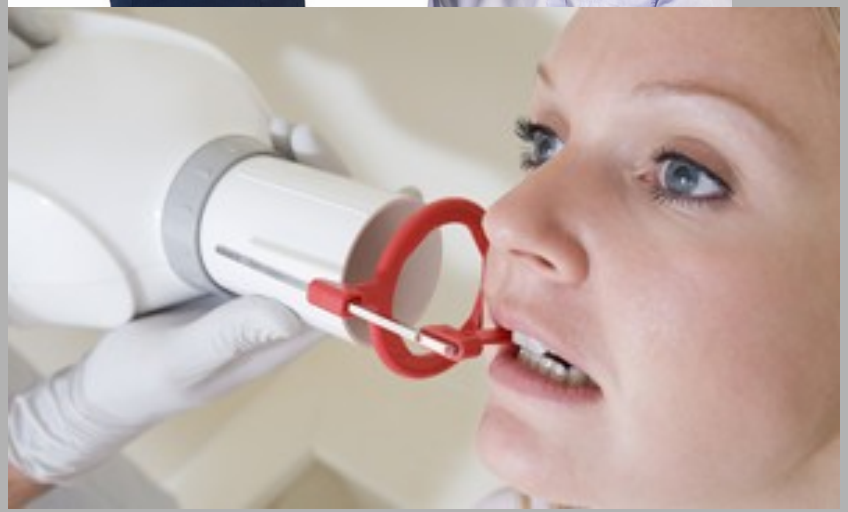


2) Dental radiographs

a) Intraoral exposures







Intraoral X-ray device

voltage of X-ray tube

50-90 kV

filtration of primary beam

1,5 mm Al - U<70 kV

2,5 mm Al - U > 70 kV

body tube

length of body tube = 10-30 cm

RADIATION PROTECTION

- Use of proper exposure and processing techniques
- Patients should be shielded with lead aprons and thyroid shields.
- These shields should have at least 0.5 mm of lead equivalent.
- Film badges

IMAGE RECEPTORS

- **RADIOGRAPHIC FILM**
- **DIGITAL RECEPTORS**
- **indirect digital imaging**

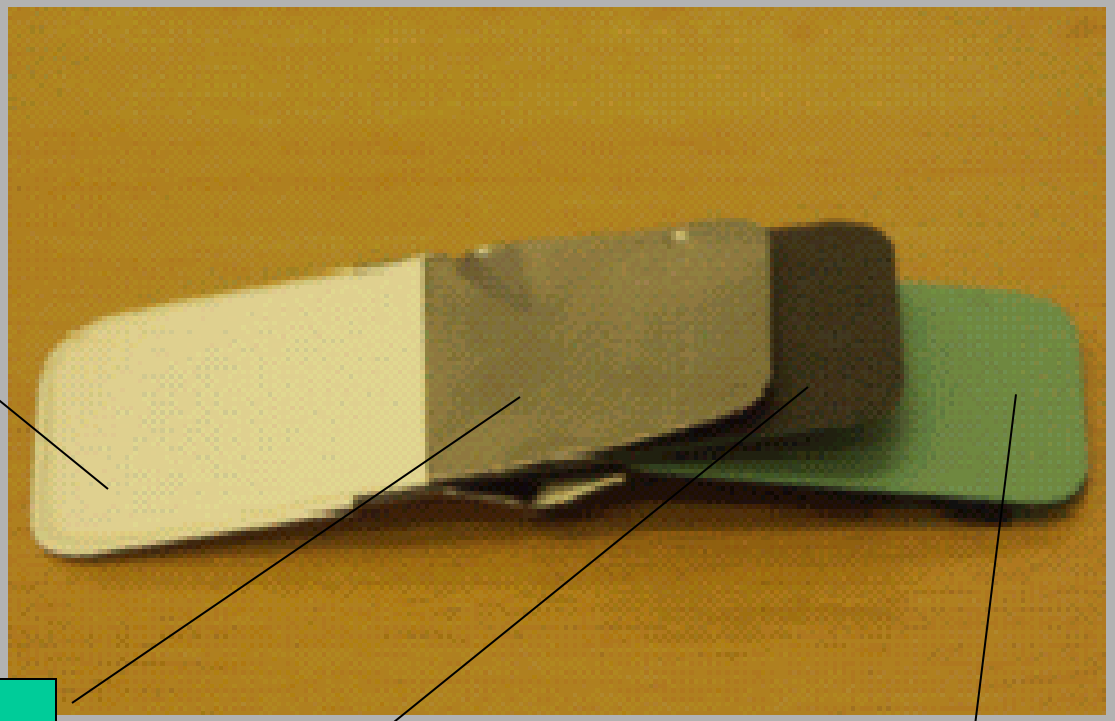
Convenctional and digital technique

- Digital:
  - CCD (charged coupled device) as a senzor

Wired and wireless intraoral sensors

Films for intraoral exposure

- dental films



SIZES

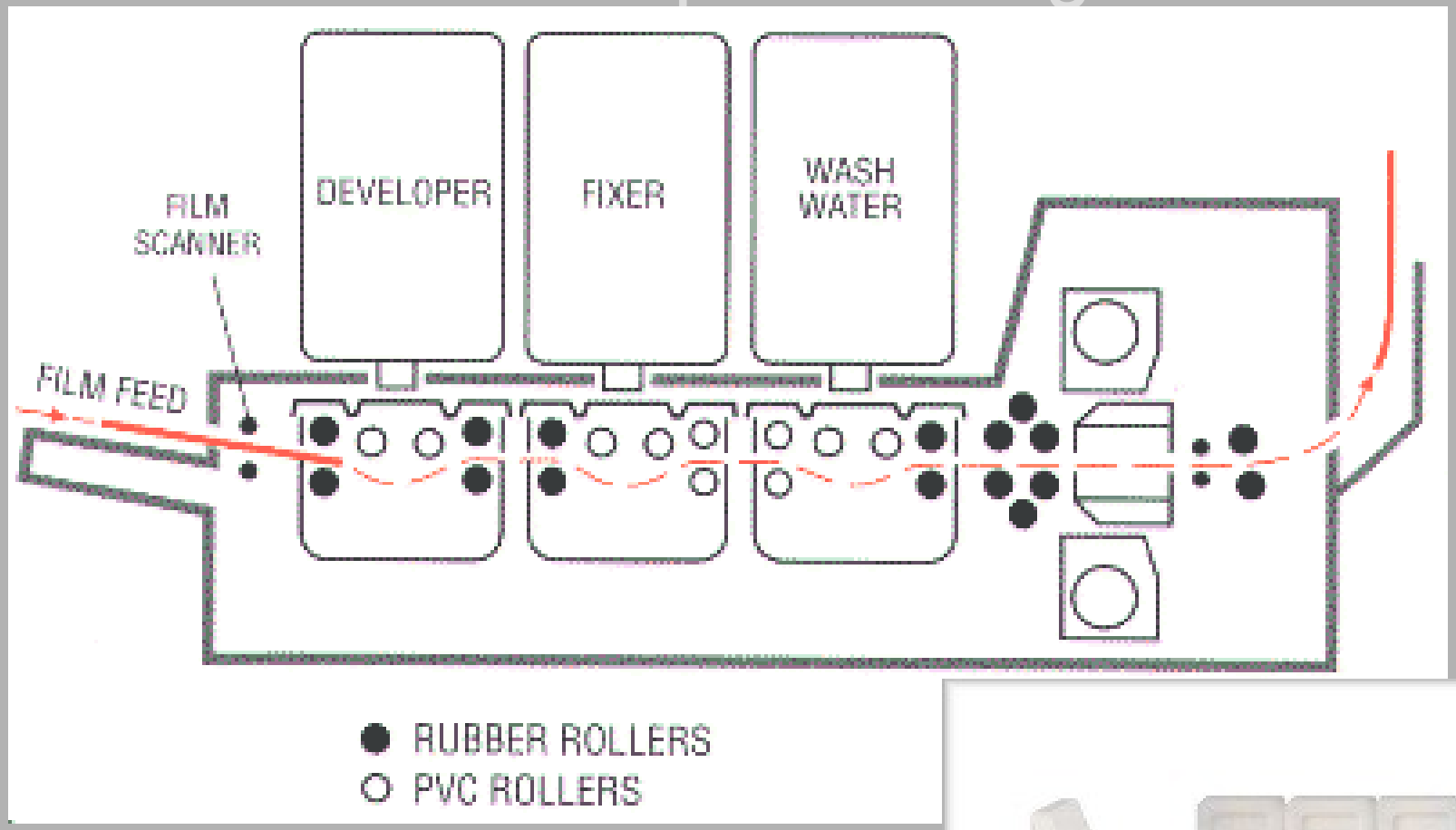
- Various sizes available, although only three are usually used routinely:
- **For periapical & bitewings**

  31 X 41 mm

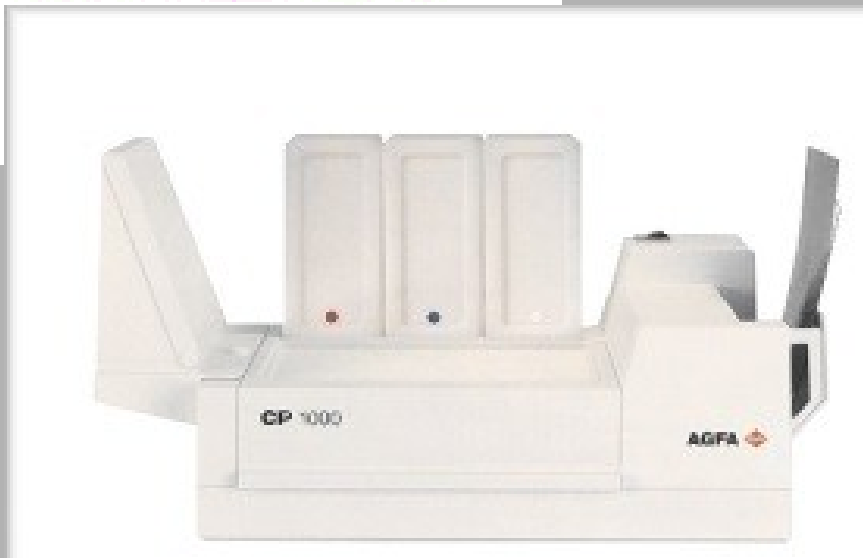
  22 X 35 mm
- **For occlusal**

  57 X 76 mm

Film processing:

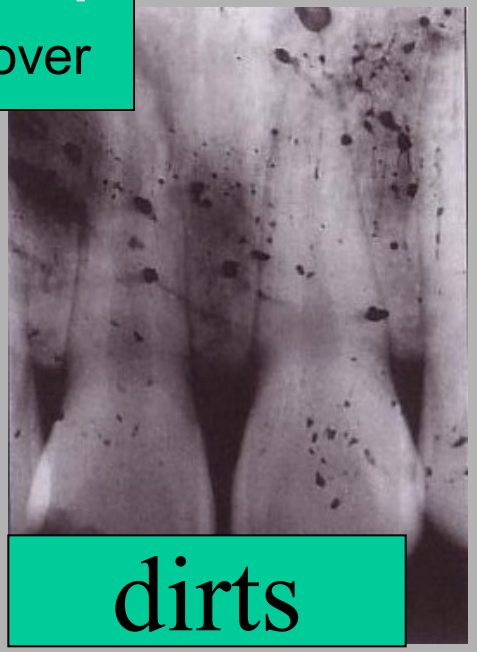


Automatic processing machine

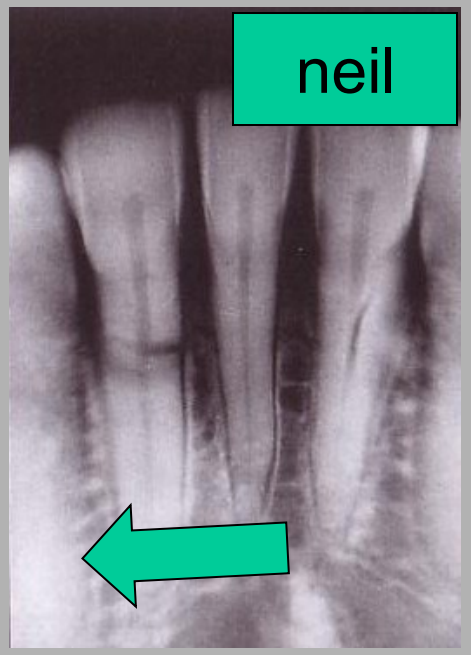


Conventional film processing - artifacts

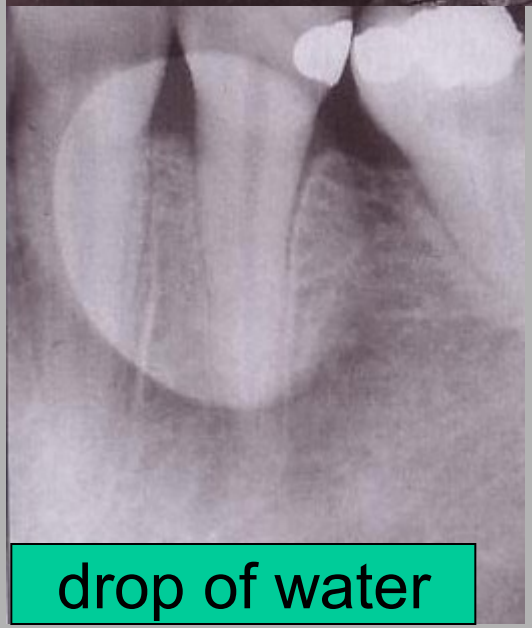
too fast taking film out of the cover



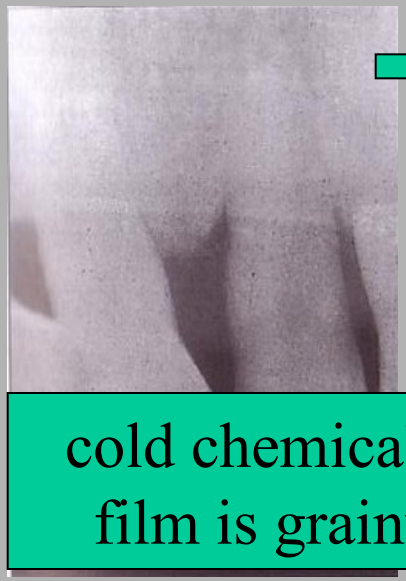
dirts



neil



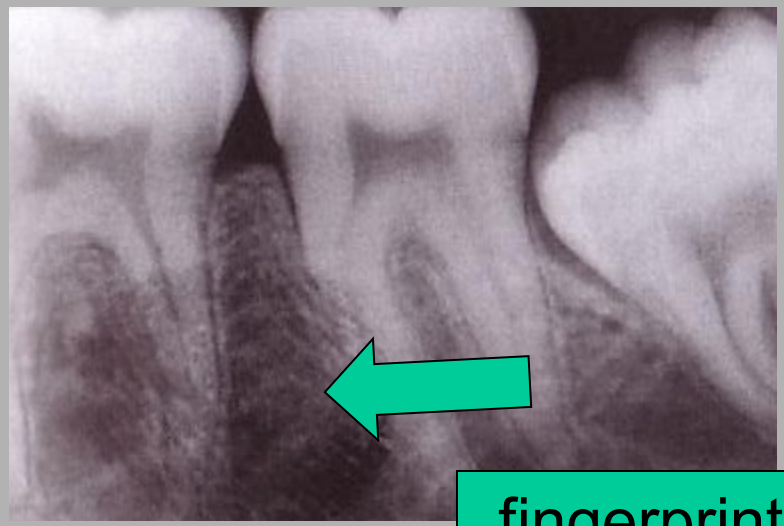
drop of water



cold chemicals
film is grainy

correct temperature

Conventional film processing - artefacts

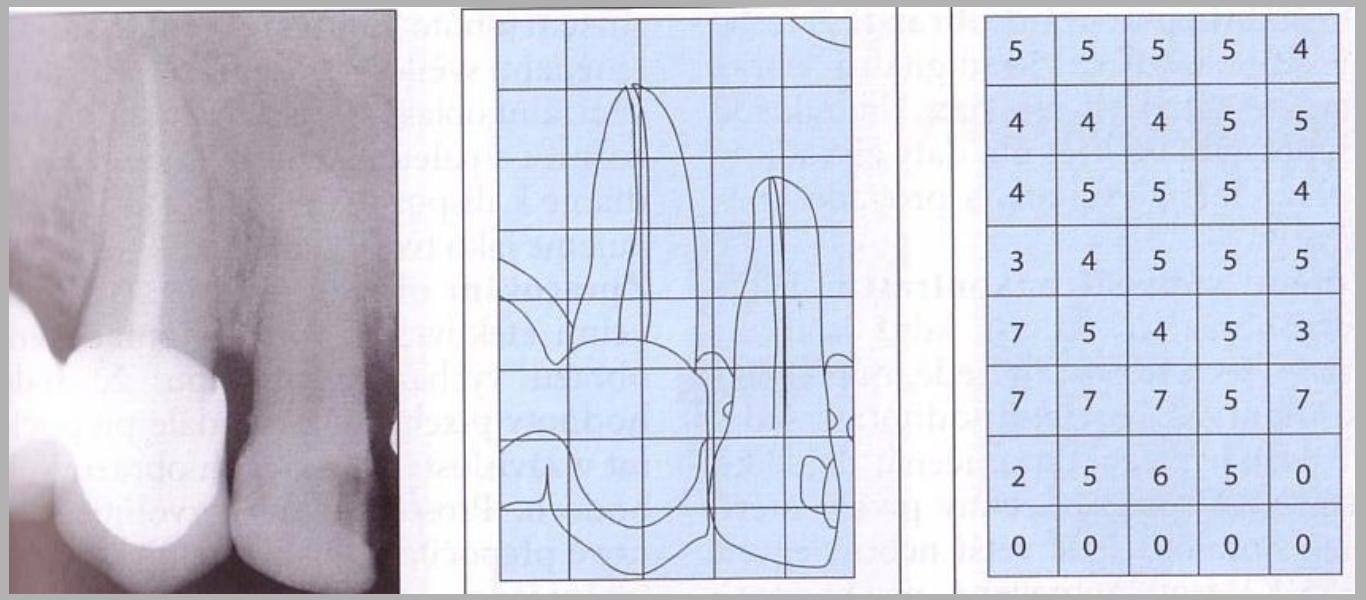


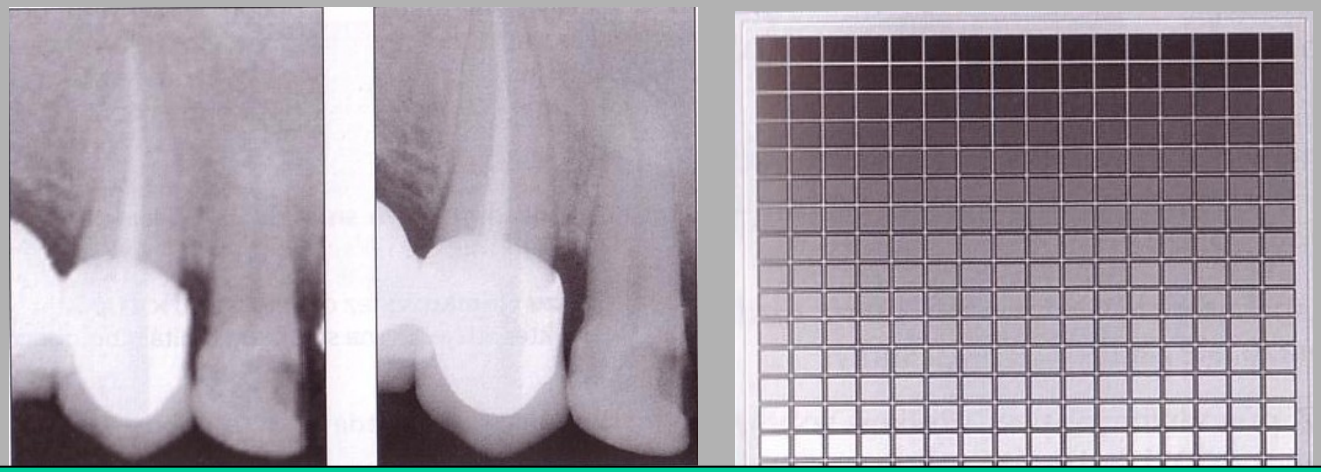
fingerprint

contact with other film

too high temperature during developing

Digital technique



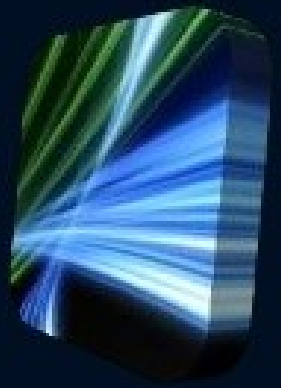


amount of radiation incident on the detector at any spot is coded by gray shade – with 256 different gray shades

Digital technique - advantages

- filmless performance
- frendly inspecting and storage of pictures
- repeated exposure without medium changing

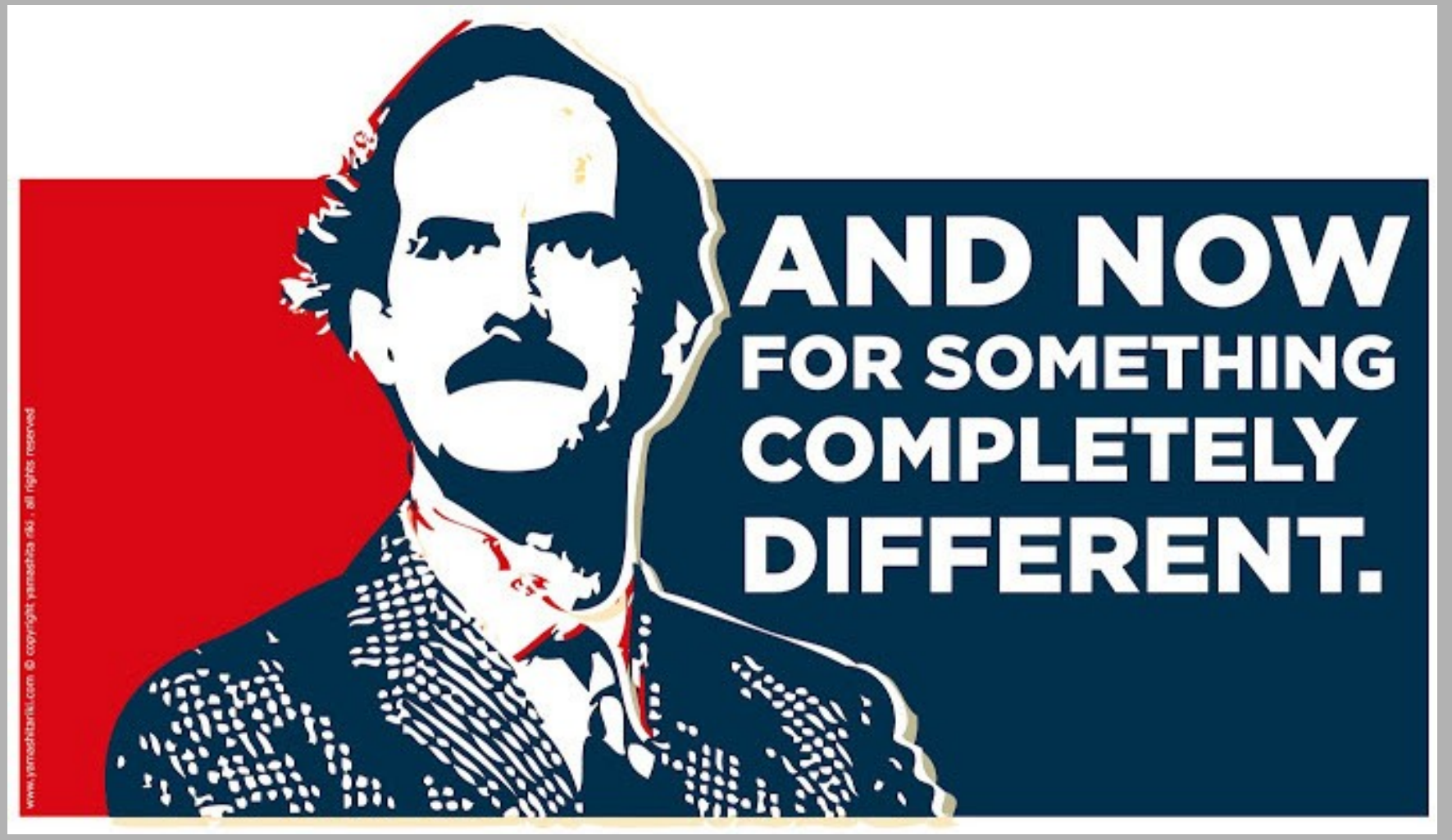
Indirect digital imaging



Exisiting Xray film digitized using CCD camera

Scans the image

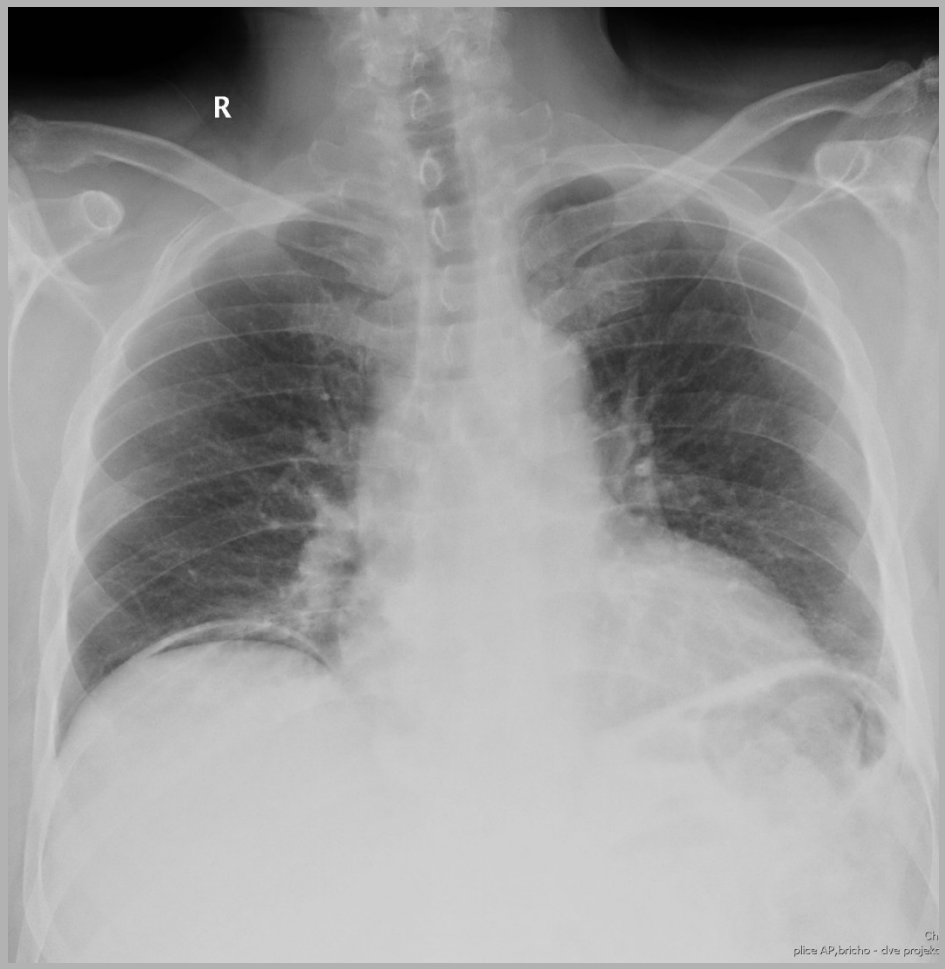
Digitizes displays on computer monitor



Interlude II.

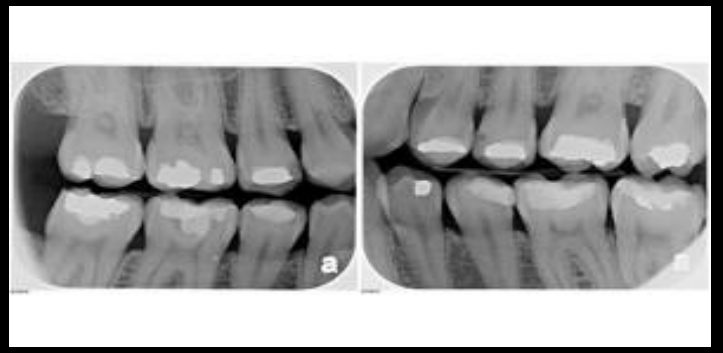
Man with a bottle in his ass

- Young man came to hospital with abdomen pain



INTRA ORAL RADIOGRAPHS

- Bitewing
- Peri apical
- Occlusal



BITEWING

- So called because patient closes the teeth together biting on a wing of card projecting from the tube side of the film
- Demonstrates occlusal surfaces,inter proximal surfaces of enamel,enamel-dentine junction & the bone levels surrounding the tooth
- Used for pre-molars,molars
- indications: dental caries, assessment of fillings & crown,periodontology

PERIAPICAL

- Shows usually 2-4 teeth,individual teeth & tissues around apices

Typical 14 film survey for adults

The central rays is targeted onto the apex; depiction of the alveolar crest is of only secondary importance.

INDICATIONS

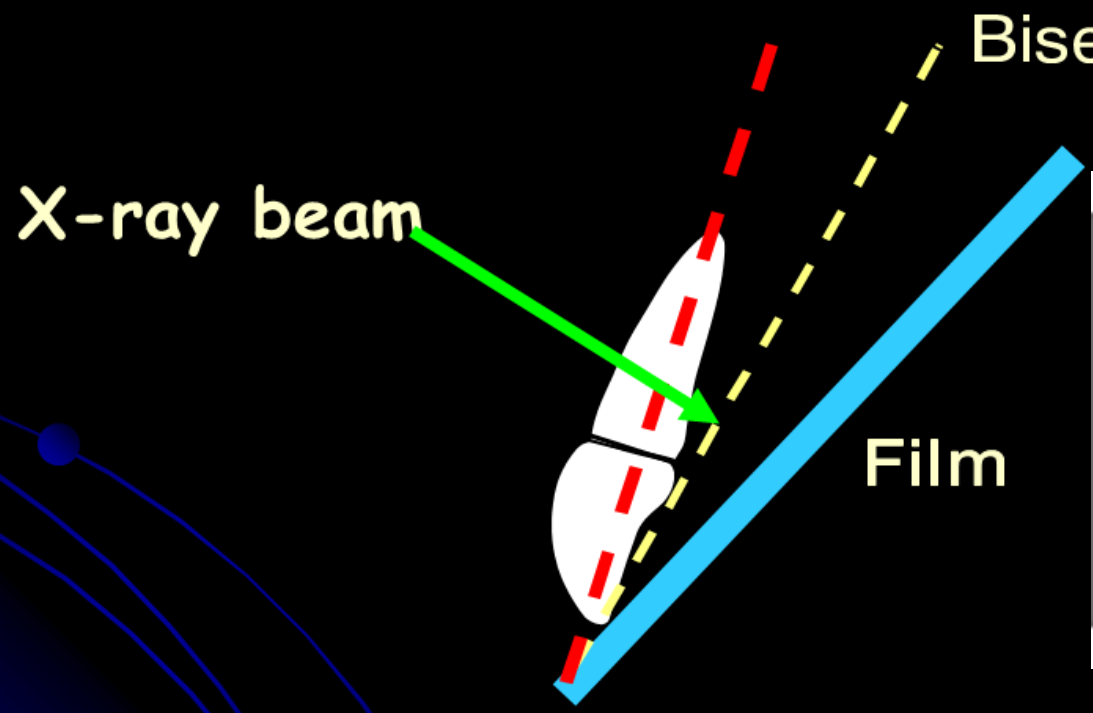
- Detection of **apical infection**
- Assessment of **periodontal** status
- After **trauma to teeth** & **associated alveolar bone**
- Assessment of root morphology **before extraction**
- During **endodontics**
- Detailed evaluation of **apical cyst** & other lesion within the bone
- Evaluation of **implants postoperatively**

Techniques for Periapical radiography

Paralleling technique

Bisecting angel technique.

Bisecting angel technique.

