DENTAL RADIOLOGY
ANATOMY OF THE TEETHS AND JAWS

Vecsei Bálint dr.

LECTURES IN ORAL RADIOLOGY

2020/2021. 1ST SEMESTER

Weeks	Title	**Presenter**	**Date**
1	*Normal anatomy of the jaws*	Dr. Vecsei, Bálint	09 September
2	*Extraoral techniques*	Dr. Dobai, Adrienn	16 September
3	*Caries, pulp cavity; Extraction of the teeth*	Dr. Szabó, Bence	23 September
4	*Periapical lesions; Root canal filling*	Dr. Pataky, Levente	30 September
5	*Periodontal disease*	Dr. Dobó Nagy, Csaba	07 October
6	*Fractures of the jaws*	Dr. Dobai, Adrienn	14 October
7	*Panoramic radiography*	Dr. Dobó Nagy, Csaba	21 October
8	*Tumors; Anomalies*	Dr. Ackermann, Gábor	04 November
9	*Interpretation of radiographs*	Dr. Dobó Nagy, Csaba	11 November
10	*Competition; The TMJ*	Dr. Dobó Nagy, Csaba	18 November
11	*Cysts of the jaws; Resorption of the teeth*	Dr. Vecsei, Bálint	25 November
12	*Paranasal sinuses*	Dr. Szabó, Bence	02 December
13	*Written exam*	Dr. Szabó, Bence	09 December

PRACTICES IN ORAL RADIOLOGY

2020/2021. 1ST SEMESTER

4TH YEAR STUDENTS

groups	date	place
1-3	Wednesday 15^{15}-16^{45}	No. 319 room at the Dental Teaching Centrum
4-6	Thursday 14^{25} -15^{55}	No. 319 room at the Dental Teaching Centrum
10	Friday 8^{00}-9^{30}	No. 319 room at the Dental Teaching Centrum
7-9	Friday 13^{45}-15^{15}	No. 319 room at the Dental Teaching Centrum

PRACTICES IN ORAL RADIOLOGY

2019/2020. 1ST SEMESTER

4TH YEAR STUDENTS

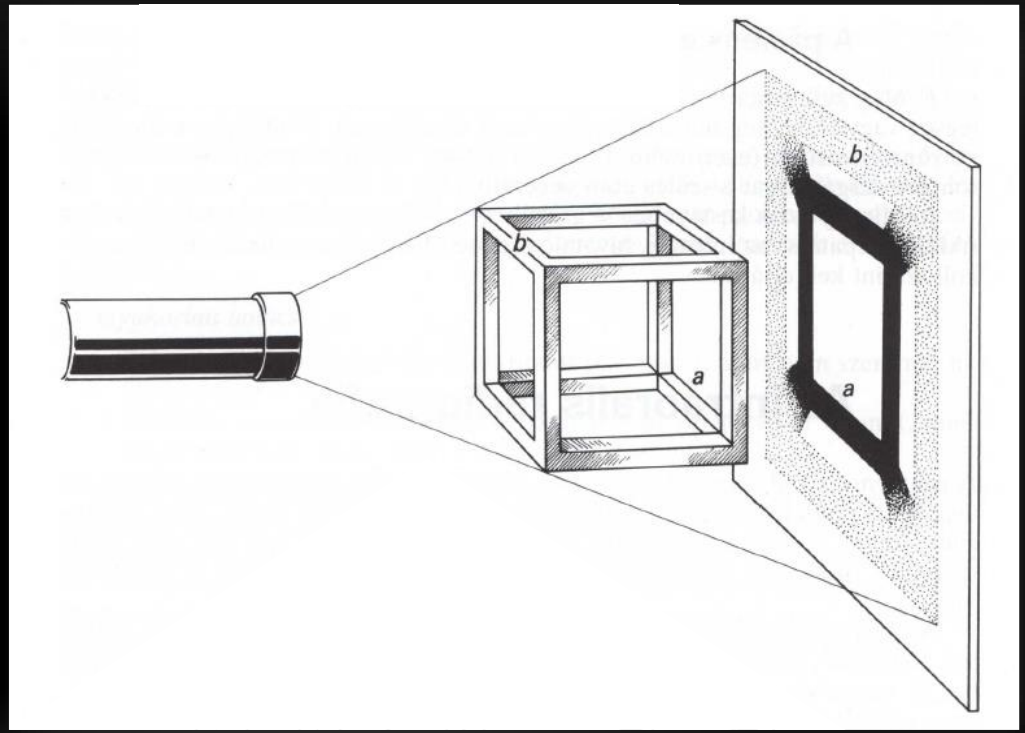
1.	Tooth anatomy	Dr. Vecsei
2.	Anatomical landmarks. Part one	Dr. Dobai
3.	Anatomical landmarks	Dr. Szabó
4.	Development of the teeth	Dr. Dobó Nagy
5.	Caries	Dr. Dobó Nagy
6.	Periapical lesions	Dr. Dobai
7.	Periodontal disease	Dr. Szabó
8.	Cyst	Dr. Dobó Nagy
9.	Tumors, anomalies I.	Dr. Szabó
10.	Anomalies **Midterm**	Dr. Dobó Nagy
11.	Practicing bisecting technique	Dr. Vecsei
12.	Practicing parallel technique, Midterm	Dr. Szabó
13.	Analyzing intraoral films	Dr. Szabó
14.	Analyzing extraoral films, Midterm	Dr. Dobó Nagy

NATURE OF THE RADIOGRAPHIC IMAGE

- The image is produced by X-rays passing through an object and interacting with the photographic emulsion on a film or sensor.
- This interaction results in blackening of the film.
- The blackening depends on the number of x-rays reaching the film – which in turn depends on the density of the object.
- The final image is a two-dimensional picture – made up of a variety of black, white and grey superimposed shadows. (*shadowgraph*)

The X-ray picture...

- Enlarge
- Distort
- Summarize
- Forget

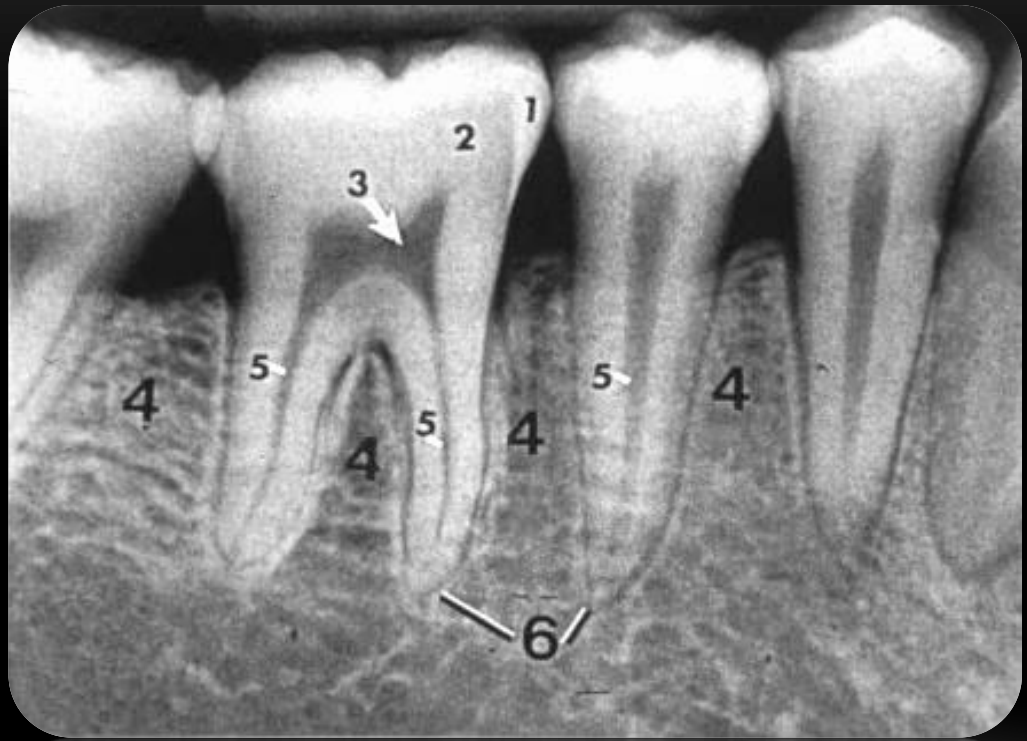


The X-ray picture, like the shadows:

