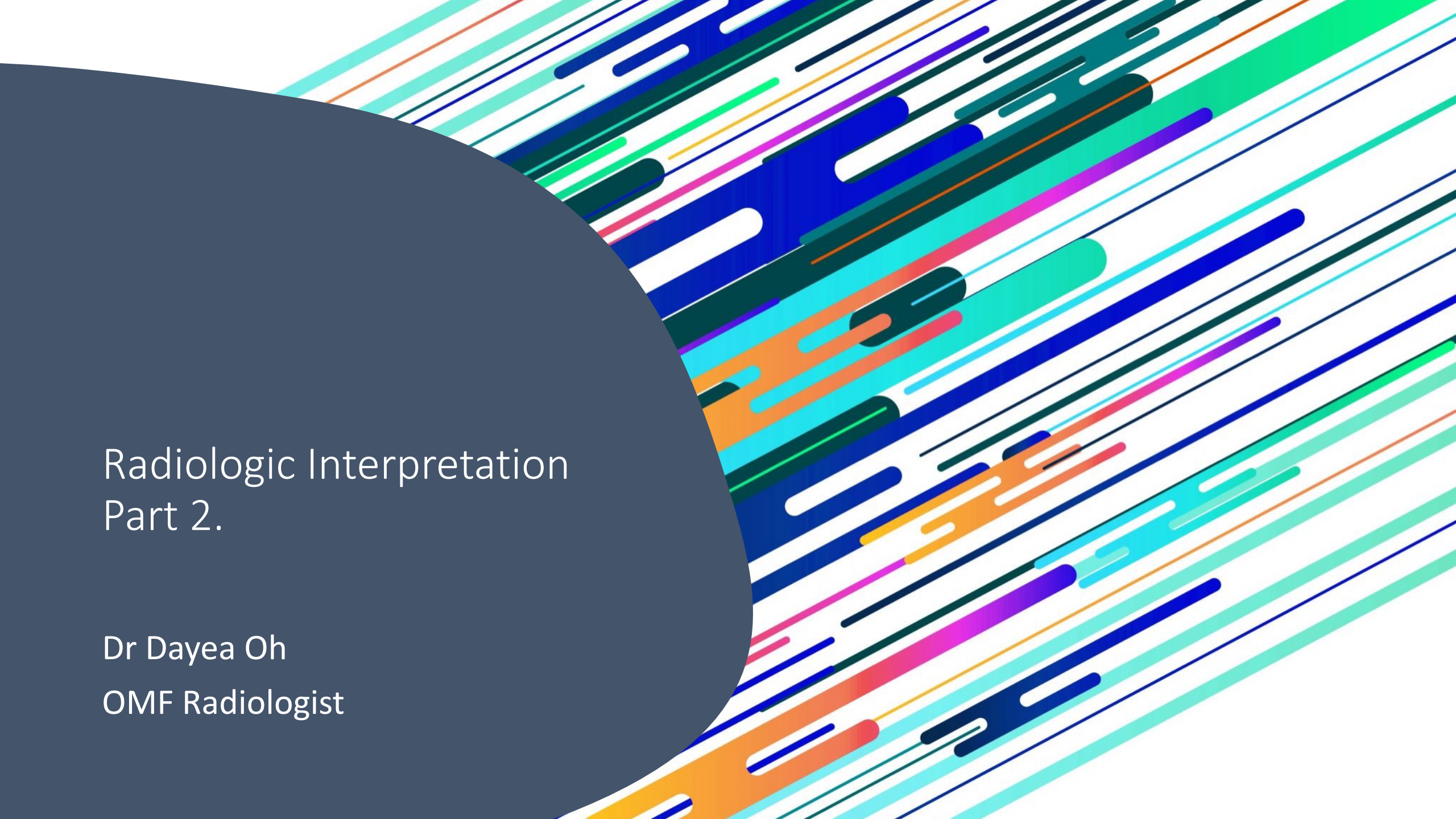




Radiologic Interpretation Part 2.

Dr Dayea Oh
OMF Radiologist

Learning Objectives

- Reviewing the systematic approach
- Describing “lesions” considering:
 - Location
 - Borders
 - Morphology
 - Internal Architecture / Pattern
 - Effects on Adjacent Tissues
- Understanding Surgical Sieve
- Choosing next appropriate diagnostic imaging modality for further evaluation
- Knowing when to urgently refer

Systematic approach

00. Any Technical or Positional Error?

1. Address Clinical Concerns

2. Dentoalveolar

- a) Count teeth & identify ectopic and/or impacted teeth
- b) Dental Anomalies (Position, Shape,...)
- c) Periodontal bone loss
- d) Dental pathology (non-carious tooth loss, caries, fracture, periapical pathologies, etc.)

3. Maxilla and Mandible

a) **Abnormal lucencies**

b) **Abnormal opacities**

- c) Altered trabecular pattern
- d) Fractures
- e) Jaw Asymmetry

4. Maxillary sinuses (esp. mucosal changes)

5. TM Joints (esp. morphological change of condyles)

6. Soft Tissues (swelling, soft tissue calcifications eg. Tonsiloliths, salivary gland stones, etc.)

7. Other sites: Spine, orbits, etc. (structural changes)

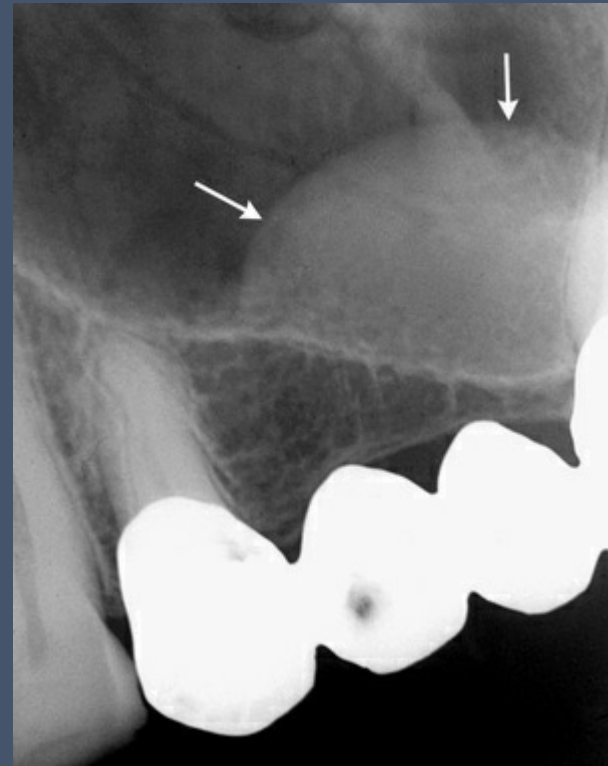
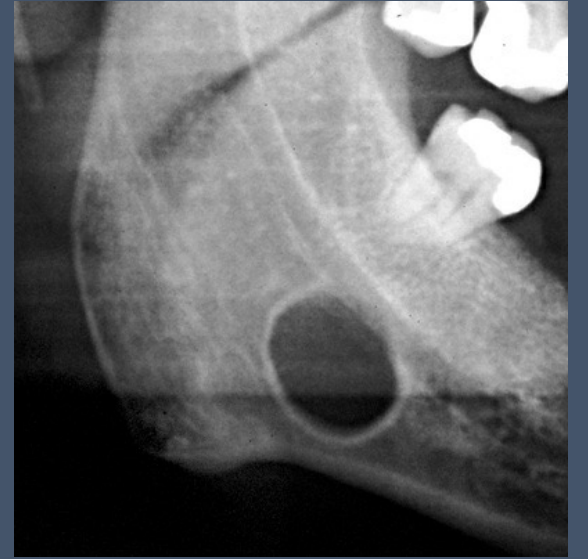
Abnormal Findings (Lesions) in the Jaws

1. Lucent? Opaque? Or Mixed?

2. Localisation

- Unilateral or Bilateral?
- Single or Multiple?
- Epicentre
 - Pericoronal / Periapical to Tooth?
 - MD Body → Superior / Inferior to Mandibular Canal or Within?
 - MX → Inferior or Superior to Maxillary Sinus Floor?
 - Other: MD condyle, ramus, angle, etc.





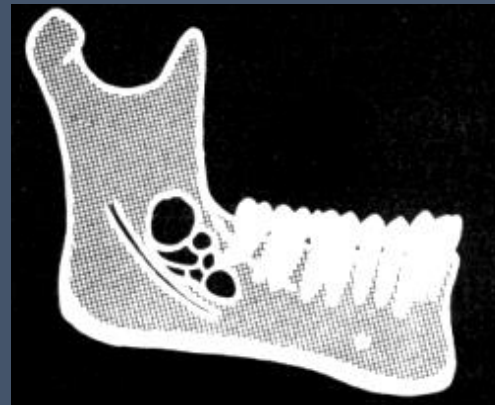
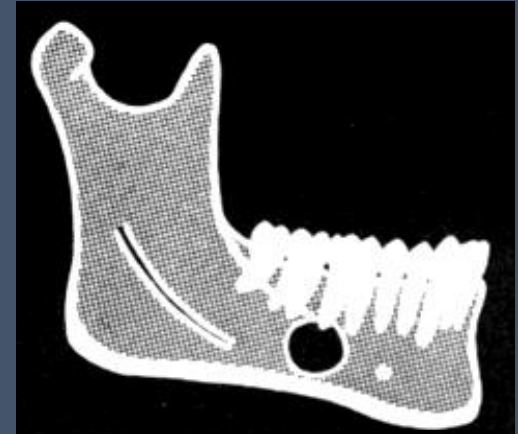
Abnormal Findings (Lesions) in the Jaws

3. Borders

- Well defined / Ill (poorly) defined
 - Well defined → Corticated, Sclerotic, etc.
- Circular, Scalloping, Irregular...

4. Morphology

- Unilocular (circular border), Multilocular, Pseudo-multilocular
- Other: circular, ovoid, triangular, ...