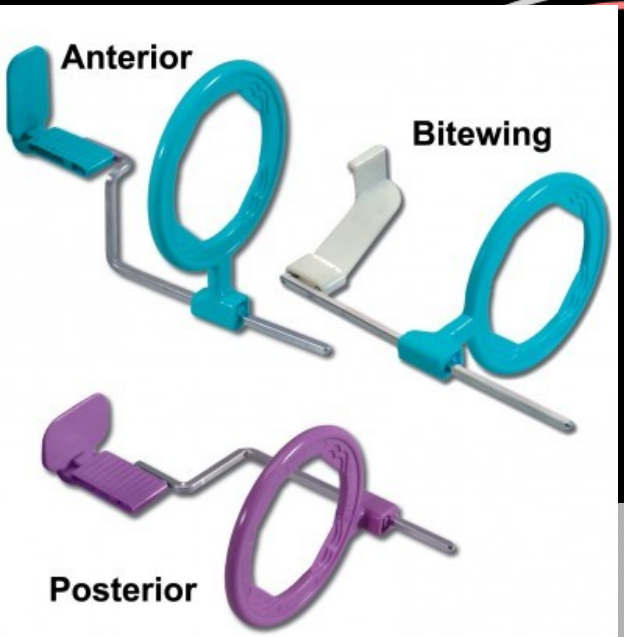


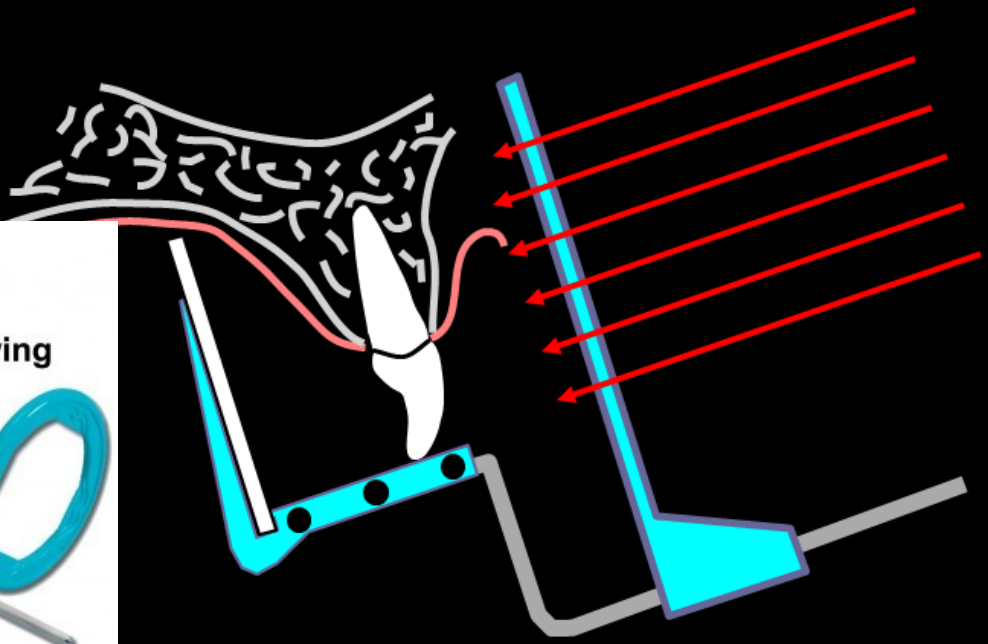
X-ray beam perpendicular to bisecting line

Paralleling technique

Right angle technique

Long cone technique





Advantages of Bisecting Angle Technique

- **More comfortable:** because the film is placed in the mouth at an angle to the long axis of the teeth, the film doesn't impinge on the tissues as much.

- **A film holder,** although available, is not needed. Patients can hold the film in position using a finger.

- **No anatomical restrictions:** the film can be angled to accommodate different anatomical situations using this technique

Disadvantages of Bisecting Angle Technique

- **More distortion:** because the film and teeth are at an angle to each other (not parallel) the images will be distorted.

- **Difficult to position x-ray beam:** because a film holder is often not used it is difficult to visualize where the x-ray beam should be directed.

- **Film less stable:** using finger retention, the film has more chance of moving during placement

OCCLUSAL

- Utilize the largest intra oral film (6 X 8cm)
- Various projections
- Maxillary occlusal projections

-Upper standard

-Upper oblique standard

- Mandibular occlusal projections

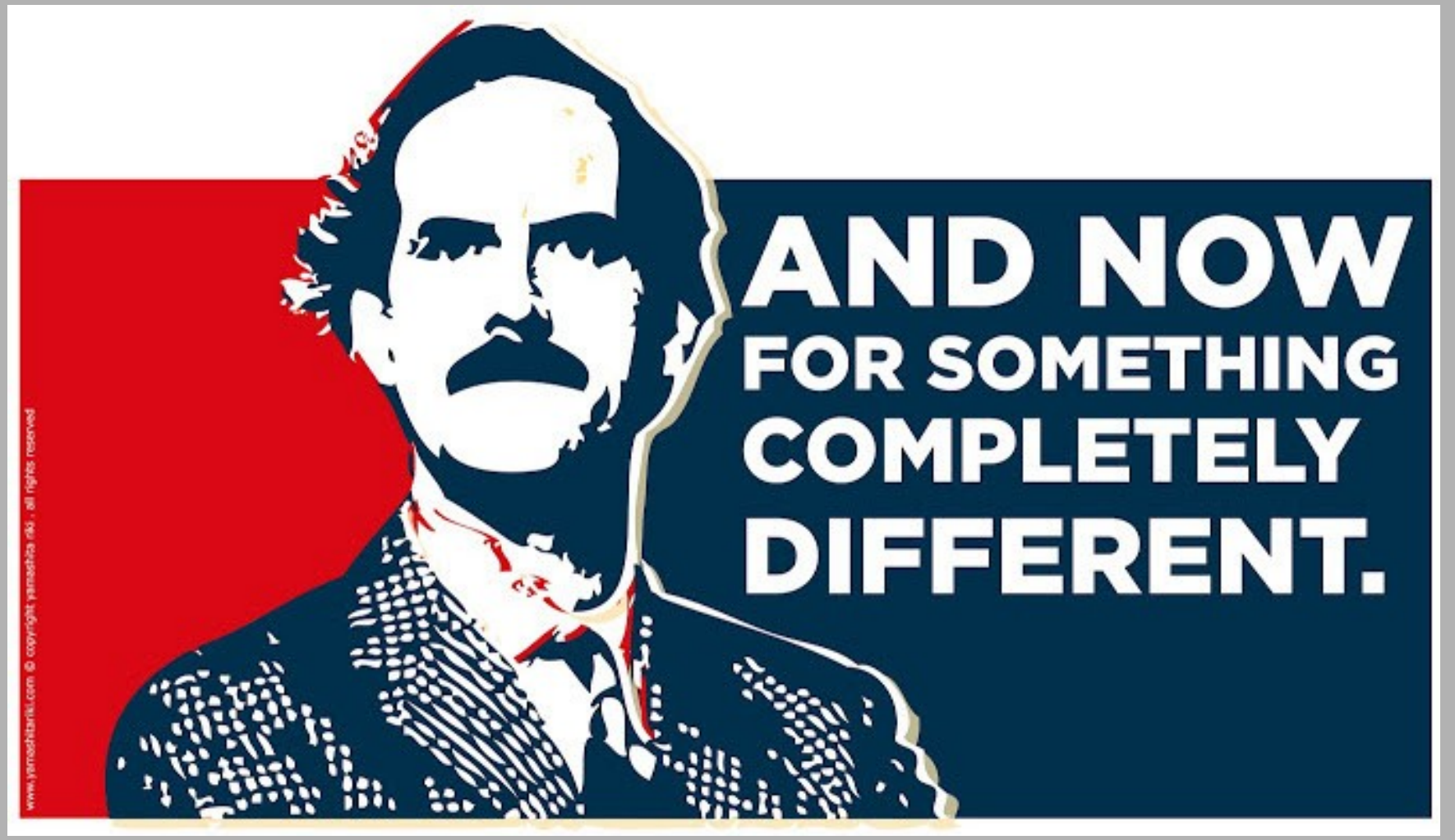
-lower 90 degree occlusal

-lower 45 degree occlusal

-lower oblique occlusal

Indications

- Identify large lesions
- Determine bucco-lingual location
- View developing anterior dentition
- Image patients with trismus (if panorama not available)



Interlude III.

Man with rapier in his nose

- Young man came to hospital with bleeding from noce after fencing with rapiers

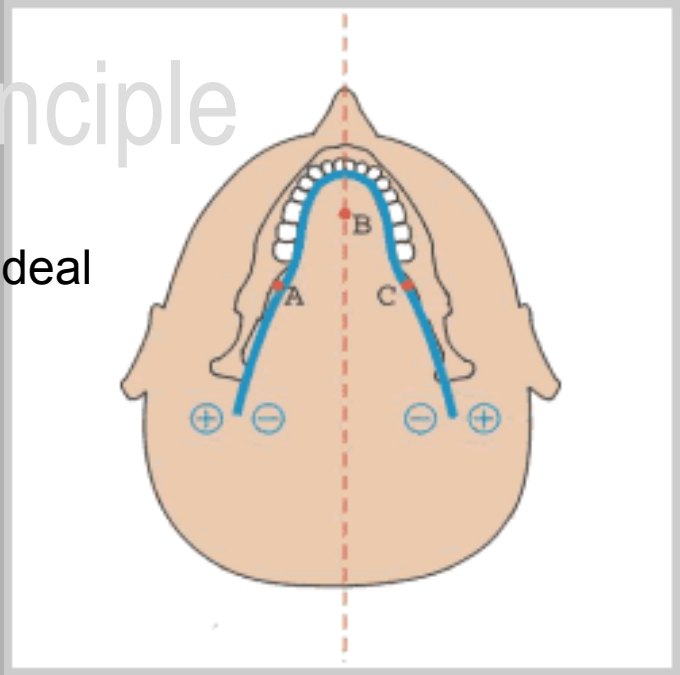
2b) Extraoral imaging

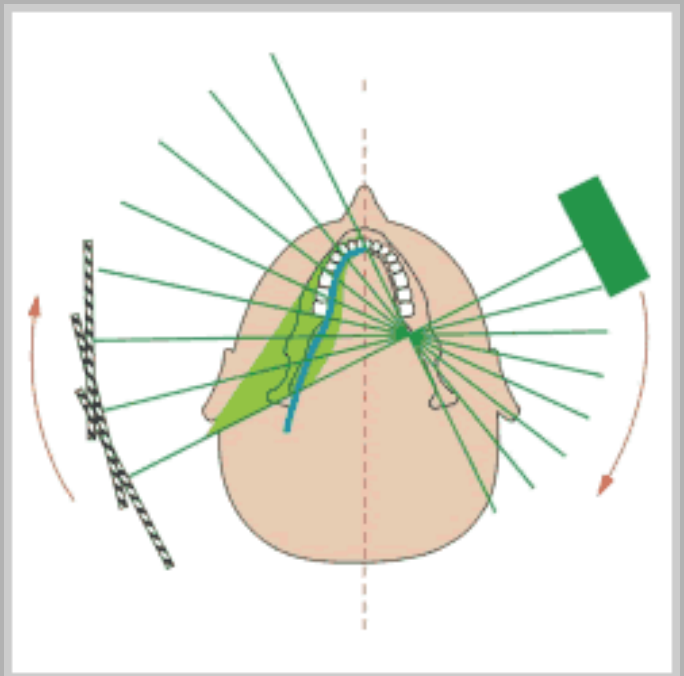
OPG - Orthopantomography

Single image of facial structures that includes maxillary and mandibular arches and their supporting structures.

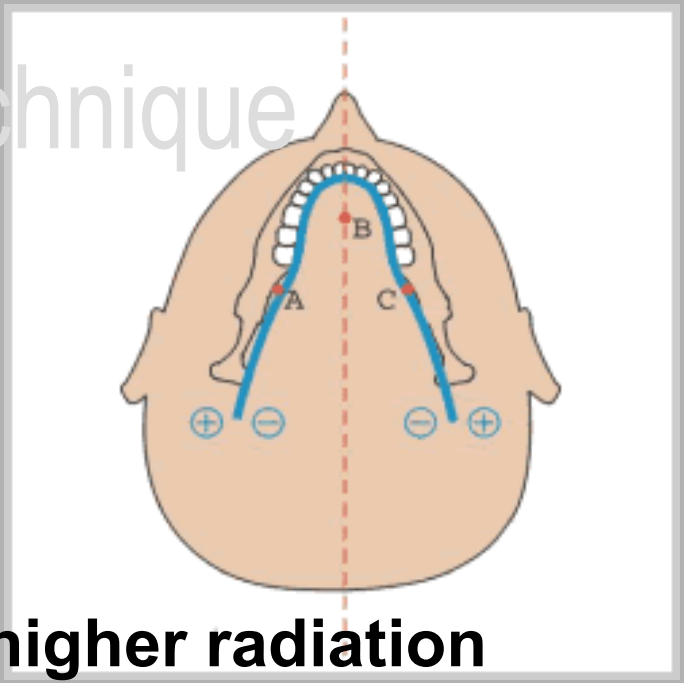
Ortopanthomography - principle

- X-ray tube goes around the head on the track of ideal teeth occlusion - parabola
- There are 3 rotatory centra very next to the teeth occlusion

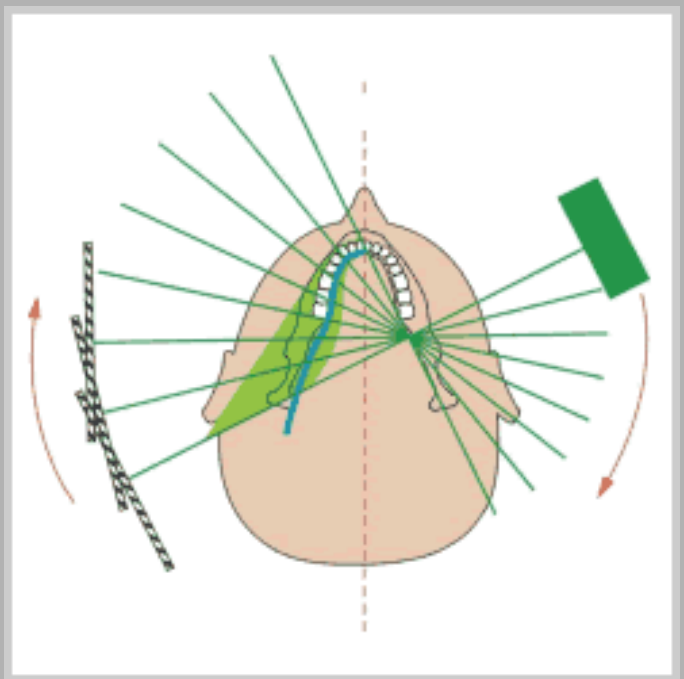




Ortopanthomography - technique



- **leyer thickness**
  - ✓ from 9 mm (frontal part)
  - ✓ till 20 mm (in the area of TMJ)
  - – **thinner leyer = less artefacts, higher radiation dose**
- defocus
- zoom
- possibility of mesuring



Indications

- Evaluation of trauma
- Third molars
- Large lesions
- Tooth development
- Developmental anomalies
- Intolerant to intraoral procedures

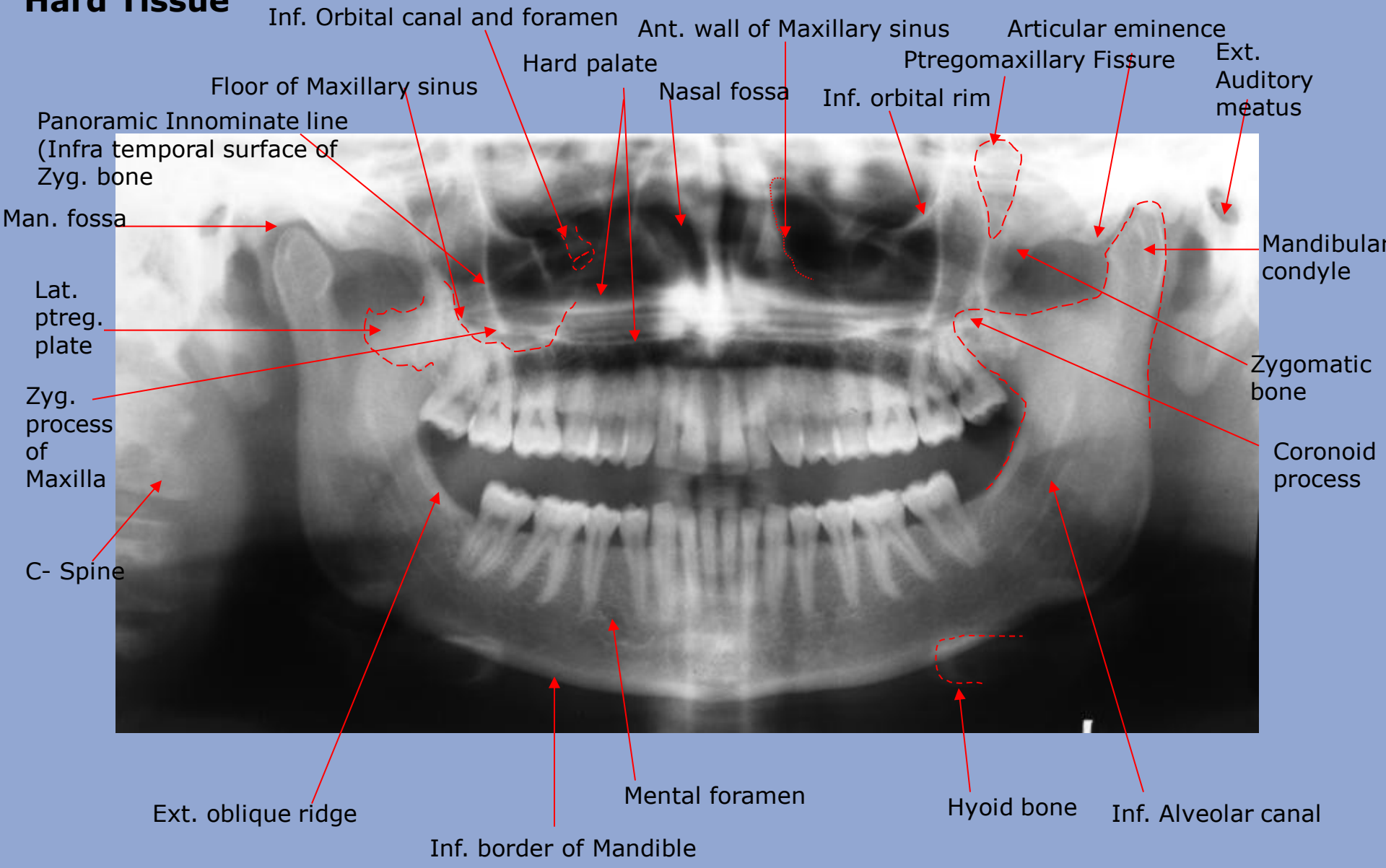
Advantages…

- Broad anatomic coverage
- Low patient radiation dose
- Convenience of examination
- Used in patients unable to open mouth

Disadvantages

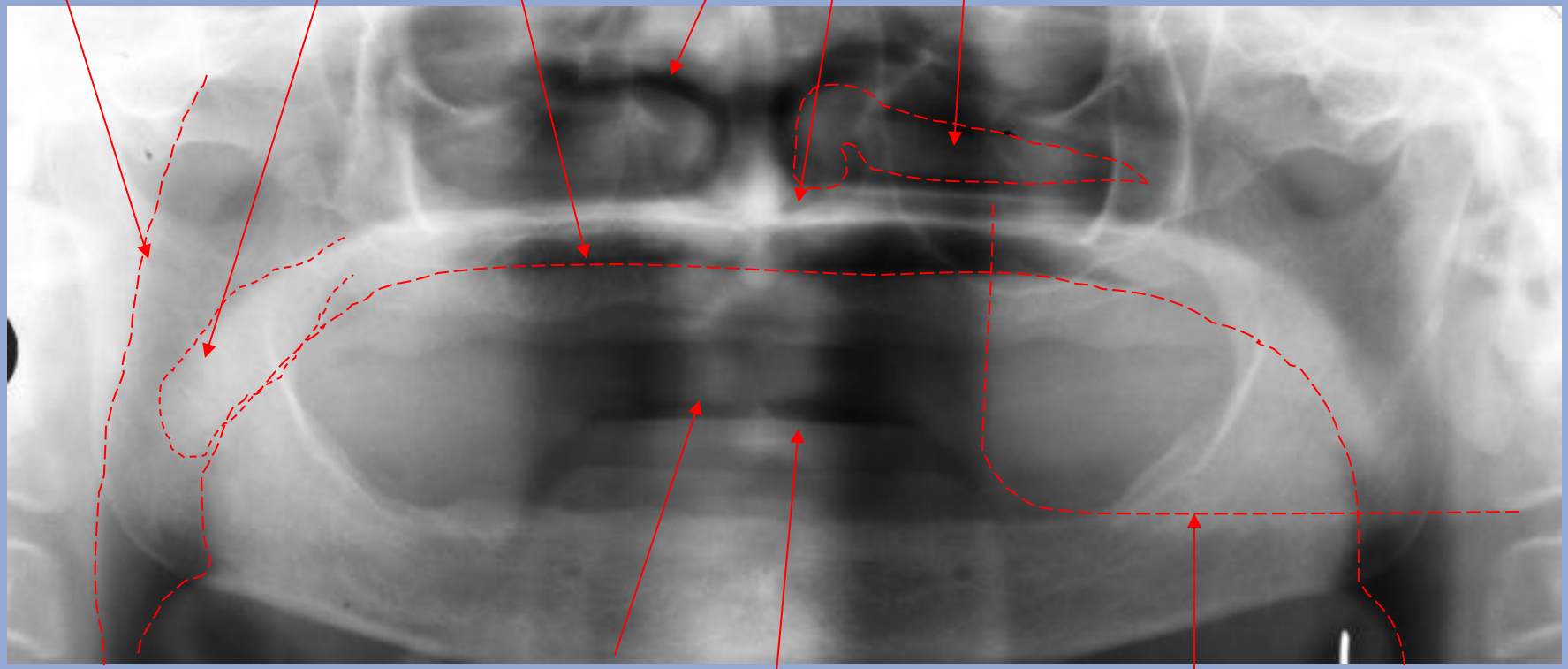
- Does not show fine anatomic details
- Magnification
- Distortion
- Overlapped image of teeth
- Expensive

Hard Tissue

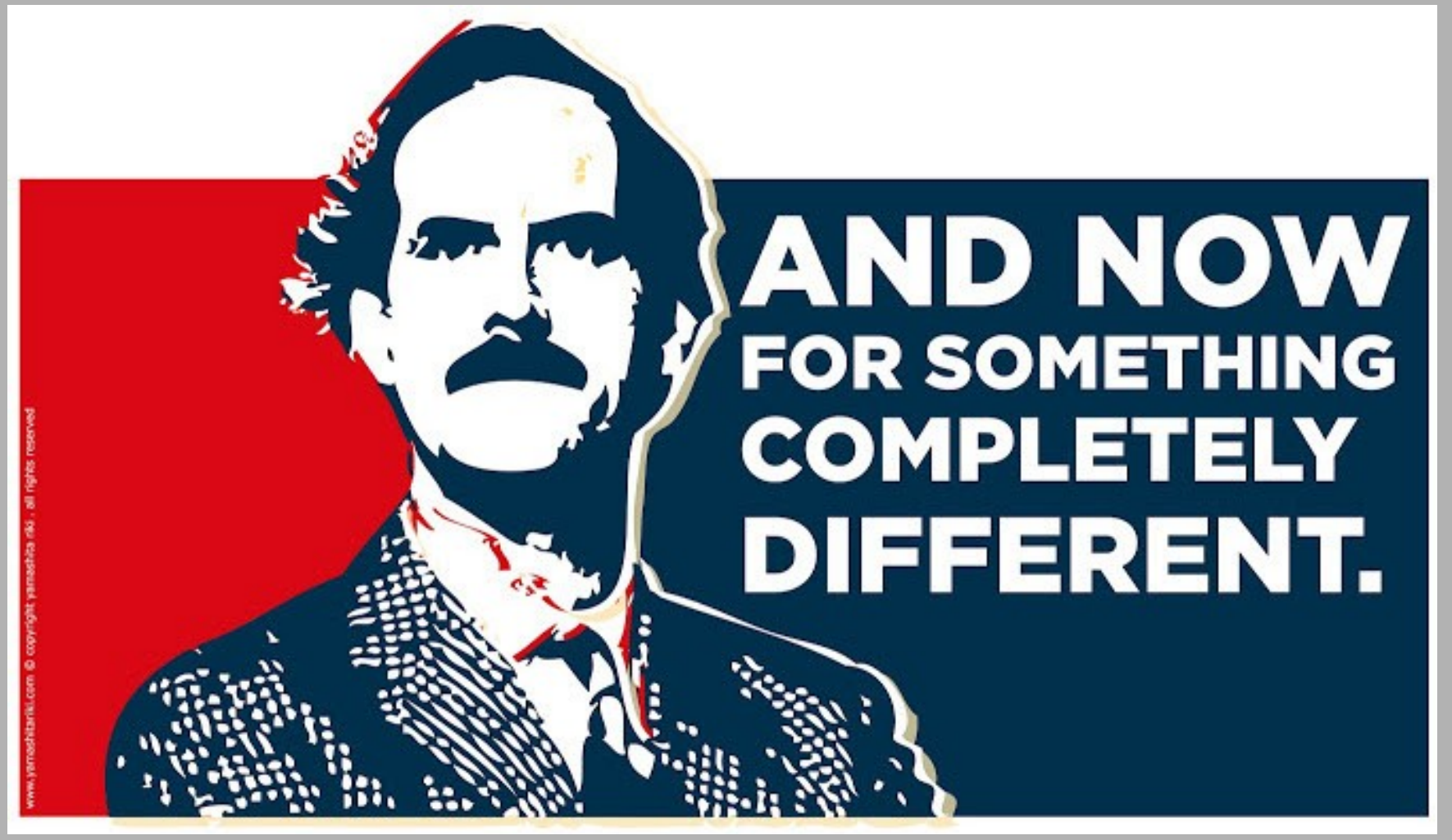


All this diagnostic information is missed in intraoral X-rays

Soft tissue (edentulous)



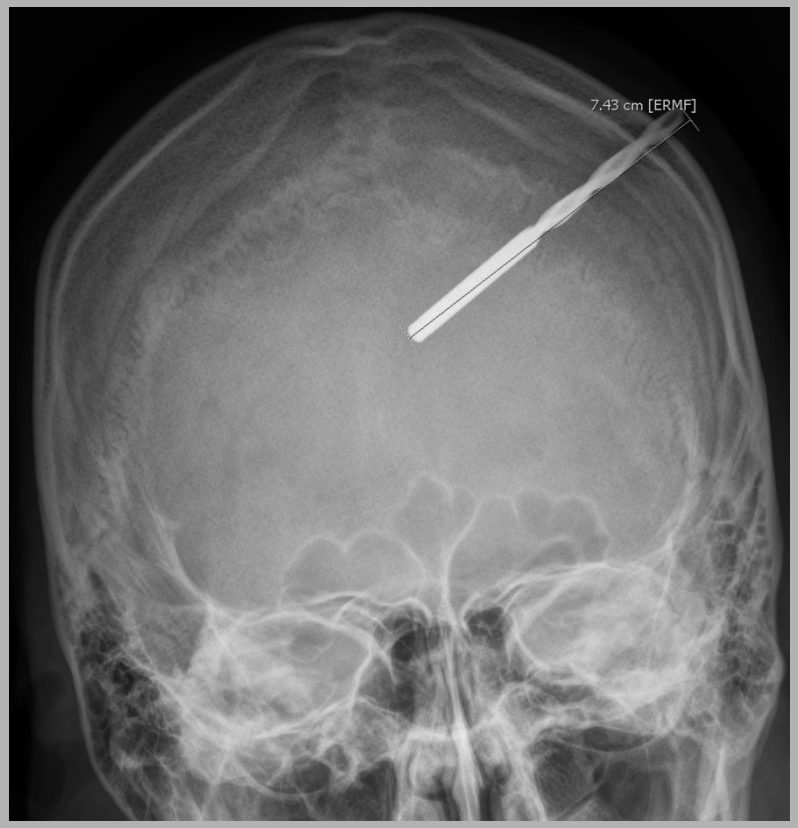
All this diagnostic information is missed in intraoral X-rays

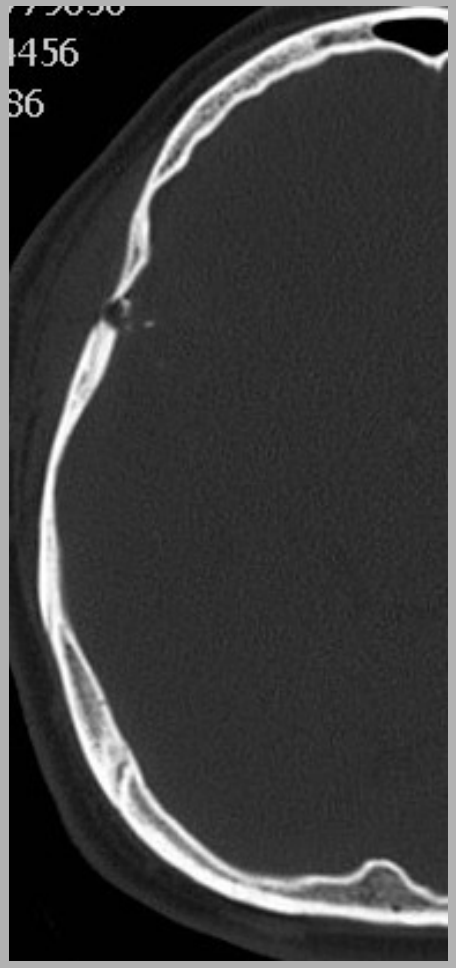


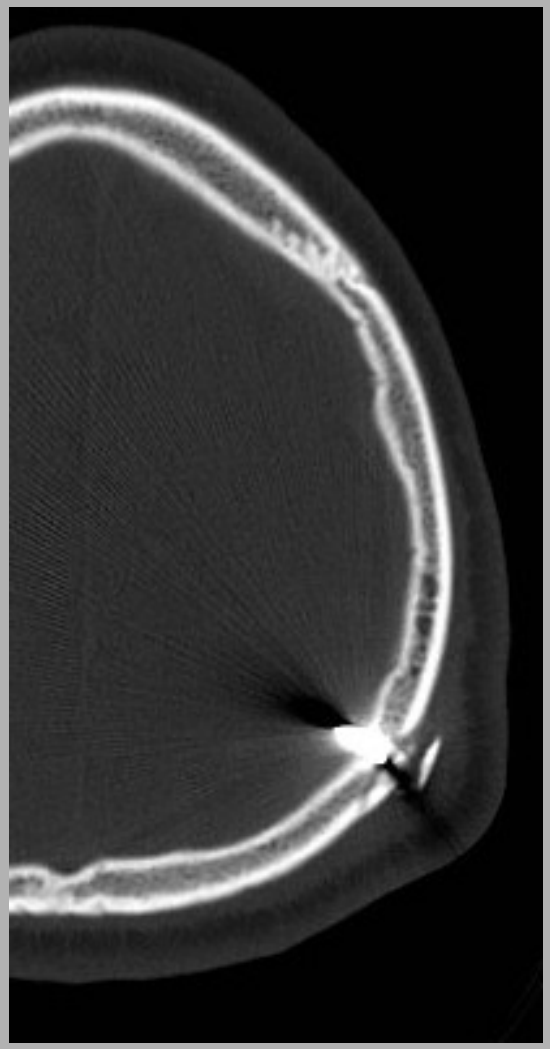
Interlude IV.

Man with screw in his skull

- Young man came to hospital with headache after falling from stairs.







Other imaging modalities:

Computed tomography (CT)

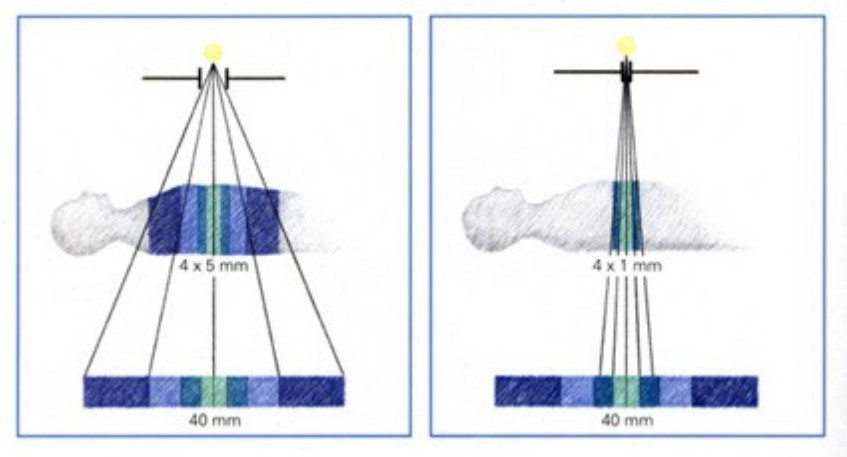
a) Classic CT
b) Dental Cone Beam CT

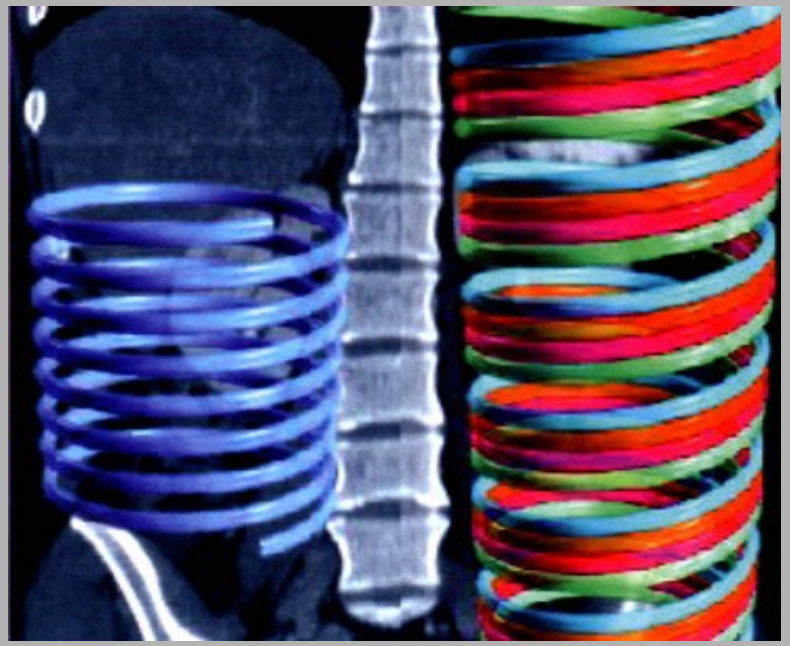
Classic CT

- CT images are acquired while the x-ray tube i rotating 360dg. around the patient
- The x-ray beam is collimated in axial orientation and divergent to encompass the patient‘s width in the other orientation.
- The intensity of attenuated x-rays emerging from the patient is measured with an array of minute detectors

Multislice CT

- Several rows of detectors each above another
- MS- detector array segmented in z axis, as a mosaic.
- –Allows for simultaneous acquisition of multiple images in scan plane with ONE rotation.