Sums up objects in the way of the beam

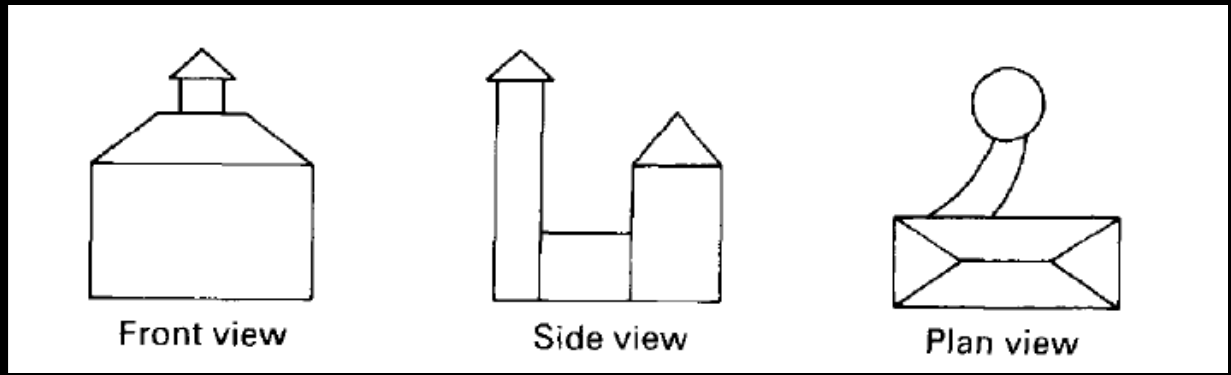
Distort, enlarge and
„forget” thiny parts

Shadowes are diverge



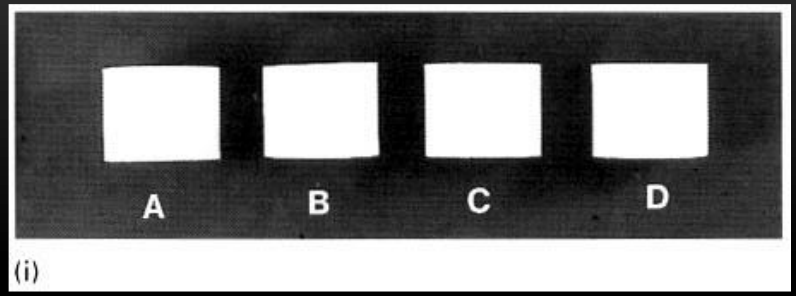
1 – enamel
2 – dentin
3 – pulp
4 – trabecular pattern of alveolar bone
5 – root canal
6 - apex

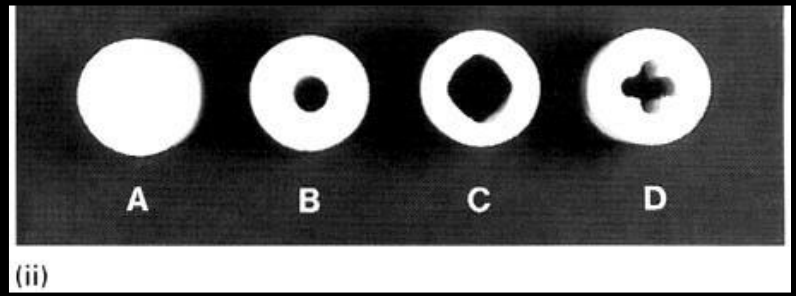
THE LIMITATIONS IMPOSED BY A TWO DIMENSIONAL IMAGE AND SUPERIMPOSITION

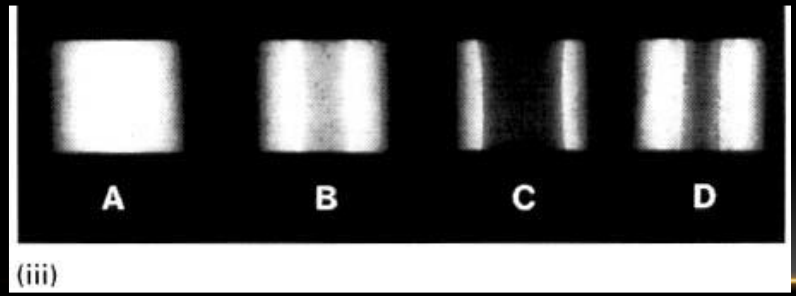


THE FINAL *SHADOW DENSITY* OF ANY OBJECT IS AFFECTED BY:

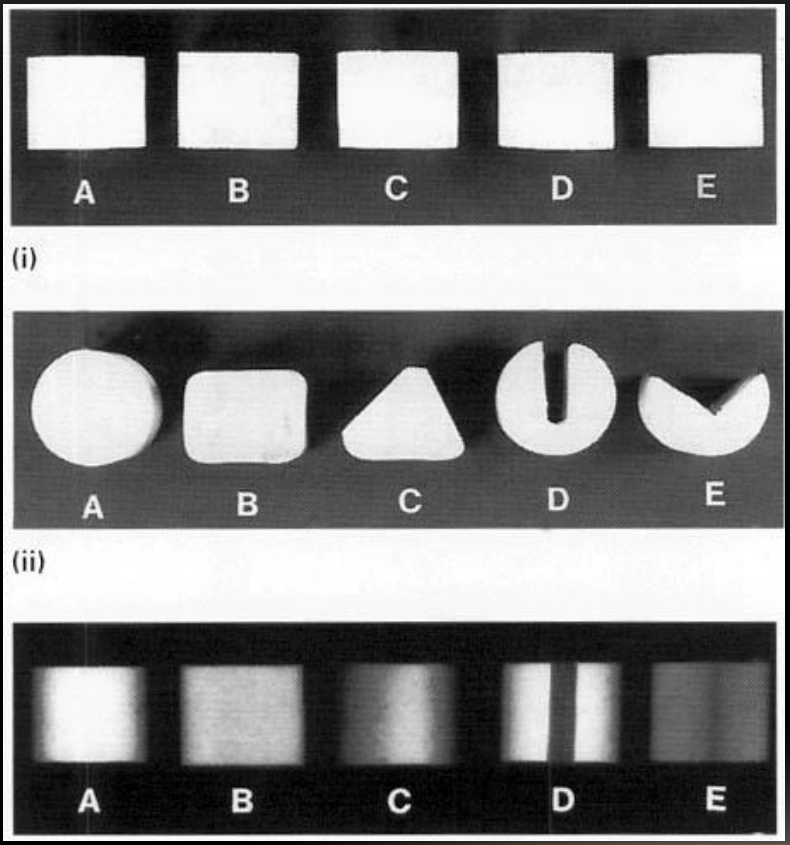
- The specific type of material of which the object is made
- The thickness or density of the material
- The shape of the object
- The intensity of the X-ray beam used
- The position of the object in relation to the X-ray beam and film
- The sensitivity of the film.