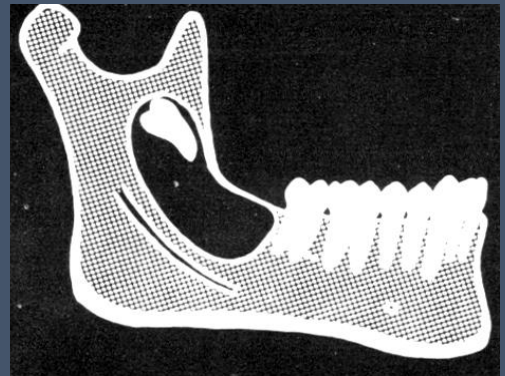
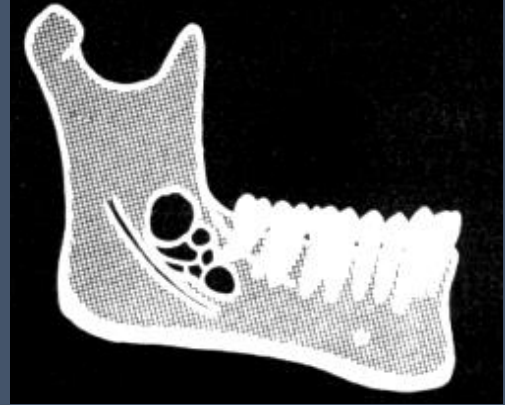
Abnormal Findings (Lesions) in the Jaws

5. Internal Architecture / Structure (lucent lesion)

- Completely lucent?
- Septa, calcifications, tooth-like structure, etc.

6. Pattern (opaque lesion)

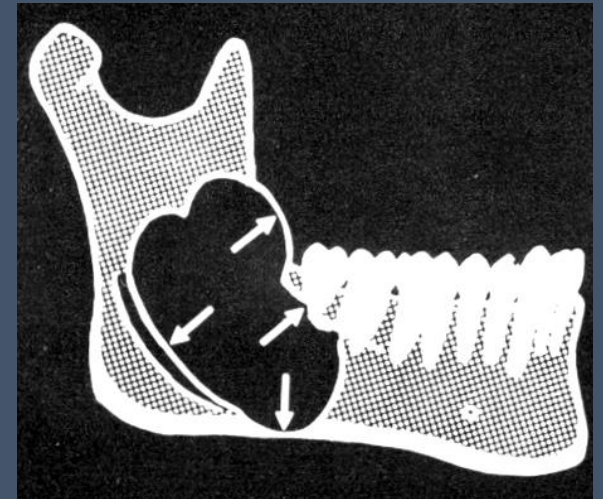
- Homogenous / Heterogenous
- Altered trabecular bone
- Ground glass, wheel-spoke, popcorn-like, etc.



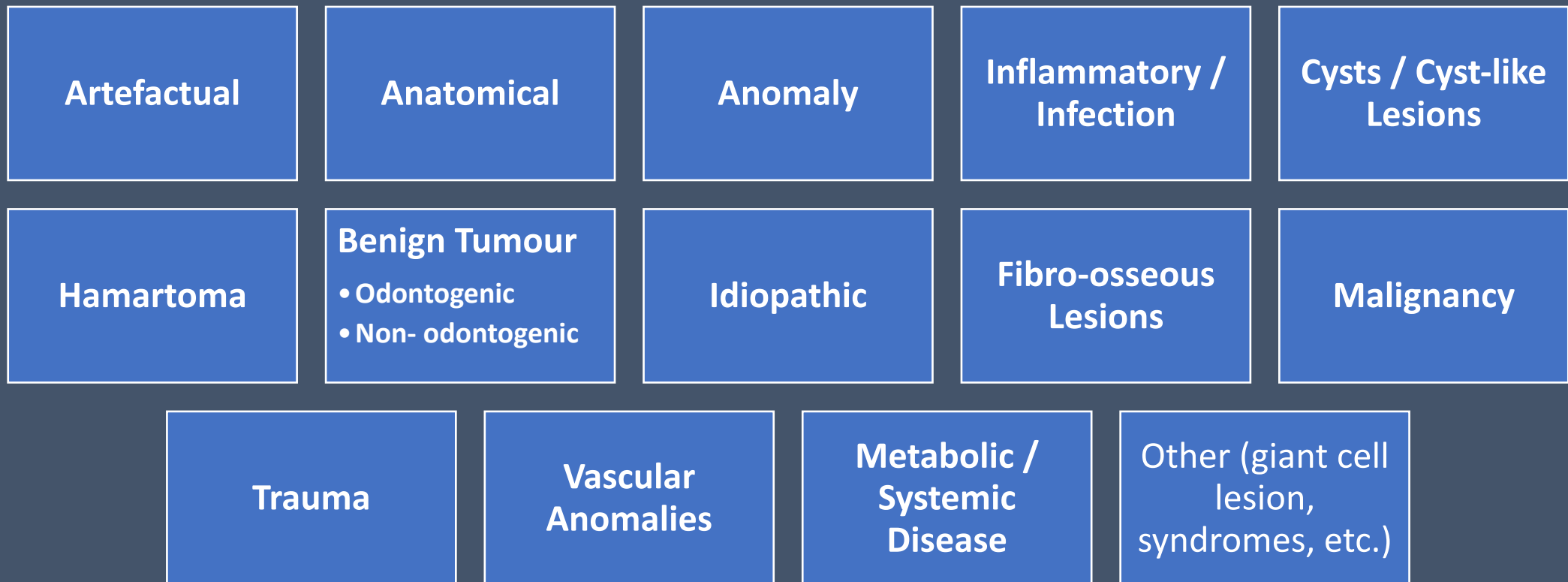
Abnormal Findings (Lesions) in the Jaws

7. Effects on Adjacent Structures

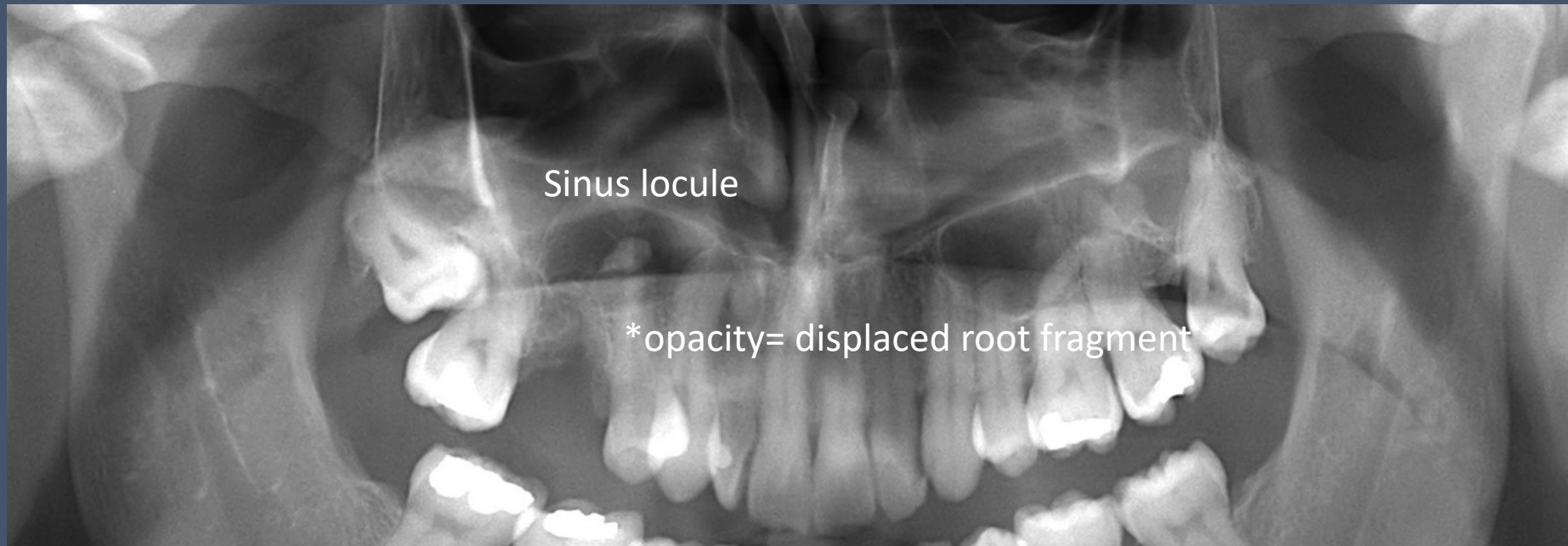
- Teeth: lamina dura, PDL space, root, follicular space
- Mandibular Canal:
 - Displacement, compression / flattening, widening, obliteration
- Surrounding Bone:
 - Sclerosis
- Cortical plate:
 - Expansion, thinning, effacement
 - Periosteal reaction / new bone formation
 - Lamellar / Onion-skin / Hair-on-end / Sunray / Codman's triangle, etc.
- Maxillary sinus:
 - Floor: lifting, effacement, discontinuity, remodelling, etc.
 - Other walls: discontinuity, remodelling, inward bowing, etc.



