

Malignant Diseases of the Jaws.

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Every single time you go through a lesion radio-graphically, you have to report on:

- Density
- Margin characteristics (Periphery)
- Shape
- Location
- Distribution
- Size
- Internal architecture/structure
- Effects on the surrounding structures

And these radiographic signs collectively would tell you what kind of lesion you are dealing with; whether it is a cystic, benign or malignant lesion.

Malignancies in the head and neck are usually **radiolucent**, with exceptions.

The malignancies in the head and neck that are **radiopaque** are:

- **Osteogenic sarcomas (Osteo-sarcomas)**
- **Chondro-sarcomas**
- **Metastases from breast and prostate cancers**

Otherwise, most malignancies that are seen in the head and neck area are radiolucent.

In **benign** lesions, we are looking at well-shaped, smooth, and corticated border, on the other side, if we are dealing with a **malignancy**, we are actually looking at an **ill-defined**, **moth-eaten**, **ragged** margin with a **wide zone of transition**, meaning that, the area in between is kind of grayish and you cannot really tell where does the lesion stop and where does the normal bone start.

Always remember, if it has a margin, it has a shape. In the case of a malignant lesion, it is really hard to confine the lesion into a real geometric shape, because **such lesions do not respect the borders**. Thus, the word: **IRREGULAR** is to be used when a malignant lesion is being described.

One of the most important things to differentiate between a benign and a malignant lesion is what it does to the surroundings;

- **Cortices**

(Inferior cortex of mandible, inferior dental canal boundaries and the floor of sinus.)

- Benign: expansion erosion
- Malignant: **erosion destruction**

Case: a cross-sectional mandibular occlusal radiograph showing a radiolucency that is actually eating the buccal plate of bone, there is minimal expansion and remodeling, and **the major process is bone resorption**.

(The maxillary sinus is one of the thinnest cortical boundaries, so it has to be observed carefully.)

Case: a periapical radiograph showing crown and bridge work, MOD amalgams and localized vertical bone loss. Another radiograph for the same patient, one month after extracting a tooth, we notice that there is **a lack of continuity of the lower border of the sinus**. If I am losing a border, that is a problem, it means that there is an aggressive process going on, either:

1. **Malignancy**
2. **Osteomyelitis**

And both are not easy stuff to deal with.

- **Periosteal reactions**

A complete destruction and detachment between the cortex and periosteum. The presence of a periosteal reaction on itself is **a sign of aggressiveness**. Some types of periosteal reactions are worse than others.

- **Onion skin** periosteal reaction → **the most benign of the aggressive**.
(Seen on *Garre's osteomyelitis*; younger kids, open apices, localized osteomyelitis → no need for a systemic antibiotic treatment).
- However, **sunray appearance; spiked appearance; Codman's triangle** (a triangle on the surface of a long bone → **the worst; the most destructive and aggressive signs of periosteal reactions**).

- **Displacement is good while invasion/destruction is bad.**

Case: two radiographs both showing an edentulous posterior right mandible. One of them is an **ameloblastoma**, it has caused displacement of the ID canal, with well-defined and corticated border → that is benign ✓. The other one shows a **squamous cell carcinoma**, where we see bad bone above and below the widened ID canal, which tells you that the bad cells have actually invaded the ID canal in order to reach the bone below the ID canal, the lesion has an ill-defined margin with a wide zone of transition, this is malignant.

- On the long term, benign lesions give light forces, similar to orthodontic forces, that might cause **displacement**, whereas malignancies do not have time, they just eat bone away; the whole supporting bone get destructed without the teeth having their chance to move, hence, **floating teeth are a bad sign**, because of the nature, speed and aggressiveness of the disease.

- **Root resorption**

- Benign: horizontal resorption → good sign✓
- Malignant: **irregular resorption where all the surfaces of the tooth are affected.** Anything benign has a coherent advancing front. In malignancy, each cell acts on its own affecting the surface of the root that is closest to it → **no coherent advancing front that can exert enough pressure for a horizontal root resorption.**

Case: a radiograph of a maxilla showing three of the bad signs:

1. Spiked roots = vertical root resorption
2. Lack of the lower border of the maxillary sinus
3. Lack displacement

→ These signs mean: aggressiveness + malignancy (**no root resorption in osteomyelitis**)

→ Radio-graphically, we concluded that this is a malignant lesion.