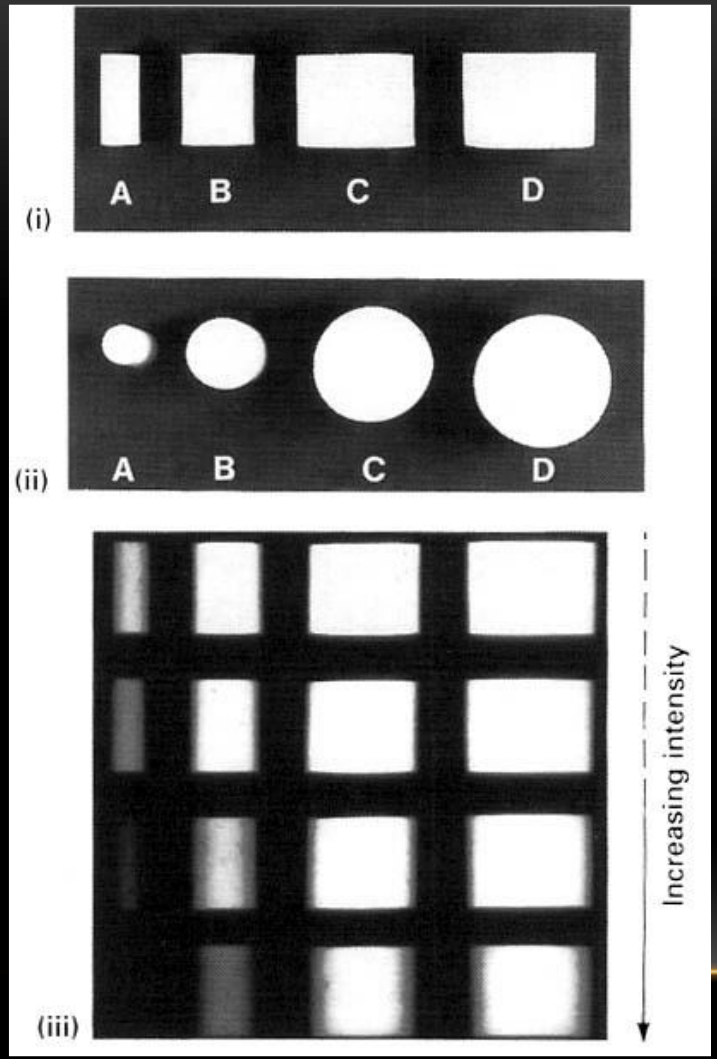
(i) Front view of four apparently similar cylinders made gypsum
(ii) Plan view shows the cylinders have varying internal designs and thicknesses.
(iii) Radiographs of the apparently similar cylinders show how objects of similar shape and material, but of different densities, produce different radiographic images.



(i) Front view of five apparently similar cylinders made from gypsum

(ii) Plan view shows the objects are in fact different shapes

(iii) Radiographs show how objects of different shape, but made of the same material, produce different radiographic images.



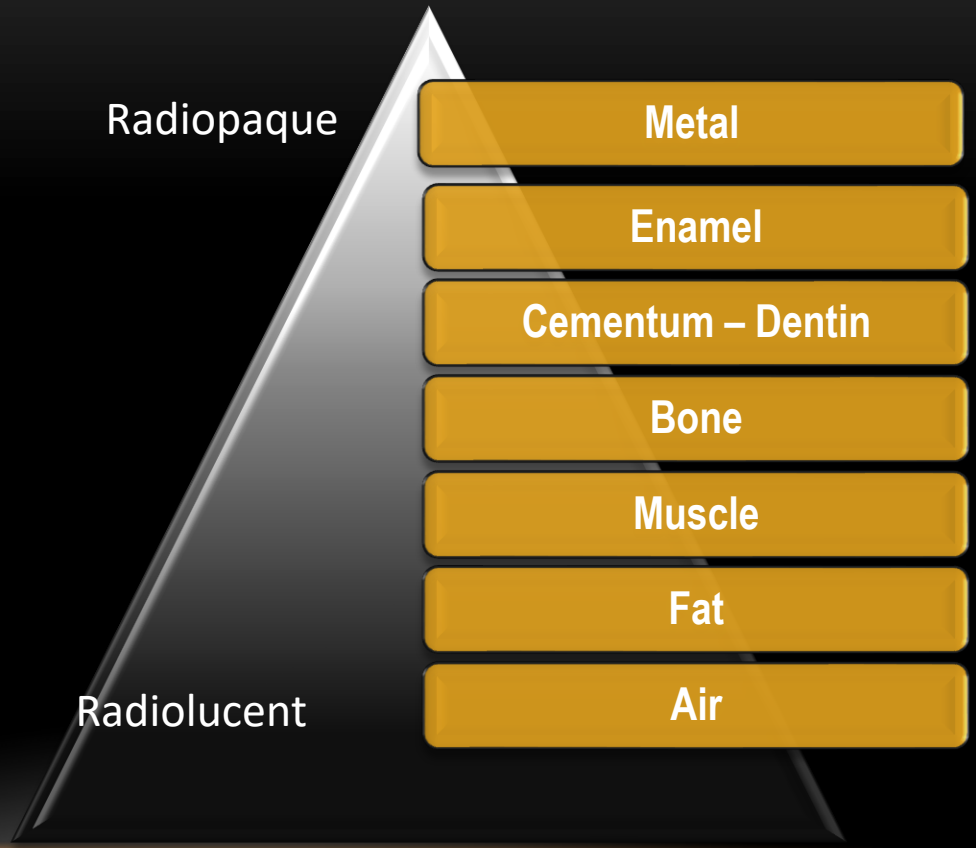
(i) Front view and (ii) plan view of four cylinders made from gypsum but of altered diameters.

(iii) Four radiographs using different intensity of X-ray beams:
increasing the intensity causes greater penetration of the object with less decrease, hence the less radiopaque (white) shadows of the object that are produced

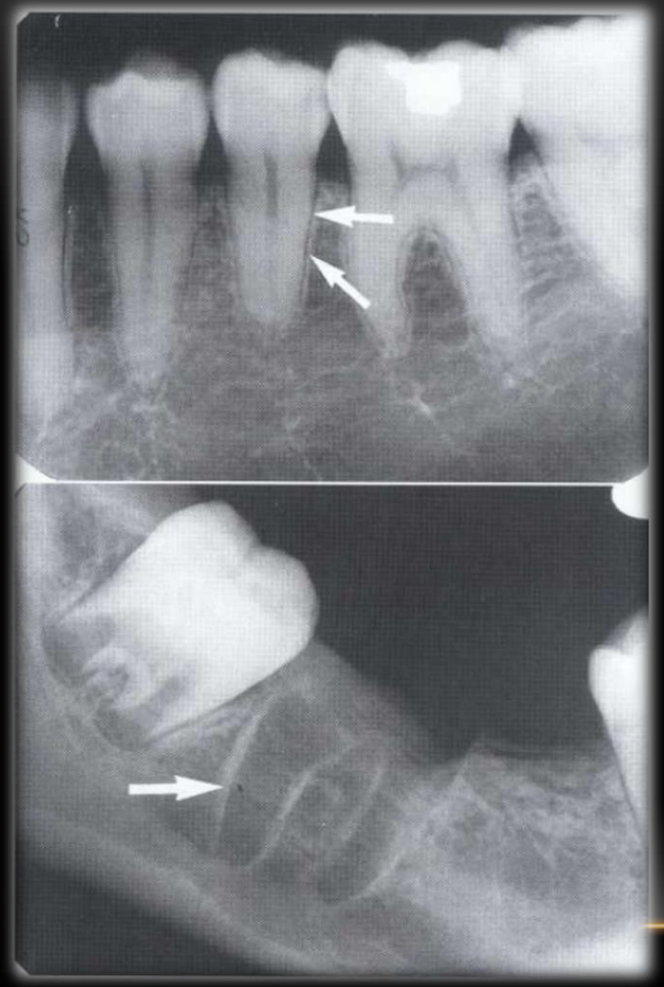
- White = **radiopaque** shadows represent the various dense structures within the object, which have totally stopped the x-ray beam.
- Black = **radiolucent** shadows – where the x-ray beam has passed through the object.
- Gray shadows represent the areas, where the x-ray beam has been partially stopped.

RADIOPAQUE VS. RADIOLUCENT

- Restorative and surgical materials have various densities and abilities to absorb. Metallic materials are more dense than enamel, thus appear very white on radiographs.