Surgical Sieve – Identifying the nature of the lesion



Anatomical

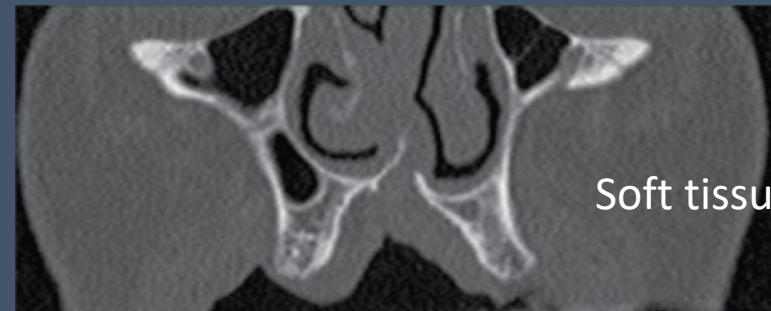


Anomaly

Cleft palate (congenital)



Most common facial birth defect

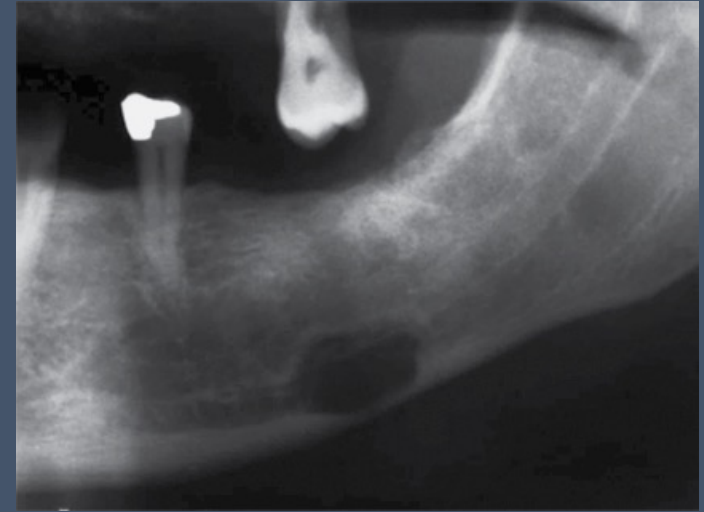
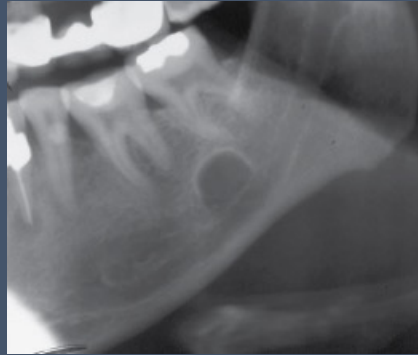


Soft tissue coverage

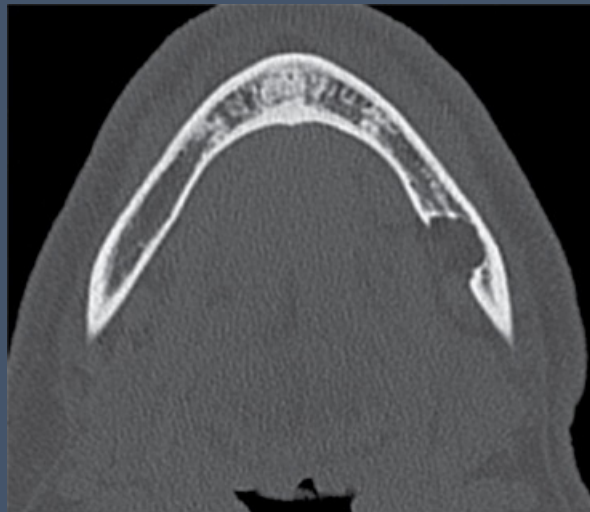
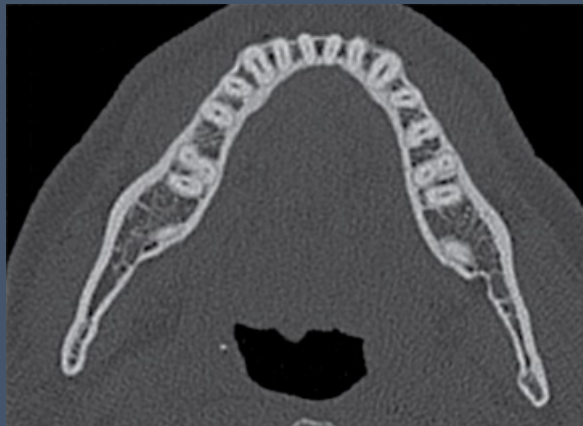
Always look for other anomalies esp dental anomalies eg. supernumerary teeth, malformed teeth, missing teeth, etc.

Anomaly

Stafne Defect



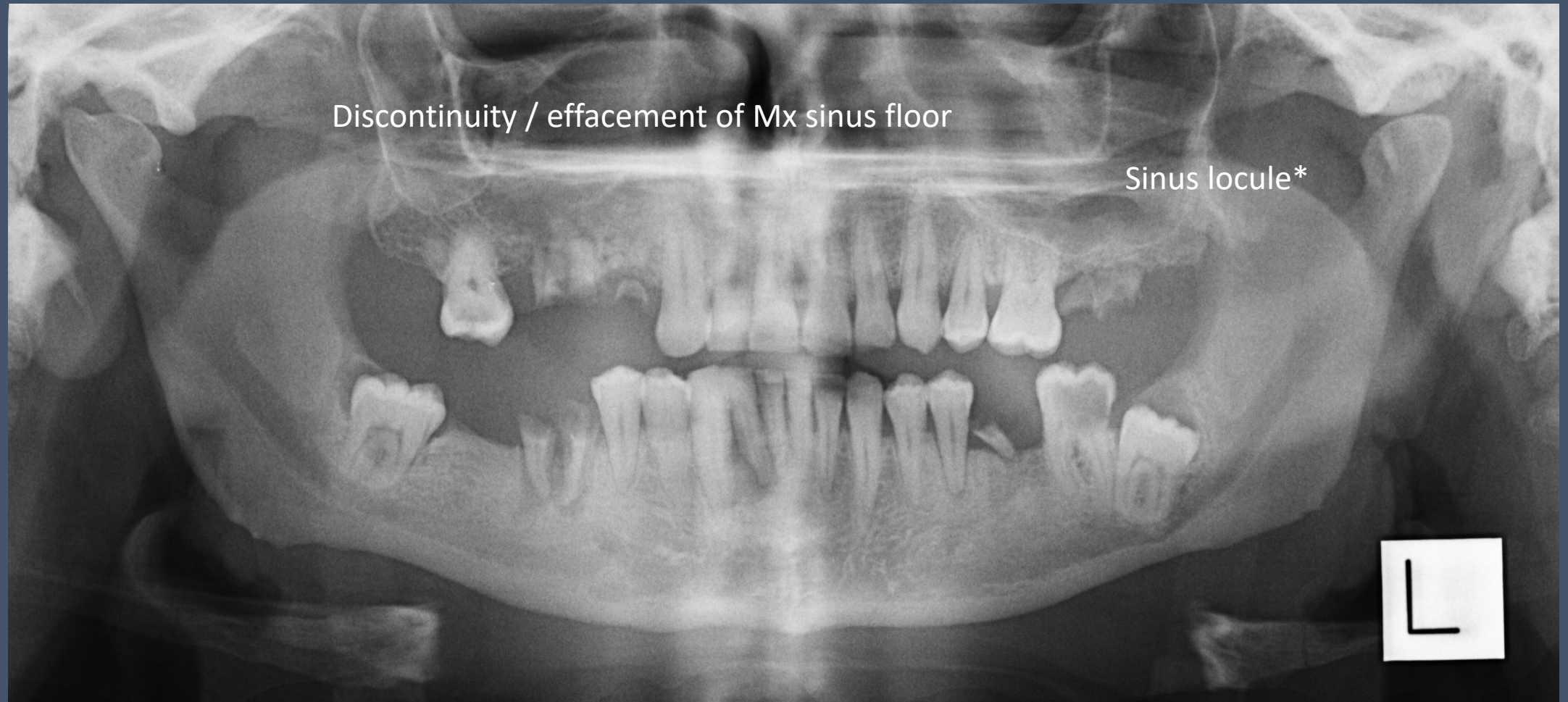
OPG: Well-defined lucency with heavily / thick corticated border



CT: Cortical depression (often fat-filled, seldom salivary gland)

Inflammatory

Lucent → Mixed lucent-sclerotic → Sclerotic



Inflammatory



Cyst

Cysts are **EXPANSILE** and have **CORTICATED** borders

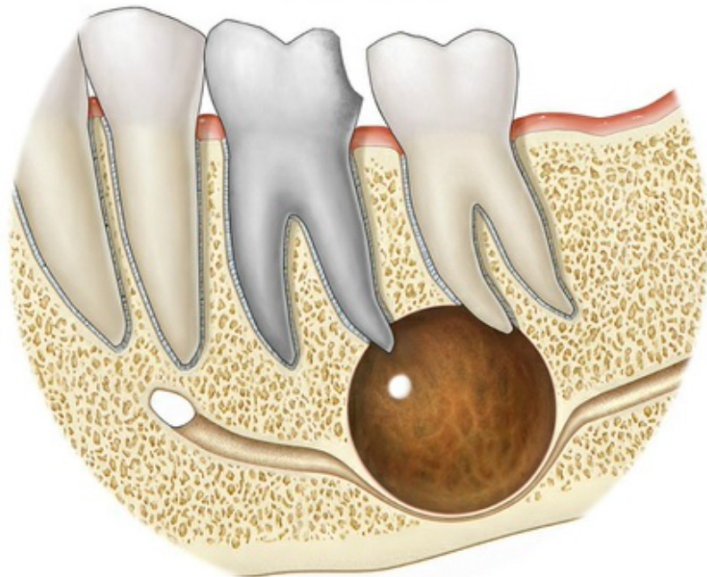


FIG. 23.1 The balloon-like “hydraulic” enlargement of a cyst in the jaws, and displacement of the adjacent inferior alveolar canal as it increases in size.