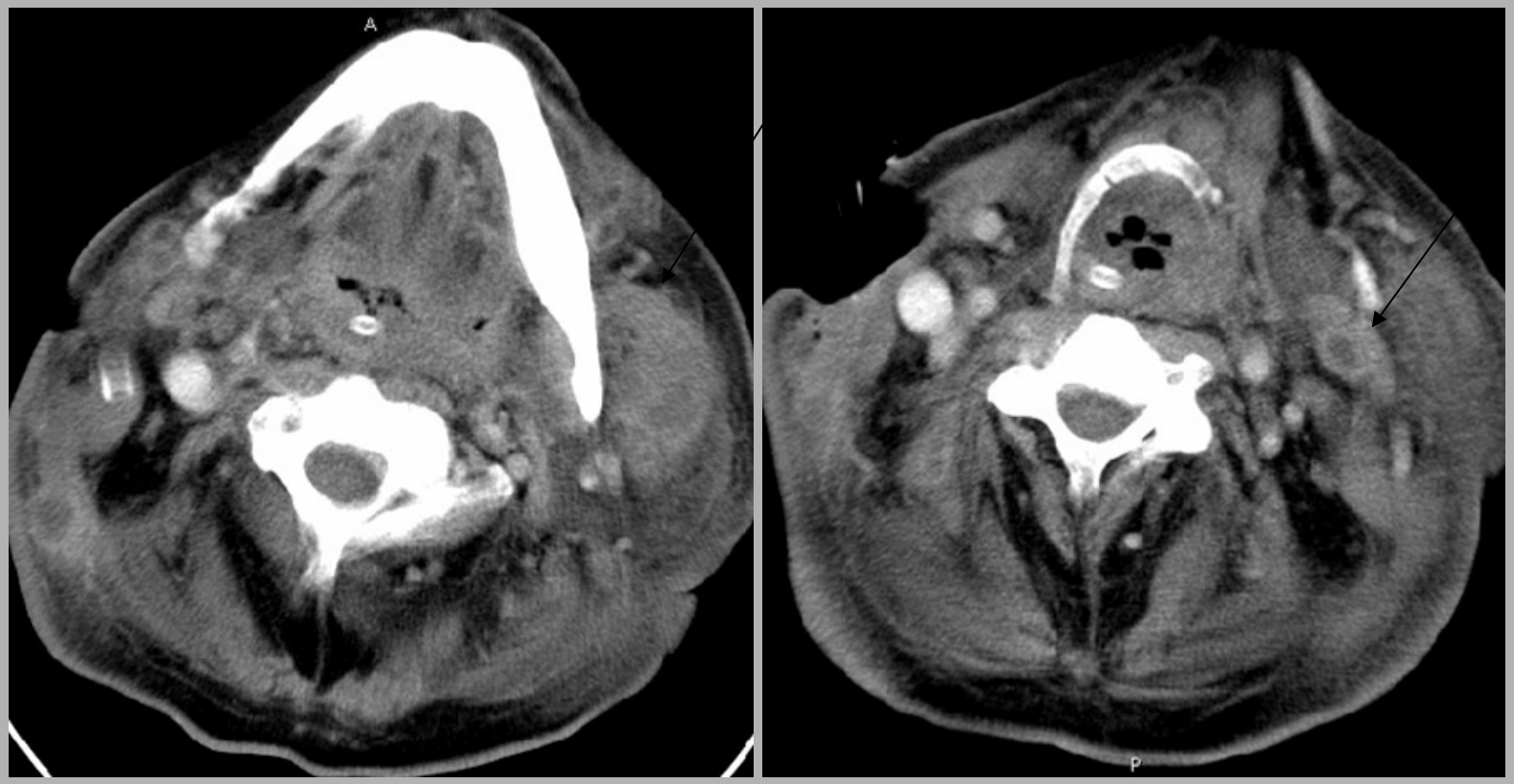


Classic CT indication

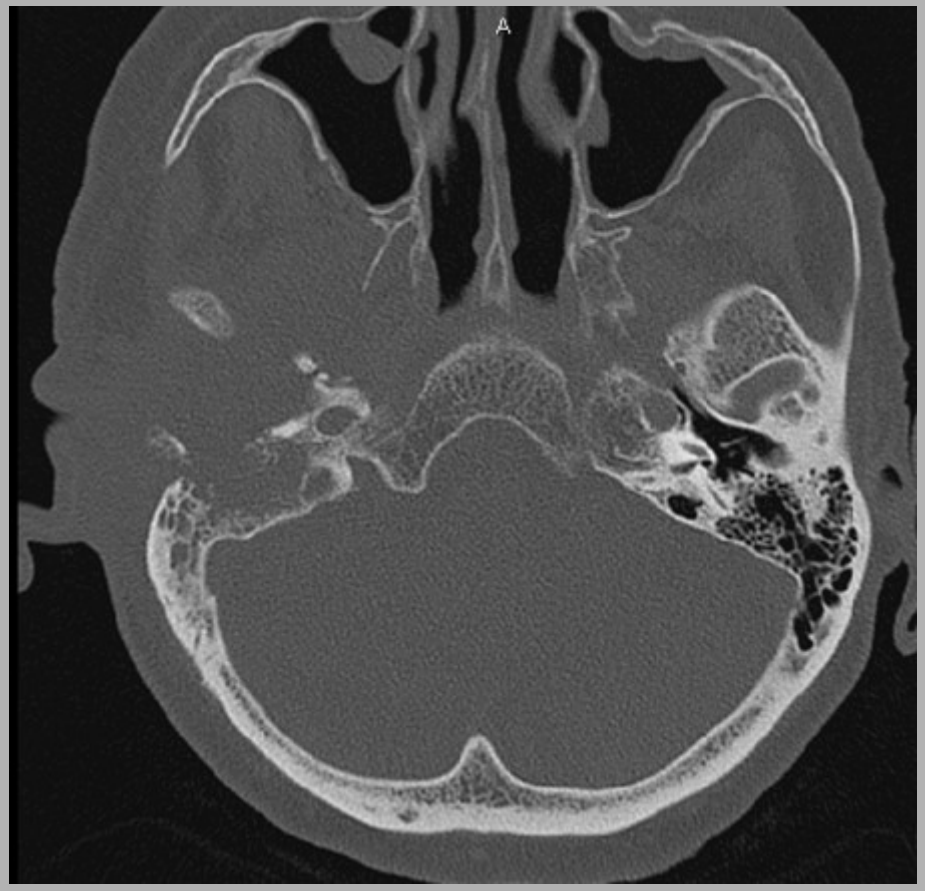
- Examination of facial soft tissue
- parotid gland disease
- diagnosing and staging tumors
- diagnosis and assess the extent of osteomyelitis (inflammation of the jaw bone)
- temporomandibular joint disorders
- impacted teeth
- complex traumatic injuries of facial skelet

Complex fractures of facial skelet

Absces

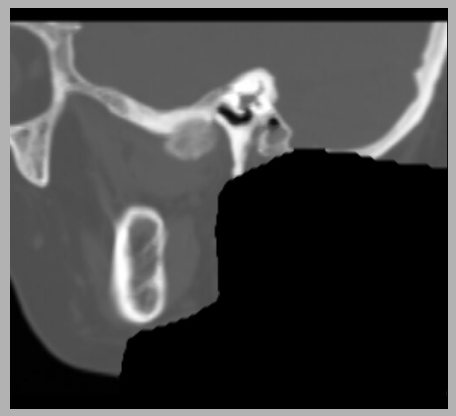


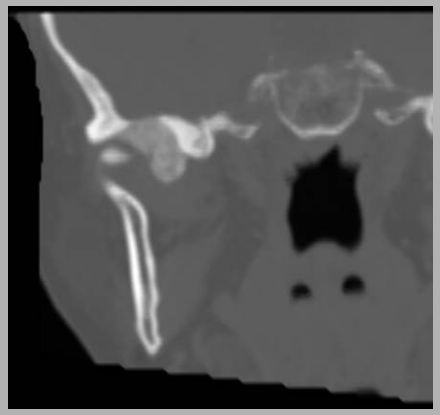
The extensive osteolysis of the temporal bone

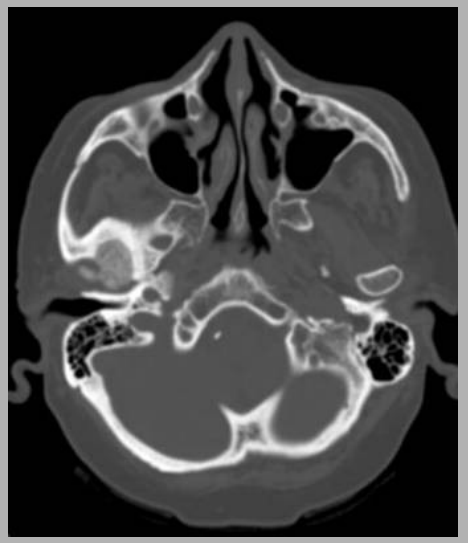


Postprocessing - reconstructions

Multiplanar rec. - MPR

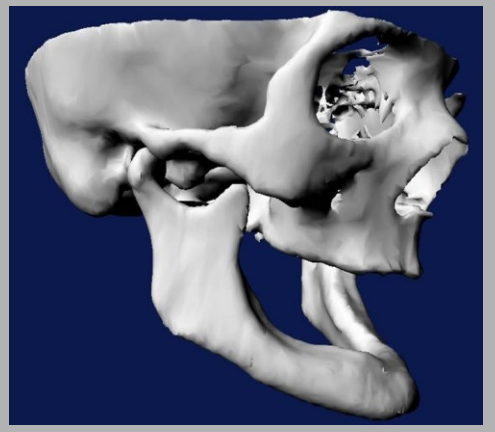






Volume rendering technique - VRT

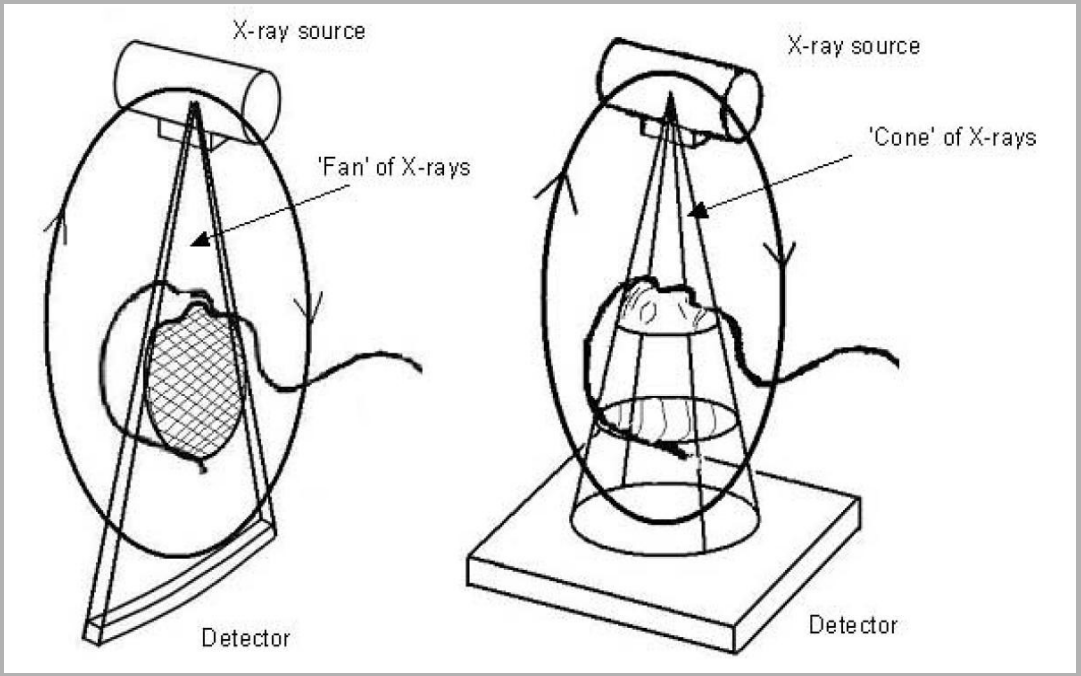
Shadow surface display - SSD



Dental Cone Beam CT

How CBCT Works

- Similar to current CT technology
- Uses cone shaped x-ray beam
- 2-D flat panel detector
- Gives volumetric data



Advantages in Dental Imaging

- Lower dose than helical CT
- Compact design
- Superior images to Panoramic
- Low cost
- Low heat load

Dose:

Panoramic: 6-20 µSv

CBCT: 20-70 µSv

Conventional CT: 314 µSv

CBCT

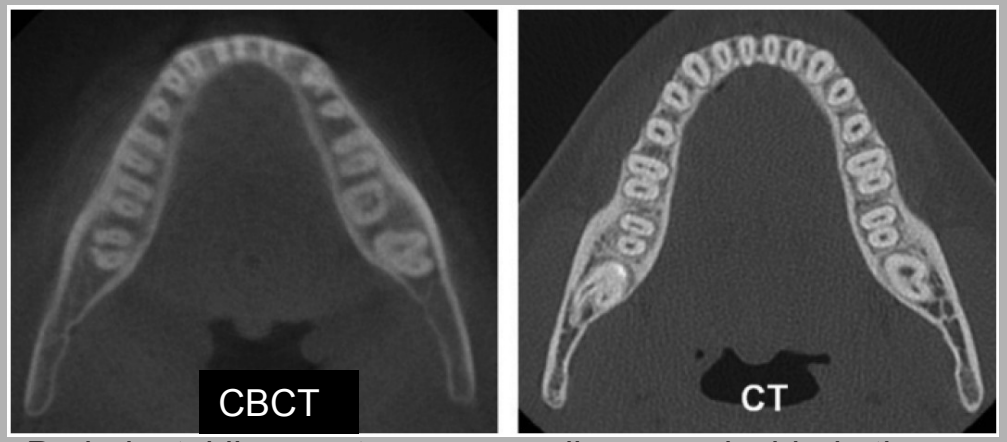
The i-Cat CBCT

Cephalometric CBCT image

Cephalometric Panoramic image

Shortcomings

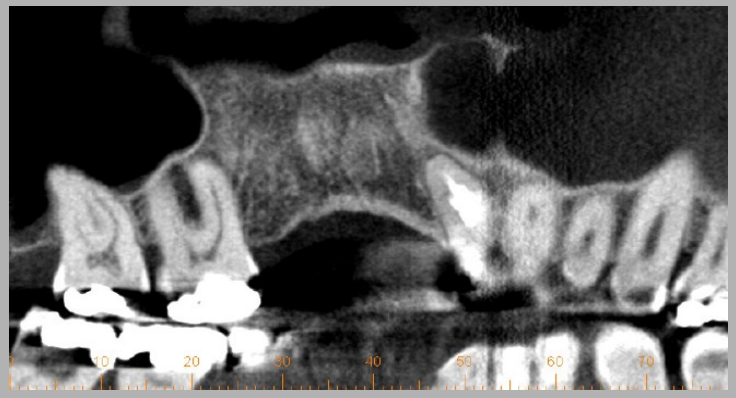
- Worse resolution in low contrast tissues
- Long scan times = motion artifacts
- Slightly Inferior quality to conventional CT

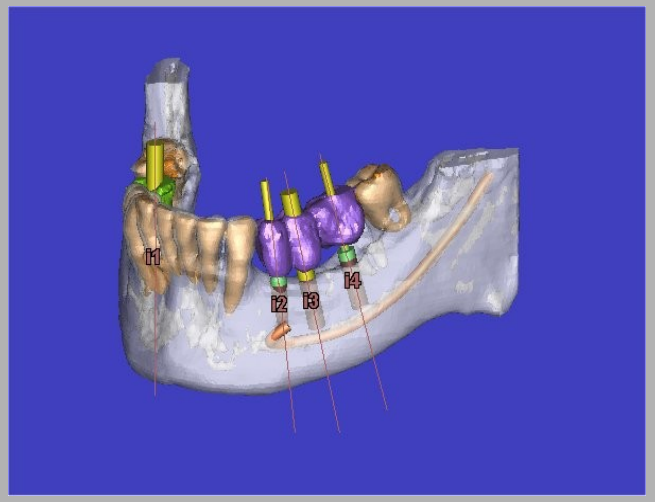


Periodontal ligament spaces easily recognizable in the dental CT but not satisfactory in the CBCT

Applications of CBCT

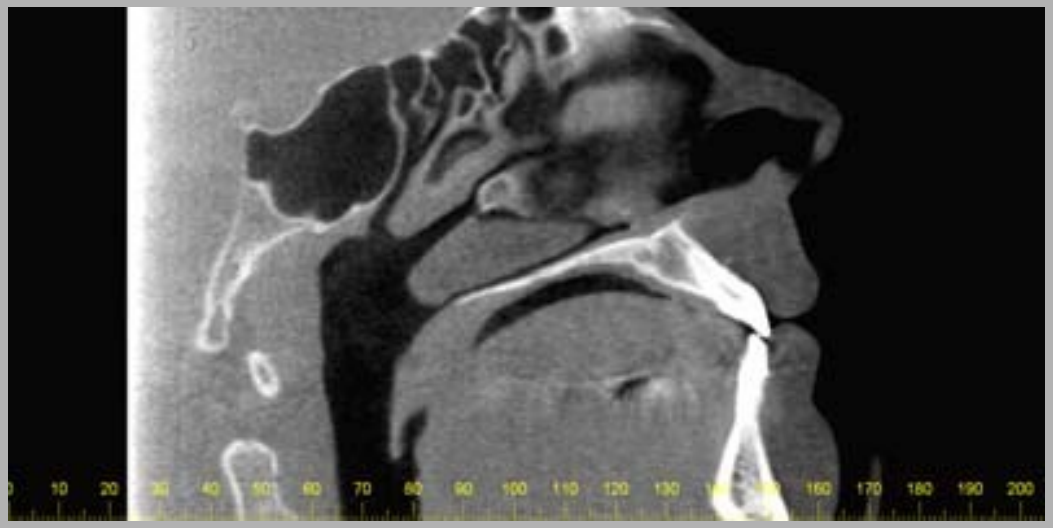
- Great for pre-planning for implant surgery
- Virtual Surgery
- Conventional CT diagnosis at 1/5 the dose
- Tumor detection
- Airway visualization





Conclusions

- CBCT offers less dose than conventional CT
- CBCT offers superior images and diagnosis to panoramic
- More practical than a conventional CT



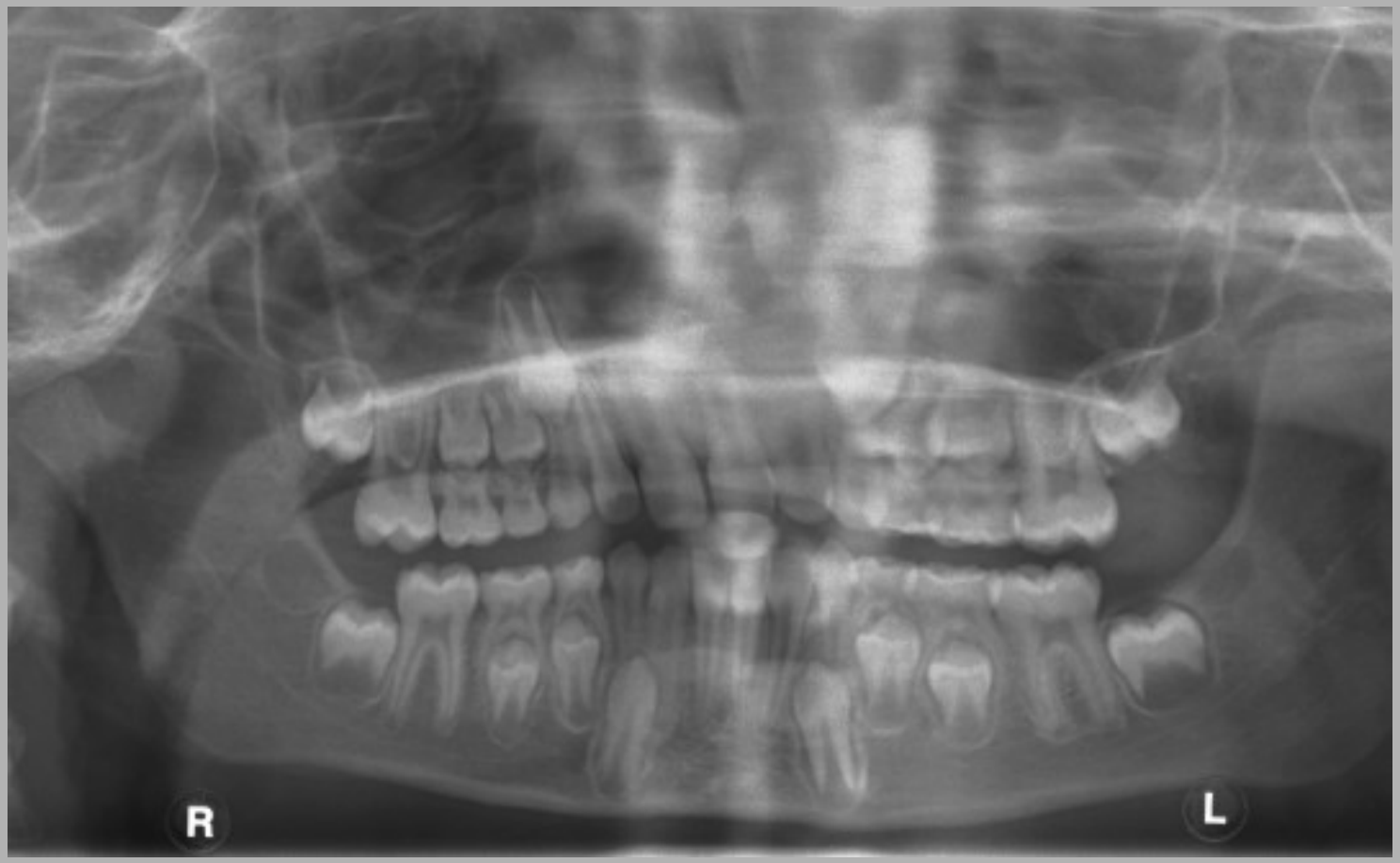
Other imaging modalities:

Contrast studies

SIALOGRAPHY

Pathology - dif.dg.

Retentio dentes



Tartar

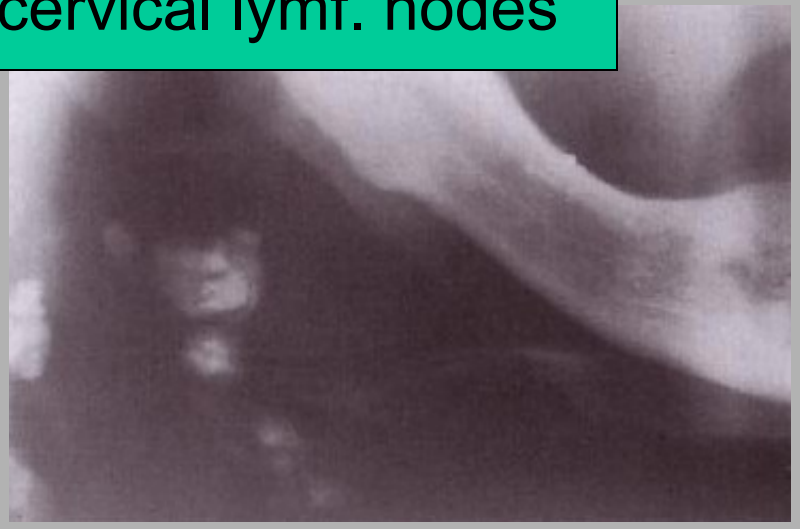
tartar is composed of mineralized tooth plaque + generalized bone reduction as a consequence of parodont pathology

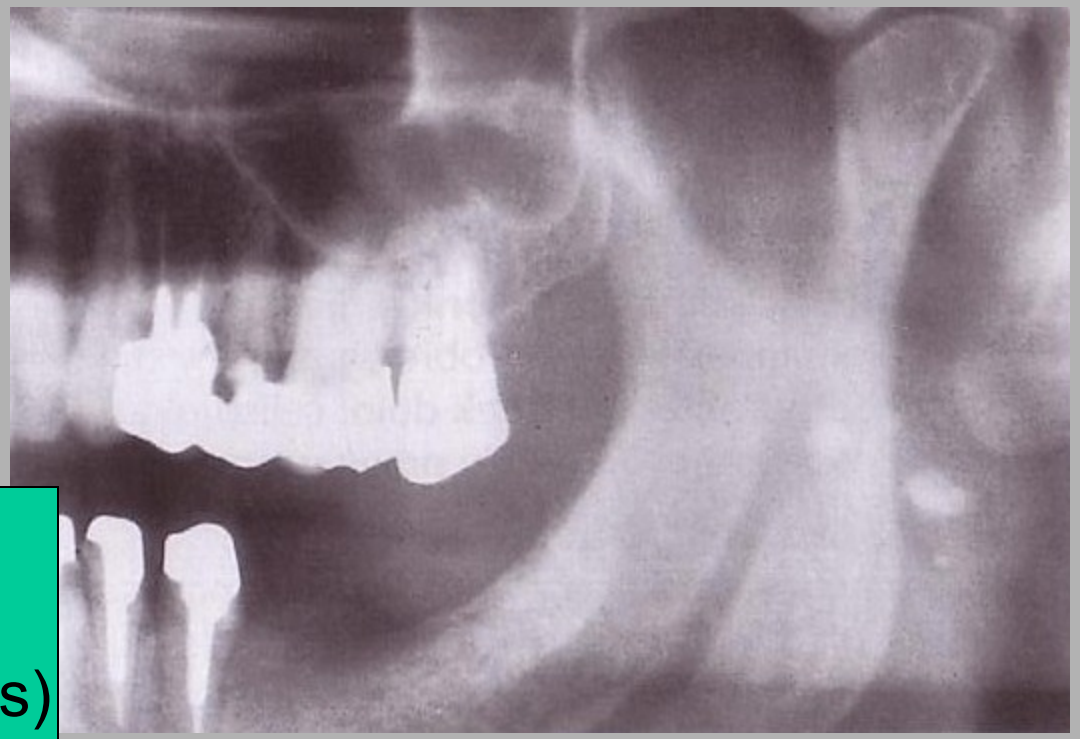
- origins in area of outfall of main salivary glands
- calcium phosphate
  - x-ray opacity

parodontitis marg. profunda
sublingual tartar

Concrements

calcified cervical lymf. nodes

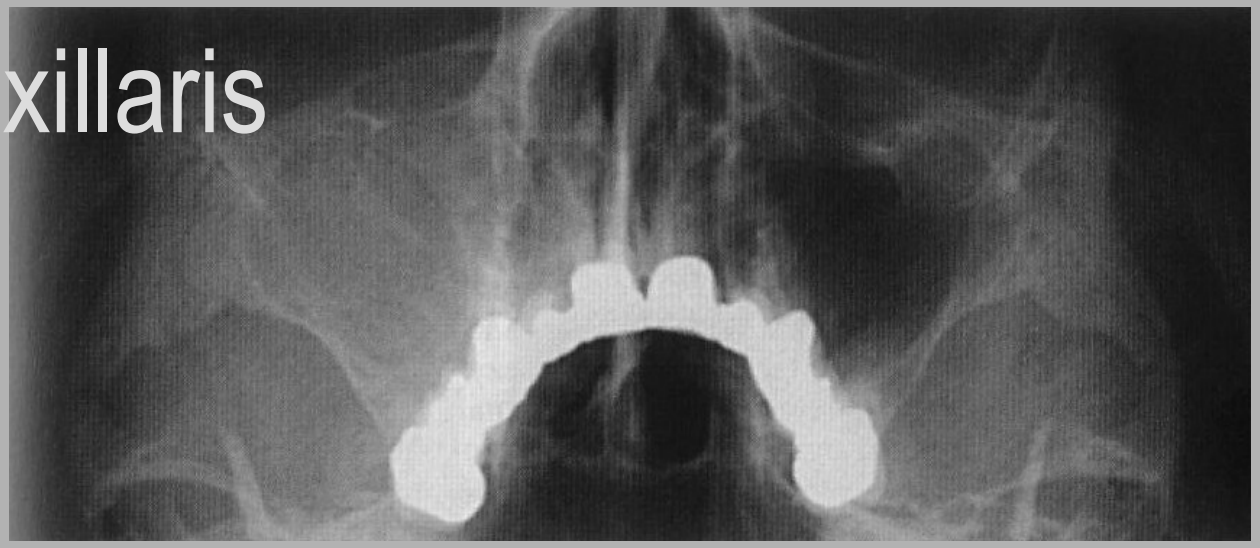


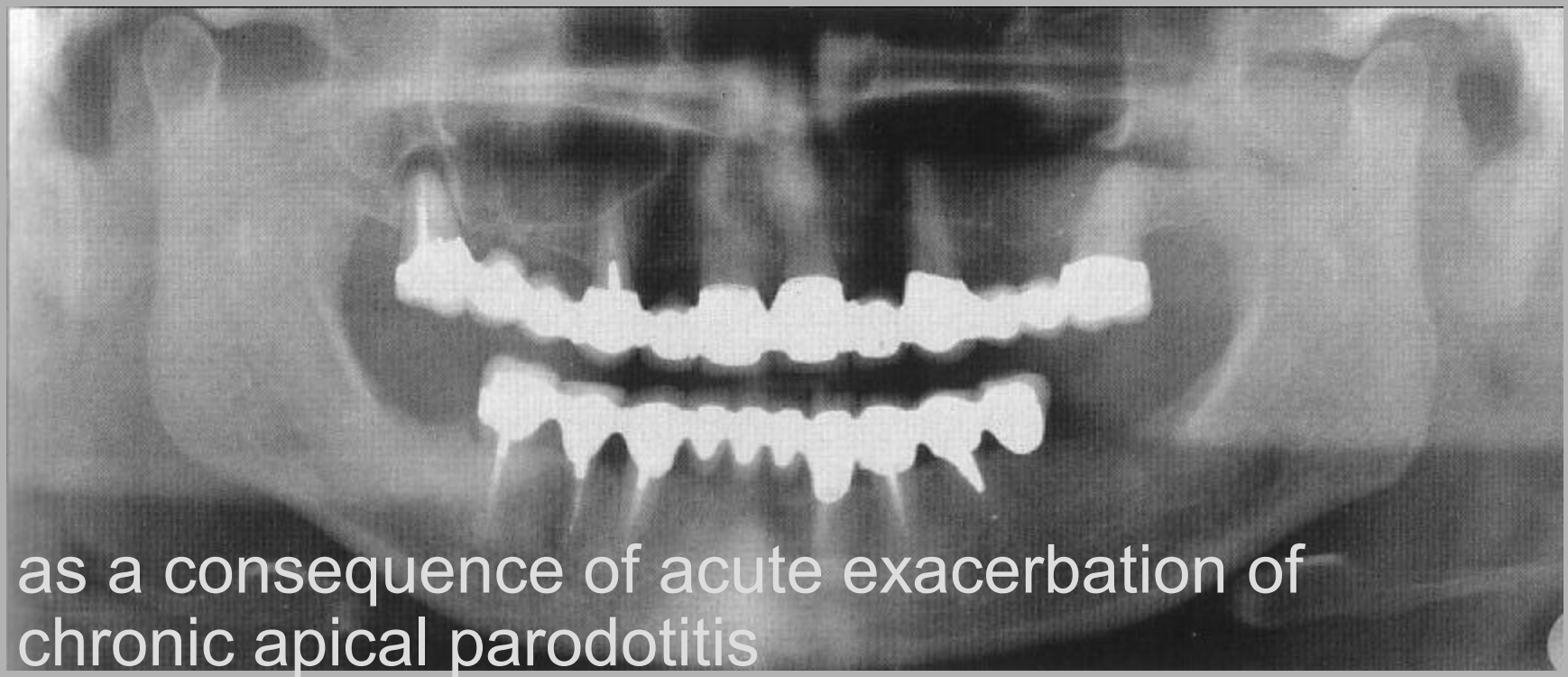


calcification of gl. parotis
as a consequence of
parotitits epidemica (mumps)