1 – enamel
2 – dentin
3 – pulp
4 – trabecular pattern of alveolar bone
5 – root canal
6 - apex

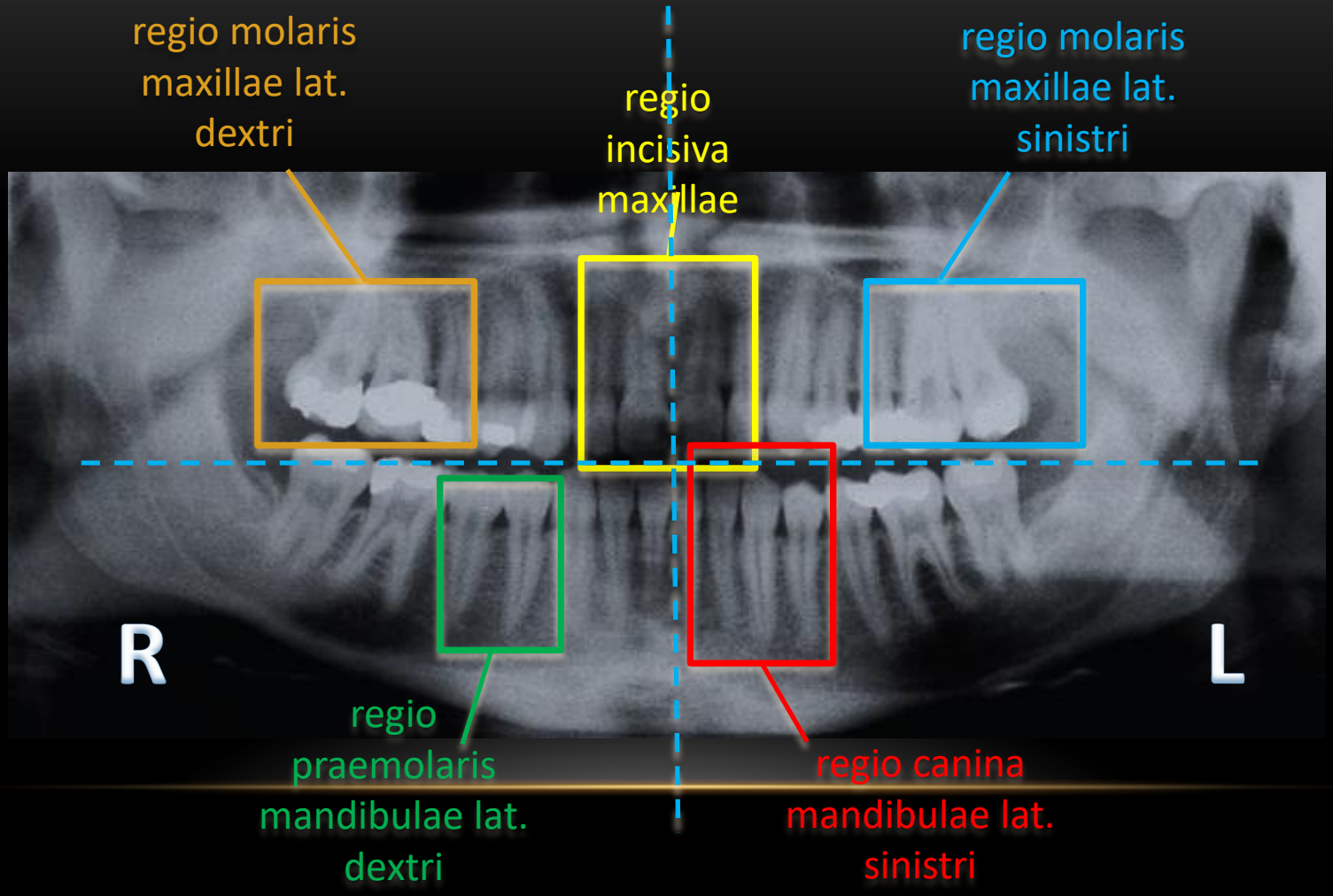


LAMINA DURA

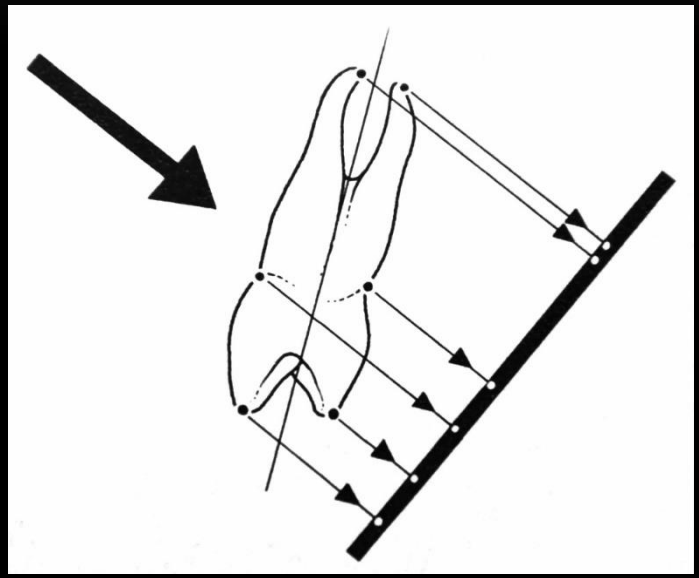
- Appears as a thin opaque layer of bone around the teeth or a recent extraction socket
- valuable diagnostic feature
- The presence of an intact lamina dura around the apex of a tooth strongly suggests a vital pulp.

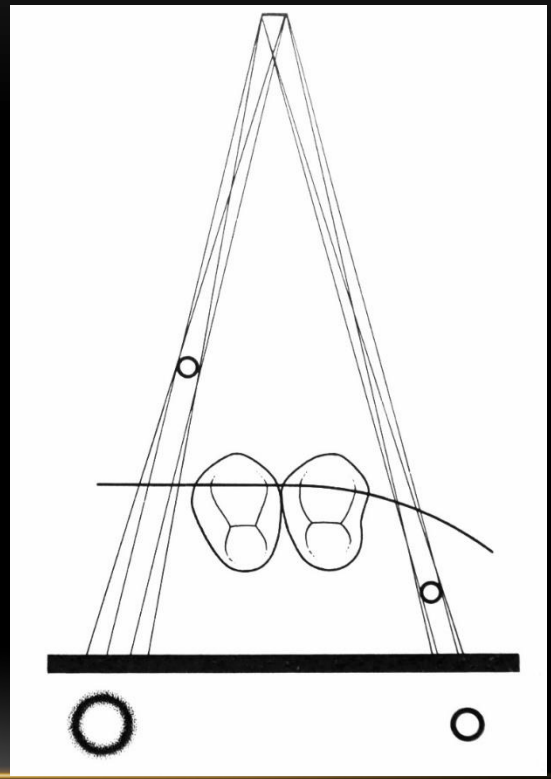
PERIODONTAL LIGAMENT SPACE

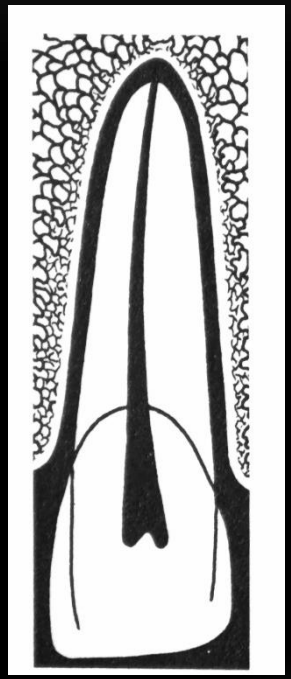
- Composed mainly of collagen, it appears as a radiolucent space between the tooth root and the lamina dura.

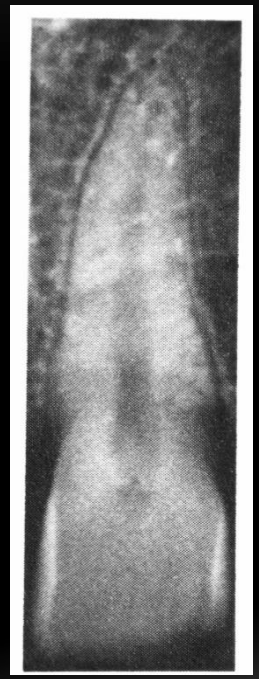

regio molaris maxillae lat. dextri
regio incisiva maxillae
regio molaris maxillae lat. sinistri
R
L
regio praemolaris mandibulae lat. dextri
regio canina mandibulae lat. sinistri