Expansile lesion centred at the apex of 13 elevating the sinus cortical floor. The slightly lobulated appearance of this dome-shaped lesion reflects some deflation related to commencement of endodontic treatment



Corticated borders = slow growing lesion

Further investigation with CBCT or MDCT

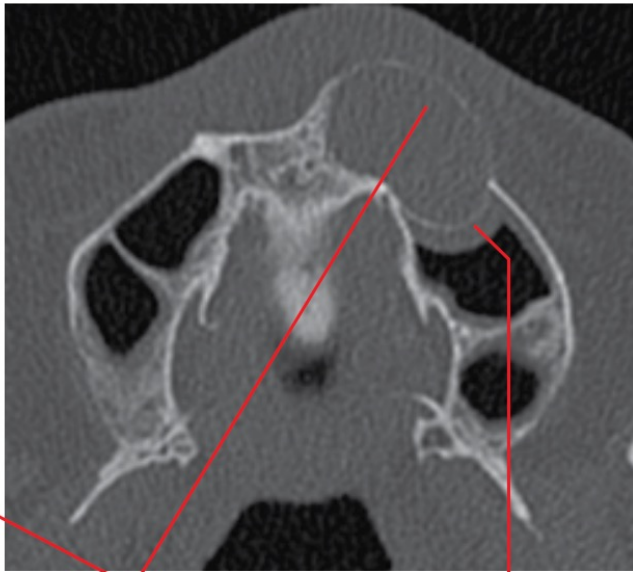
Cyst

(a)



Well-defined corticated expansile lesion centred at the apical foramen of 23, extending labially and also inferiorly over the labial aspect of the root

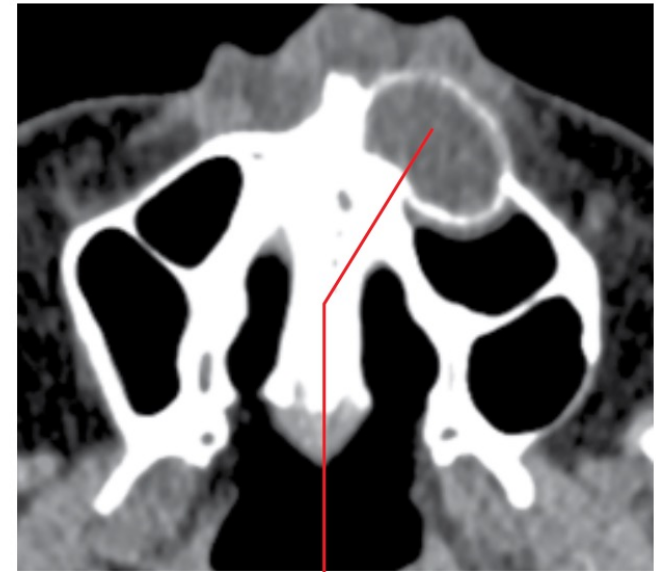
(b)



Labial expansion with cortical thinning and focal effacements

Elevated cortical floor of the left maxillary sinus

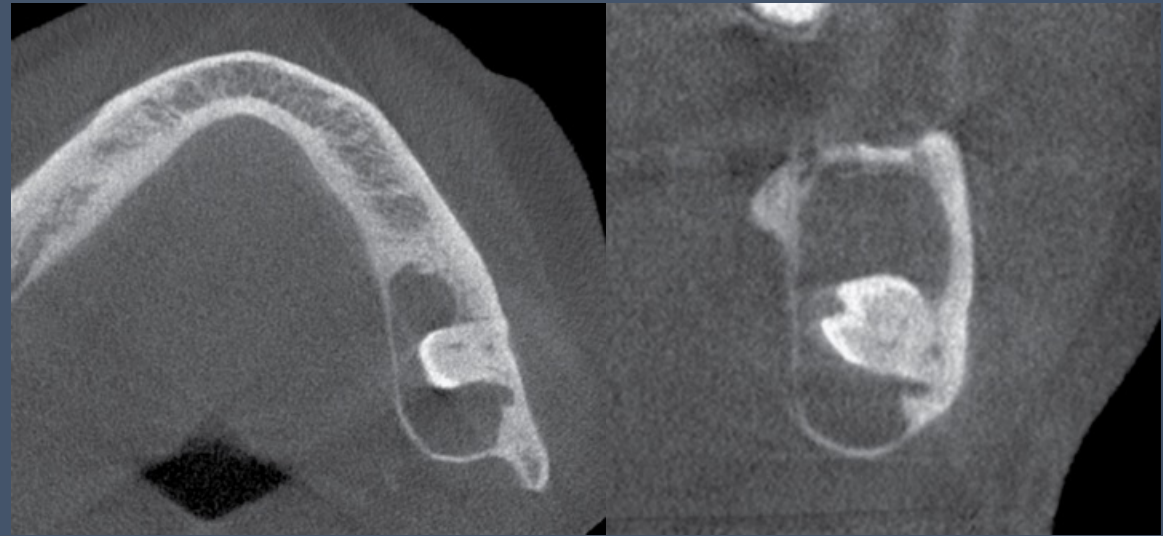
(c)



Internal homogeneous fluid attenuation. This lesion is well contained in spite of the focal effacements of the labial cortex

Radicular Cyst on MSCT / MDCT

Cyst

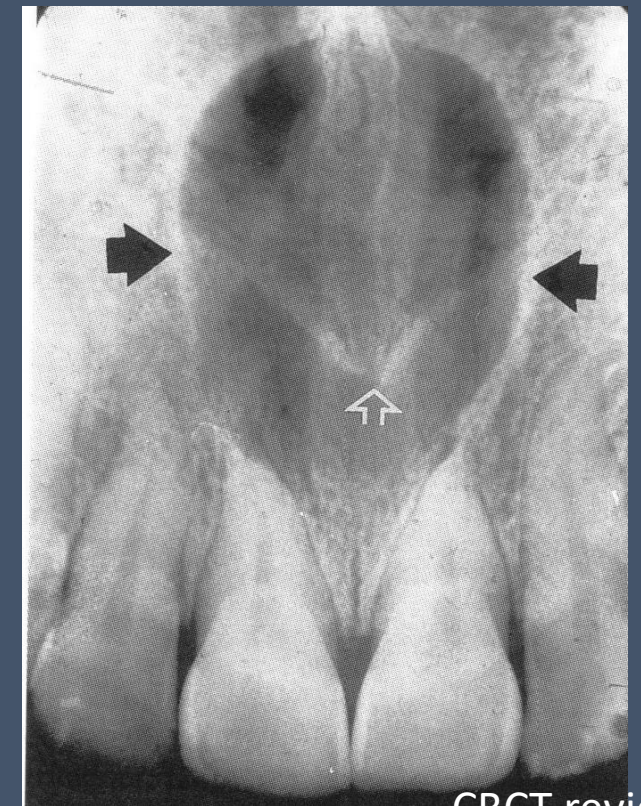


Dentigerous cysts have a pericoronal relationship with unerupted teeth ie. associated with crown

Cyst



Incisive canal cyst / nasopalatine duct cyst

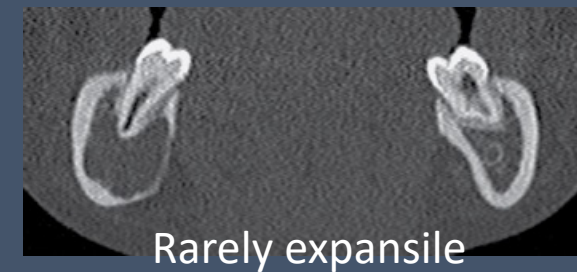
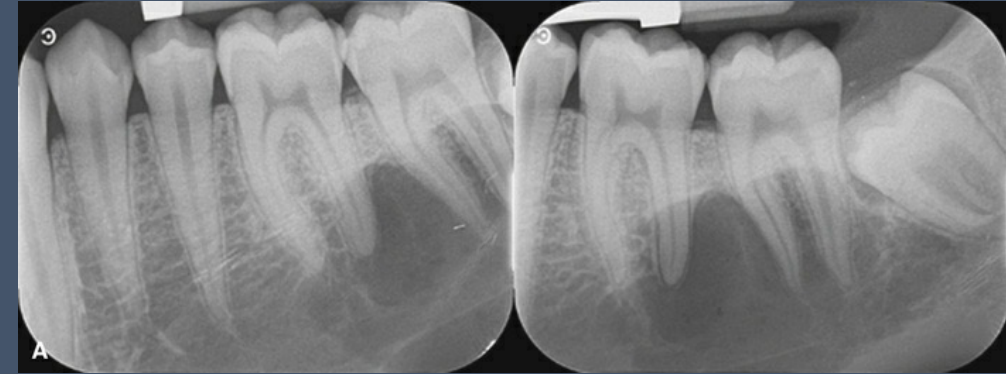


Pseudocyst (Cyst-like Lesion)



Simple Bone Cyst

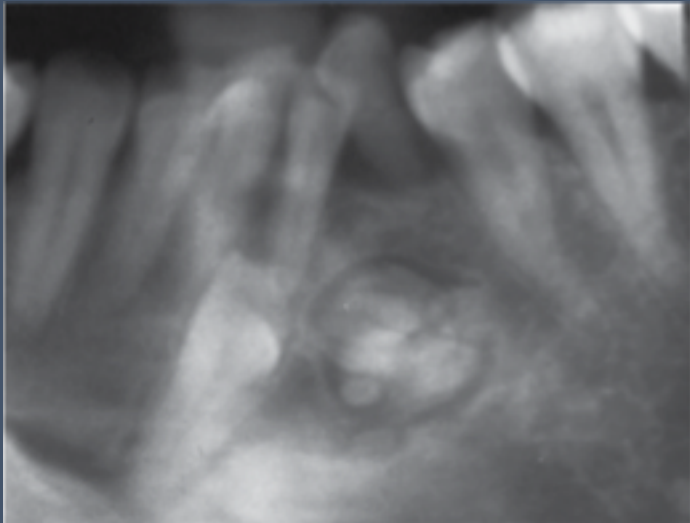
Corticated lucency. Can be mildly expansile.