Sinusitis maxillaris

w, 57 y

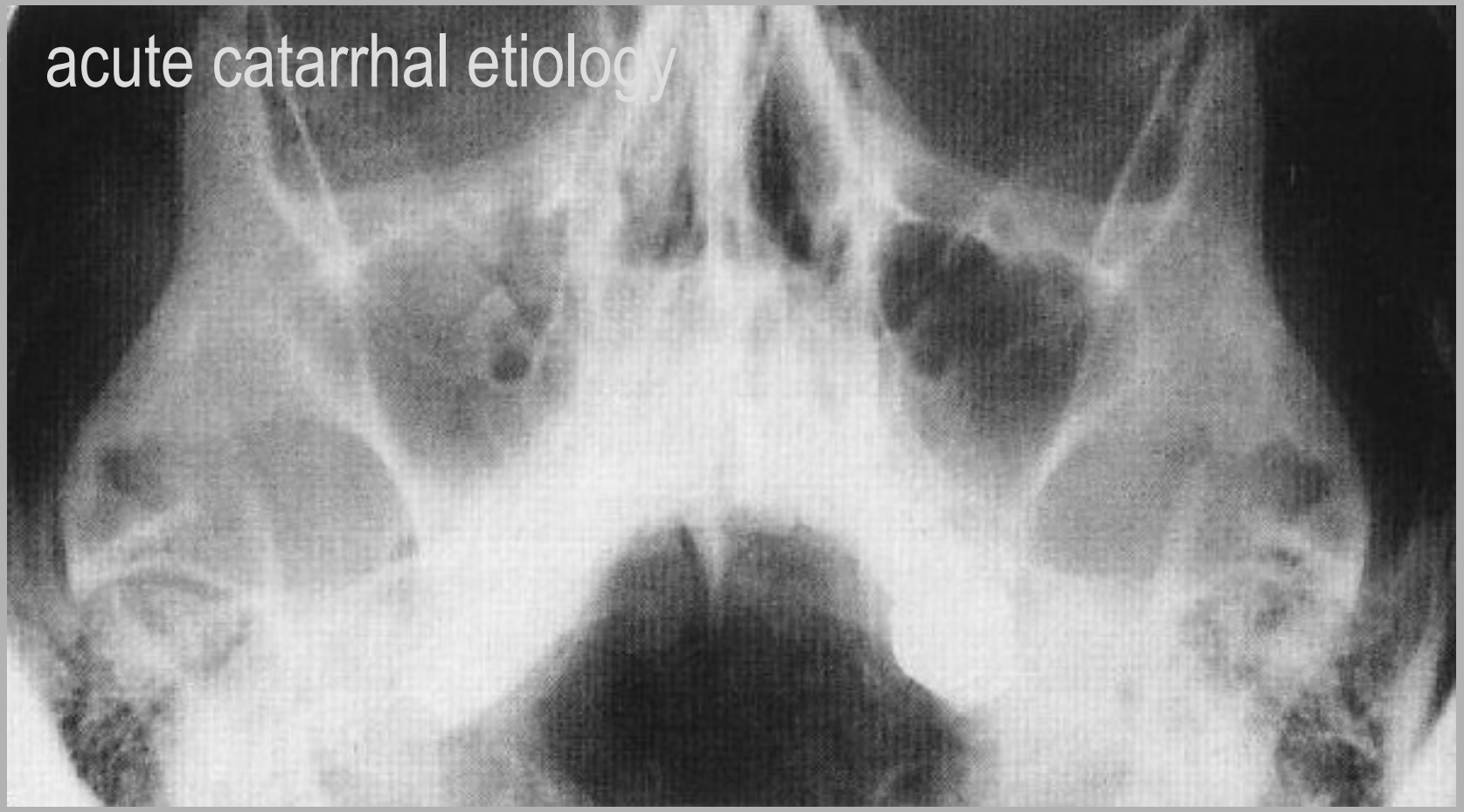




- as a consequence of acute exacerbation of chronic apical parodotitis

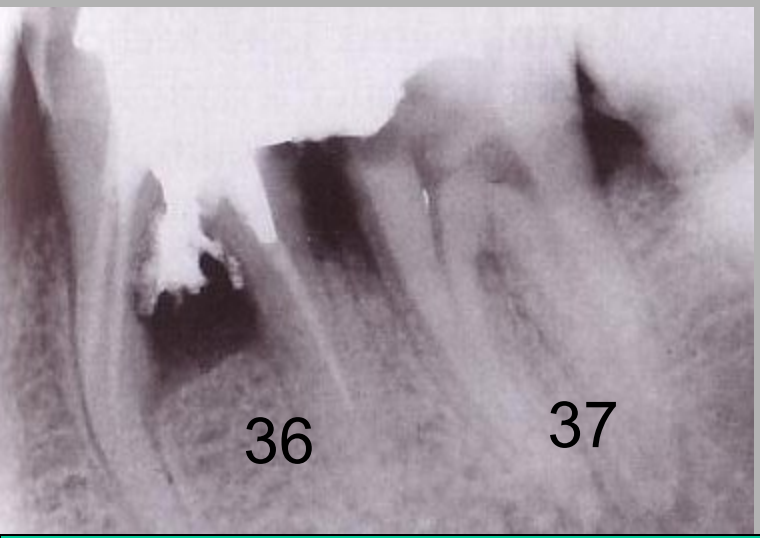
Sinusitis maxillaris

- w, 17 y
- acute catarrhal etiology



Marginal periodontopathy

bone reducion between 35,37
as a consequence of amalgam overhang
caries 34,37,38



mezial posttraumatic
central granuloma

oversupply of root filling
injury to the desmodont and mesodont of tooth root
etiology: via falsa
= interradicullar bone loss

chronic. apical periodontis

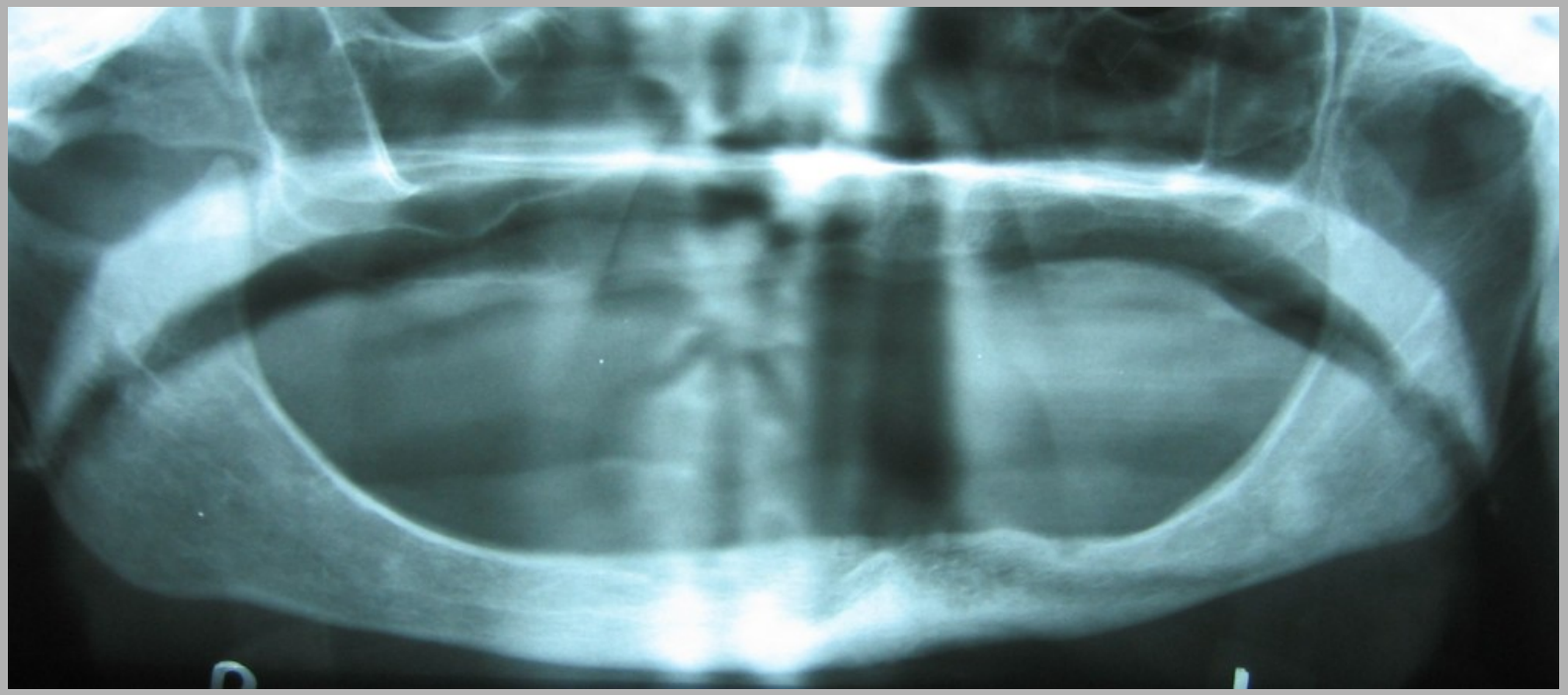
periodontitis chronica

Marginal periodontopathy

traumatic occlusion
etiology: fixed bridgework
massive bone reduction
sclerotic reactive zone - apically (36,37)

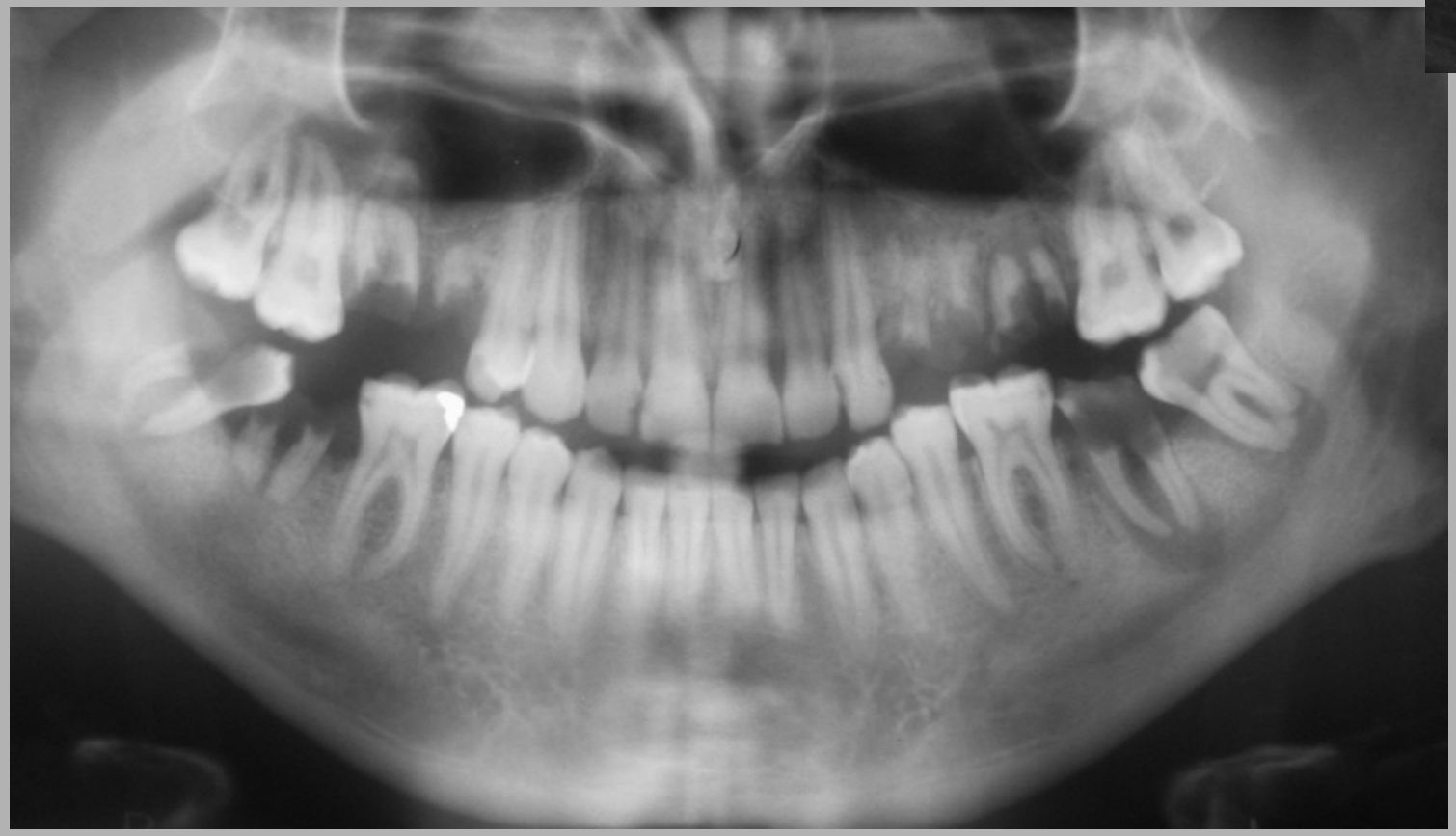
Marginal periodontopathy

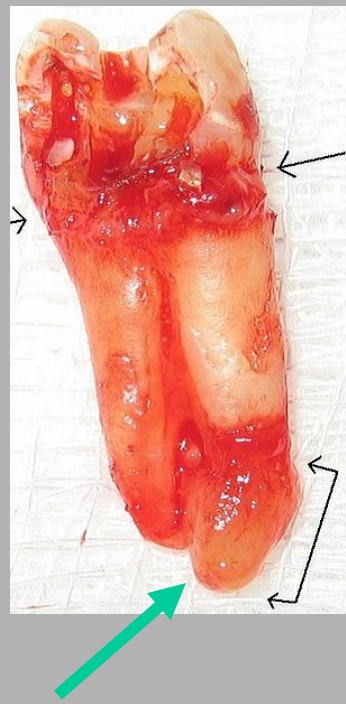
alveolar and mandible bone reduction
old age



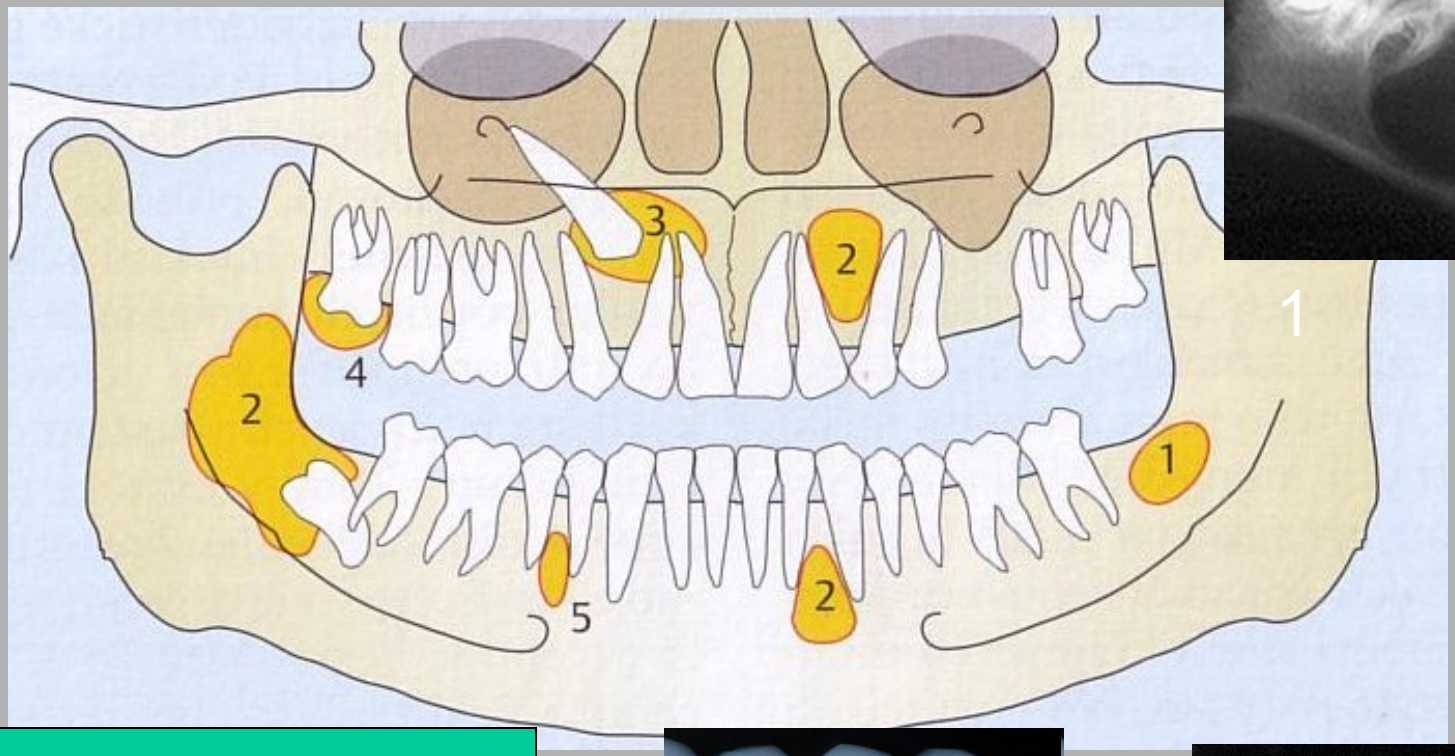
Periapical abscess

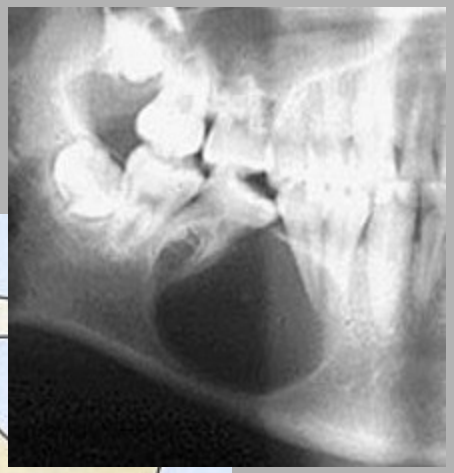
A **periapical abscess** is the result of a chronic, localized infection located at the tip, or apex, of the root of a tooth.





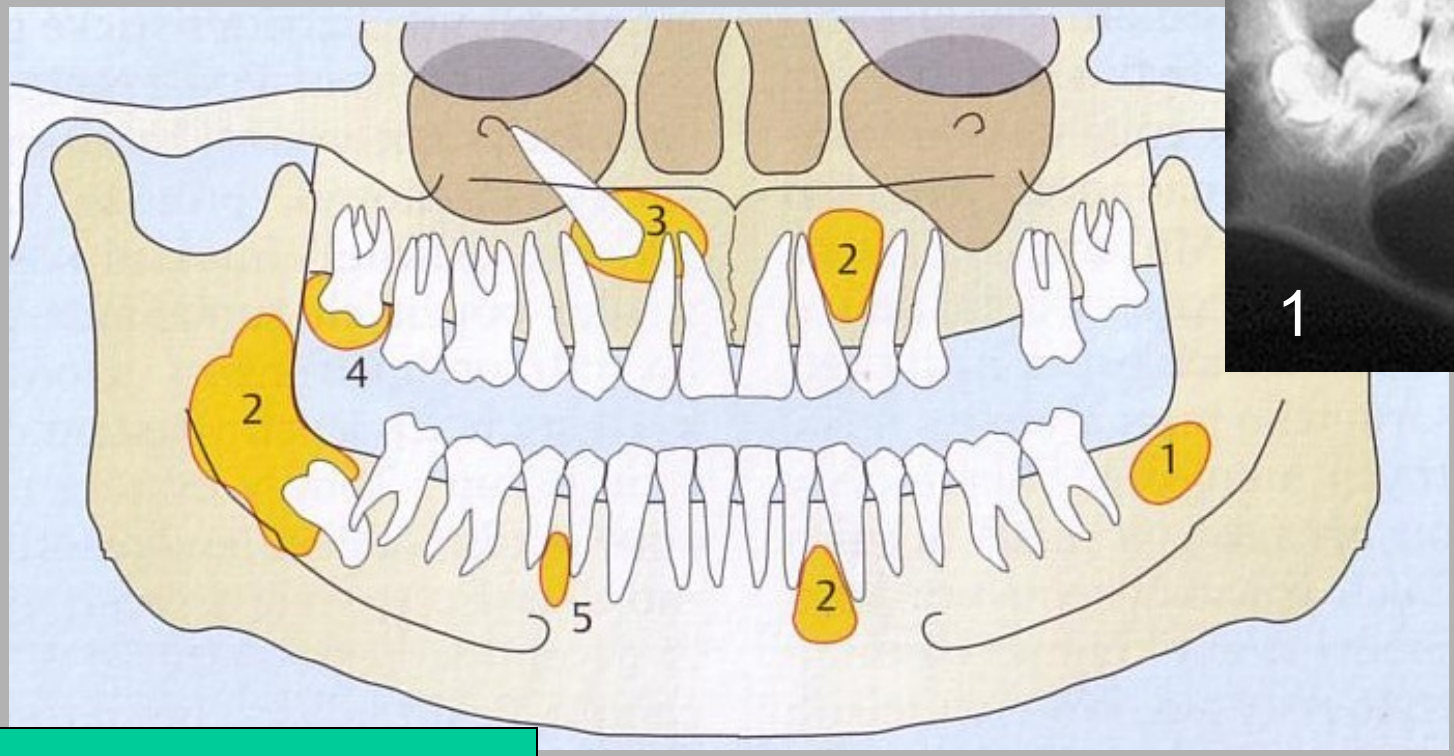
Cysts – odontogenic

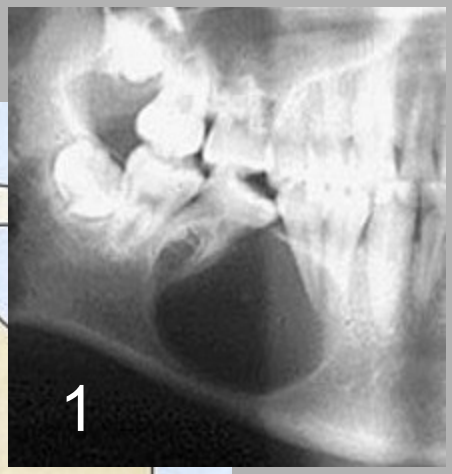




1. primordial c.
2. keratocyst
3. folikular c.
4. lateral parodontal c.

Cysts – odontogenic

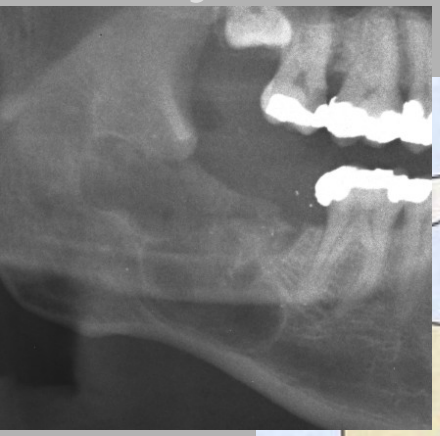


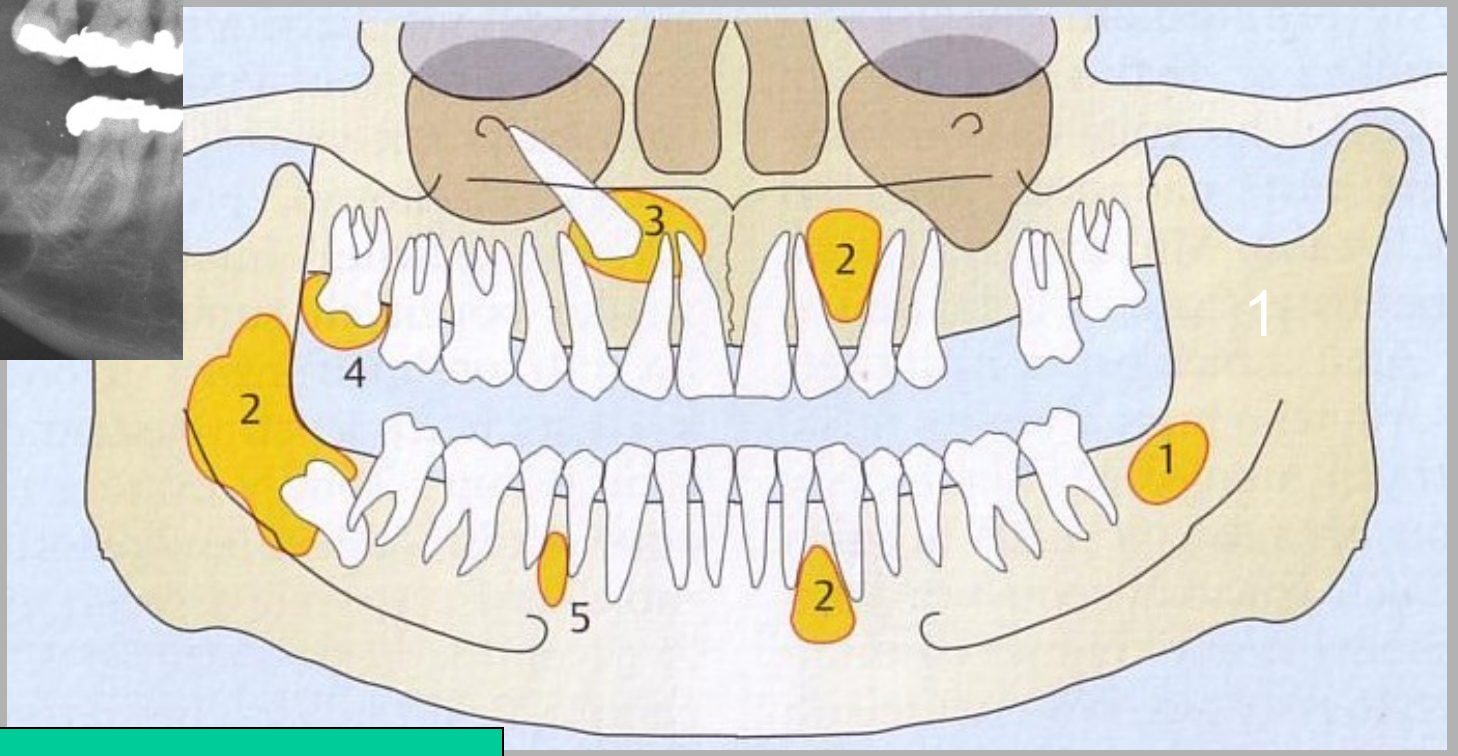


1. primordial c.
2. keratocyst
3. follicular c.
4. lateral periodontal c.

A primordial cyst is a devolepmental odontogenic cyst. It is found in an area where a tooth should have formed but is missing. Primordial cysts most commonly arise in the area of mandibular third molars.

Cysts – odontogenic

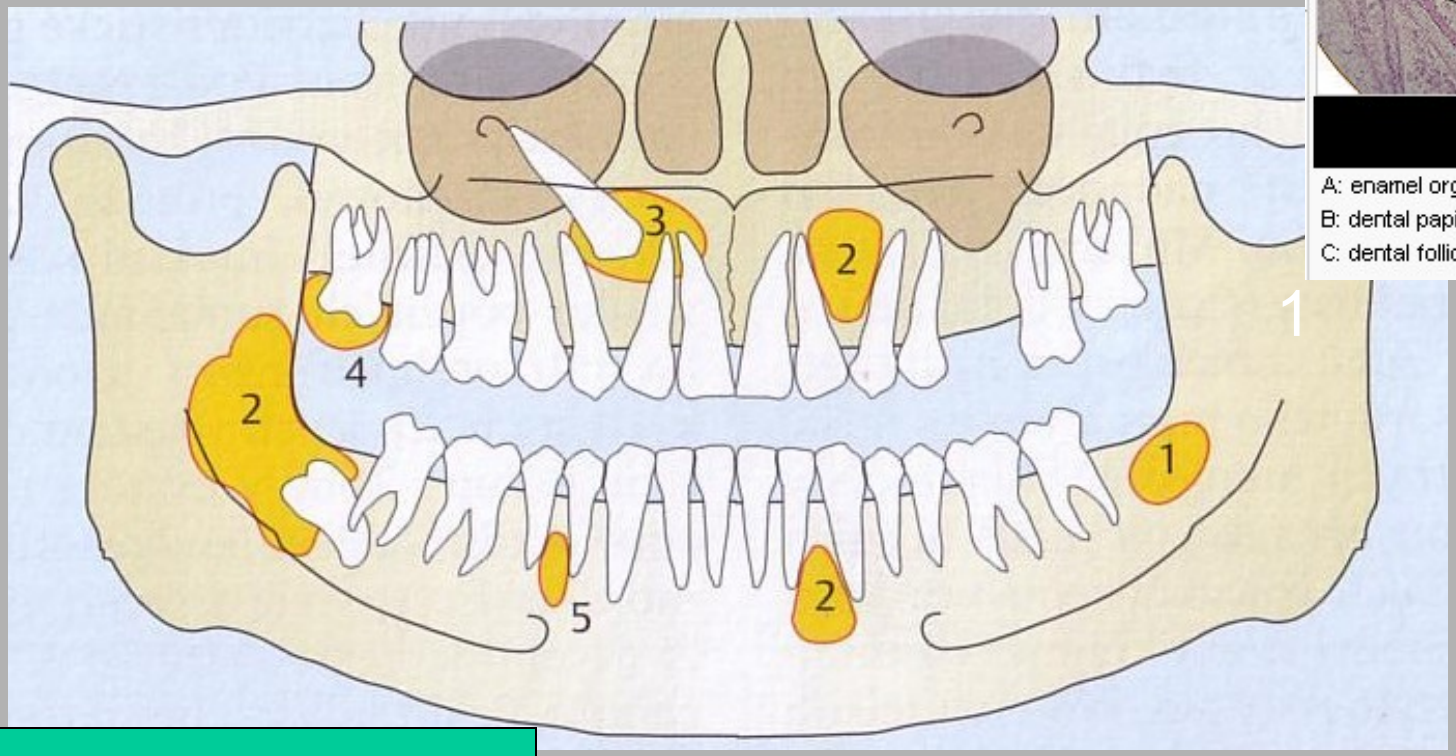


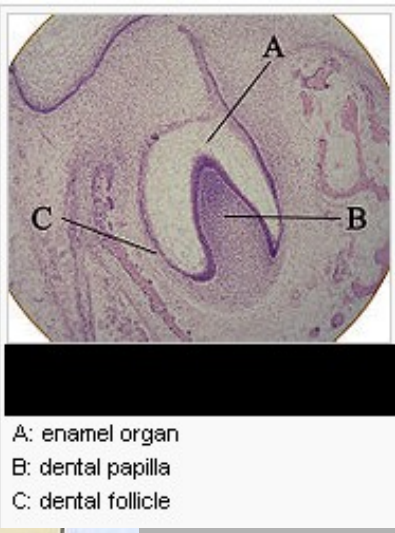


1. primordial c.
2. keratocyst
3. follicular c.
4. lateral periodontal c.

Keratocyst is a benign but locally aggressive developmental cystic neoplasm. It most often affects the posterior mandible.