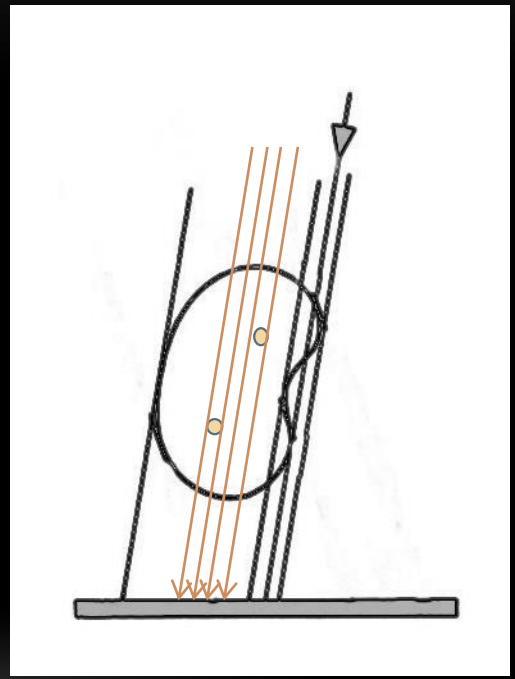
BUCCAL „OBJECTS” WILL HAVE A DIFFERENT SHADOW…









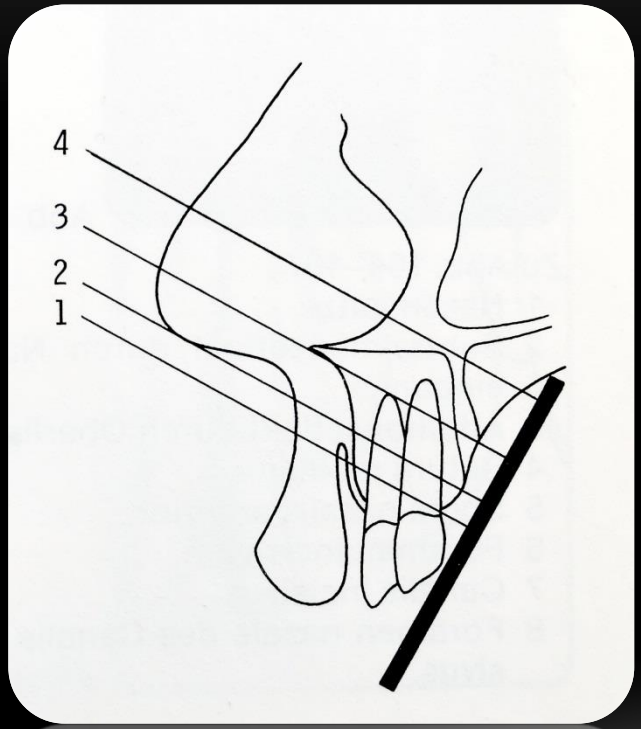


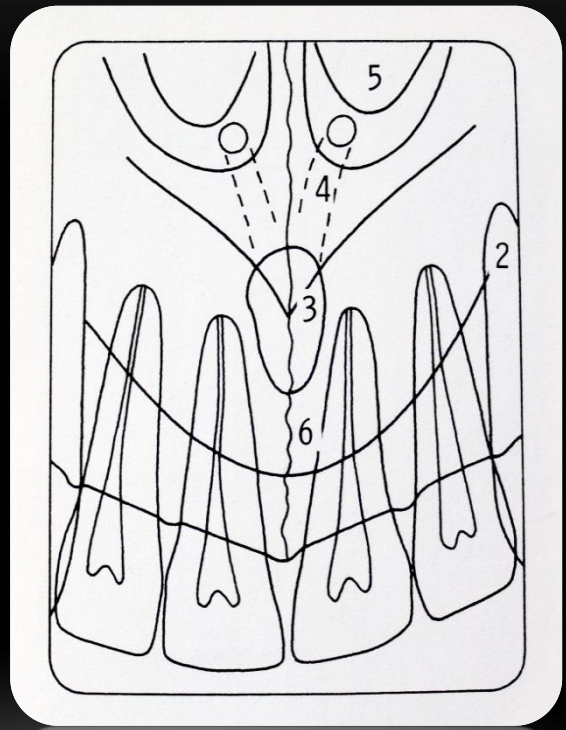
CHECK THE MOLAR TOOTH RADIOGRAPH: MORE ROOTS CAUSE DIFFERENCES IN OPACITY.

Remember- this is just an extracted tooth!

Other structures, like the bones in the way of the x-ray beam, the lamina dura, the periodontal ligament space, will cause a more complicated image in vital situations.

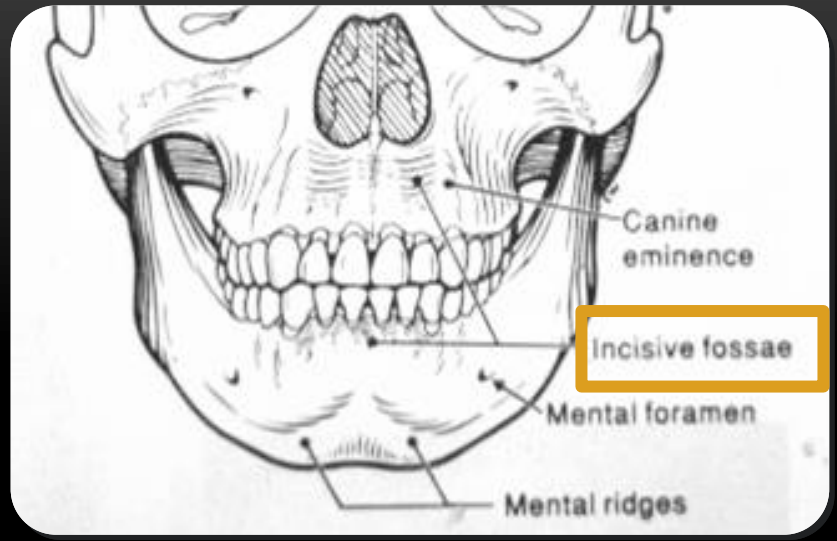
ANATOMICAL STRUCTURES IN THE INCISIVE MAXILLARY REGION

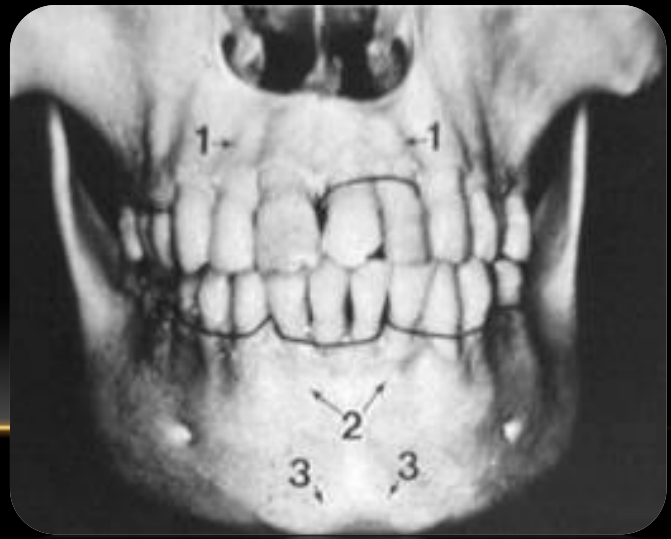




1. The sensor
2. Nose
3. Anterior nasal spine and incisive foramen
4. Incisive canal
5. Nasal cavity
6. Intermaxillary suture

INCISIVE FOSSAE





MAXILLA

Latin

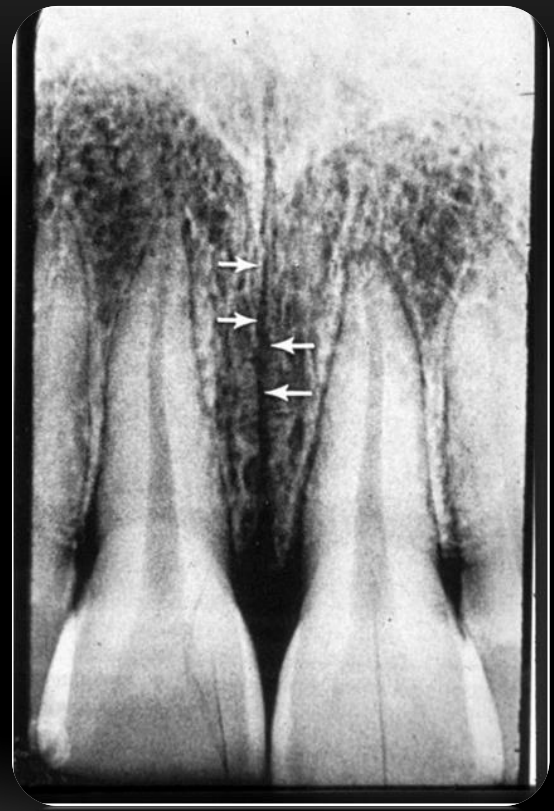
- sutura intermaxillaris
- spina nasalis anterior
- cavum nasi
- foramen incisivum
- fossa incisiva
- sinus maxillaris
- proc. zygomaticus
- os zygomaticum
- tuber maxillae
- proc. pterygoideus