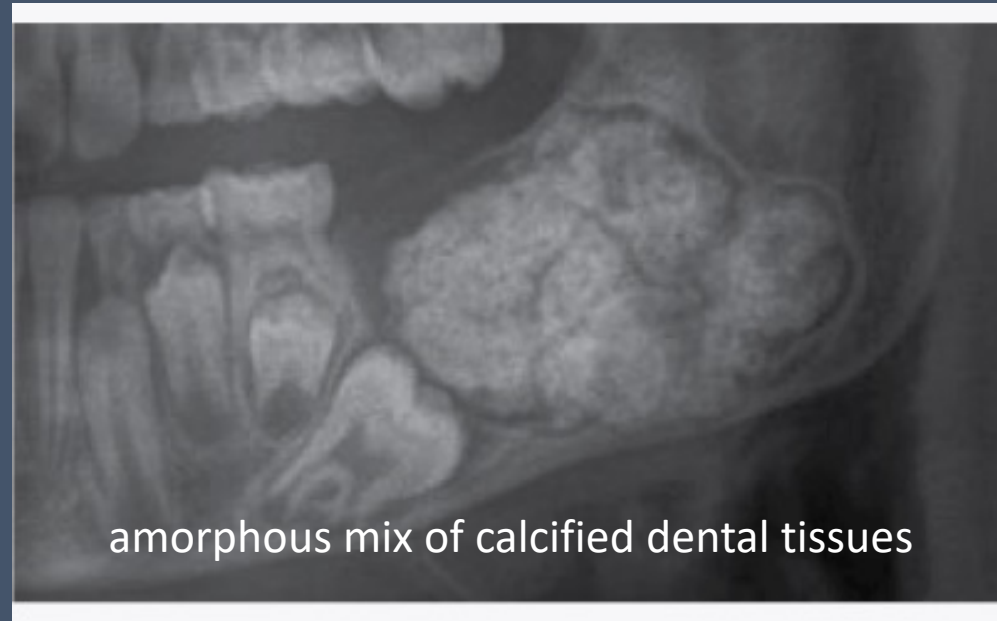
Harmatoma (Tumour-like Lesions)



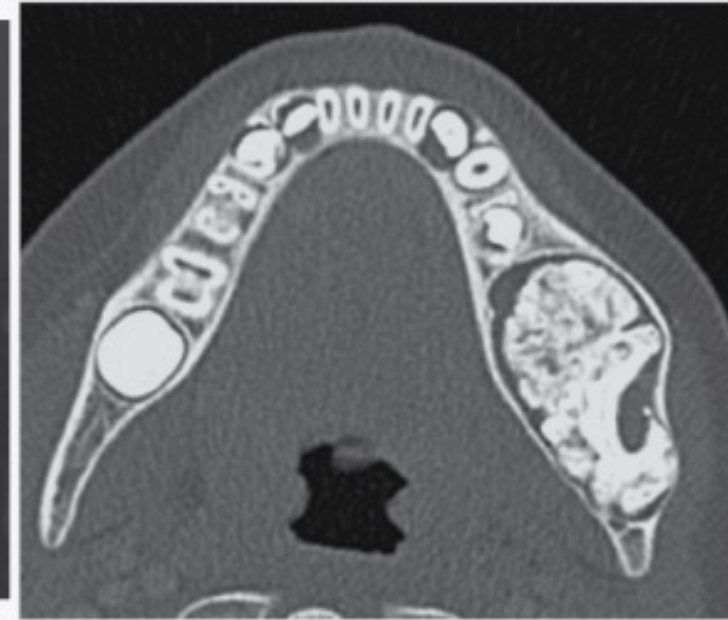
Odontoma / odontome (Compound type & Complex type)



Multiple tooth-like opacities



amorphous mix of calcified dental tissues



CT (CBCT or MSCT/MDCT) Review
Refer to Surgeon

Benign Odontogenic Tumour

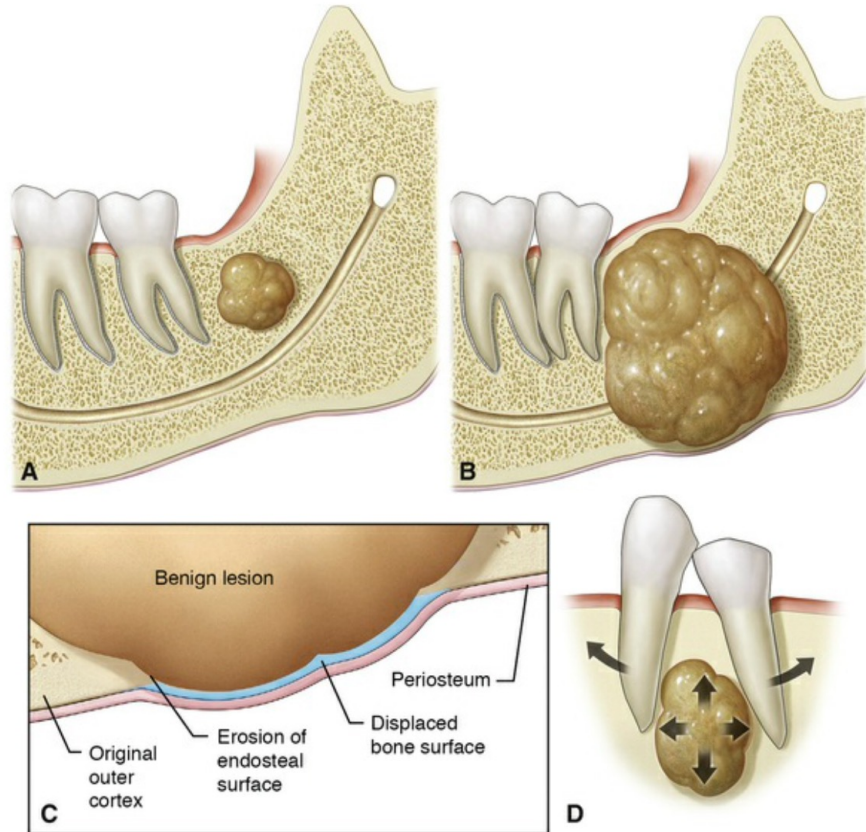


FIG. 24.1 Benign lesions grow concentrically in bone (A). They can be round to oval, or lobulated (B). As they grow, benign lesions can displace adjacent bone borders (C) and teeth (D), and externally resorb tooth roots.

“Mass effect”

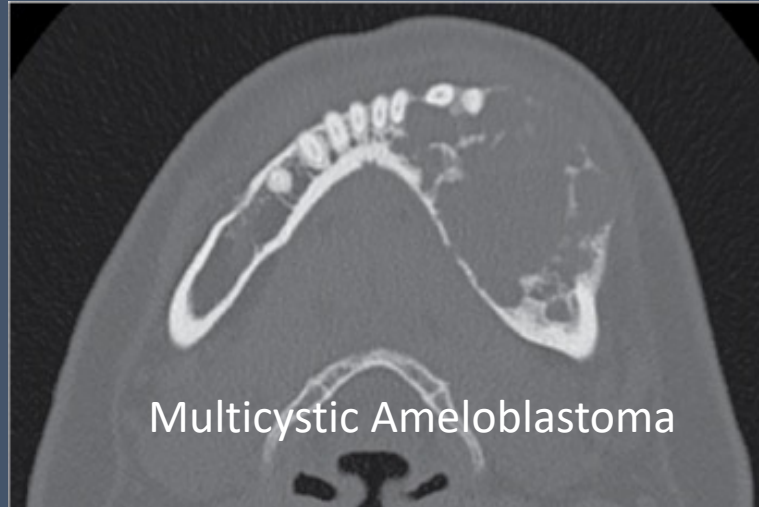
Expansile features + Resorption



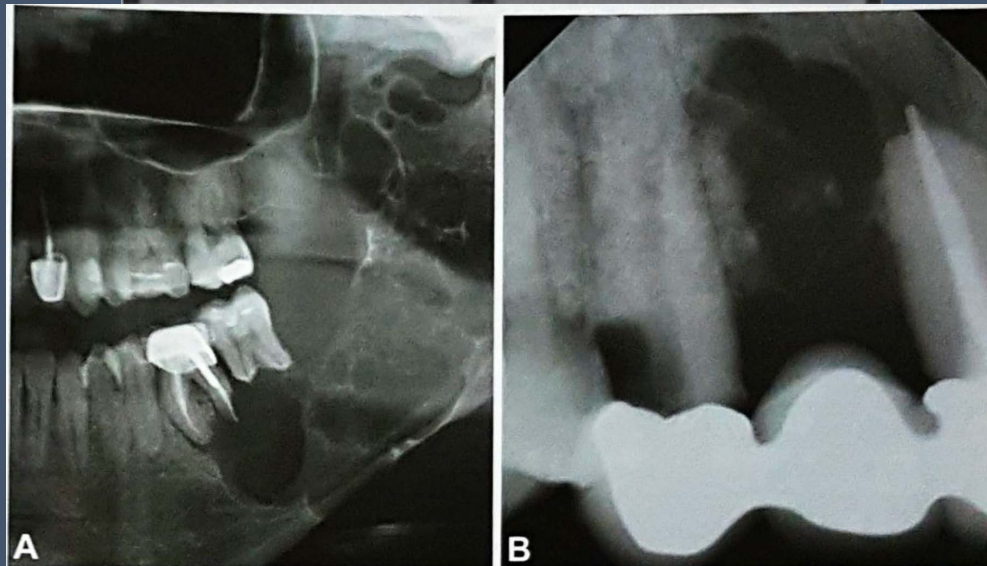
Unicyclic Ameloblastoma

MDCT/MRI Review
Refer to Surgeon

Benign Odontogenic Tumour



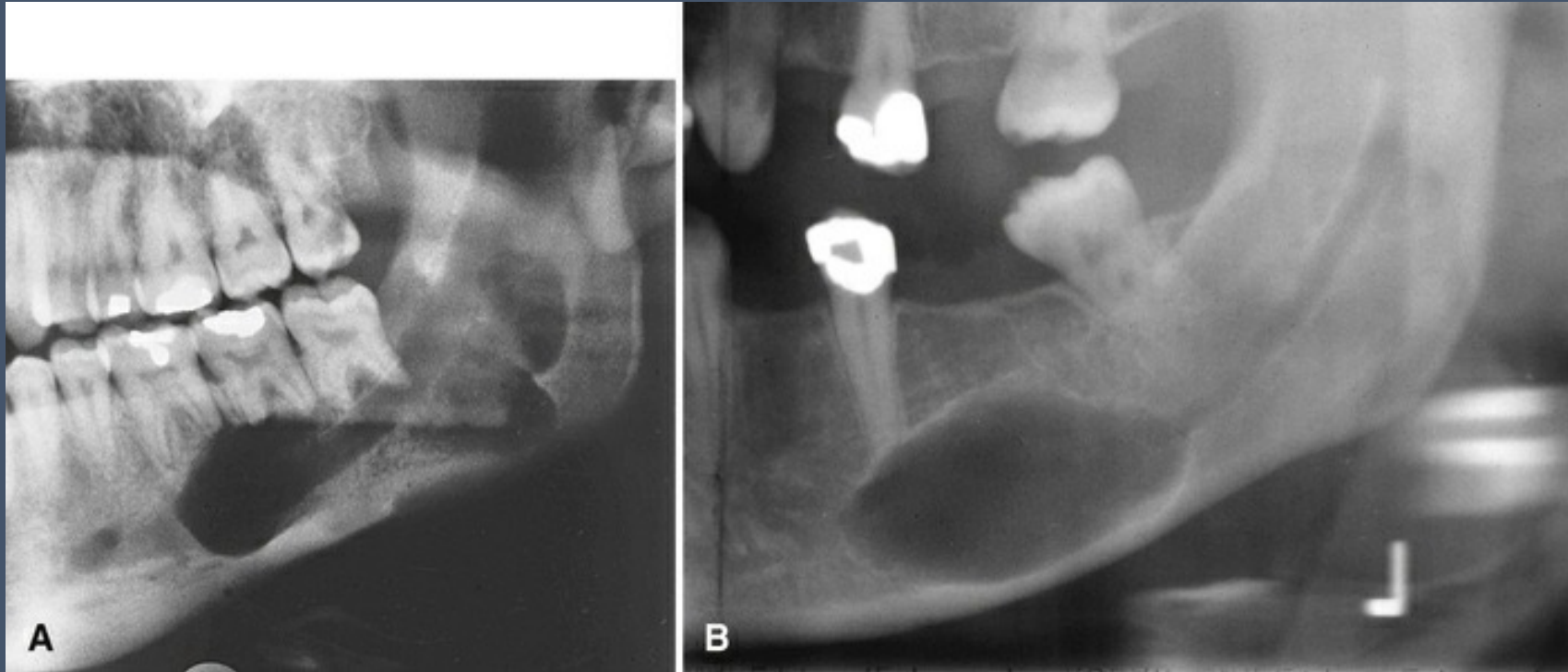
Well-defined, expansile, multilocular lucency with thick, curved internal septa resulting “soap bubble” appearance