How can I tell what is the type of this malignant lesion?

From the location. In the maxillary sinus, there are two common cancers:

1. Squamous cell carcinoma
 2. Lymphoma
- (Osteosarcoma affect a different age group.)

Note: Anything in the sinus is radiopaque even if it is radiolucent.

- **Asymmetric widening of the PDL space**

You have to think of two things:

1. **Active orthodontic treatment**
2. **Vertical root fracture**

If they are not present, and cannot be present → **trouble!** → Osteosarcomas, lymphomas or chondrosarcoma (very rare.)

Thus, asymmetric widening of the PDL space that could not be explained by an active orthodontic treatment or vertical root fracture → malignancy.

Malignant Odontogenic Tumors

(Very rare)

- Ectodermal
 1. **Malignant ameloblastoma**
 - Malignant histologic features
 - Benign behavior

 2. **Ameloblastic carcinoma**
 - Benign histologic features
 - Malignant behavior

There is a controversy regarding these two variants.

Discussion point: some say this is not a true metastasis, but while we are removing the ameloblastoma, aspiration occurred. Other people say that this doesn't explain the whole picture, because when aspiration occurs you can expect it will progress in certain lobes but they are occurring in the apical lobes, not the easiest path when aspiration occurs. Also, there are some reported cases of metastasis to lymph nodes, which cannot be due to aspiration.

NOTE: You will find **the total opposite** in the book regarding which of these two variants has the malignant behavior (metastasis) and which has the malignant histologic features (increased and abnormal mitosis and large hyperchromatic, pleomorphic nuclei), due to the debate between radiologists and pathologists on which is which, but, **you will not be asked about the theory part related to that in the exam.**

- Mixed
 1. **Ameloblastic fibrosarcoma**
 - The sarcoma variant of the ameloblastic fibroma
 - A childhood malignancy

Malignant Non-Odontogenic Tumors

(Much more common)

- Ectodermal

1. Squamous cell carcinoma

Mostly a **peripheral lesion** that invades the bone.

- **The most common head and neck malignancy, especially, in intraoral sites. Followed by metastasis. (Intra-bony)**
- Radiographic signs:
 1. Radiolucent: central/peripheral
 2. Ill-defined borders
 3. Irregular
 4. Cortical destruction

Case: a radiograph for an 88-year old female showing a lot of attrition, overfunction, a tooth that has some sort of a vertical root fracture or something local that has resulted in a perio-endo lesion. The patient didn't respond to treatment and with follow-up appointments, the lesion was found to be a **squamous cell carcinoma in the alveolar process**.

Case: an 83-year old female presented to a periodontal clinic with a **one-site pocket**, a really deep pocket (above 9mm). What is really confusing is that there is **no local factors** and the patient is not getting any better after scaling, root planning and local antibiotics, further destruction is still happening resulting in loss of the floor of the sinus → SCC.

The differential diagnosis here would be a **periodontal defect**.

Masses in the maxillary bone would rather go in the sinus, thus, a lot of them will not manifest clinically until the lesion has progressed and became advanced.

- Radiographs are not always taken to discover malignancies, too often, the malignancy has already been diagnosed via clinical examination, history... etc. But you still have to go through imaging for staging. **(Bony invasion → Stage 4)**

Case: complete destruction of a lingual wall with a history of an old healed SCC that is obviously now invading the bone.

Sometime, you might be seeing something that does not correlate with a current clinical presentation but there must be something in the history.

Case: 50-year old female with peripheral SCC in the posterior right mandible. Invasion of the body of the mandible right next to a soft tissue SCC of the posterior tongue.

2. Metastatic carcinoma

Why metastasis? Because usually it is a central bony lesion.

- Metastases would definitely look like any malignancy;
 1. Radiolucent (mostly): central/peripheral
May have radiopaque foci (breast/prostate)
 2. Ill-defined border
 3. Irregular
 4. Cortical destruction
- Intra-bony lesion
- Multiple lesions mostly.