English

- **Intermaxillary suture**
- **Anterior nasal spine**
- **Nasal cavity**
- **Incisive foramen**
- **Incisive fossa**
- **Maxillary sinus**
- **Zygomatic process**
- **Zygomatic bone**
- **Maxillary tuberosity**
- **Pterygoid process**

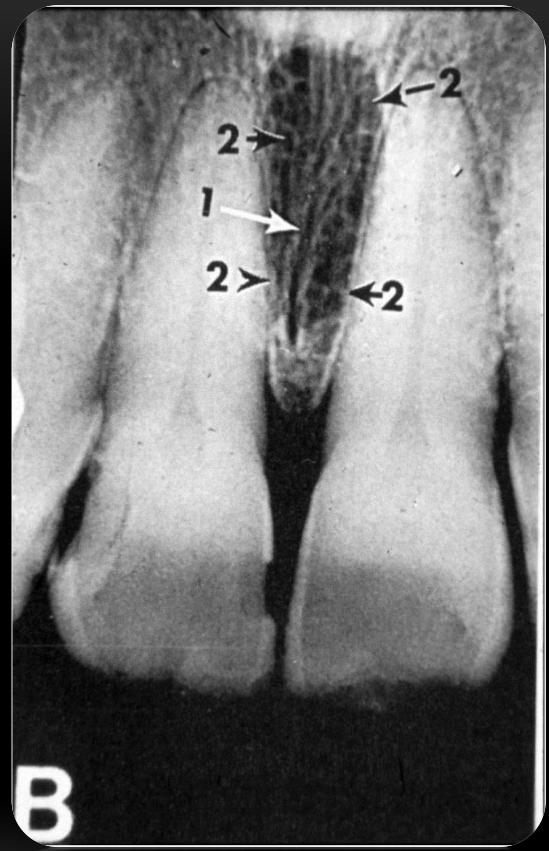
SUTURA INTERMAXILLARIS

- In the midline
- Straight suture – with connective tissue fibers
- Translucent strip between two opac cortical layers



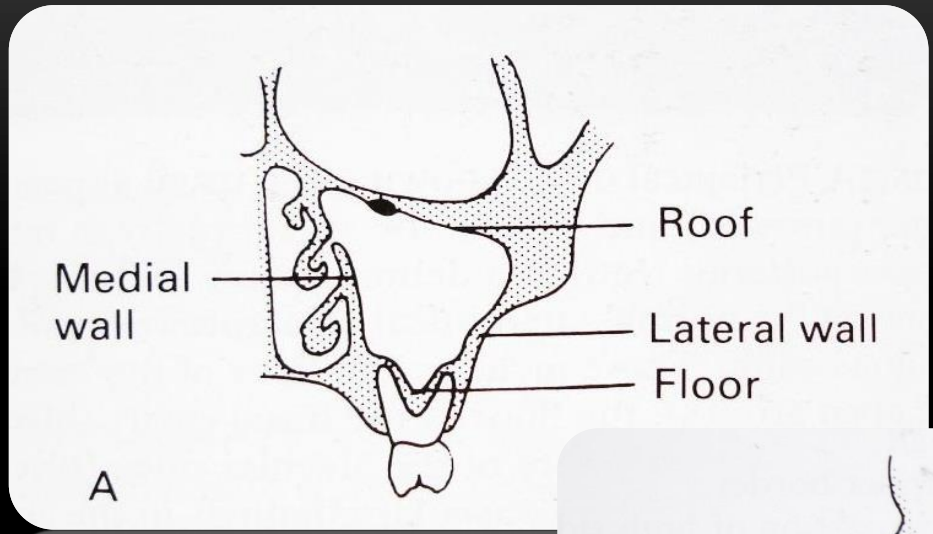
FORAMEN INCISIVUM

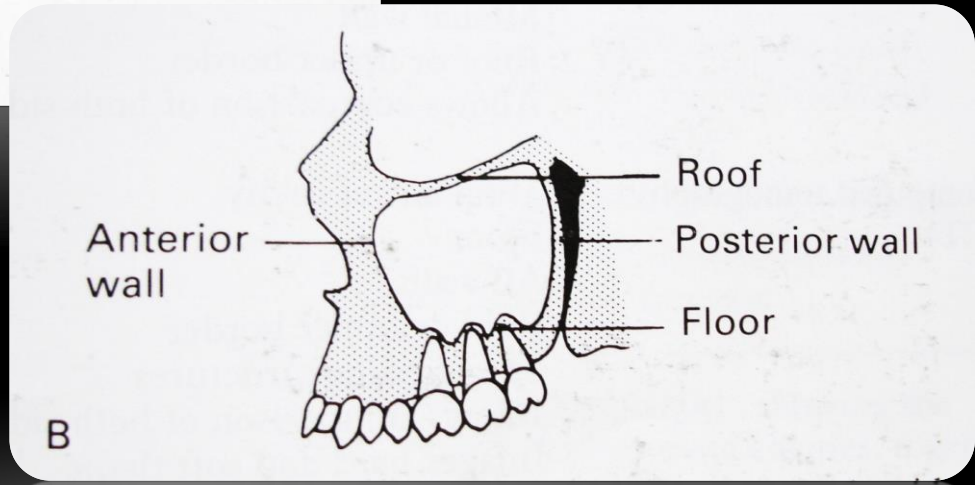
- Palatal opening of incisive canal
- Shape: "round, ovoid, heart shaped"
- Size is also varied
- Upper edge is sharp – lower is blur



MAXILLARY SINUS

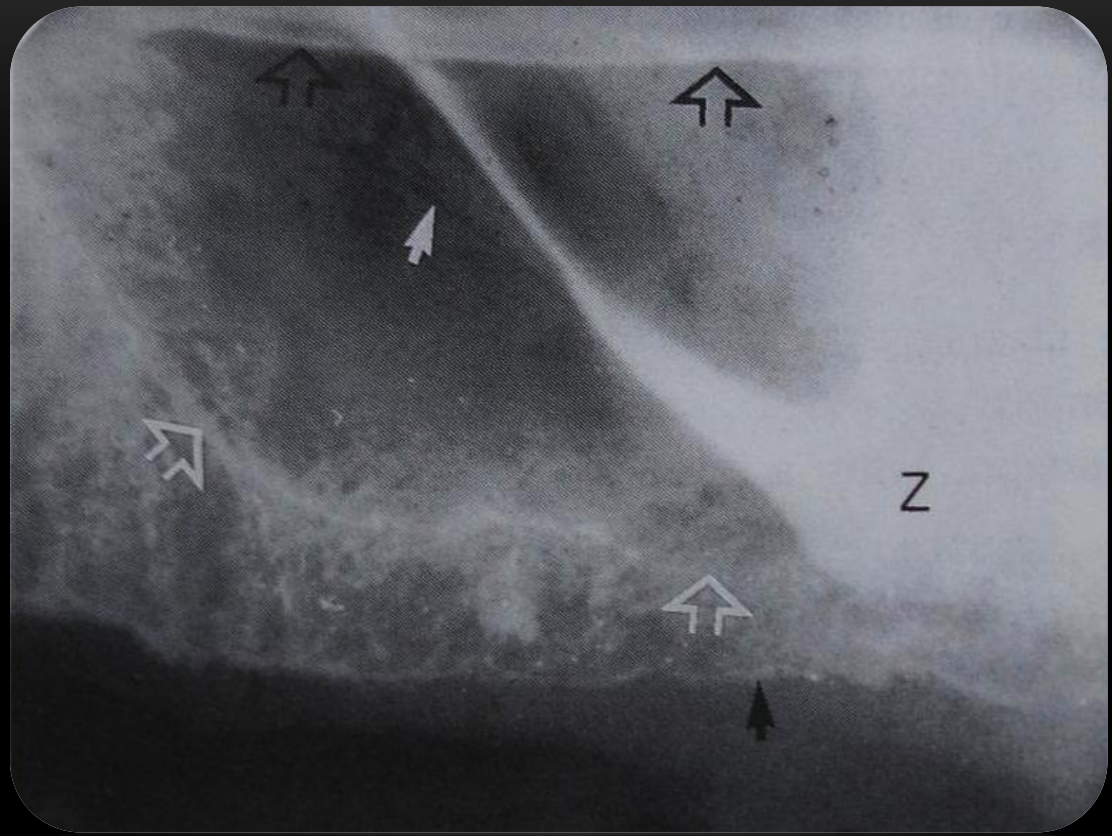
- Recesses:
  - r. frontalis
  - r. infraorbitalis
  - r. zygmaticus
  - r. palatinalis
  - r. alveolaris