Recurrent Ameloblastoma

MDCT/MRI Review
Refer to Surgeon

Benign Non-odontogenic Tumour

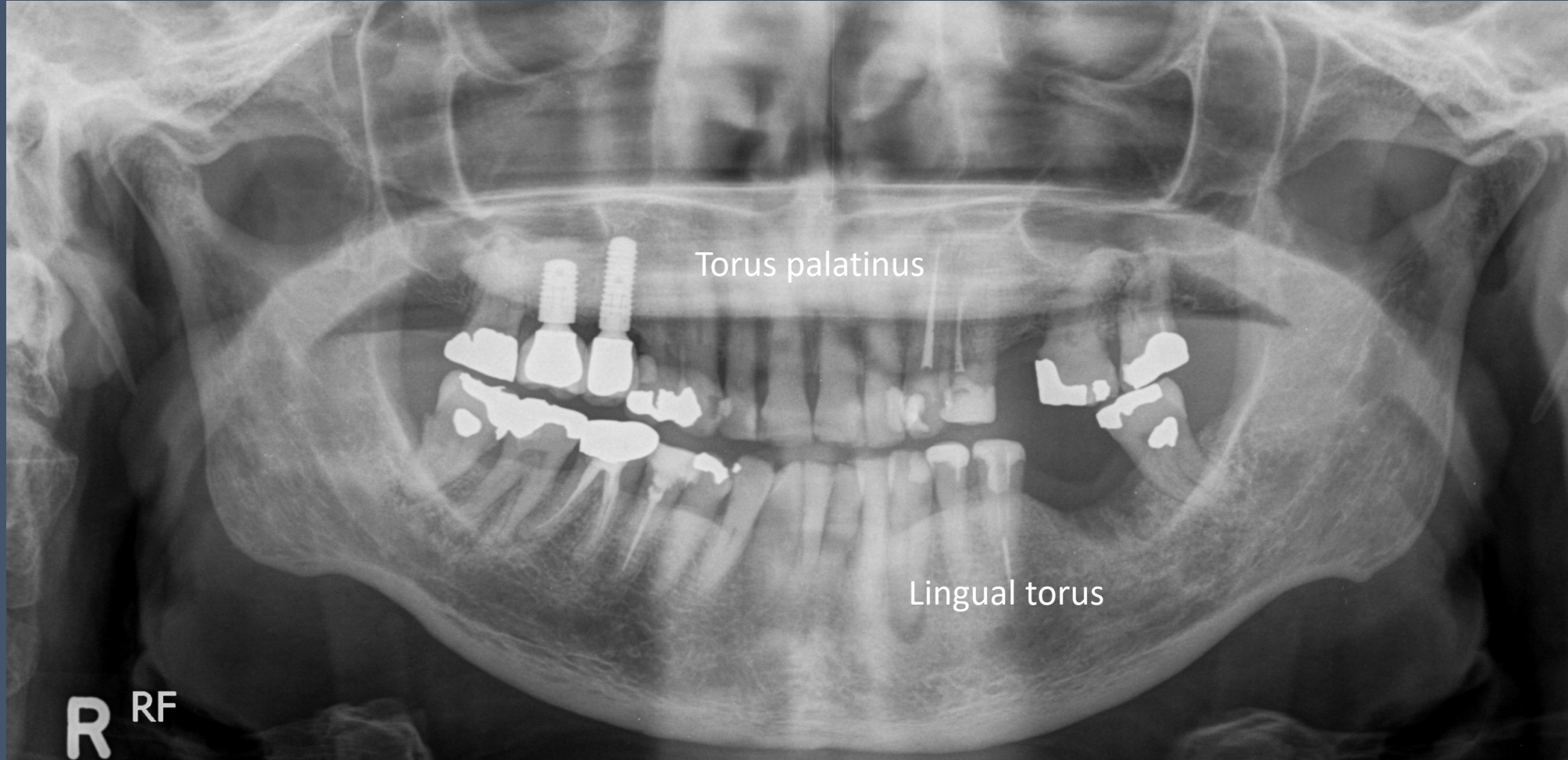


Fusiform, expansile lucency associated with **mandibular canal**
Neurofibroma (strong association with Neurofibromatosis type 1 (NF1))

MDCT/MRI Review
Refer to Surgeon

Idiopathic

Tori & Exostoses are considered as an anatomical variant



Clinical monitoring (unless symptomatic)

Idiopathic

Bone islands are also considered as hamartomas

Localised dense bone (often homogenous cortical density)

Can occur anywhere

Most common site: MD premolar-molar region

Various morphologies

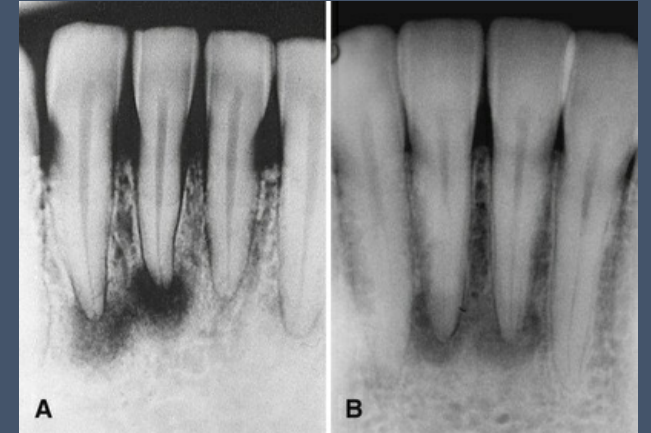
Seldom resorb teeth

Bone islands continuous with cortical plates are termed enostosis



*Further evaluation not required.
Monitor with I/O or OPG (unless symptomatic)*

Fibro-osseous



Periapical COD



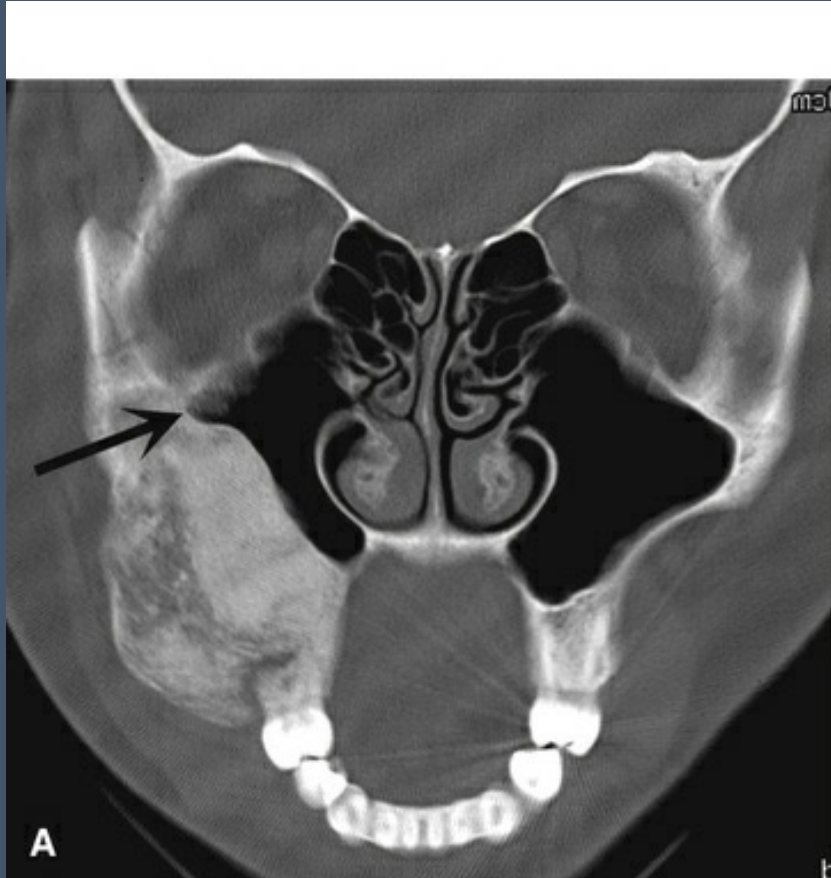
Cemento-osseous Dysplasia (unifocal or multifocal)

- Early, immature lesions are lucent
- Late, mature lesions are opaque with a lucent rim and sclerotic borders