Cysts – odontogenic



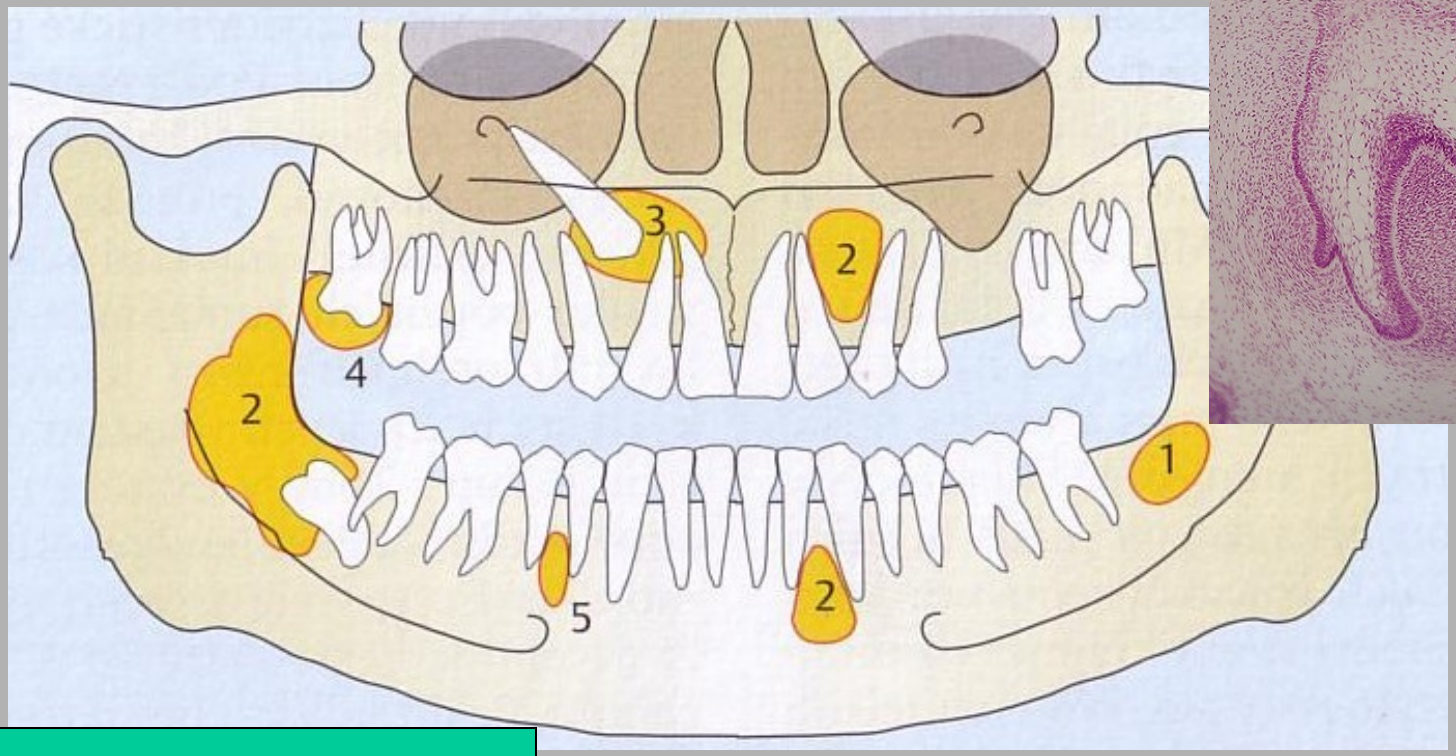


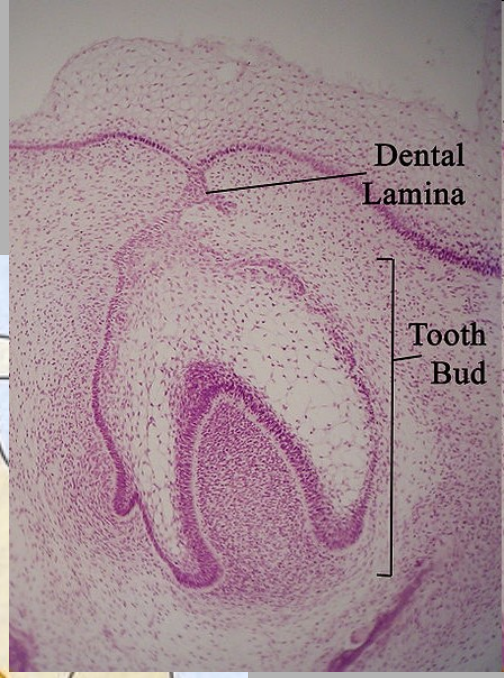
1. primordial c.
2. keratocyst
3. follicular c.
4. lateral periodontal c.

A follicular cyst is a cyst of dental follicle

The **dental follicle** is a sac containing the developing tooth and its odontogenic organ.

Cysts – odontogenic

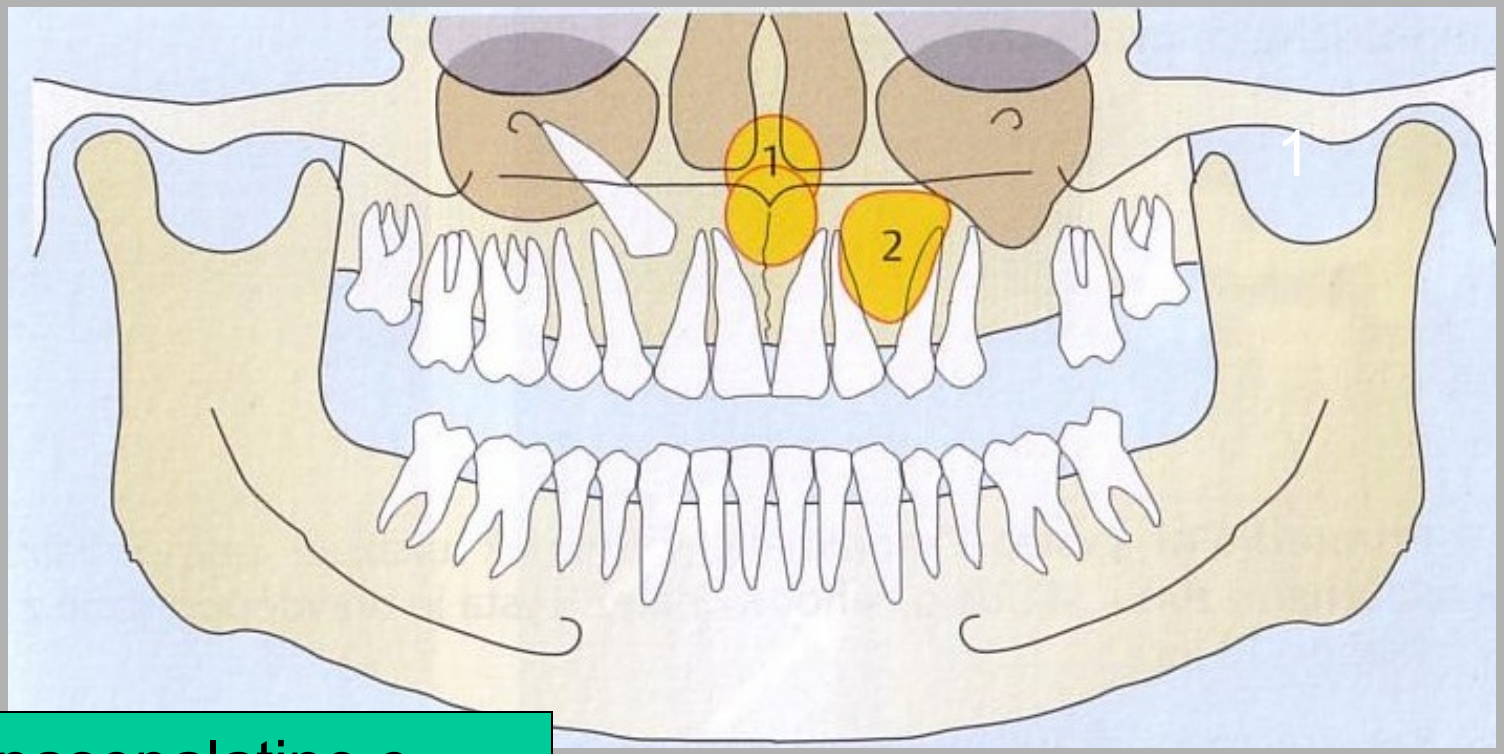




1. primordial c.
2. keratocyst
3. folikular c.
4. lateral parodontal c.

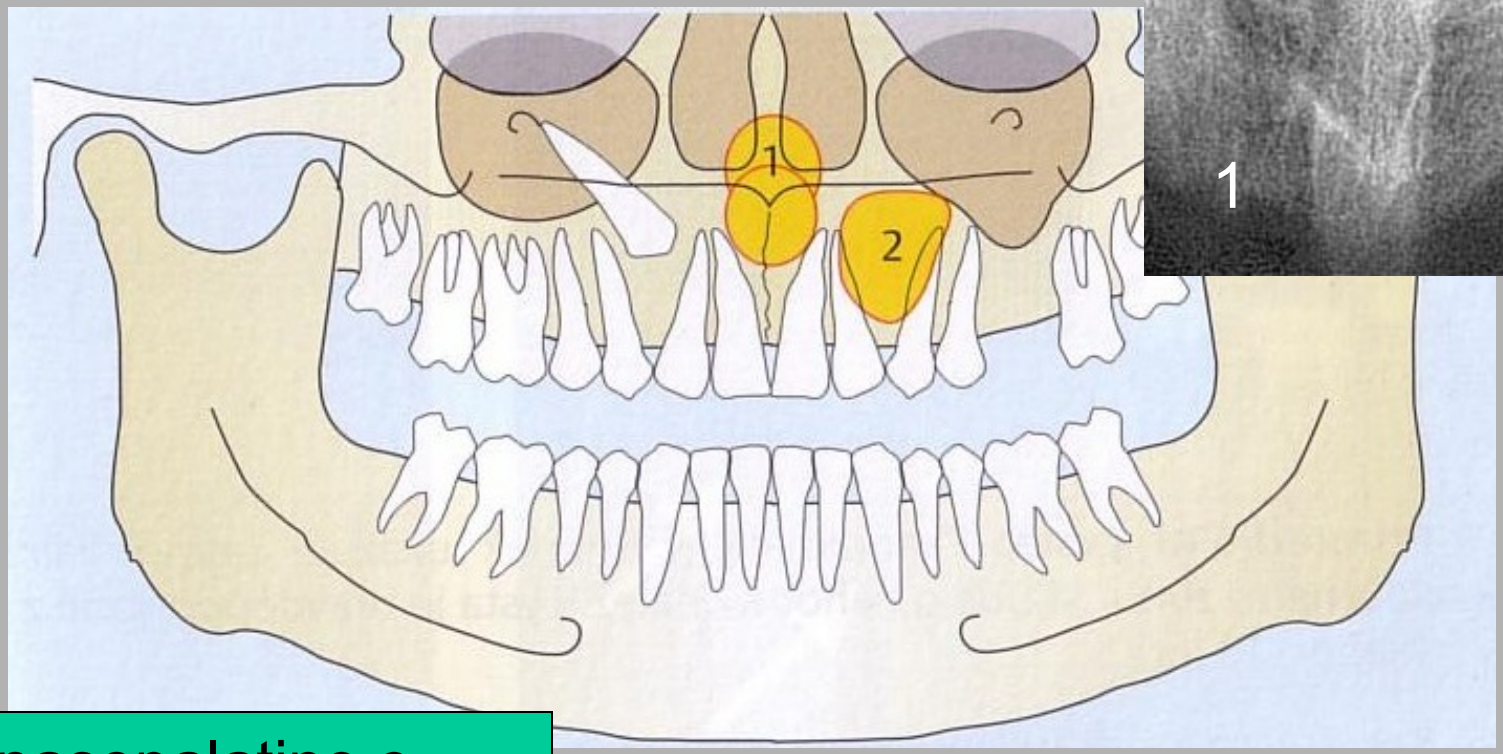
The **lateral periodontal cyst** is a cyst that arises from the rest cells of the dental lamina. It is more common in middle-aged adult males. Usually, there is no pain associated with it, and it usually appears as a unilocular radiolucency (dark area) on the side of a canine or premolar root. Microscopically, the lateral periodontal cyst appears the same as the gingival cyst of the adult.

Cysts – non-odontogenic



1. nasopalatine c.
2. nasolabial c.

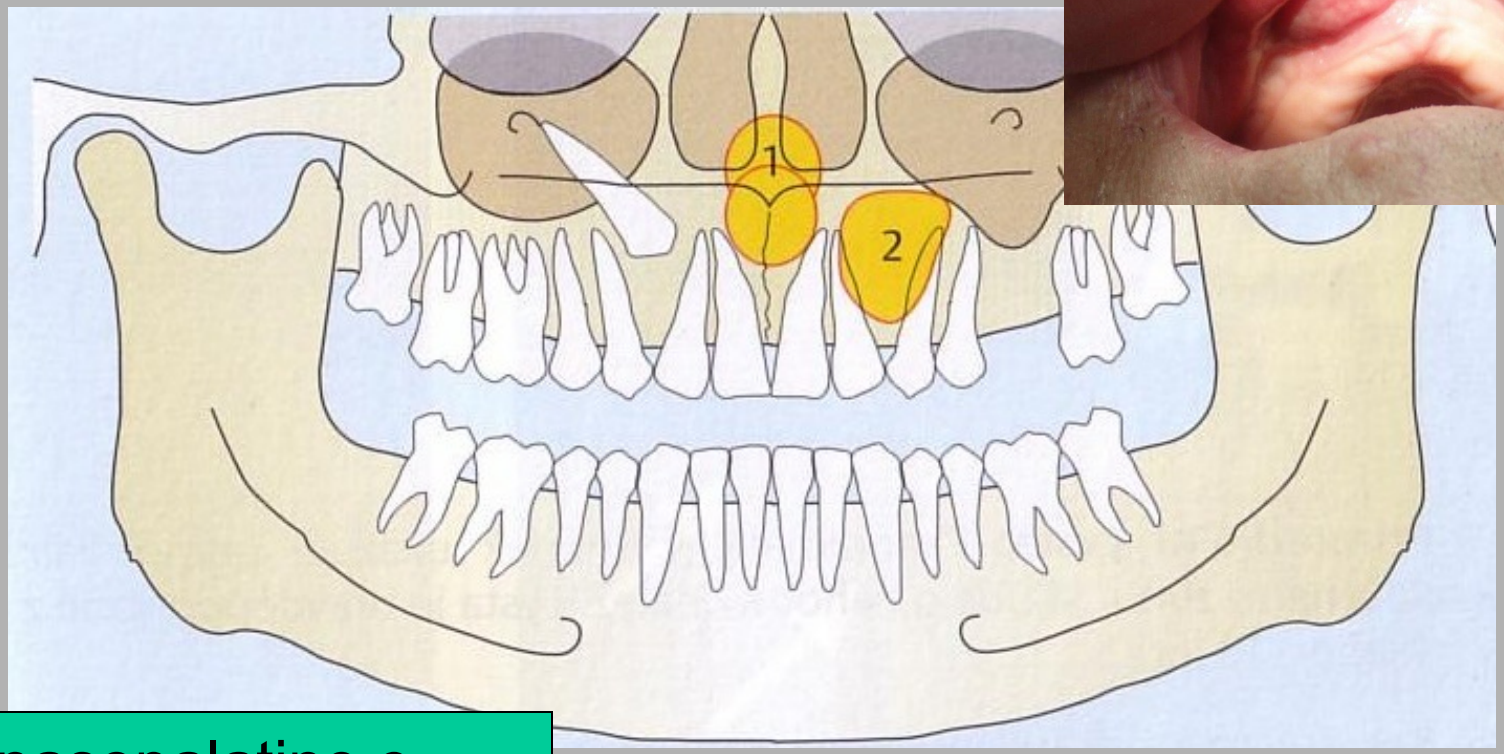
Cysts – non-odontogenic



1. nasopalatine c.
2. nasolabial c.

Nasopalatine cyst occurs in the median of the palate.

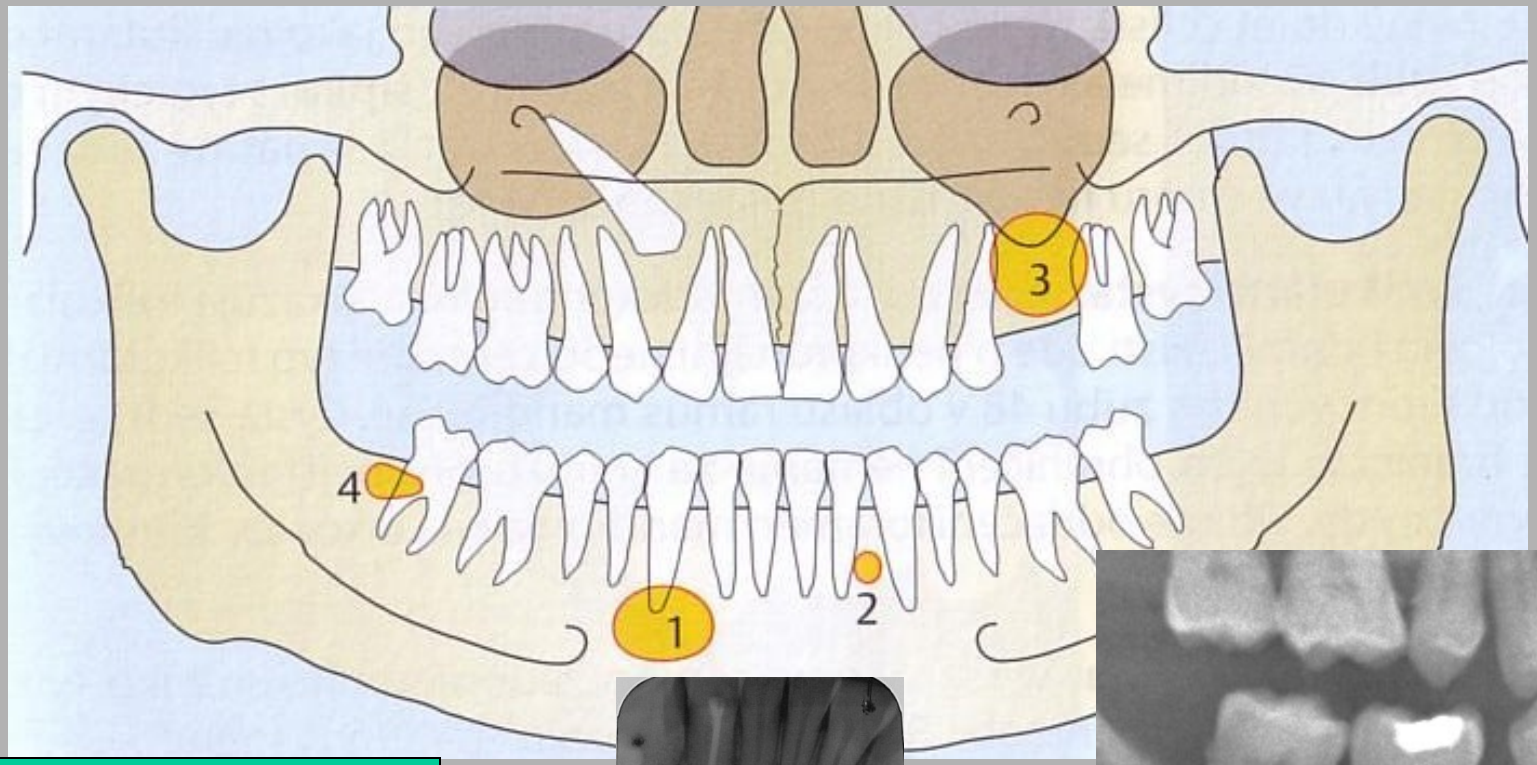
Cysts – non-odontogenic

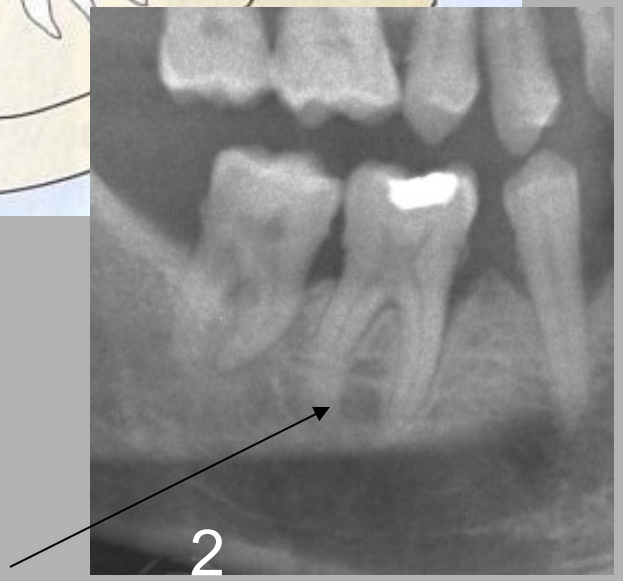


1. nasopalatine c.
2. nasolabial c.

Nasolabial cyst is located superficially in the soft tissues of the upper lip. Unlike most of the other developmental cysts, the nasolabial cyst is an example of an extraosseous cyst.

Cysts - inflammatory



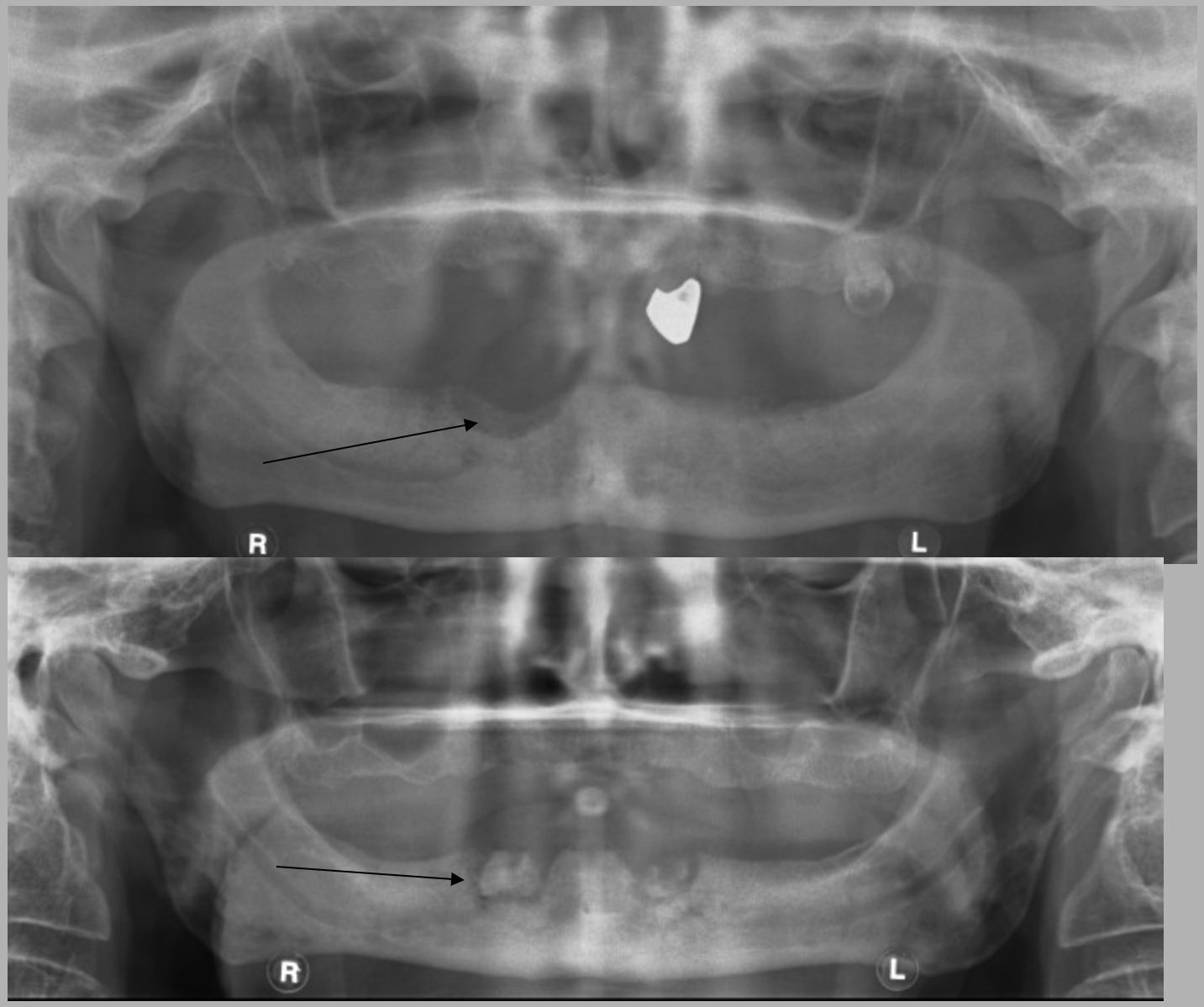


1. apical radicular
2. lateral radicular
3. residual lateral
4. parodontal (Craig´s) - wisdom tooth

Carcinoma

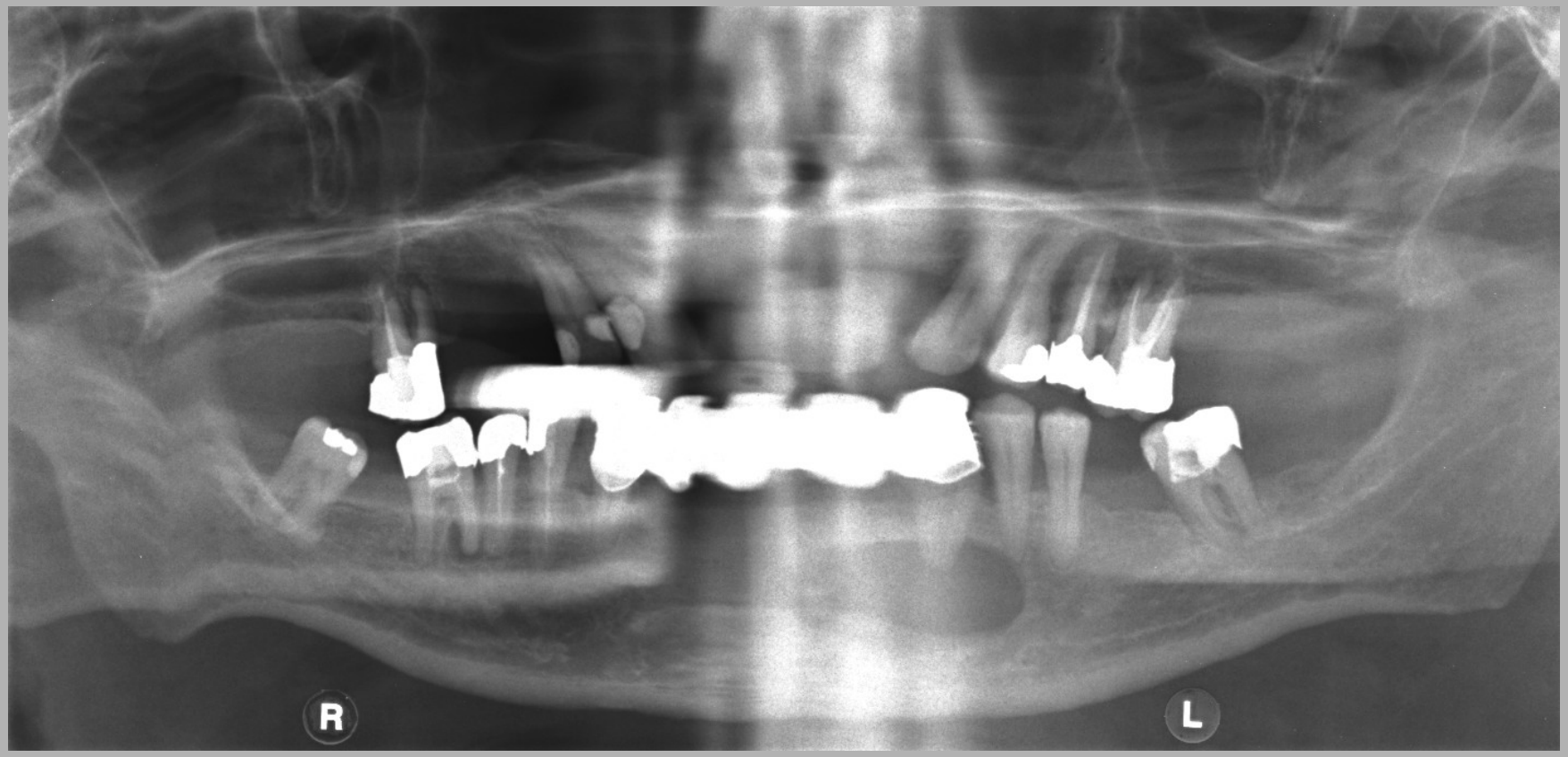
- the most often carcinoma of oral mucosa.
- intraepitelial mucosal carcinoma
- infiltration of:
  - adjacent bones
  - lingual part of mandible
- osteolysis
- paresthesis
- smokers, older age

Osteonecrosis mandibulae

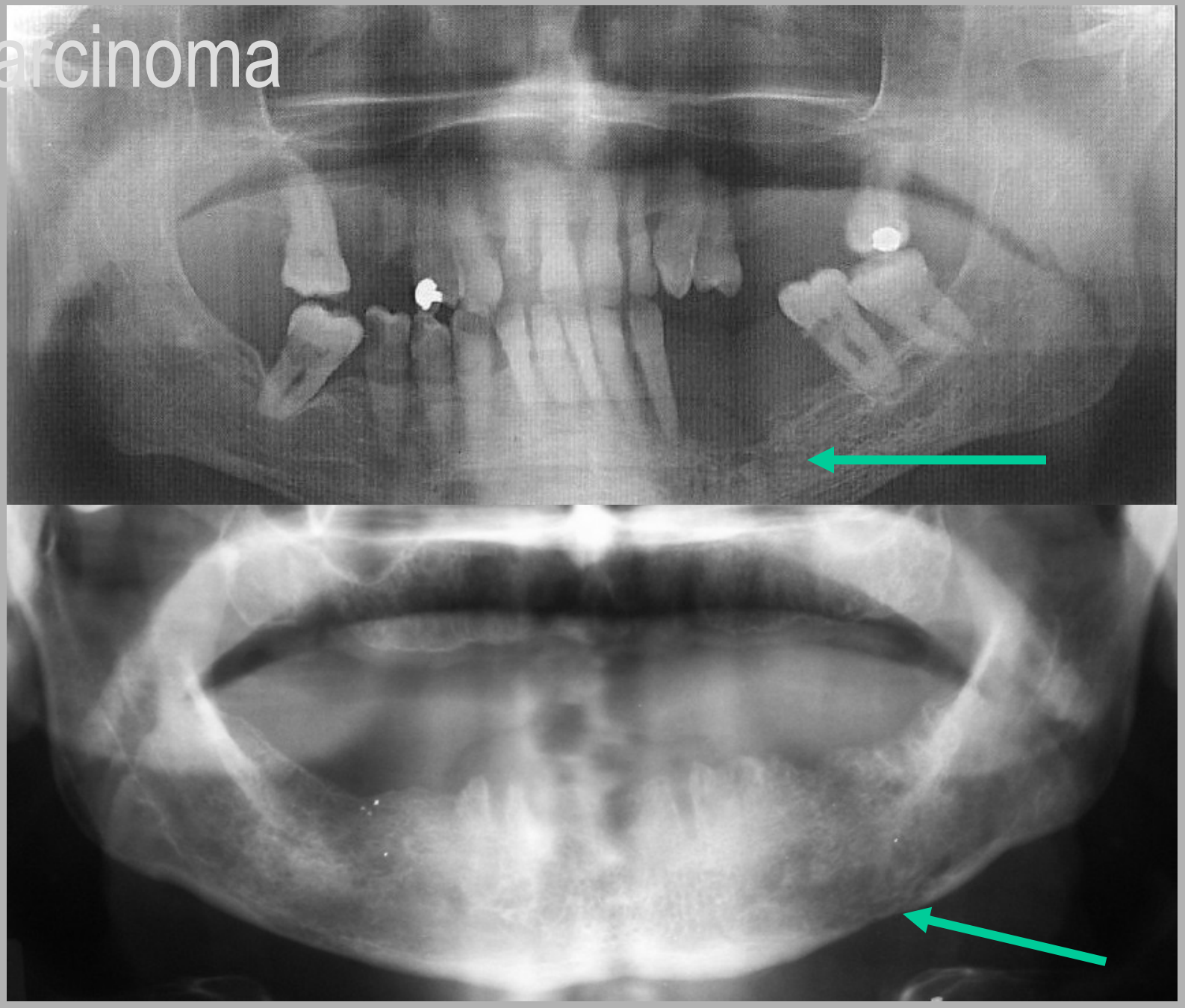


Radicular cyst

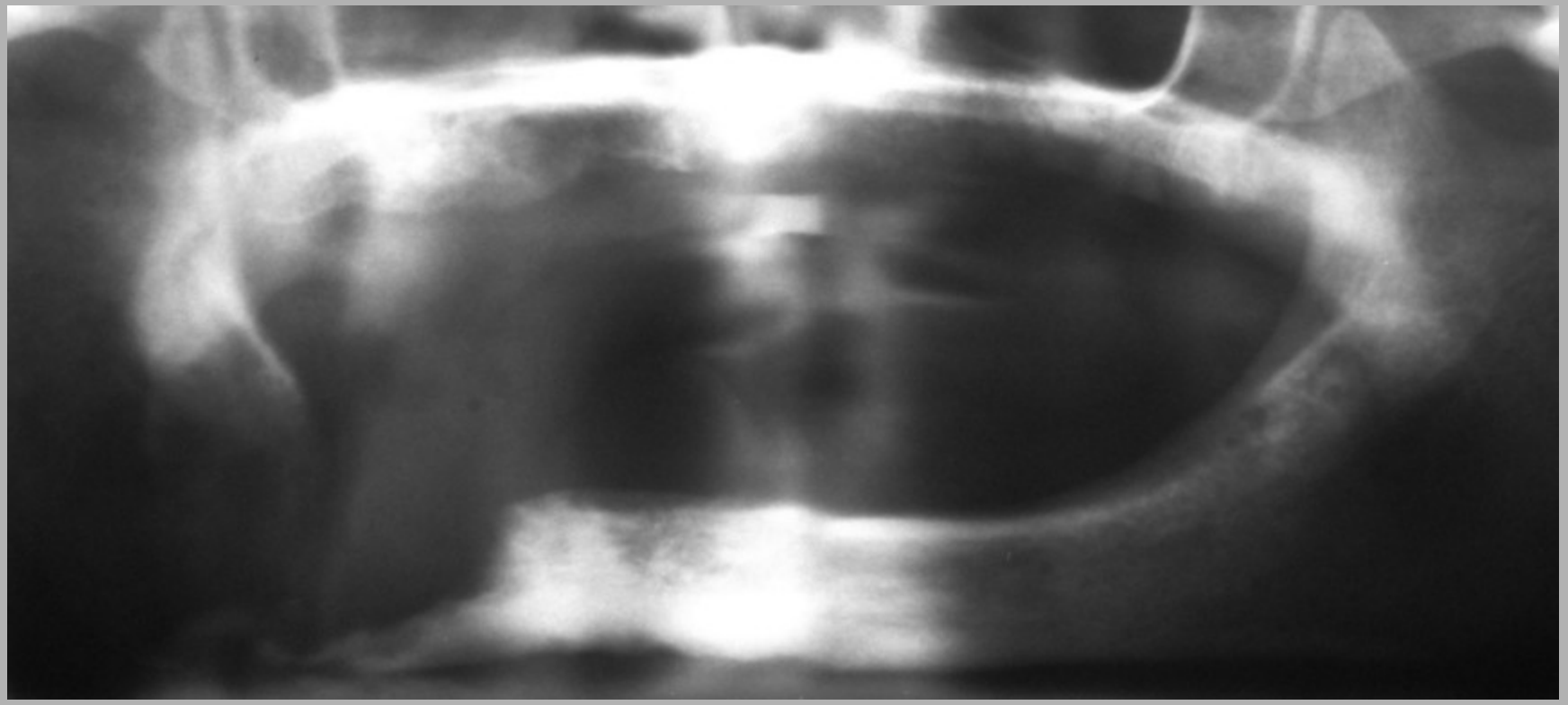
- cystis radicularis -234 purulenta
- after intraoral incision excretion of pus and blood.