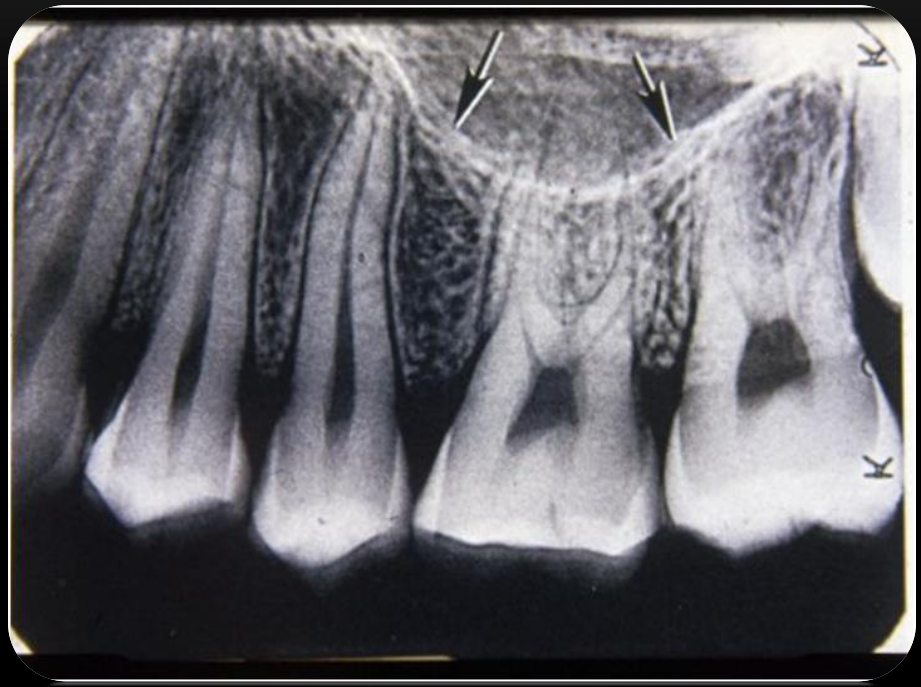

Roof
Medial wall
Lateral wall
Floor
A

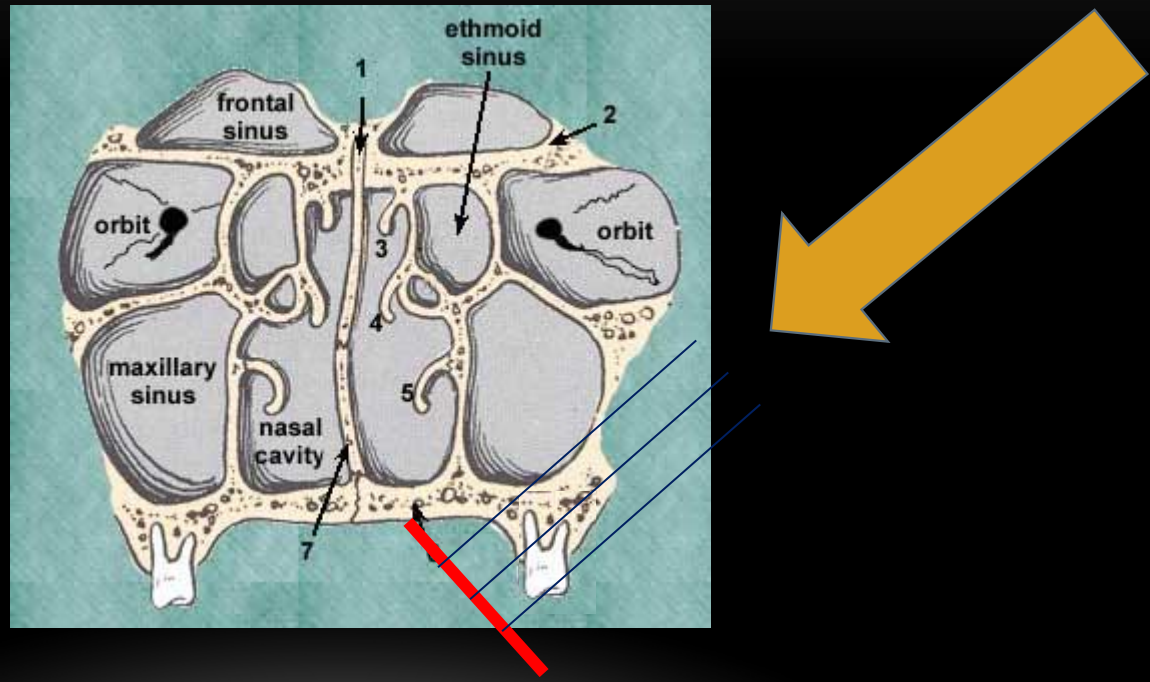

Roof
Anterior wall
Posterior wall
Floor
B

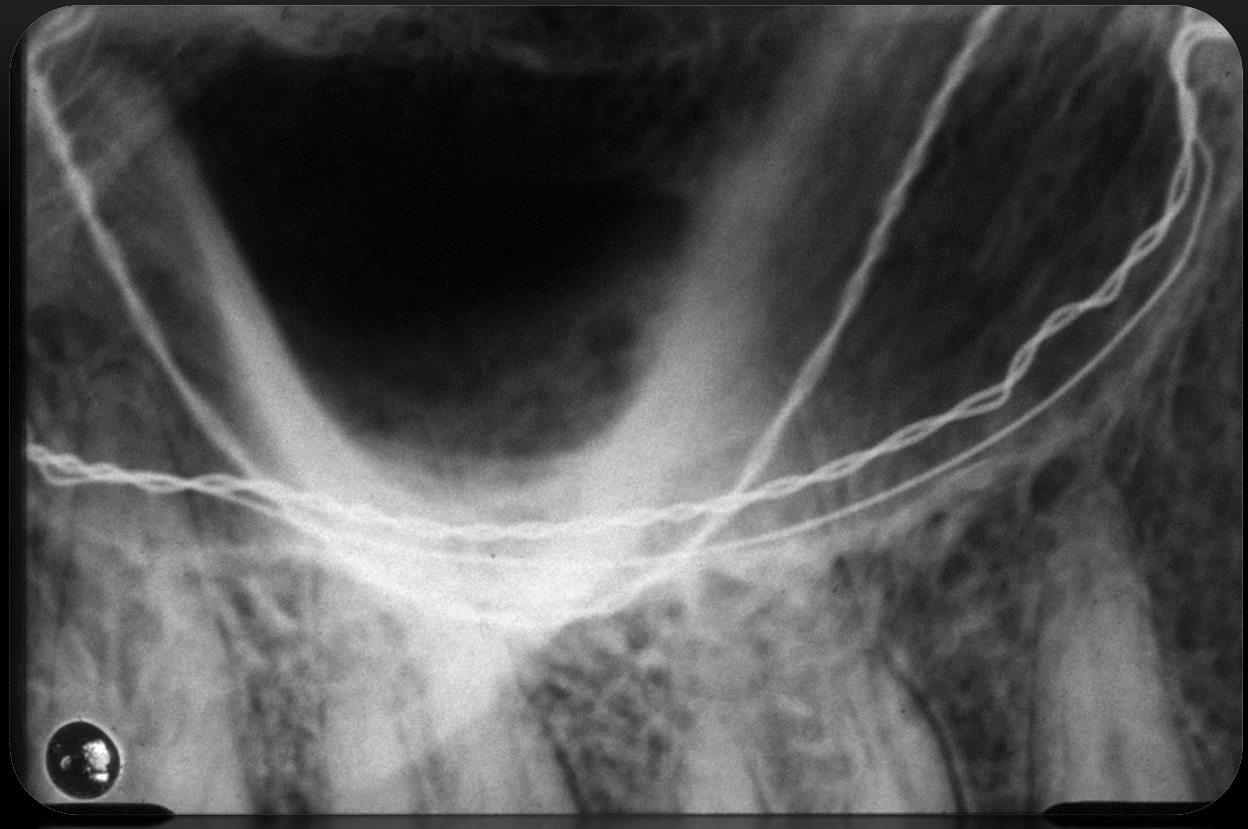
RECESSUS ALVEOLARIS

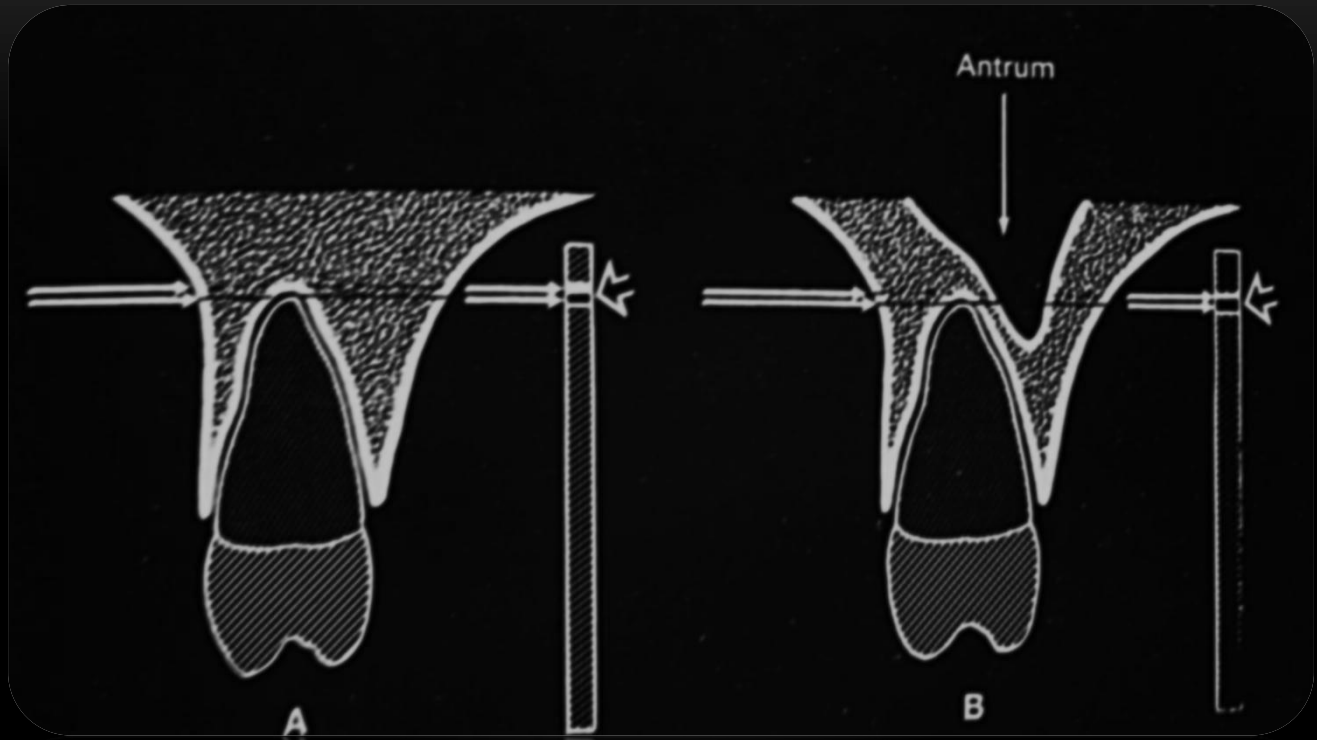
- Sinus Line – Clear compacta line
- In general it starts from the preamolars