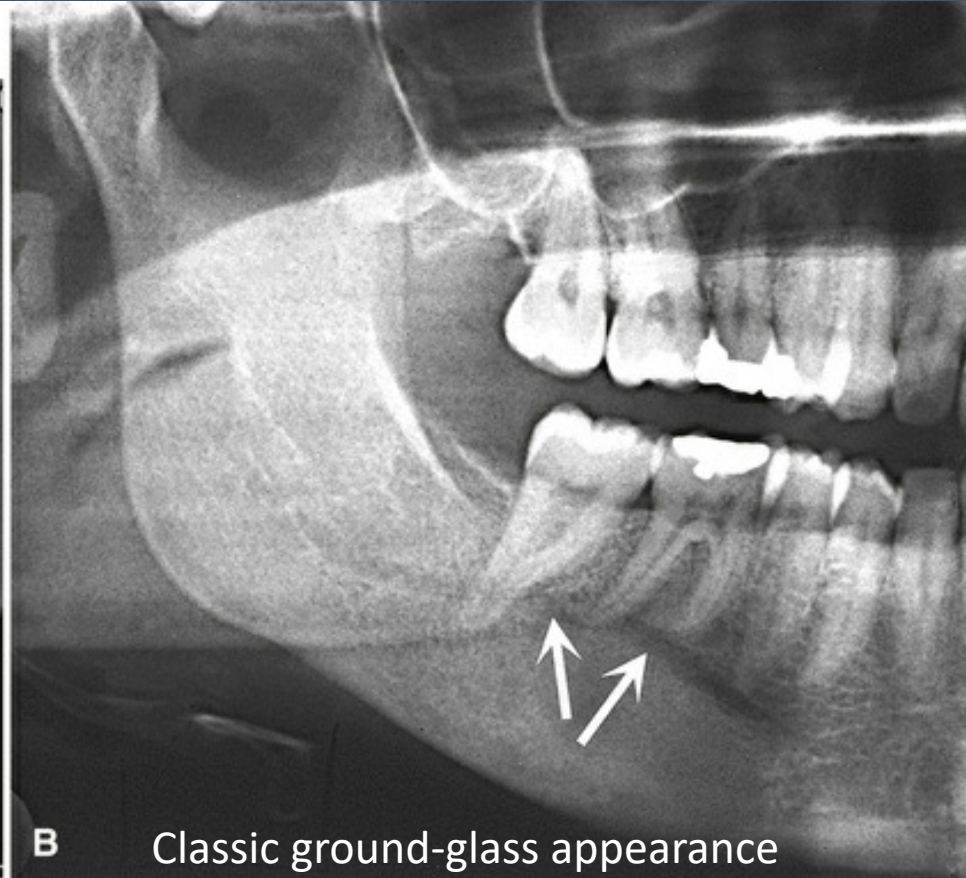
Can consider CBCT review

Fibro-osseous

Fibrous Dysplasia



Heterogenous pattern; mixed
hypodensity & ground-glass bone

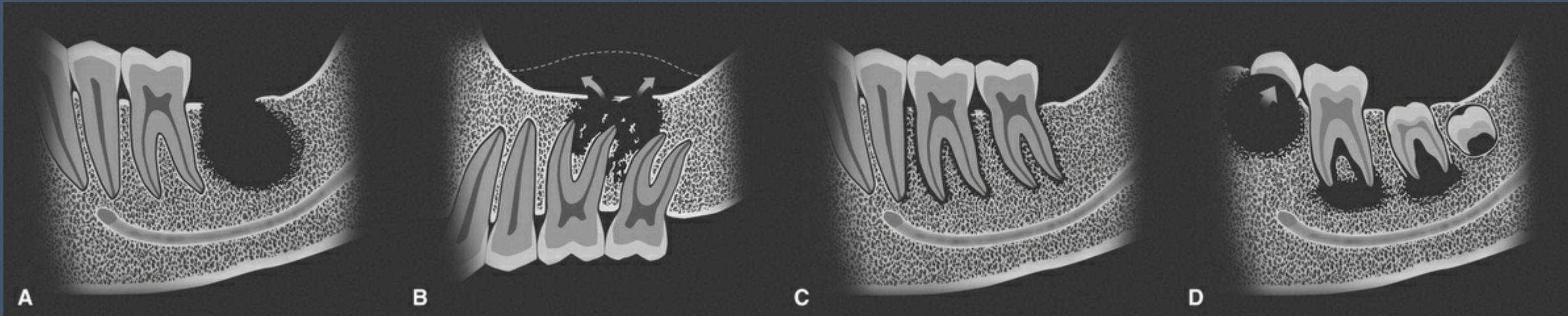


Smooth expansion

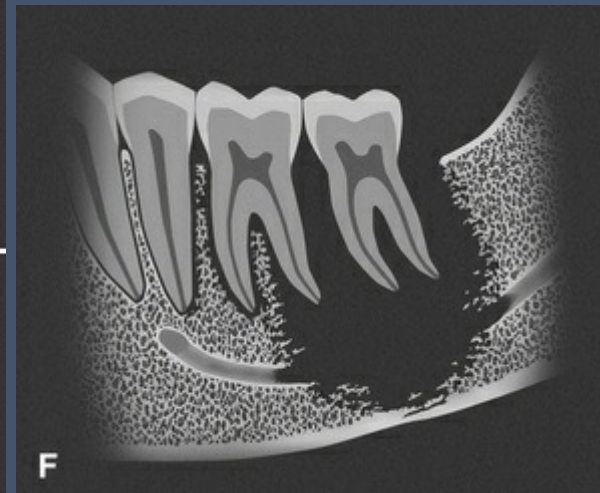
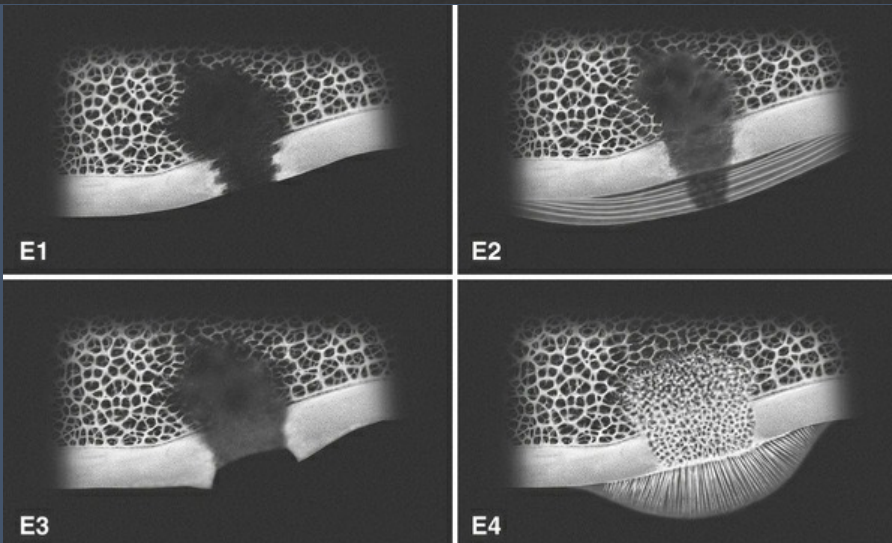
CBCT vs MDCT

Malignancy

Ill-defined borders, fast-growing, destructive, invasive (invade through path of least resistance)



Cortical destruction
+ various periosteal
reaction



“floating teeth”
- Loss of lamina dura

Urgent Referral to Surgeon

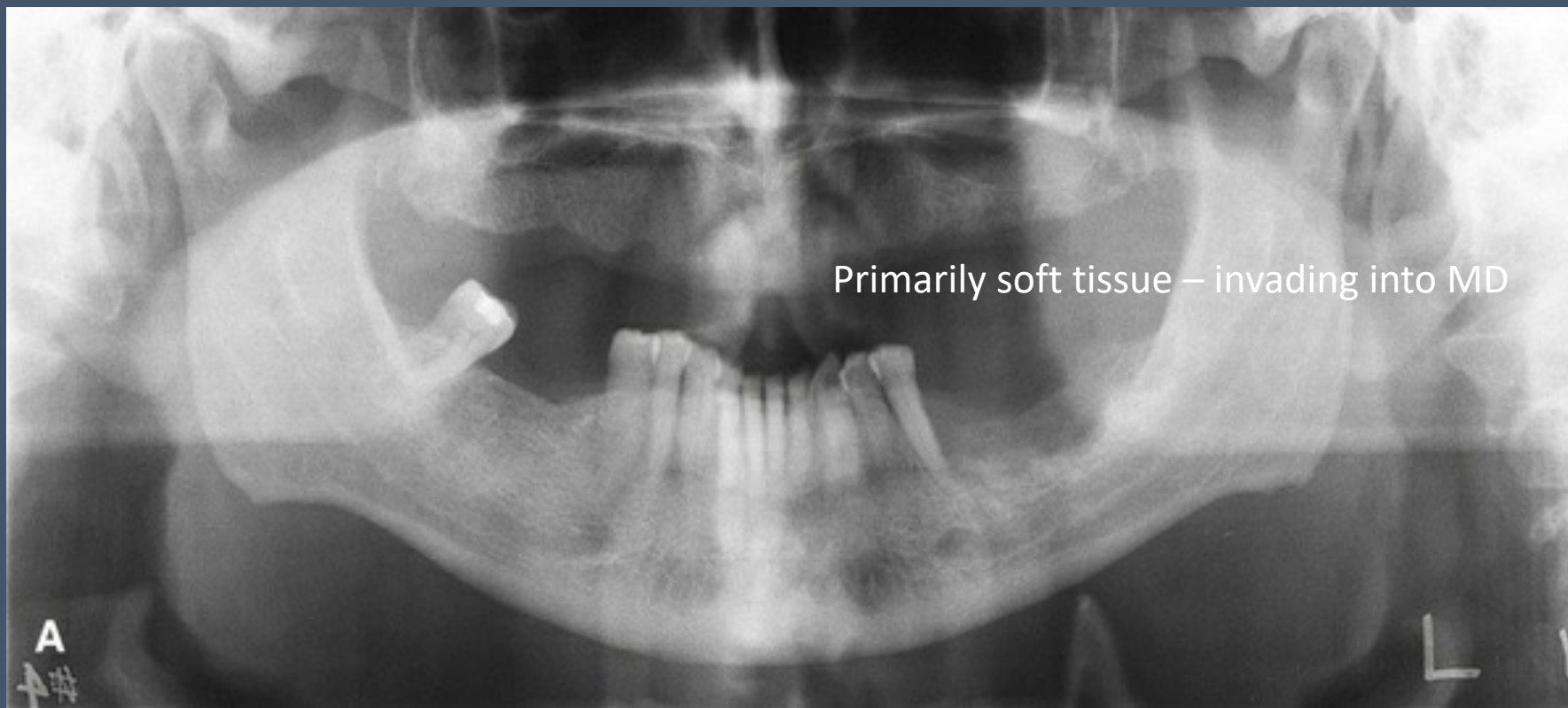
Squamous cell carcinoma (left mx sinus)