Carcinoma



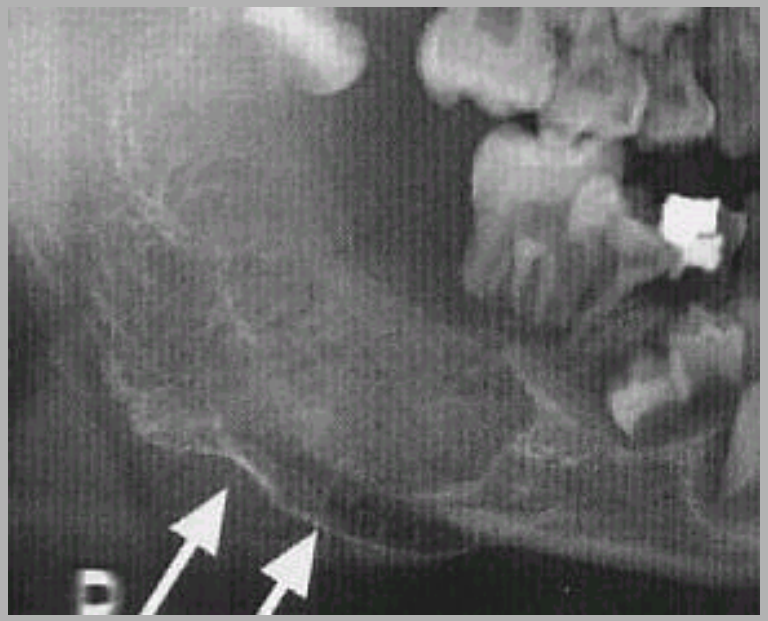
Carcinoma



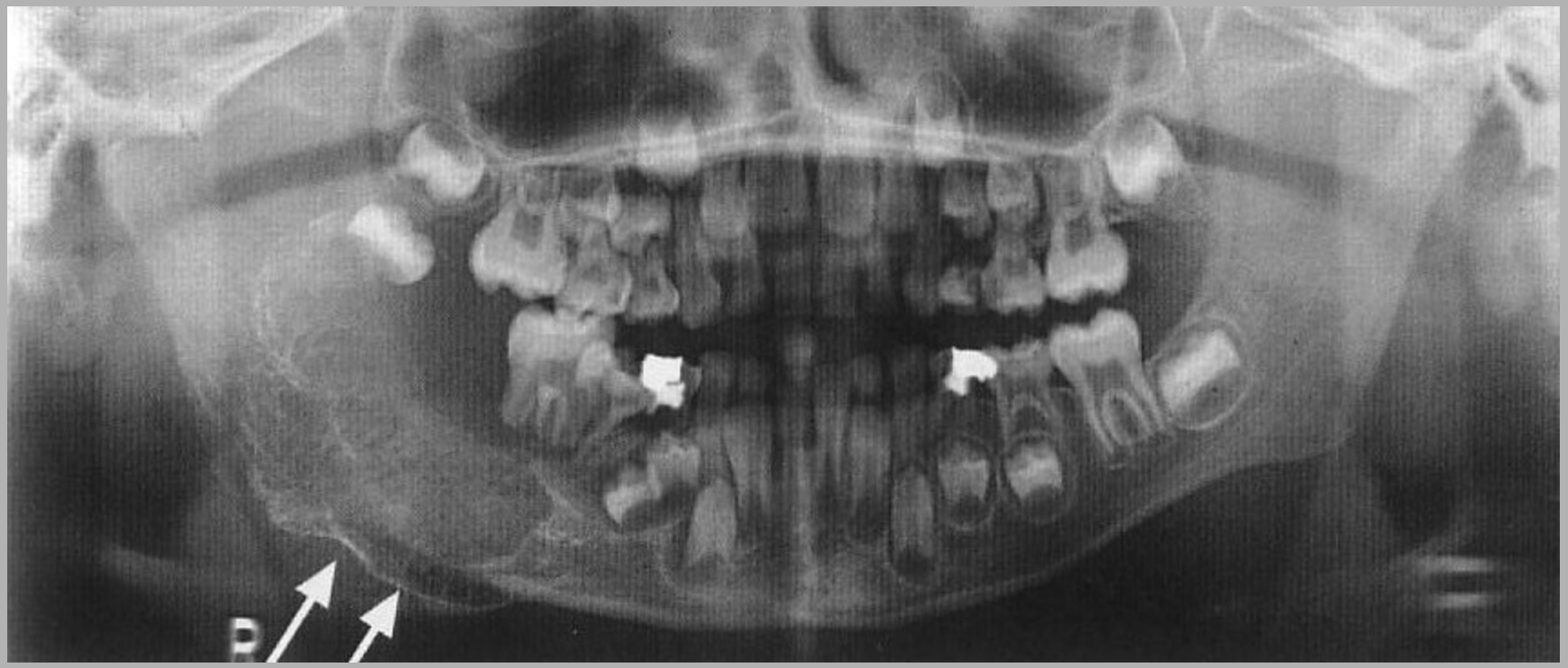
Ewing sarcoma

- children 10-20 y
- high grade malignant
- fast grow
- soon metastatis
- angle of mandible
- painfull
- X-ray: „slices of onion“
- Dif.dg.
  - osteosarcoma
  - endosteal hemangioma

gold diagnostic standard
MRI



Ewing sarcoma



boy, 7 y
difficulty clinics
oedema of low jaw
movement of teeth
periost reaction

Osteosarcoma

- 2. and 3. decennium
- mesenchymal tumor
- histologic
  - osteoblasts
  - chondroblasts
  - fibroblasts

RTG

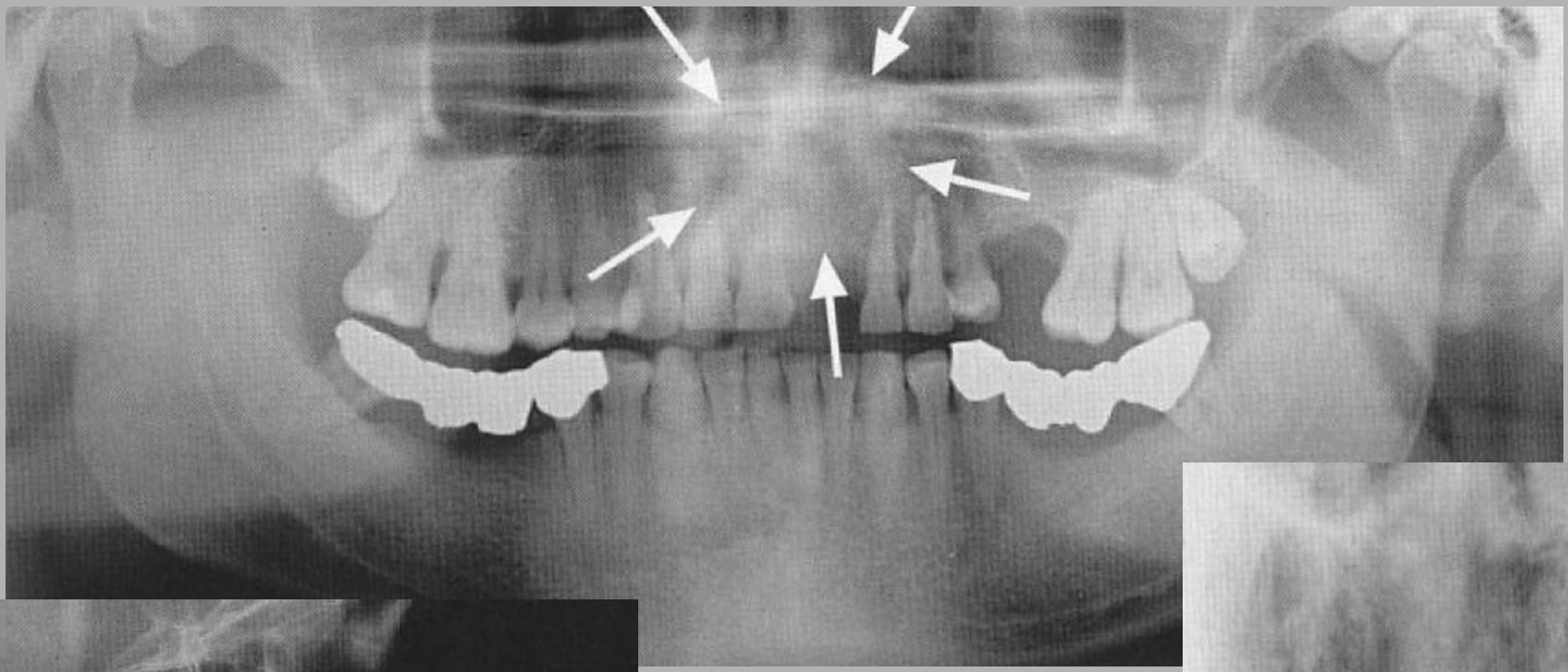
- osteoblastic + osteolytic

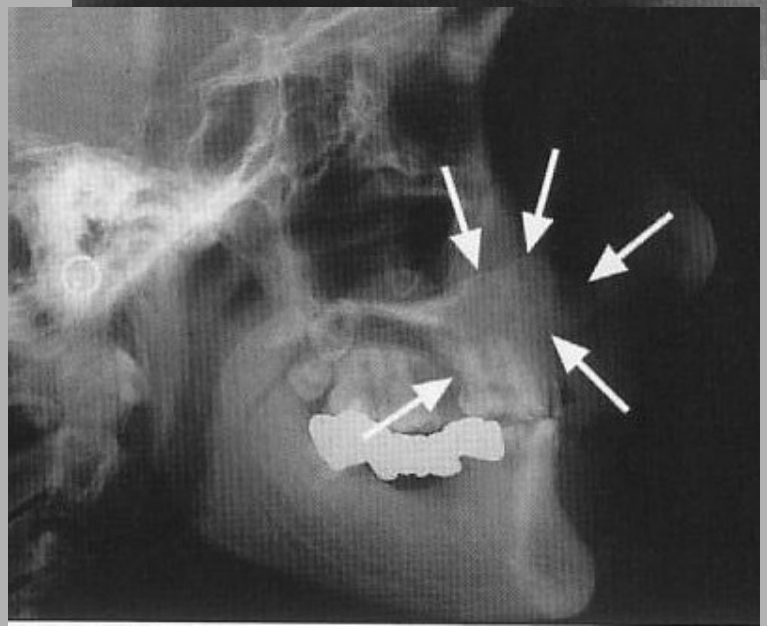
– various image

Osteosarcoma

w, 29 y

Osteosarcoma

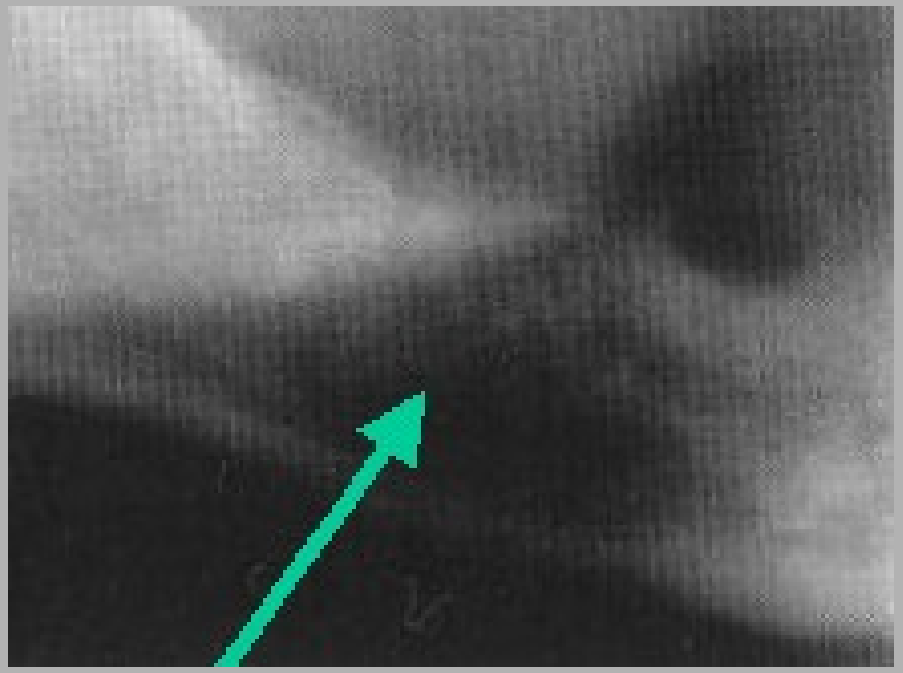




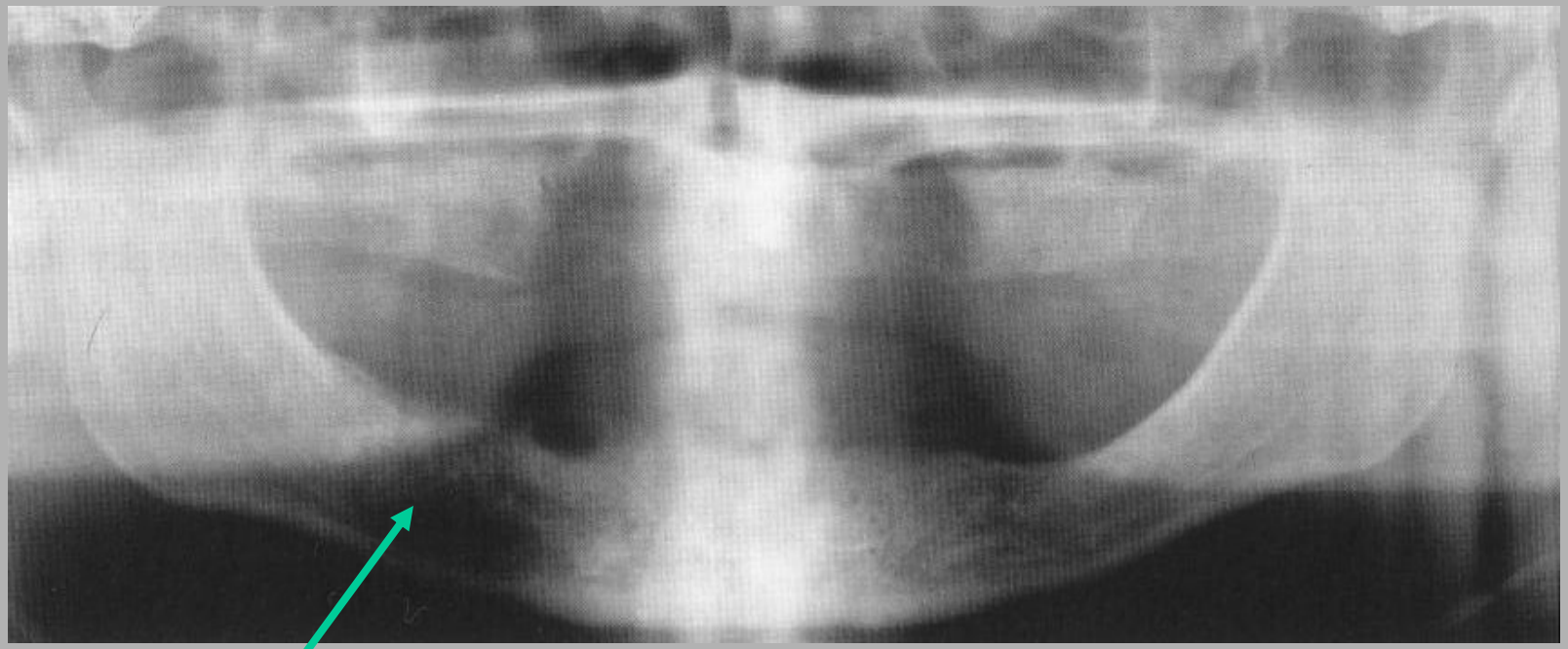
m, 40 y

Metastasis

- carcinomas of:
  - mamma
  - lung
  - gl. thyreoidea
  - prostate
- blood spread
- clinics:
  - pain in the bones
  - „reasonless“ teeth release
  - paresthesis of lower lip
  - pathological fracture
- <u>suspicion = scintigraphy</u>

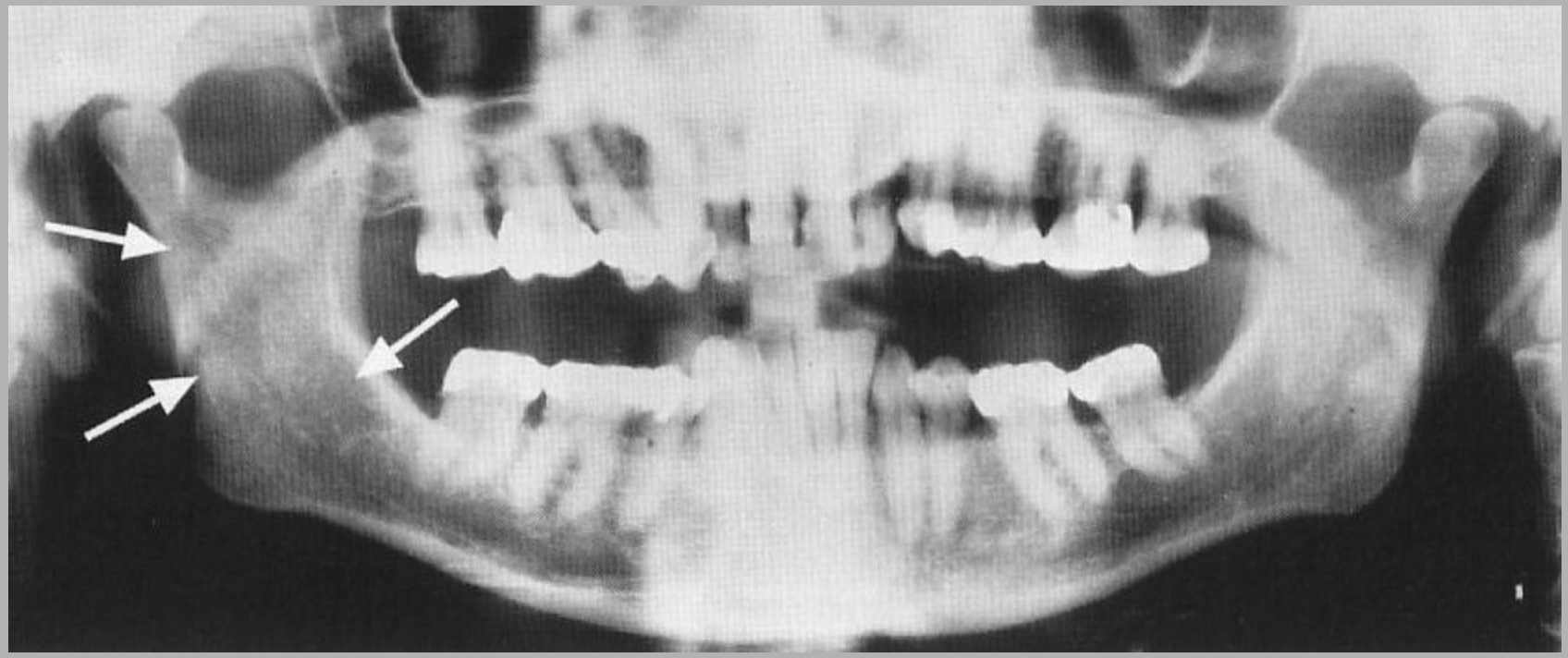


Metastasis



- m, 69 y
- prostate carcinoma
- transparency

Metastasis



- bowel carcinoma
- spotted, blurred

Odont. myxoma

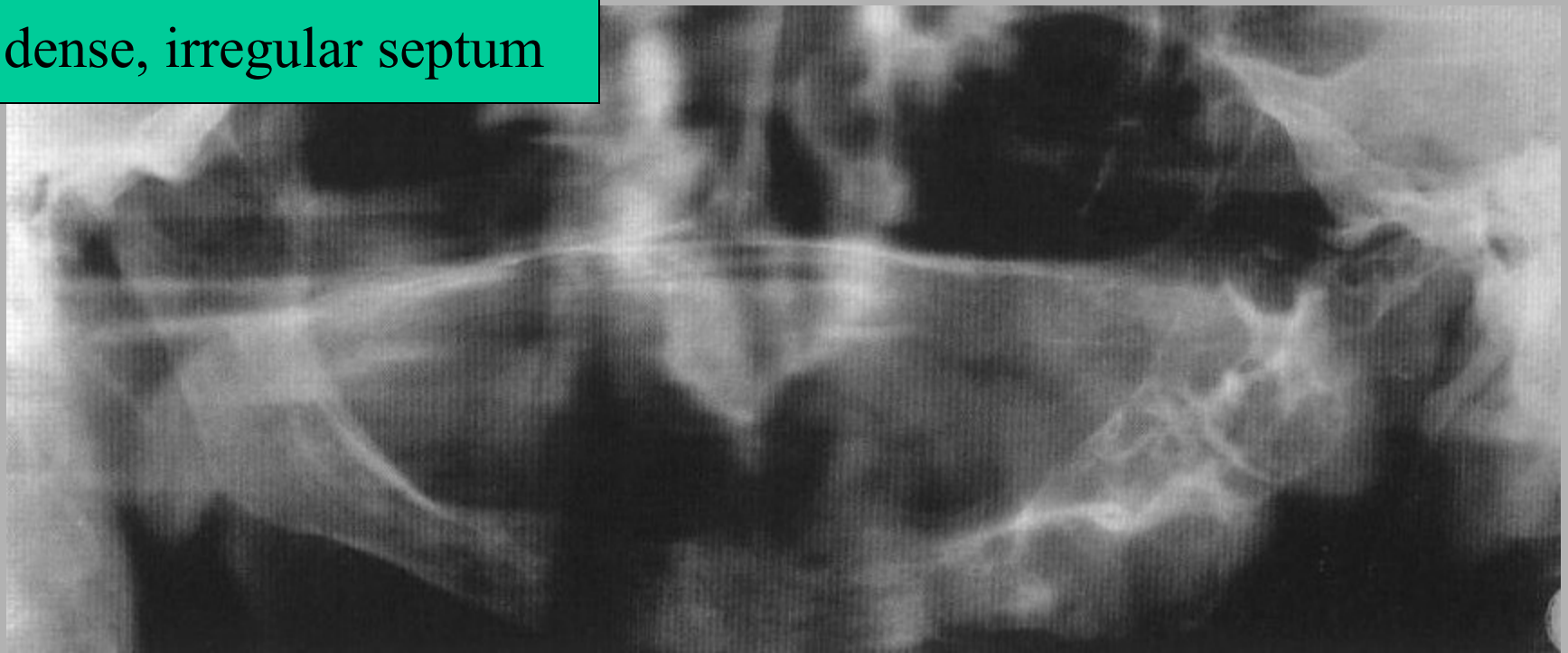
- age 10-50 y
- w/m 1:1
- jaws (only)
- most often in lower jaw - caput of mandible
- growth
  - fast
  - endosteal
  - muscle infiltration (occasionally)
- good bounded, irregular translucency
- often relaps

Odont. myxoma

w, 34 y

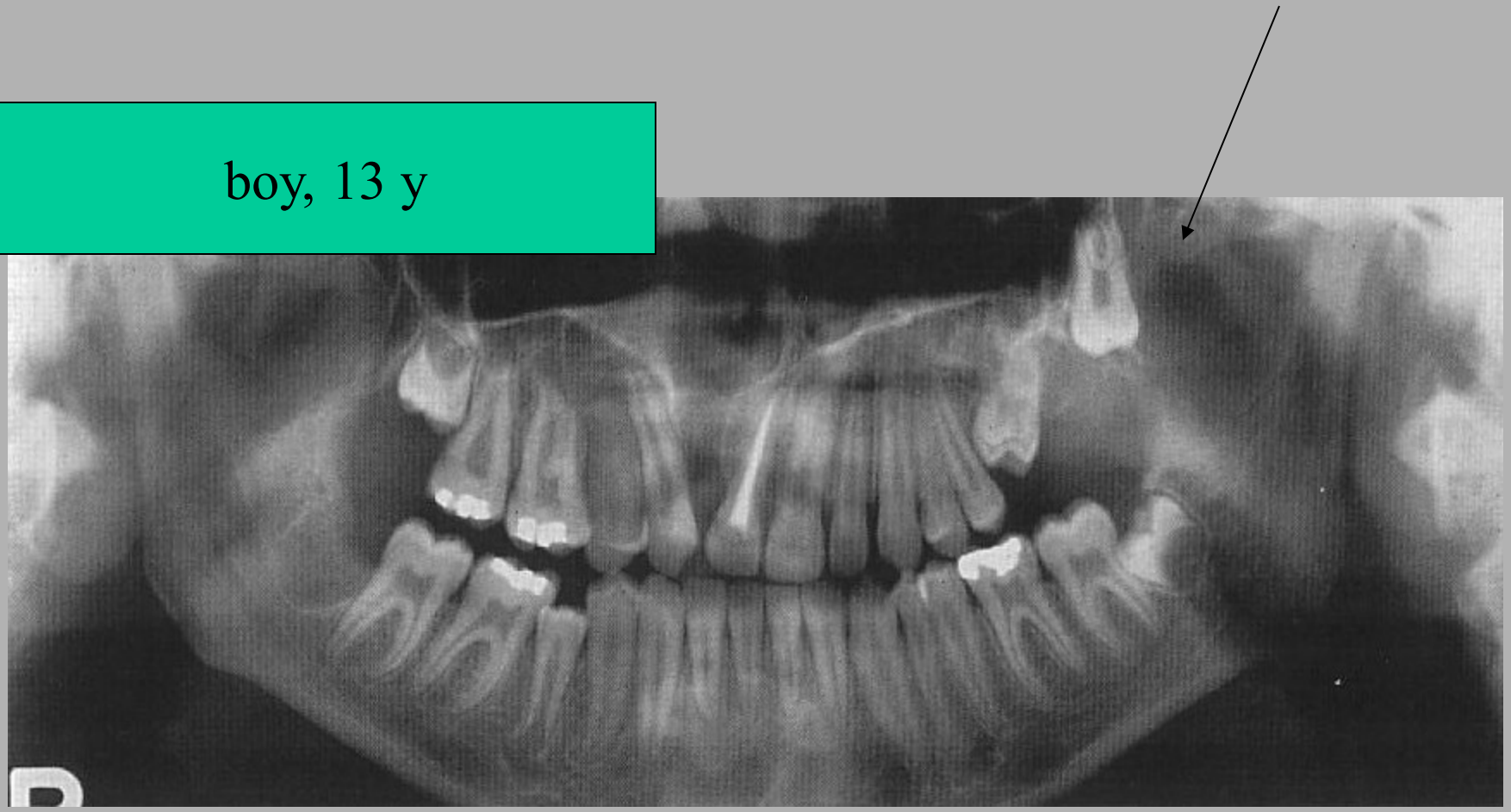
structure - net

dense, irregular septum



Odont. myxoma

boy, 13 y



Odontoma

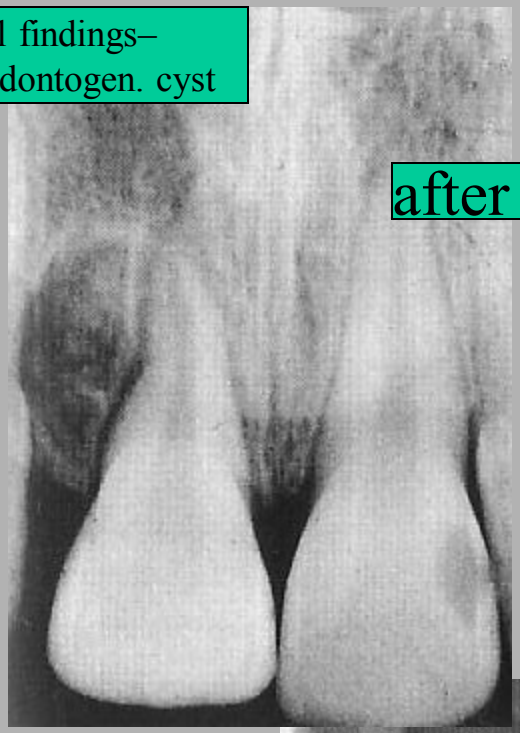
- similar to the hamartomas
- conglomerate of various teeth tissues
  - <u>composite</u> odontoma
    - ✓ contains several developed teeth
  - <u>complex</u> odontoma
    - ✓ contains basic teeth tissues in amorphous mass

composite

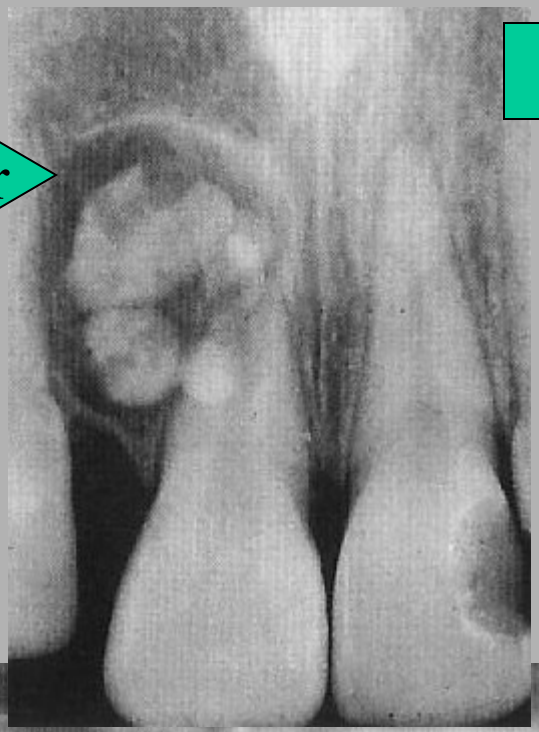
complex

Odontoma

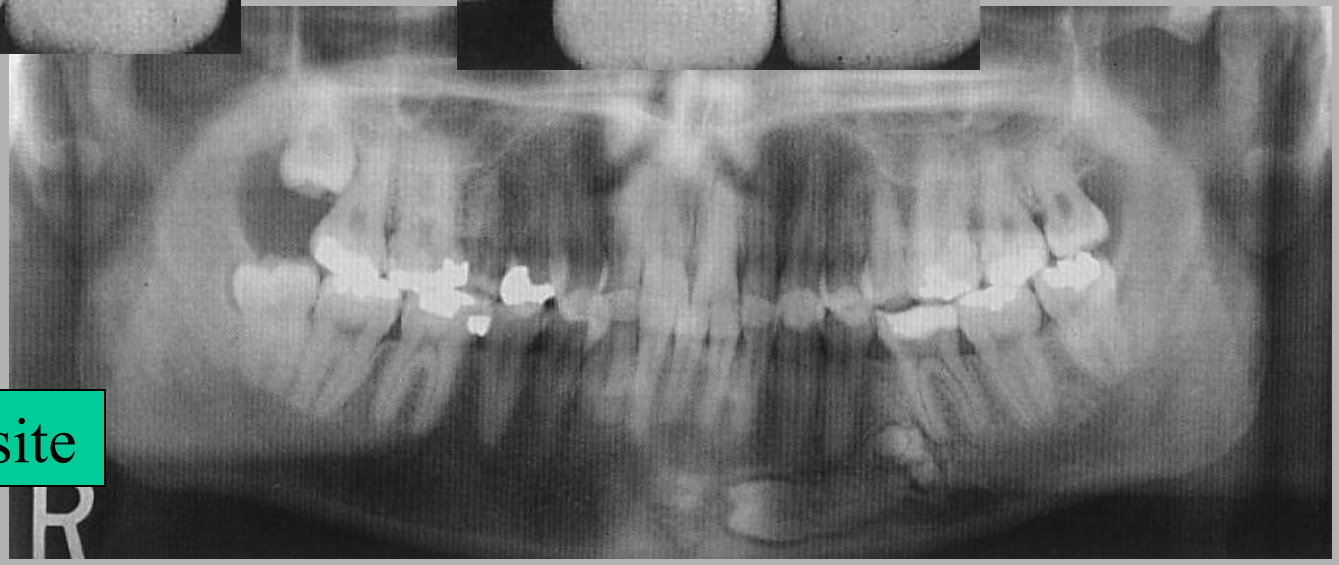
incidental findings–
susp. calc. odontogen. cyst