(Multiple lesions with aggressive signs and symptoms → metastasis should definitely be on the top of my differential diagnosis.)

Case: an occlusal radiograph, normally, in the anterior maxilla, we should see nicely the lower border of the nose bilaterally, but here I don't see it, that means it is gone and if it is gone I need to find the reason why → **metastatic carcinoma in a lady with a history of breast cancer.**

- Mesodermal

1. Osteo-sarcoma

Radiographic signs:

1. Radiolucent (osteolytic)
2. **Widening of the PDL space**
3. Mixed osteogenic
4. **Periosteal reactions → Flecks/Sunray appearance**

Case: bitewing radiographs for a very young individual, big pulps with a good bone level, some follicular space on the 8, multiple amalgams. Another radiograph for the same patient after 5 years showing a lytic lesion with an ill-defined border. What could they have missed in the bitewing radiographs? Asymmetric widening of the PDL space.

Case: another osteosarcoma with irregular root resorption and lack of the floor of the sinus.

- **Lack of the floor of the sinus**: SCC, osteosarcoma or something else? You need to take a **biopsy** and check the **histopathological features**.
- As a GP, you only need to know if what you are seeing is aggressive or not, and have a list of what it could be.
- **Extraction sockets** create an empty space that would make the oral cavity or other cavities in the head and neck area more accessible for the bad cells.

2. Chondro-sarcoma

- Asymmetric widening of the PDL space
- Completely obliterated canals
- Ill-defined lesion of a **radiopaque internal structure**

NOTES:

- Adenoid cystic carcinoma → lack of the floor of the sinus
- Lining of the floor of the sinus contains glandular cells as well, so minor salivary glands tumors could happen inside the sinus itself.
- Lymphoma → lack of the floor of the sinus
- Non-Hodgkin's lymphoma → complete destruction of the sinus
- **Soft tissue that is coming out of the sinus, any presence of soft tissue element is usually a red flag!**

Case 1:



- A periapical radiograph, for the right mandible, a premolar projection.
- **Asymmetrical widening of the PDL space** associated the distal surface of the canine and the mesial surface of the first premolar.
- Why not a vertical root fracture?
There's no restorations nor is a post, the tooth not endodontically treated.

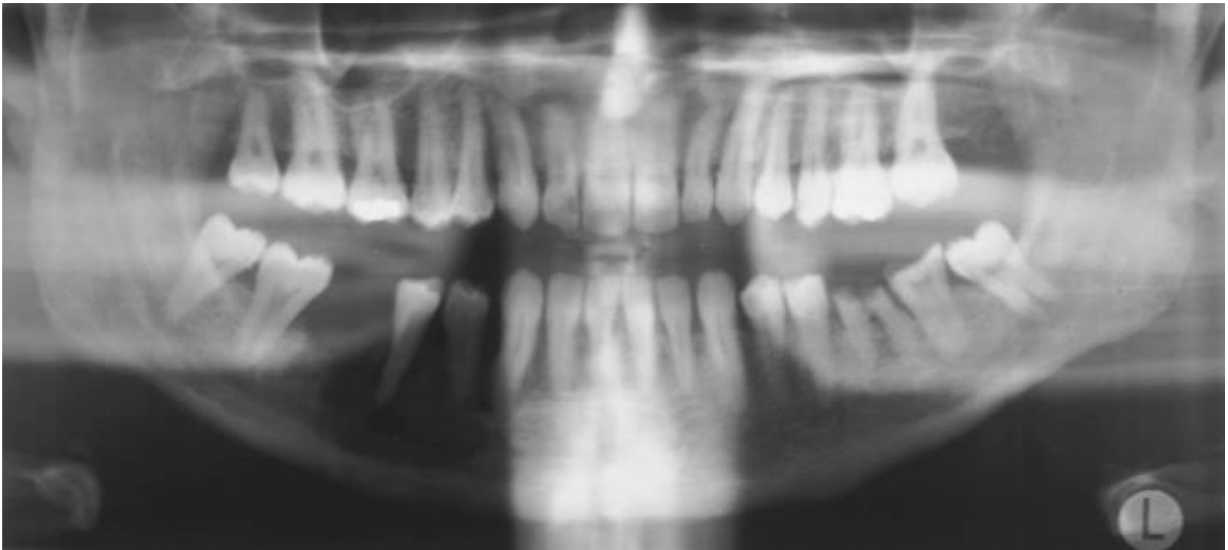
Case 2:

31 year old male was referred to Oral Surgery for evaluation and management of a lesion of left mandible



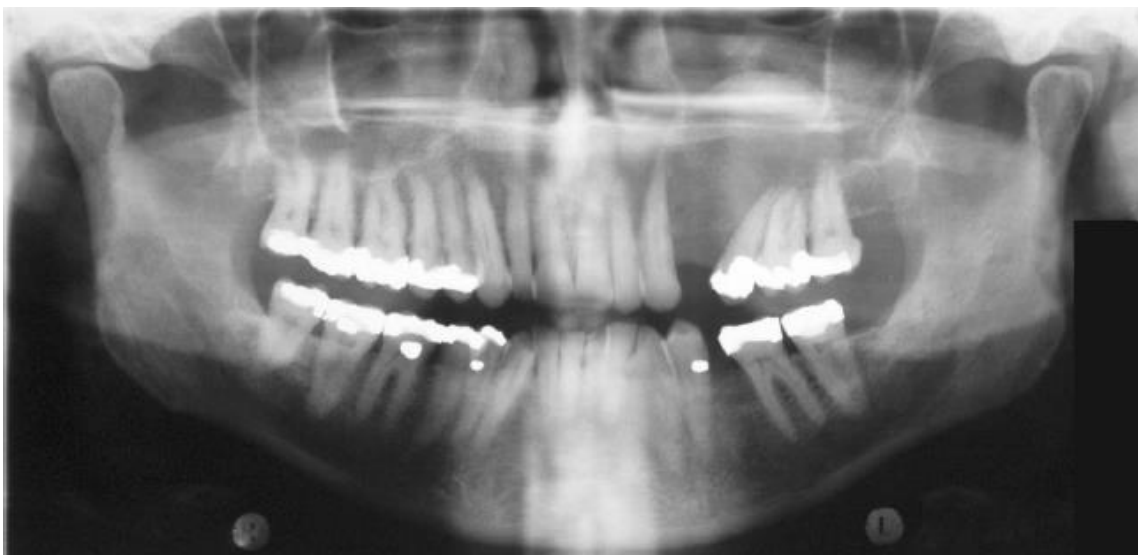
- A panoramic radiograph
- There is a radiolucency in the lower left mandible and lesion is **ill-defined**.
- **Spiked roots**
- **Floating teeth**
- Paresthesia (most probably)

Case 4:



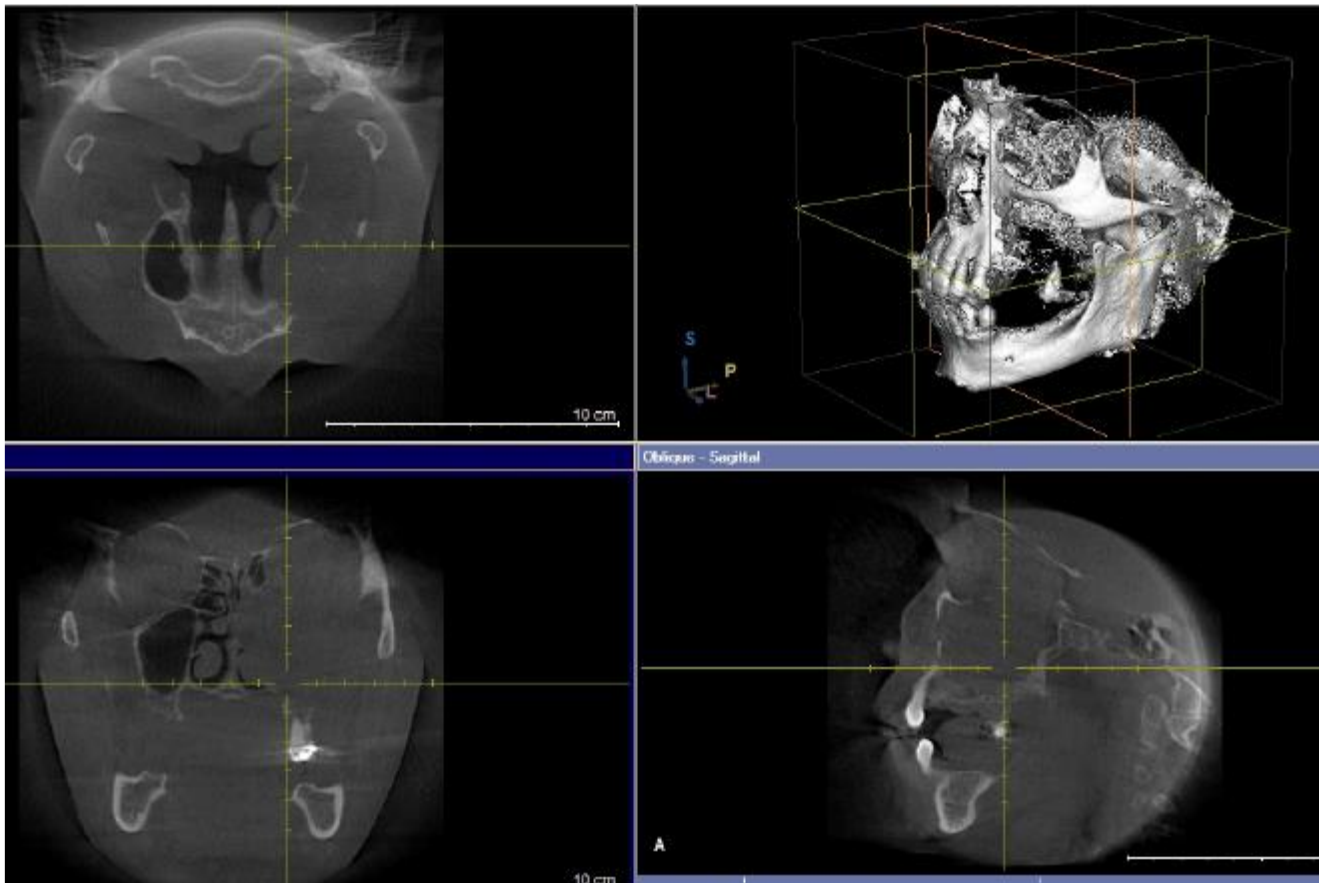
- A panoramic radiograph
- There is a radiolucency in the lower right mandible and lesion is **ill-defined**.
- **Spiked roots**
- **Floating teeth**
- **Irregular = malignancy**
- Paresthesia✓ (most probably)
- The lower border of the mandible here is intact✓.
- Teeth may or may not be mobile. In malignancy, there is a high cellular contents filling the whole space.

Case 5:



- Dome shaped radiolucency; a retention pseudocyst?
- **BUT!** Paresthesia✓✓✓ (from the history)
- **Lack of the floor of the sinus**✓.
- Diagnosis: *lymphoma*
- **Be systematic: 1 cortices → 2 symmetry → 3 count teeth**