REFER to OMF Surgeons Straight Away

Urgent Referral

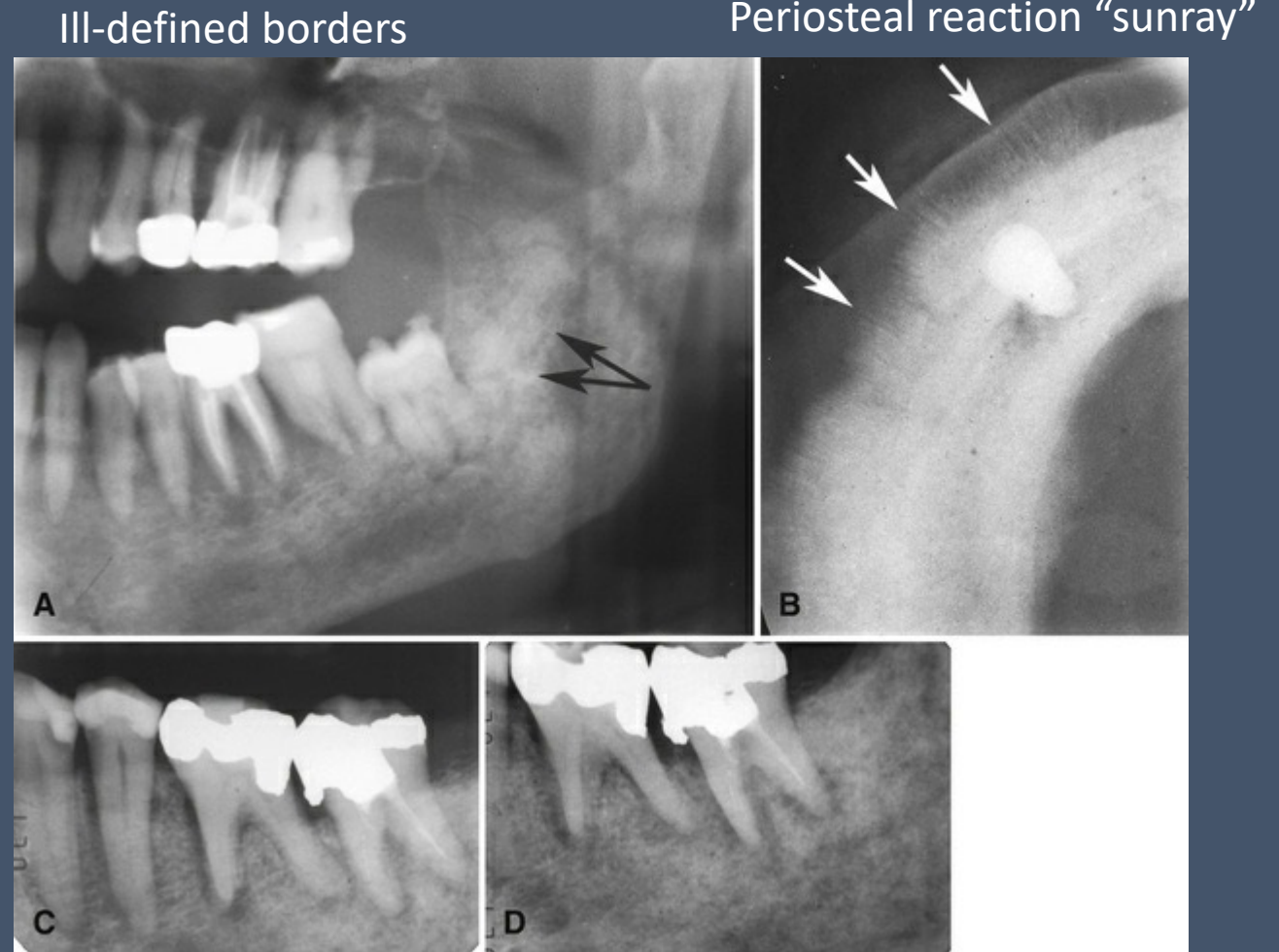
Squamous cell carcinoma (oral cavity)



Urgent Referral

Osteoblastic Cancer

Metastatic cancer – primary prostate cancer
(some breast cancer also)

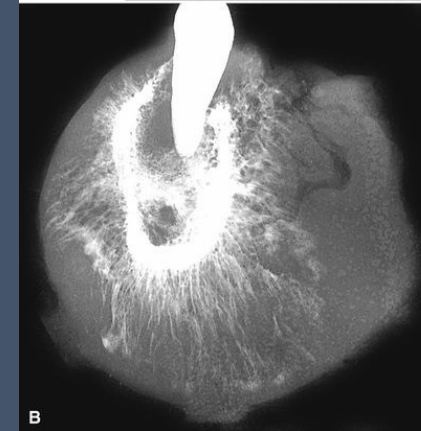
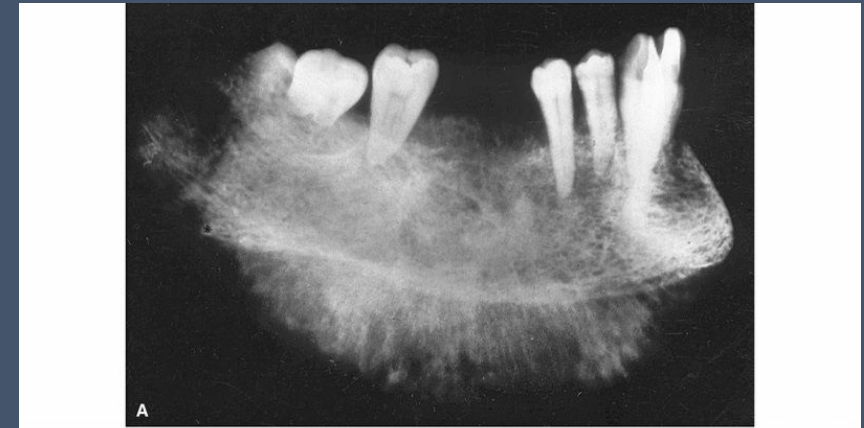
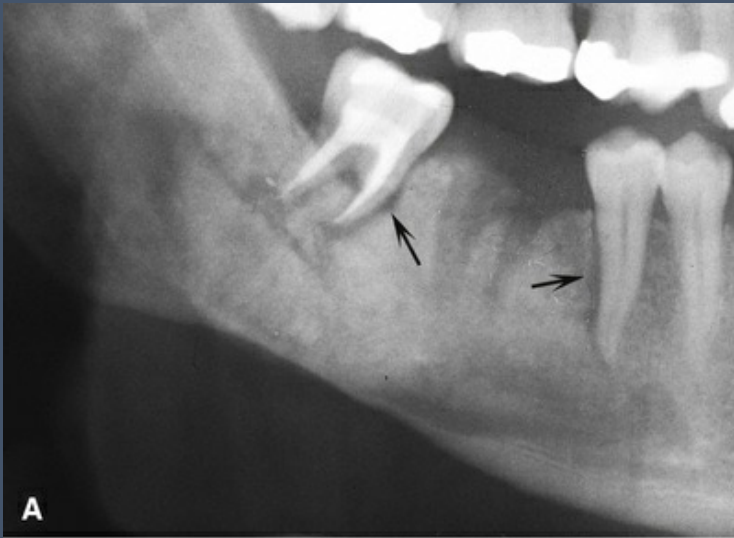


Loss of lamina dura

Urgent Referral

Primary Bone Cancer

Osteogenic sarcoma



Urgent Referral

OPG Report Checklist

1. Identify any *significant* OPG error
2. Check stage of dentition (deciduous / mixed / permanent)
3. Identify any missing teeth (& supernumerary teeth, if present)
 - Are there implants in edentulous sites? Comment on peri-implant crestal bone level.
 - Are there root remnants?
4. Identify any impacted or ectopic teeth
 - Location
 - Angulation
 - Morphology (both crown & root system)
 - Relationship with adjacent structures eg. Adjacent molars, mx sinus, IDC, etc.
5. Any dental anomalies? (eg. Dens invaginatus, supernumeraries, etc)
6. Identify periodontal bone loss
 - Perio-endo bony defects
 - Horizontal bone loss
 - Angular bony defects / vertical bone loss
 - Furcation involvement
7. Are there calculus deposits? Where?
8. Is there existing restorative therapy?
 - Identify any faulty restorations eg. overhang, insufficient margin
9. Identify caries including recurrent caries
10. Identify non-carious tooth loss (NCTL) eg. attrition
11. Is there existing endodontic therapy?
12. Identify periapical lucencies ie. periapical inflammatory lesions
 - Any associated root resorption, antral floor remodelling, reactive sclerosis, reactive mucosal thickening in antrum?
13. Identify any **abnormal lucencies or opacities** in the jaws
 - Location
 - Border and Morphology
 - Well-defined? Ill-defined?
 - Overall shape – oval, round, elongated, etc.
 - Internal architecture
 - Effects on adjacent structures
 - Surgical Sieve - Differential diagnoses if can.
14. Extragnathic structures
 - Maxillary sinuses – Symmetrical? Size? Opacity? Floor and walls intact?
 - Condyles – Symmetrical? Deformity? Remodelling? Sclerosis? Pitting? Beaking / lipping? Loose bodies?
 - Airspace
 - Cervical spine
 - Any presence of soft tissue calcifications?
 - Check submandibular region, tonsillar regions, carotid bulb region, etc.
 - Pterygomaxillary fissure
 - Orbits
15. **Summary (for long reports or reports with significant pathology)**
 - Further imaging required? If yes, which modality?

Further Reading

Essentials of dental radiography and radiology 5th edition
by Whaites, Eric; Drage, Nicholas

White and Pharoah's Oral radiology: principles and interpretation 8th edition
By Ernest Lam

Atlas of Oral and Maxillofacial Radiology
By Bernard Koong