after 2,5 year



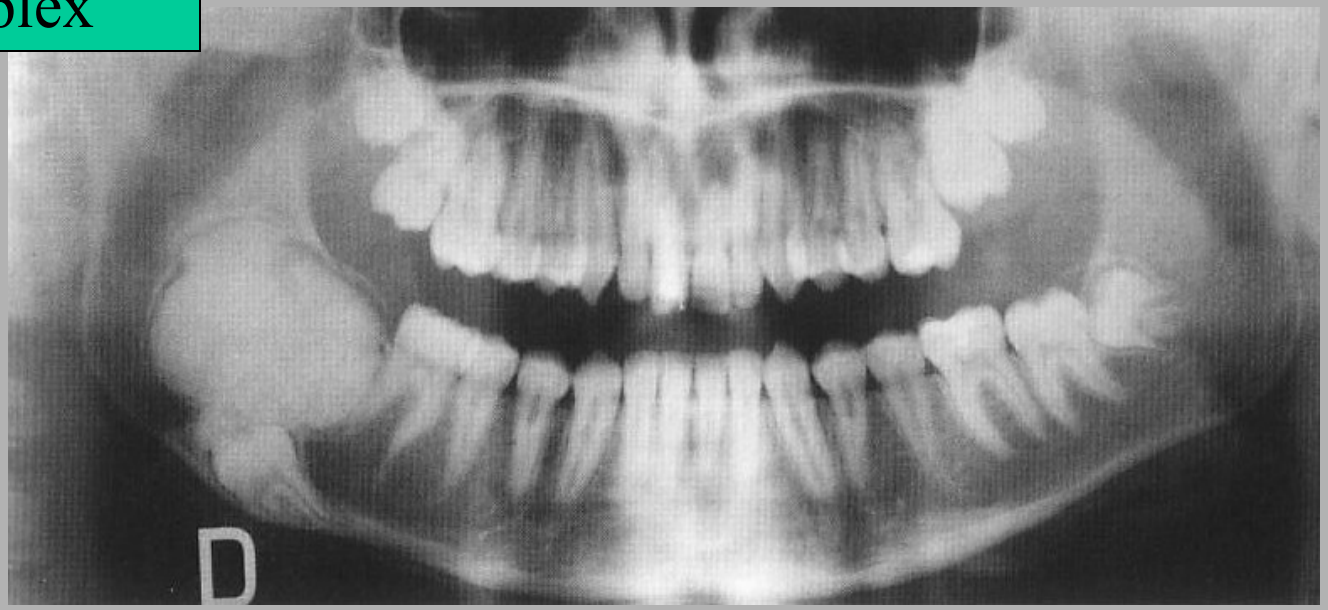
composite



composite

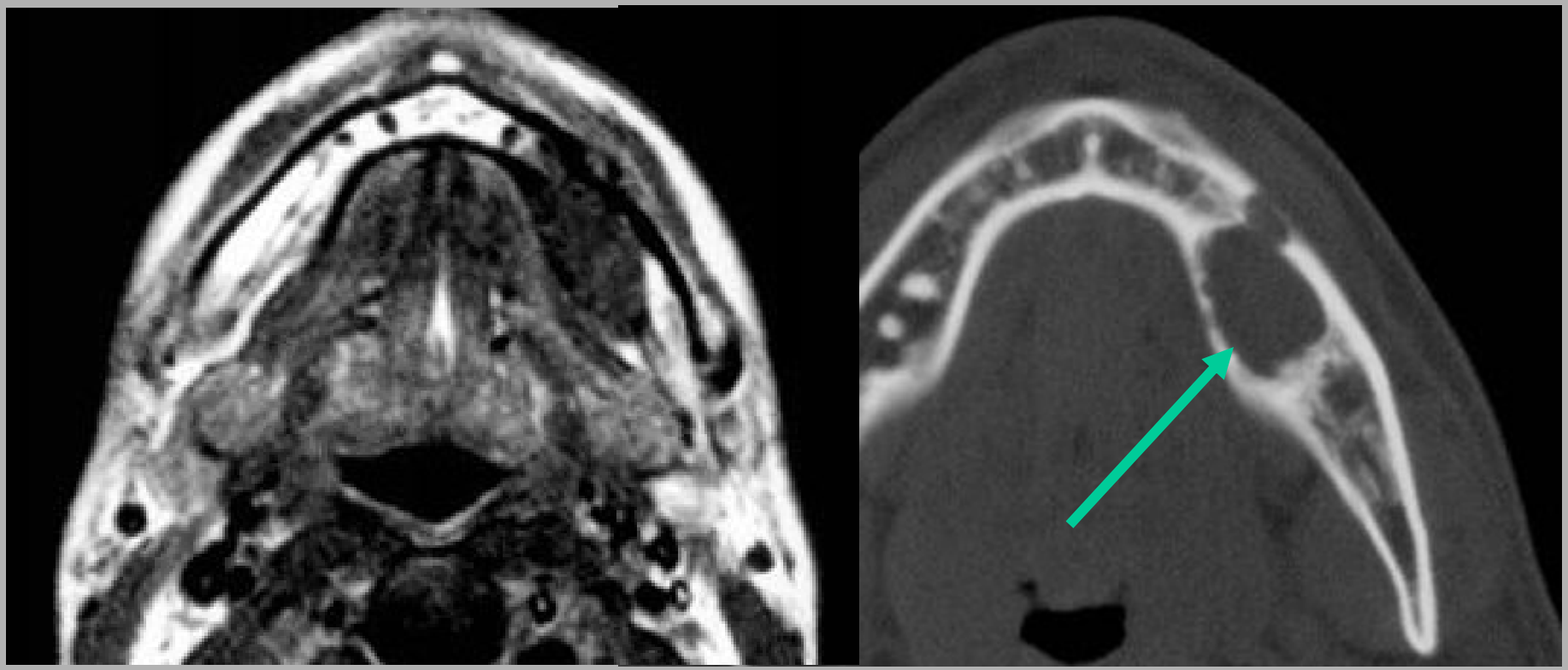
Odontoma

complex



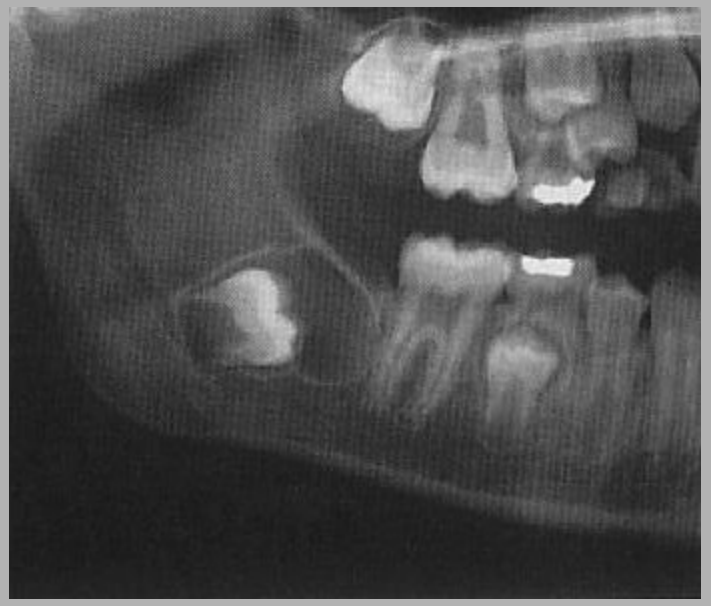
Fibroma

- **Fibromas** (or **fibroid tumors** or **fibroids**) are benign tumors that are composed of fibrous or connective tissue.



Ameloblastic fibroma

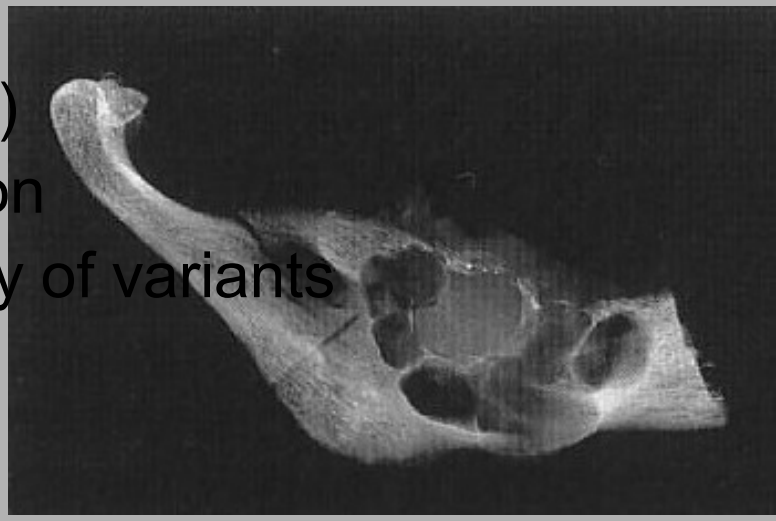
- The **ameloblastic fibroma** is an odontogenic tumor arising from the enamel organ or dental lamina
- tumor with odontogennal epithelium and ectomesenchyma
- benign
- 10-20 y, boys
- in molar mandible region
- dif.dg.
  - folicular cyst
  - ameloblastoma
- don´t recidivate

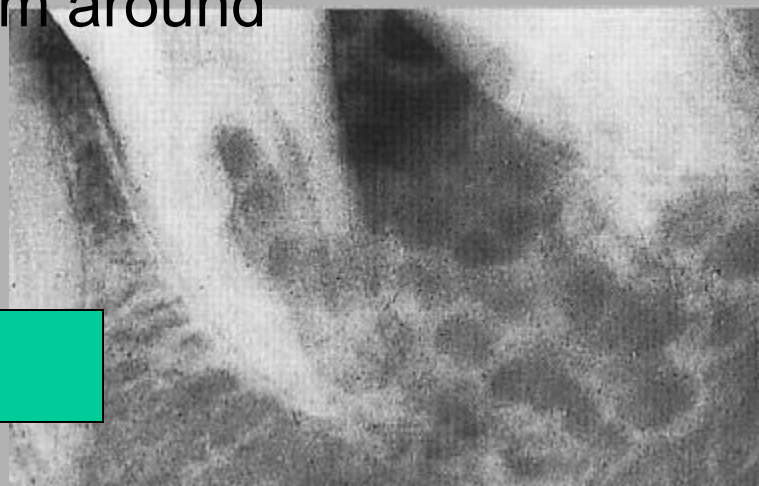


Ameloblastic fibroma

Ameloblastoma

- is a rare, benign tumor of odontogenic epithelium
- m/w 1:1
- in a region of caudal molars (80%)
- long-term relaps = radical resection
- variable histological image – many of variants
- RTG
  - multilocular
  - multicystic
  - bubble transparency with septum around
  - compacta thin out
- slow growth, painless
- oedema, facial asymetry

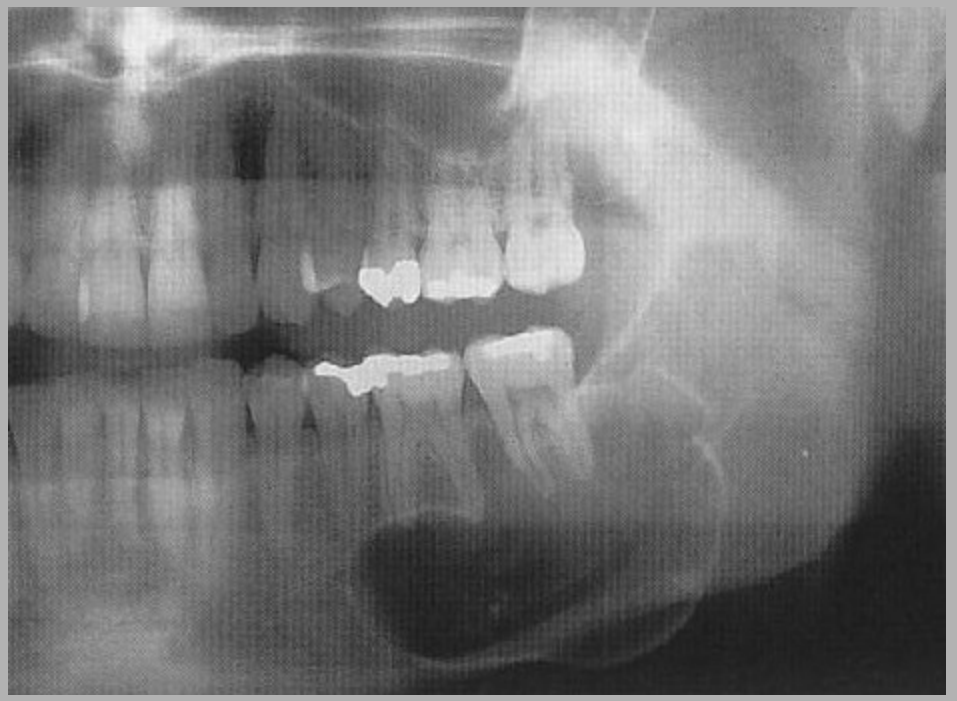


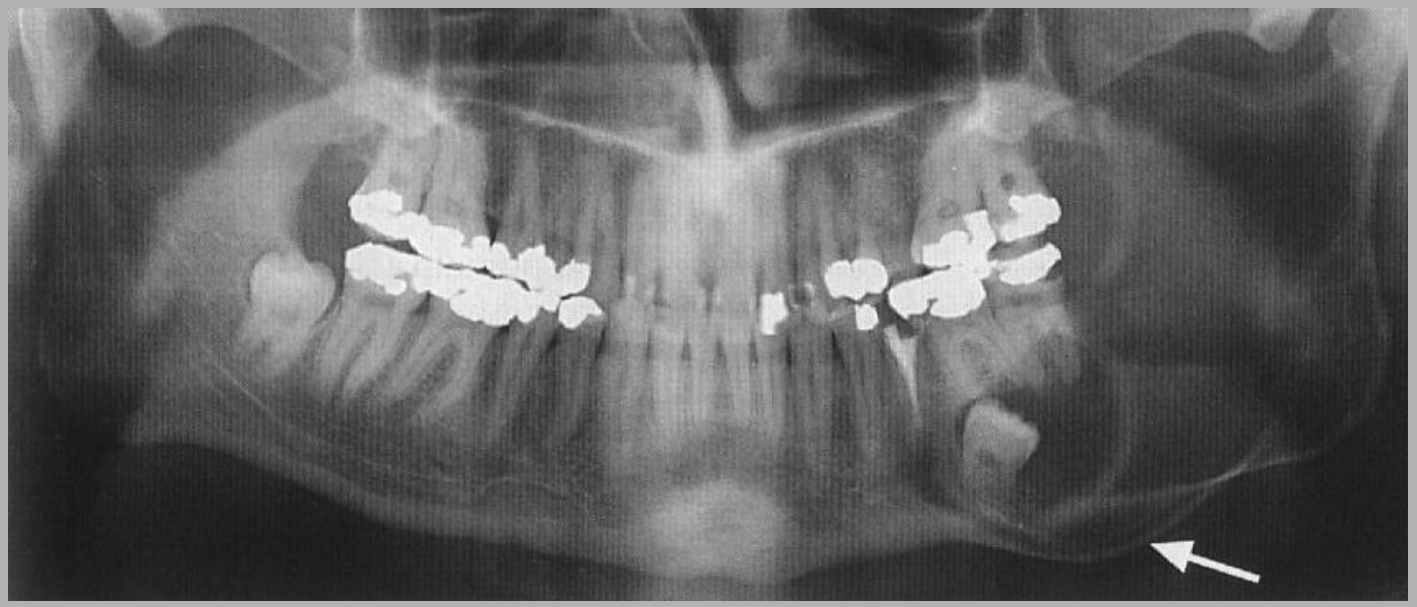


„honeycomb“ structure

Ameloblastoma

- dif.dg.
  - folicular cysts
  - keratocysts
  - ameloblastic fibroma
  - odontogennal myxoma
  - central eosinofil granuloma

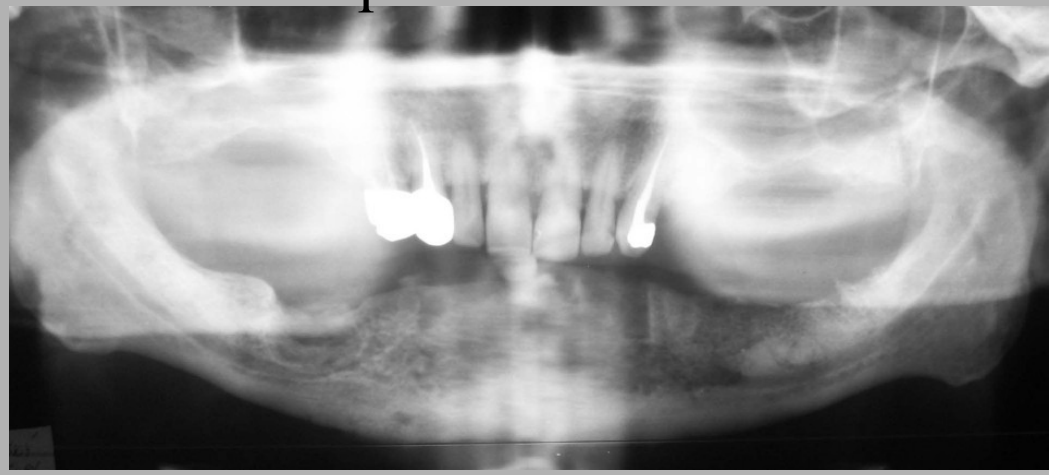


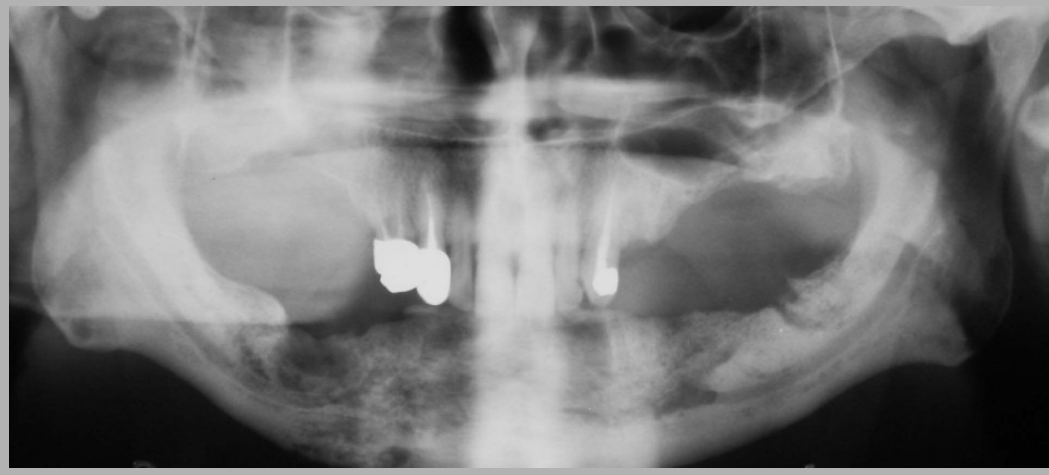


Myeloma

is a cancer of the white blood cells known as plasma cells.

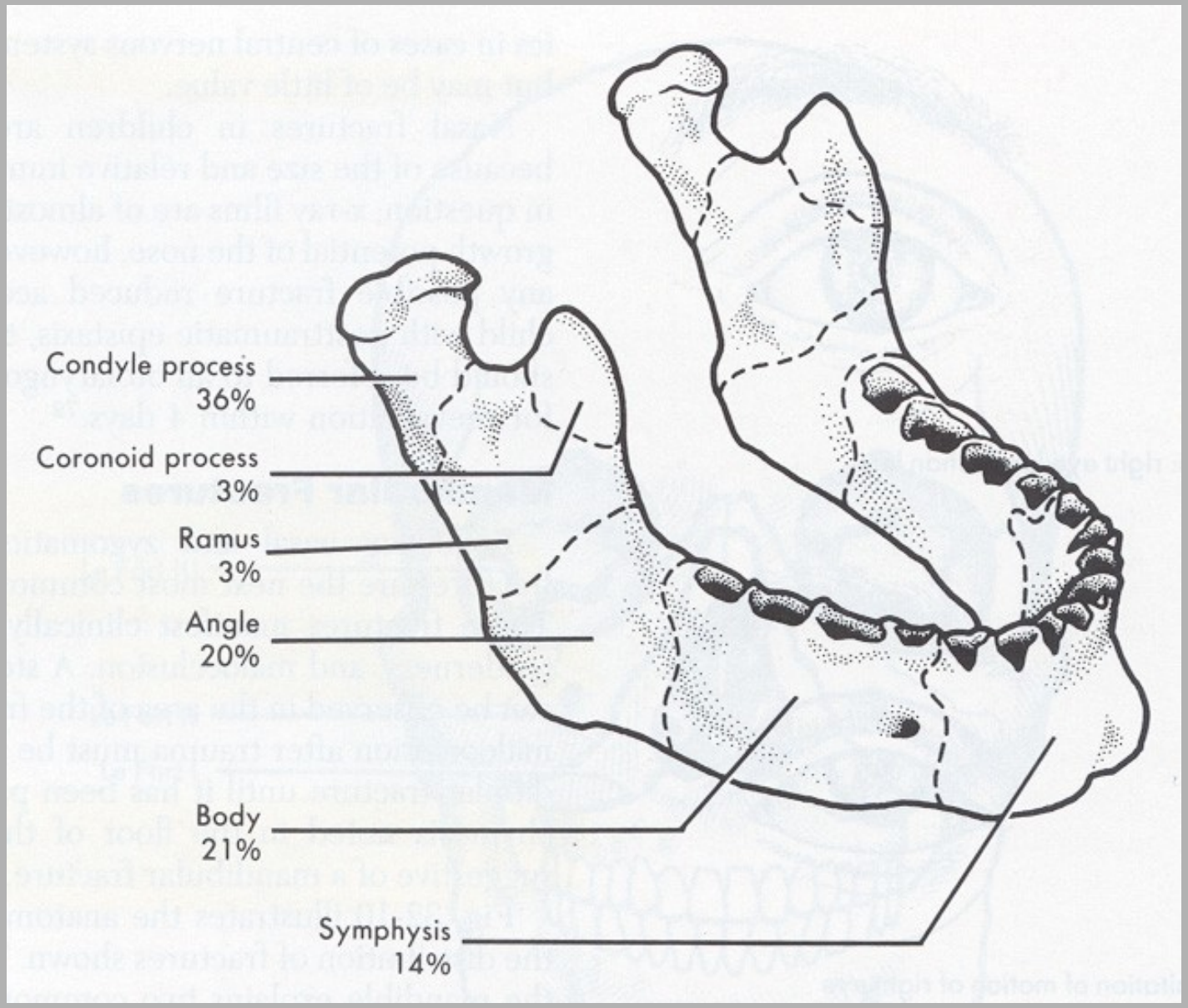
- Hypercalcemia (corrected calcium >2.75 mmol/L)
- Renal insufficiency attributable to myeloma
- Anemia (hemoglobin <10 g/dL)
- Bone lesions (lytic lesions or osteoporosis with compression fractures)
- Frequent severe infections (>2 a year)
- Amyloidosis of other organs
- Hyperviscosity syndrome



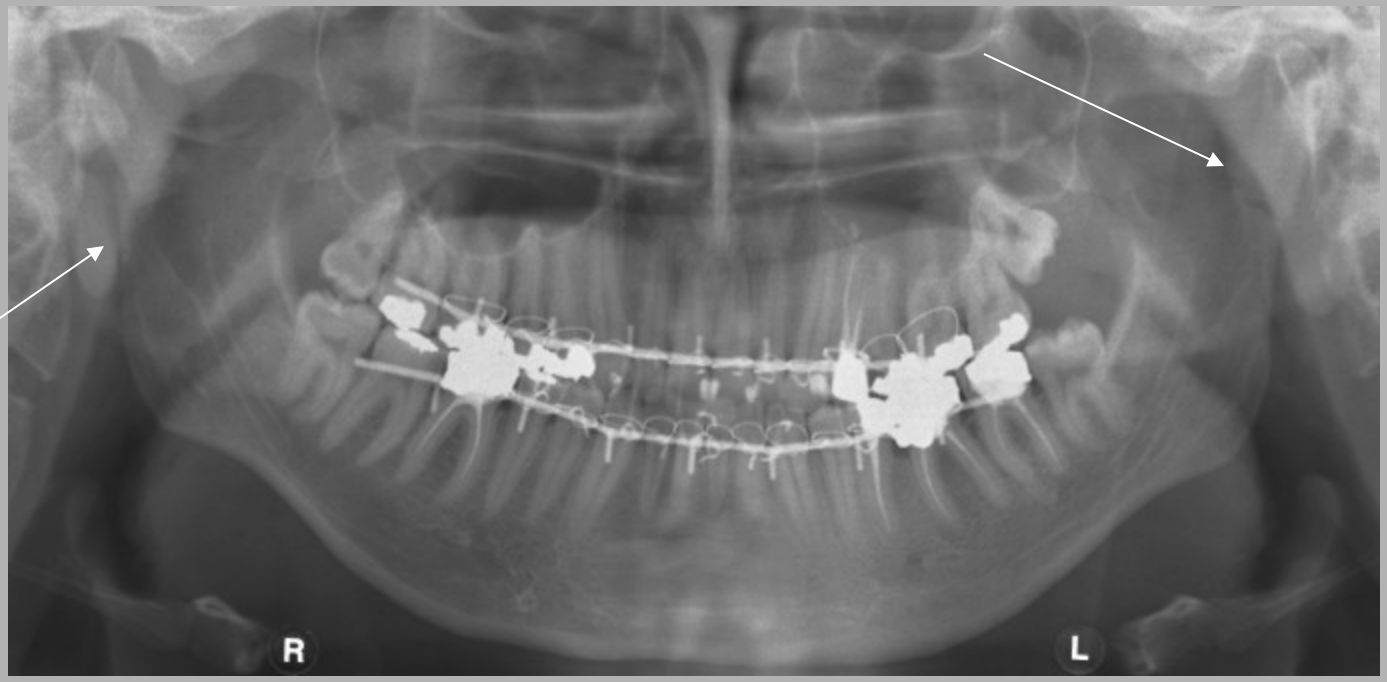


Mandible fractures

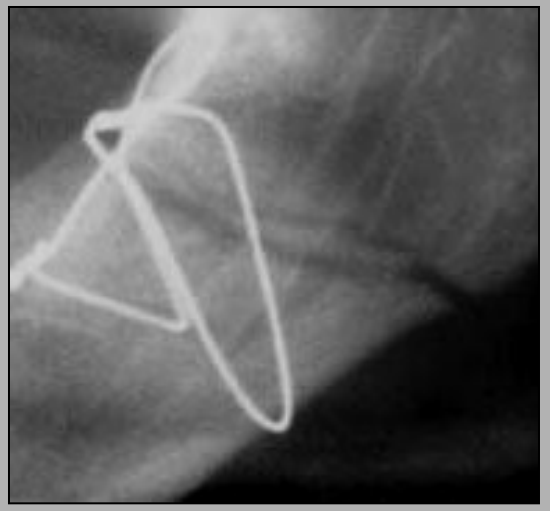
Mandible fractures



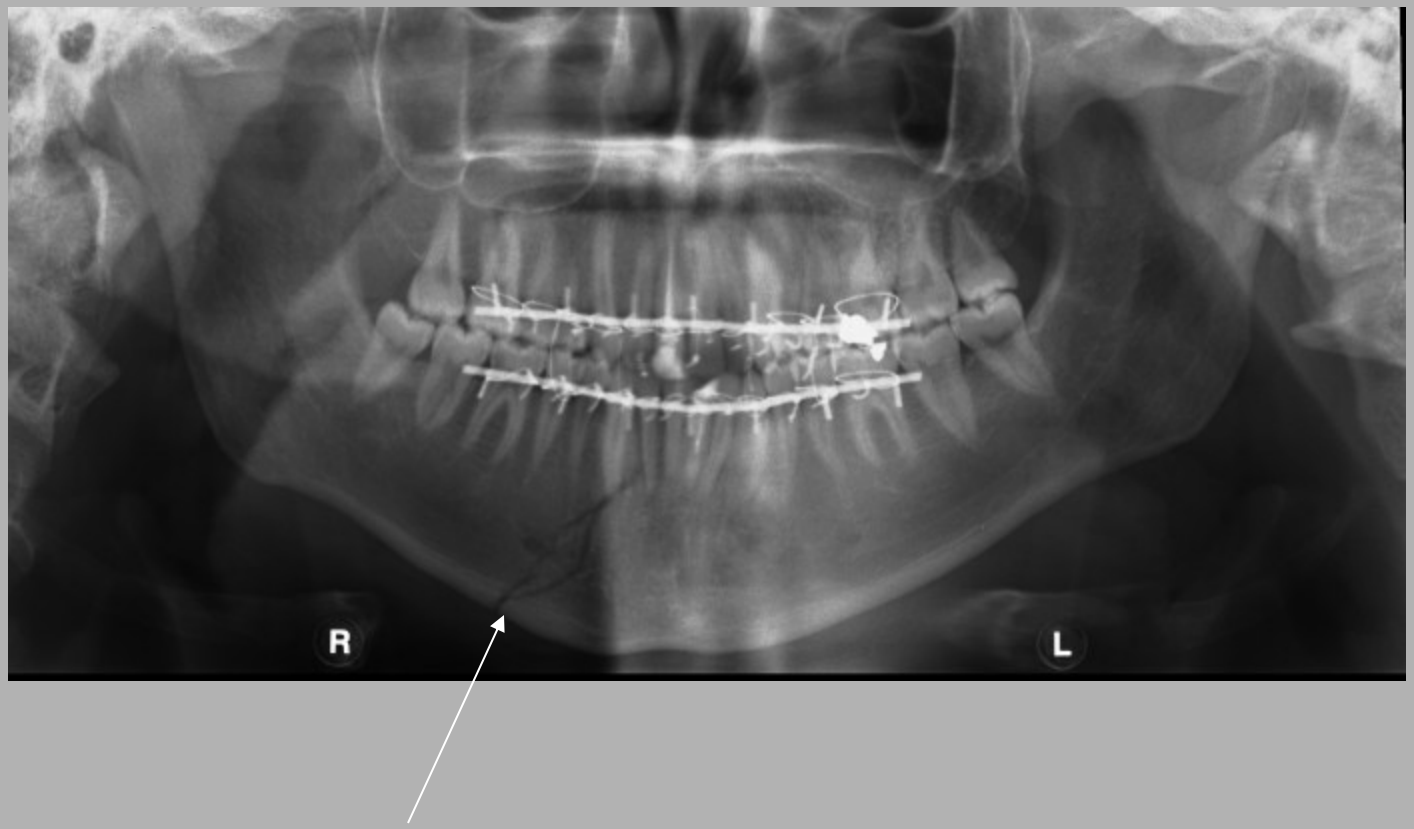
Fract. processus articul. mandibulae bilat.