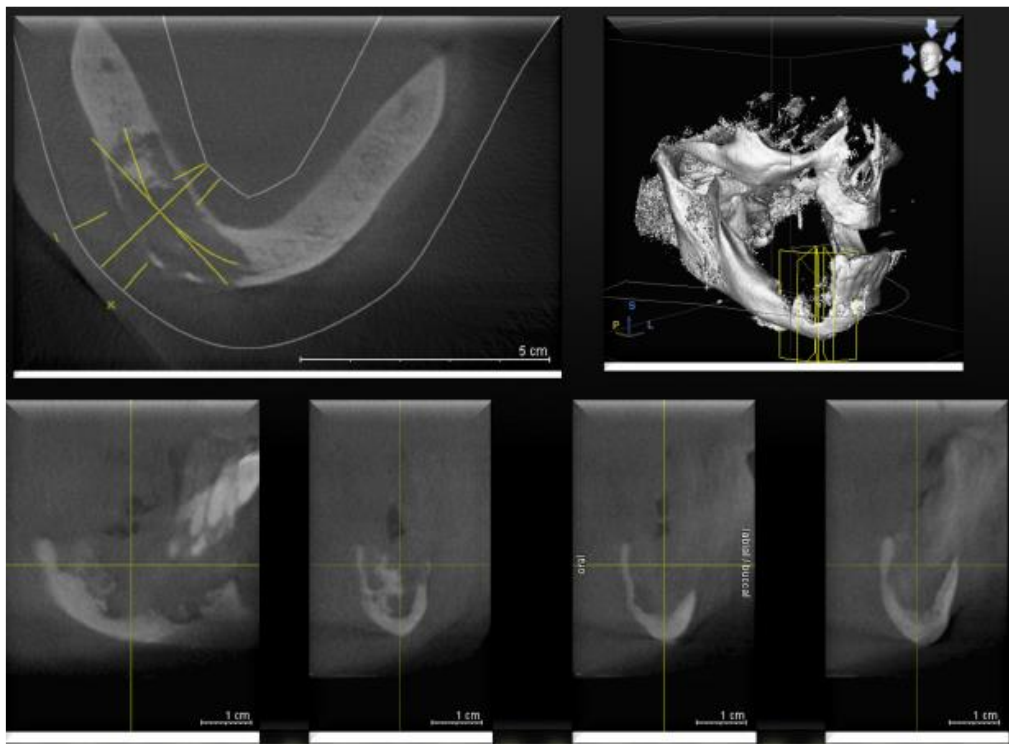
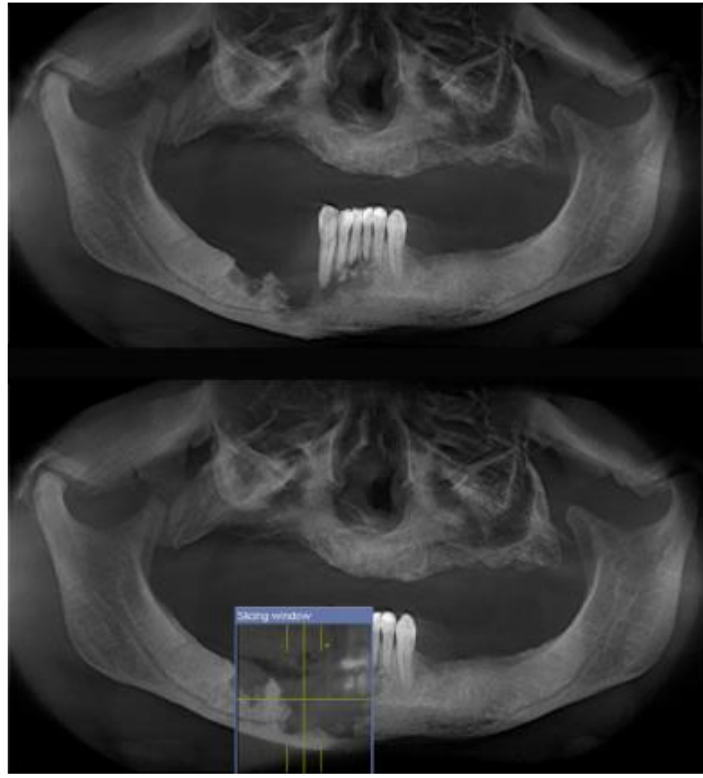
Case 9: (Important for the exam!)



- A less subtle case
- There is a sinus on one side, while everything is destroyed on the other side.
- Could be: SCC, osteosarcoma or any of the malignant salivary gland diseases
- Borders of the sinus are destroyed → malignancy
- Even the floor of the orbit is missing
- An aggressive lesion

The important thing is **the general features**✓; such as **destruction, floating teeth, paresthesia ...etc.** It is not that important to know which malignancy I am dealing with.

Case 10:



- A **moth-eaten defect** in the anterior mandible
- Floating teeth
- Destructive lesion: malignancy or osteomyelitis
- The patient has a SCC, why not an osteosarcoma? Because the doctor does remember the patient, otherwise, you cannot really tell radio-graphically what it is exactly, you need to run more tests to reach your final definite diagnosis.