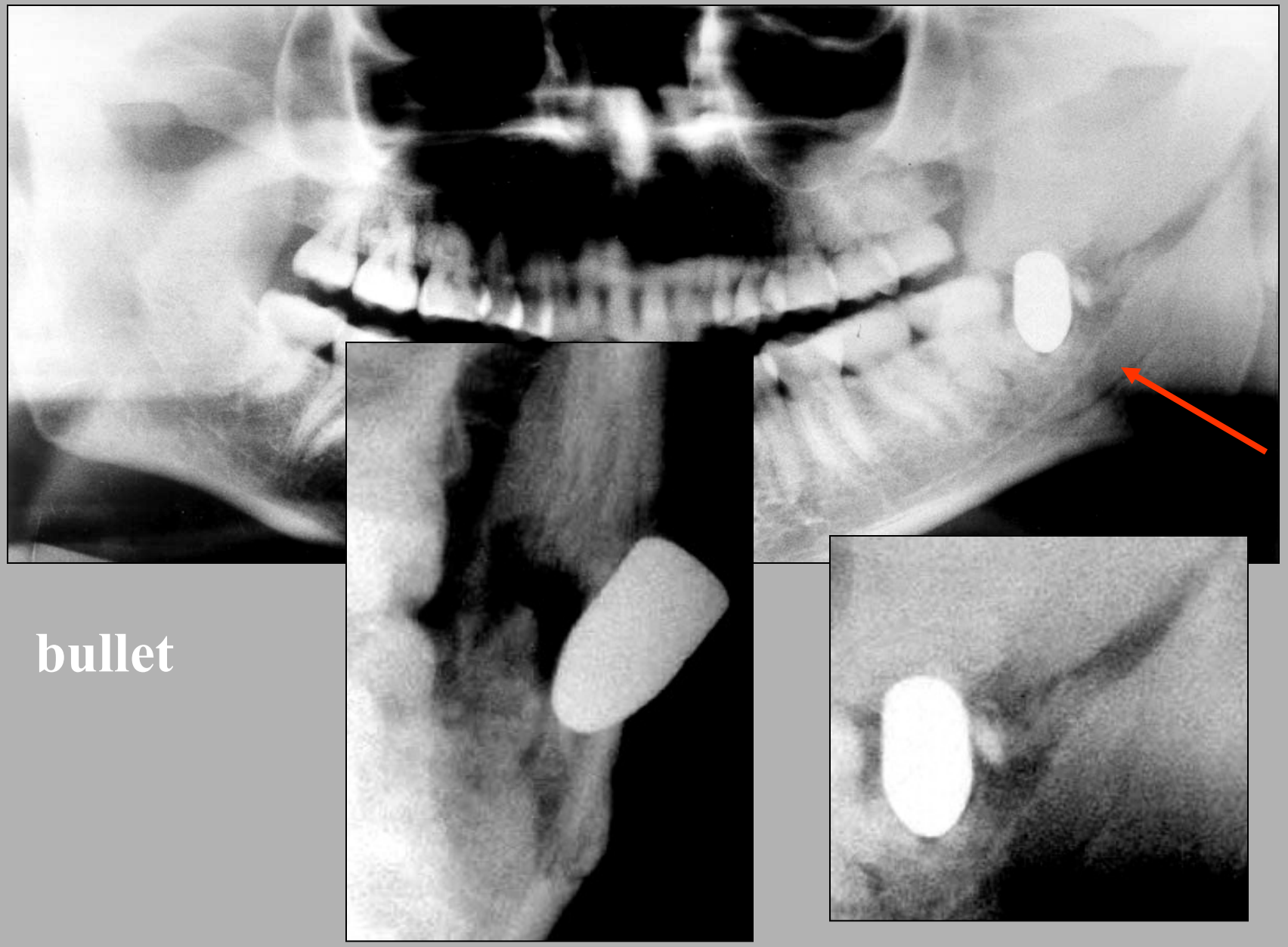
mandible angle - sutura



Body



symphysis



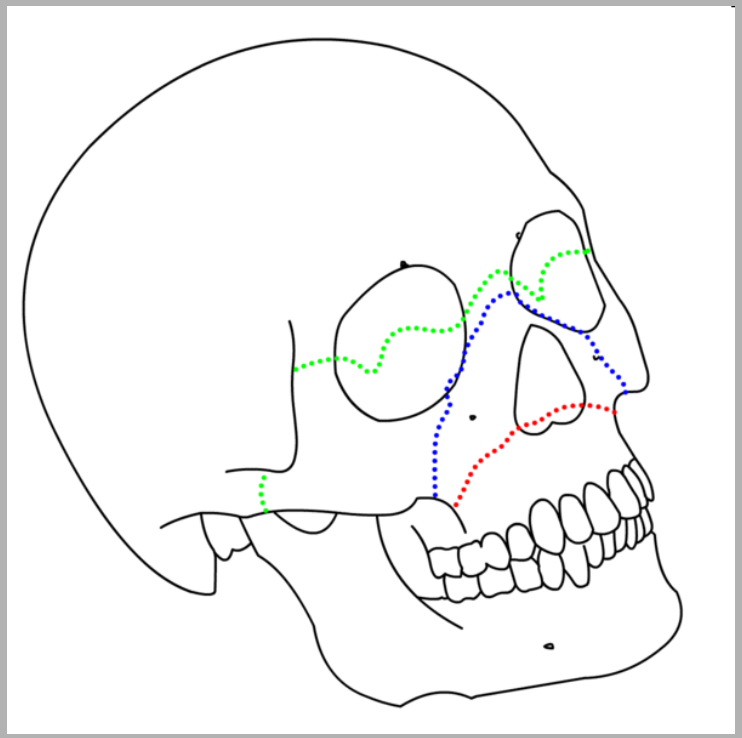
bullet

Pathological fracture apical cyst

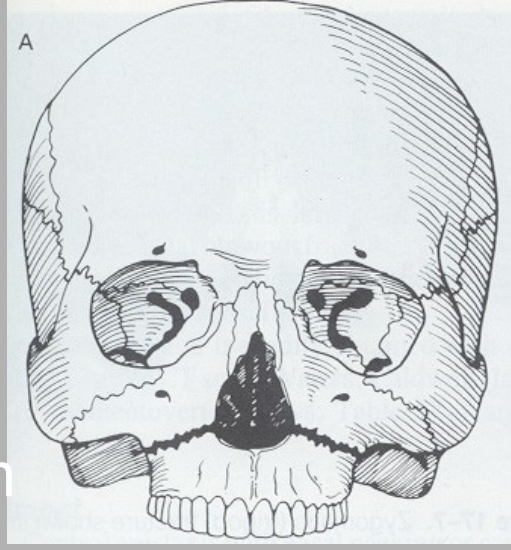
Maxillar fractures

Le Forte

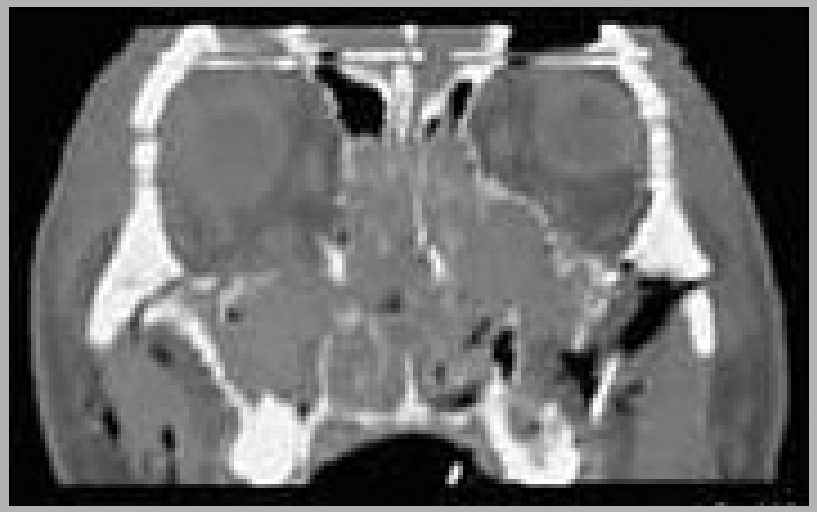
- high energy trauma
- Classification: **Le-Forte I-III**
- **all types Le Forte involve processus pterygoideus**



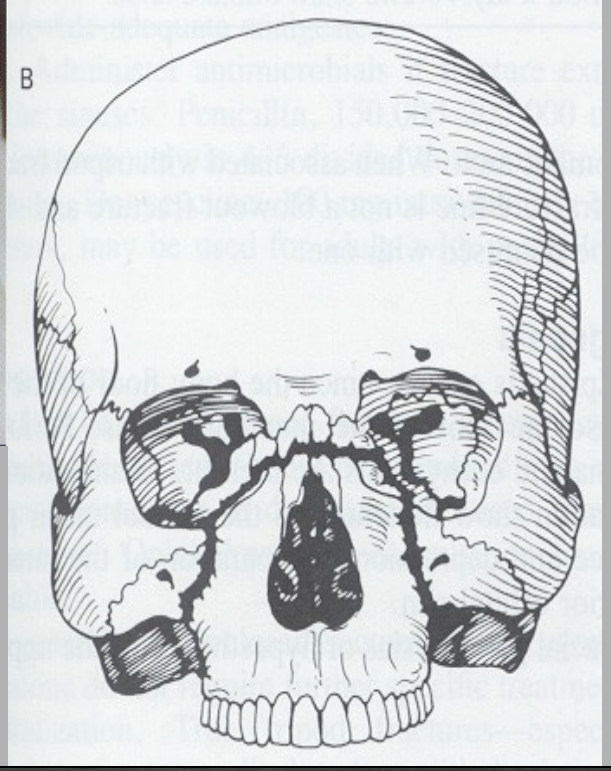
LeFort I



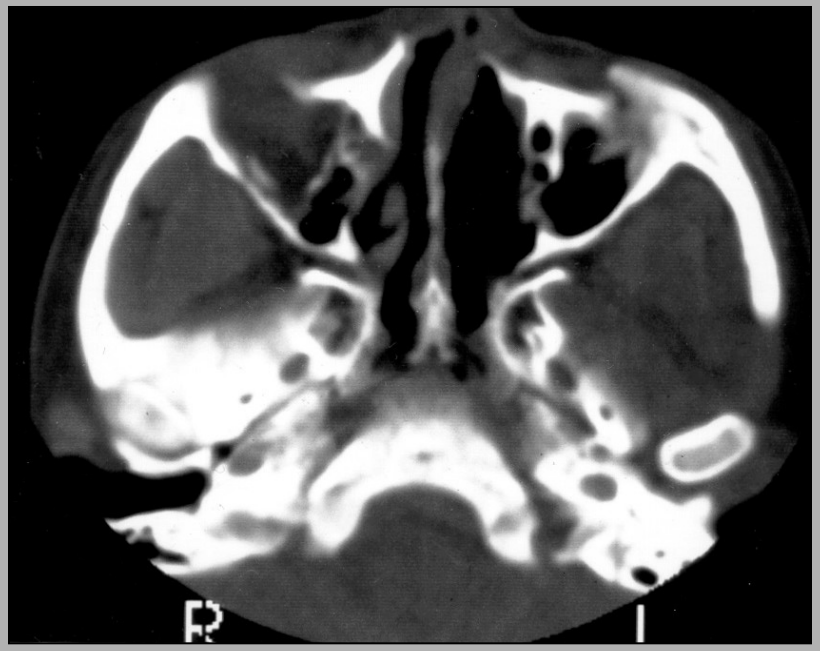
- horizontal fracture
- 'floating palate
- The fracture extends from the nasal septum travels horizontally above the teeth apices
- crosses below the zygomaticomaxillary junction, and traverses the pterygomaxillary junction to interrupt the pterygoid plates.

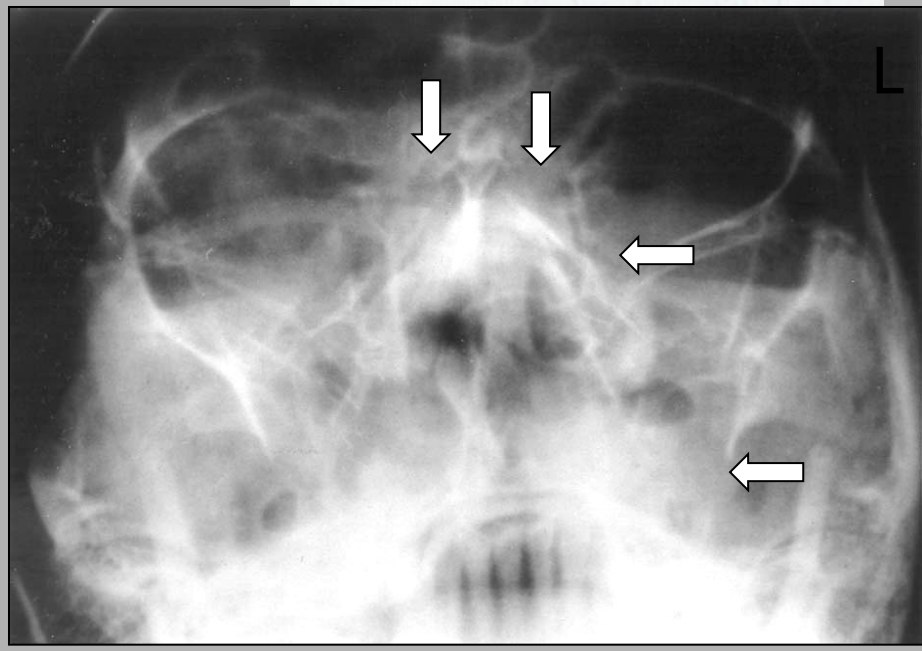


LeFort II



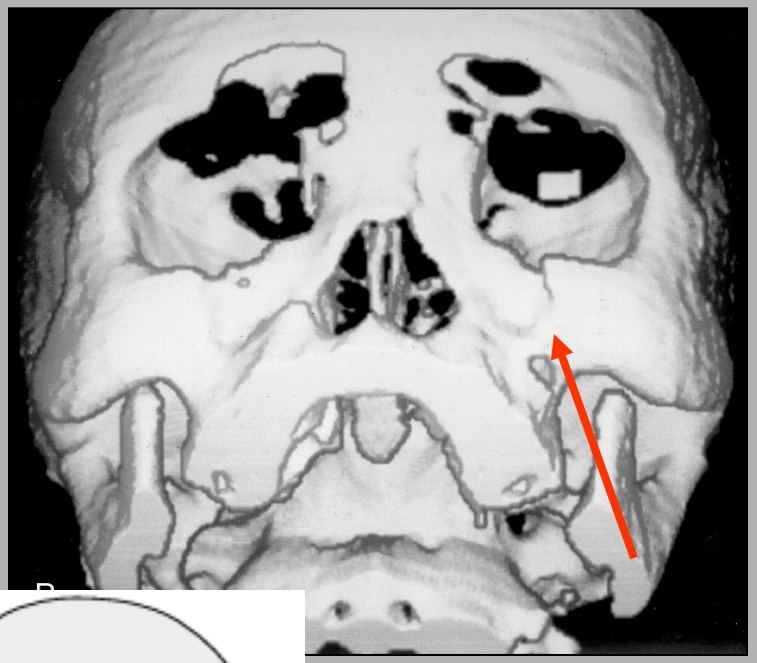
- ✓Maxilla
- ✓Medial portion of orbits
- ✓nasal bones

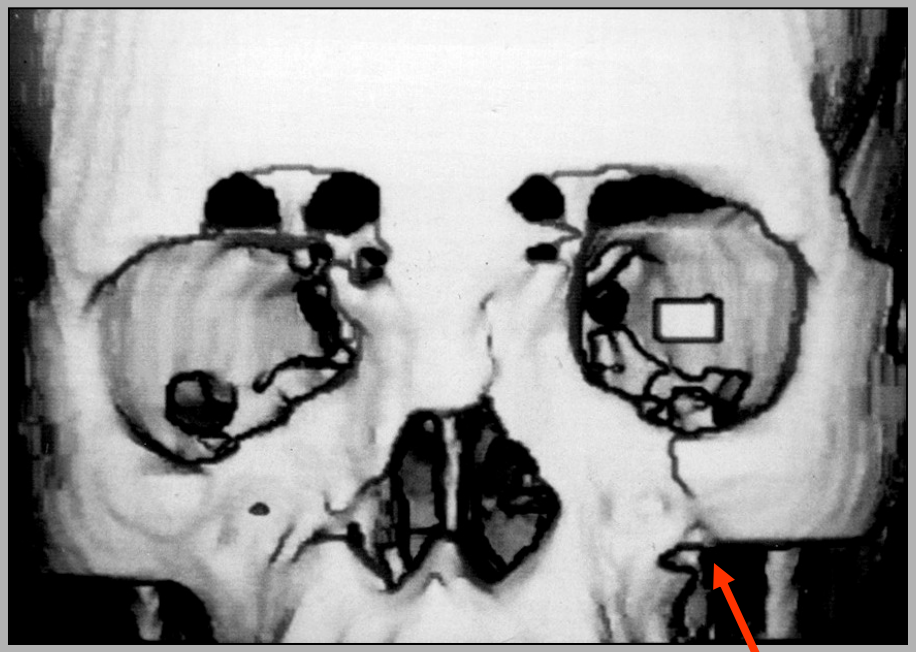


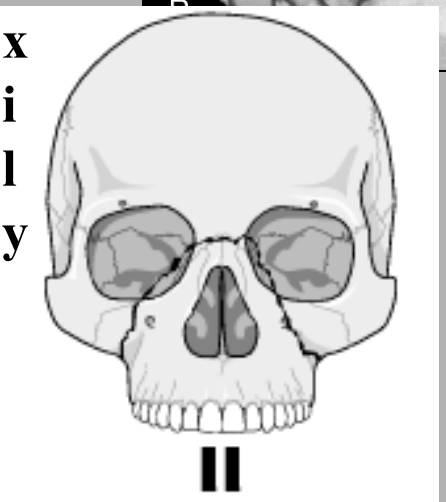


LeFort II

Fraktury maxily







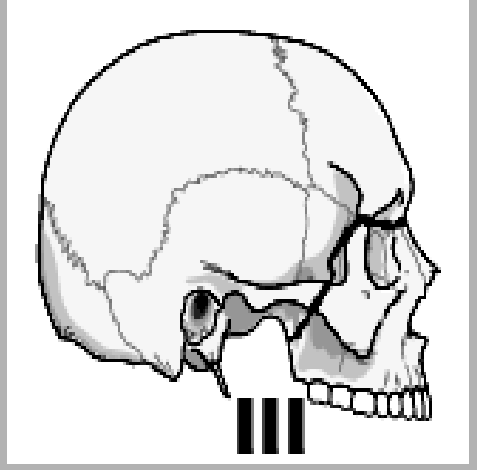
CT 3-D reconstruction

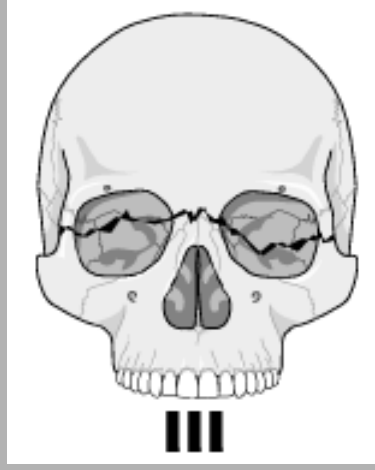
LeFort II

Fraktury maxily

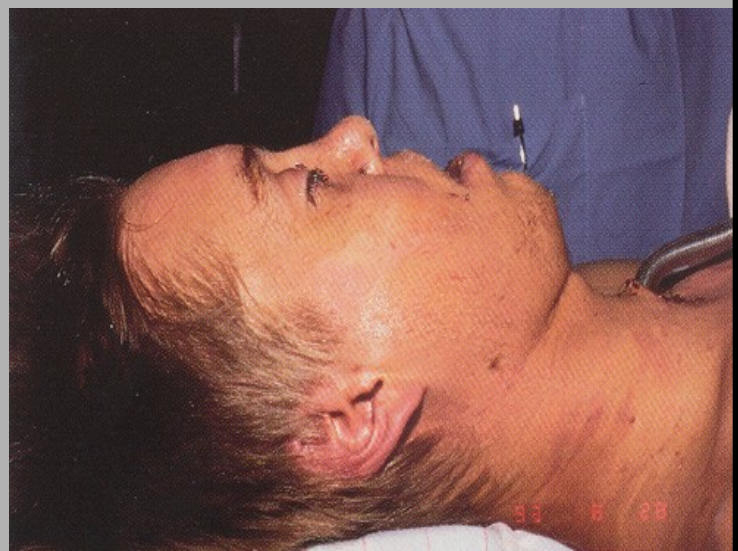
II

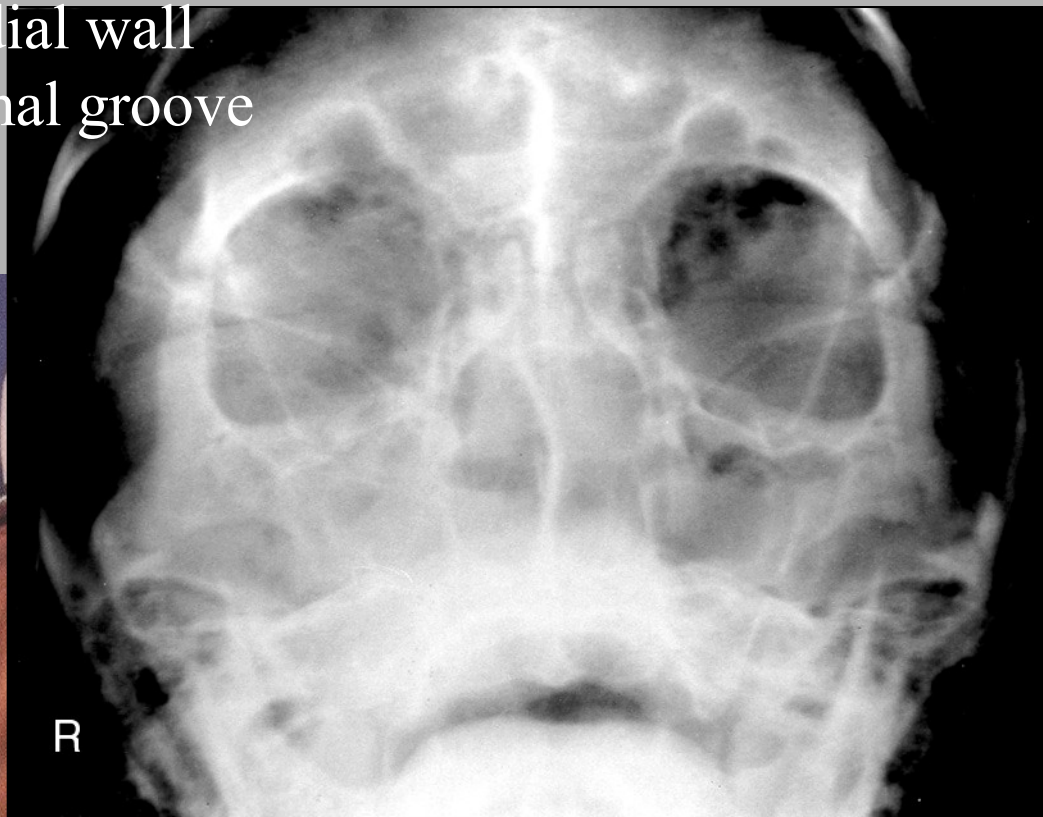
LeFort III

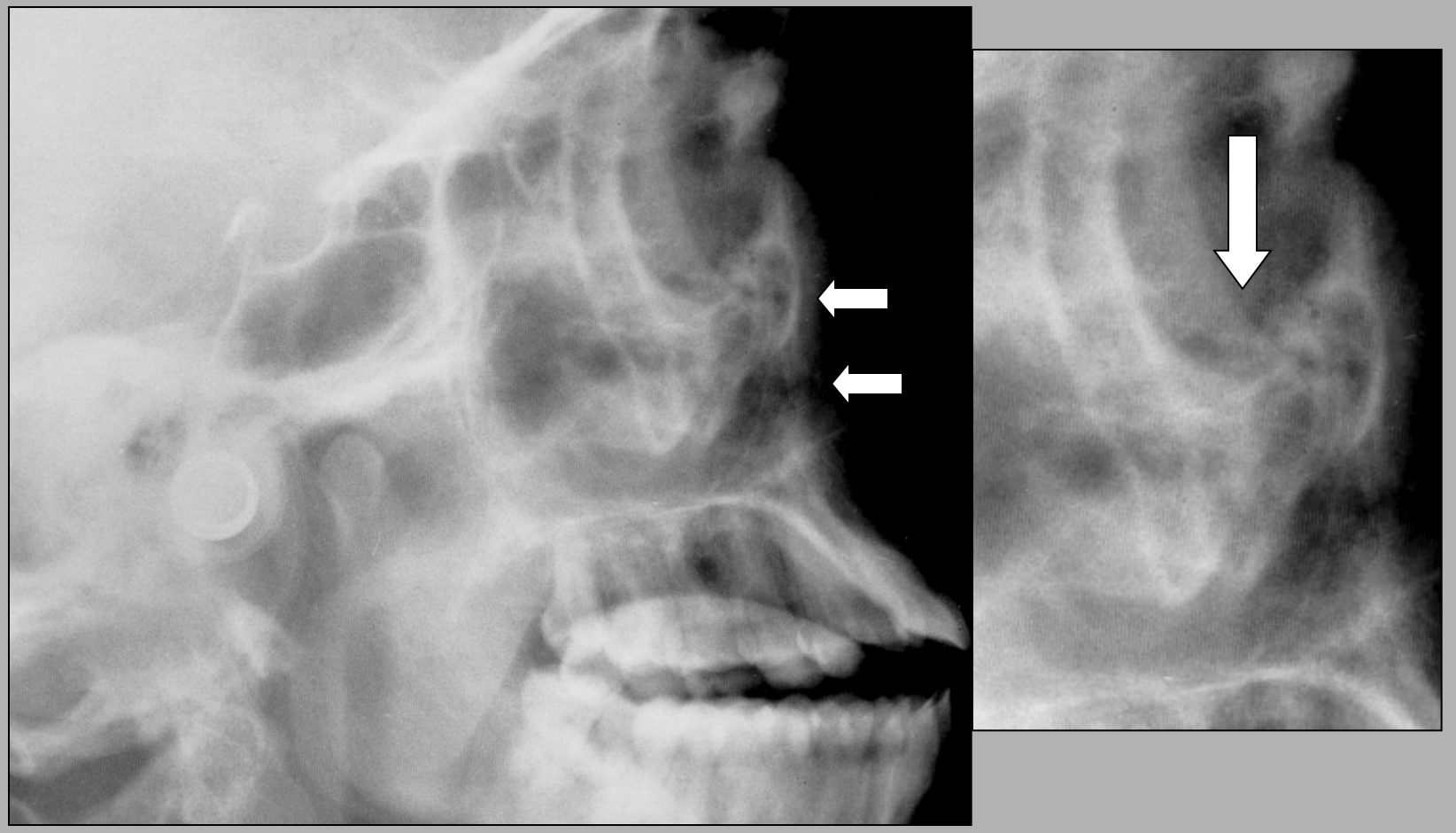




- fractures (transverse)
- known as craniofacial dissociation
- involve the zygomatic arch
- start at the nasofrontal and frontomaxillary sutures
- extend posteriorly along the medial wall of the orbit through the nasolacrimal groove and ethmoid bones.

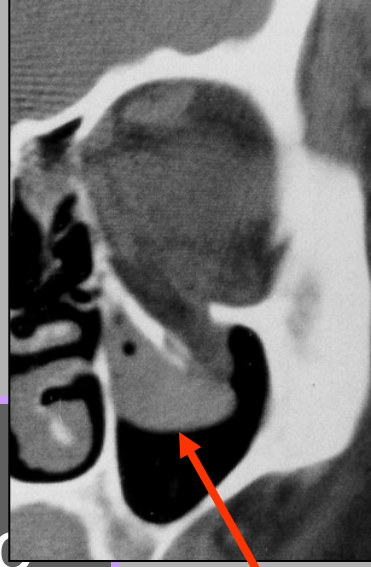






Orbital fractures

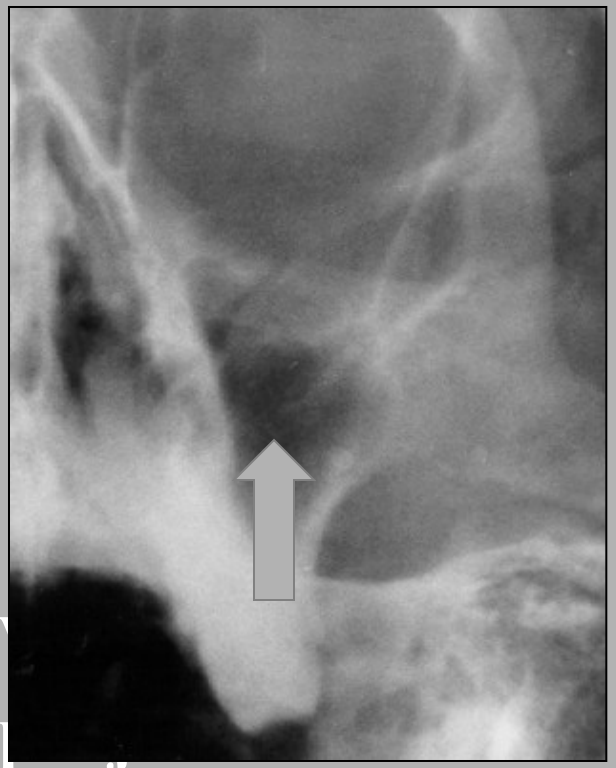
„Blow-out“ fraktura

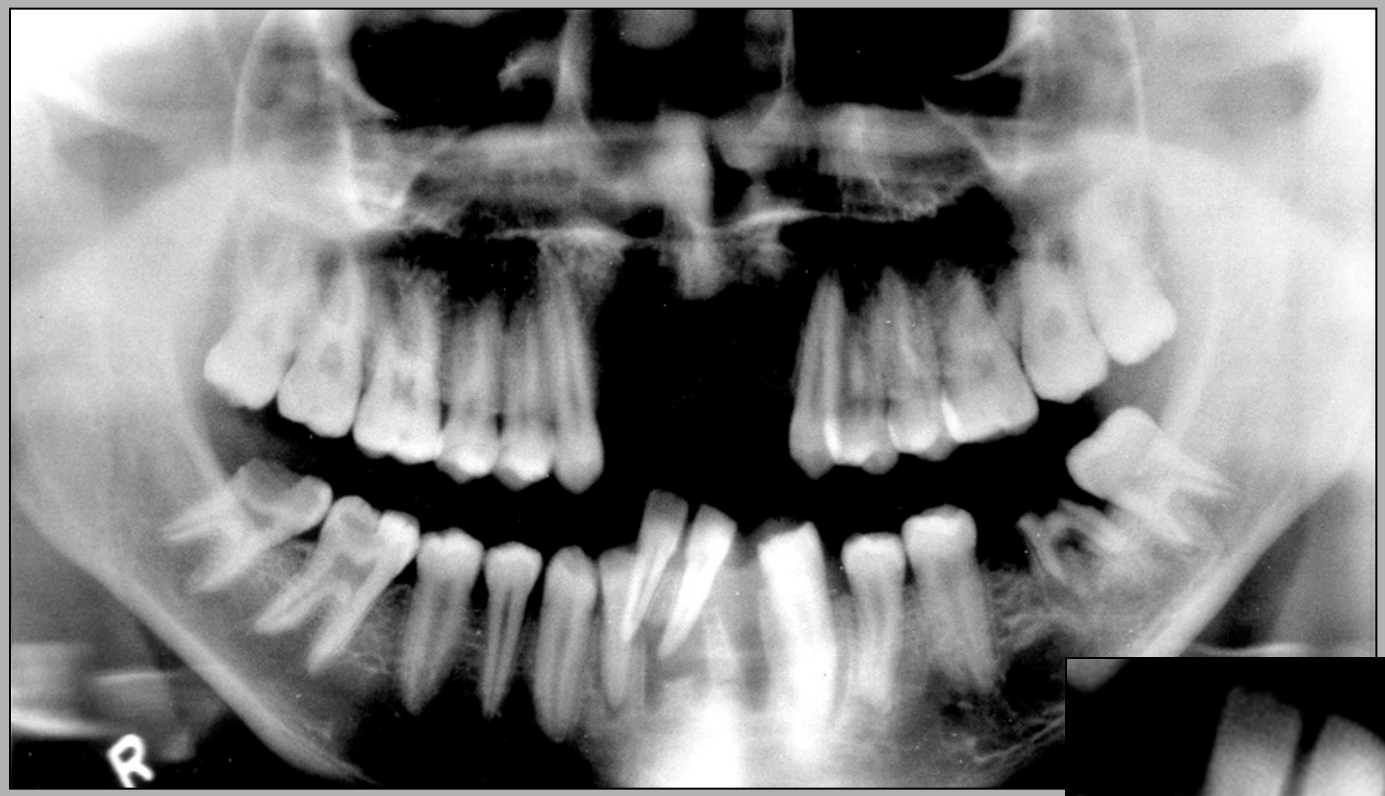


- Síla se přenáší přes tenké dno orbity, kde dochází k fraktuře v blízkosti infraorbitálního kanálu.
- Měkké tkáně přesahují okraj orbity.
- Afekce maxilárního sinu.
- Dislokace dna orbity.
- Polypoidní denzita při horním okraji maxil. sinu při herniaci obsahu orbity.
- Parestezie tváře.

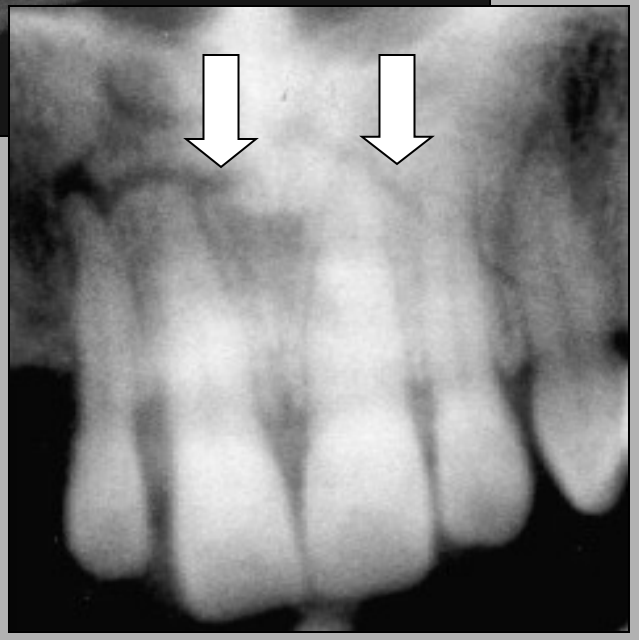
Orbita

„Blow-out“ fract.





Subluxation.



Alveolar fract.

Periodontics:

- Alveolar bone height
- Alveolar bone health
- Generalised vs localised

  alveolar bone loss
- Peri-radicular infection