- The deepest part is around the first and second molars
- LATEROBASAL wall's projection!
- With nasal line the sinus line forms an X, Y, V-shaped drawing

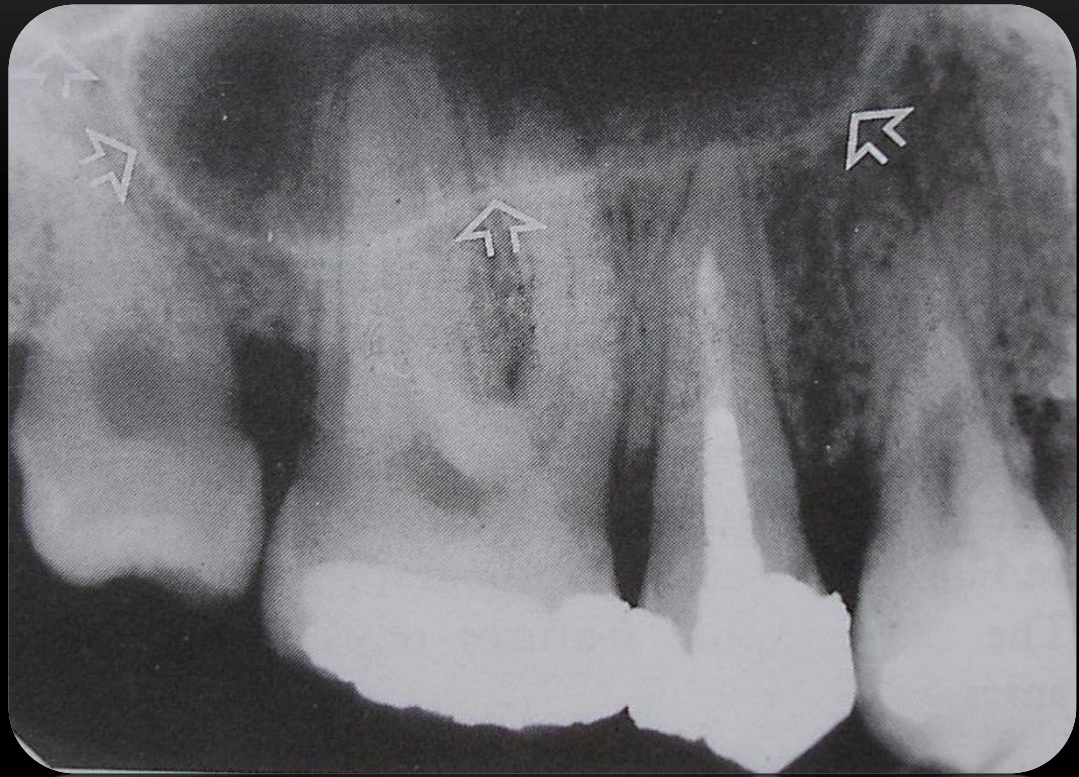

Z




ethmoid
sinus
1
frontal
sinus
2
orbit
orbit
3
4
maxillary
sinus
5
nasal
cavity
7



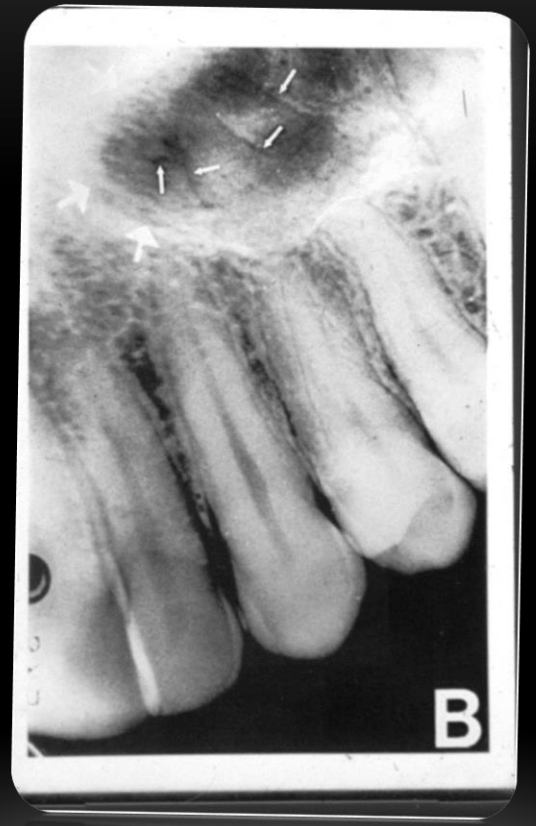

Antrum
A
B

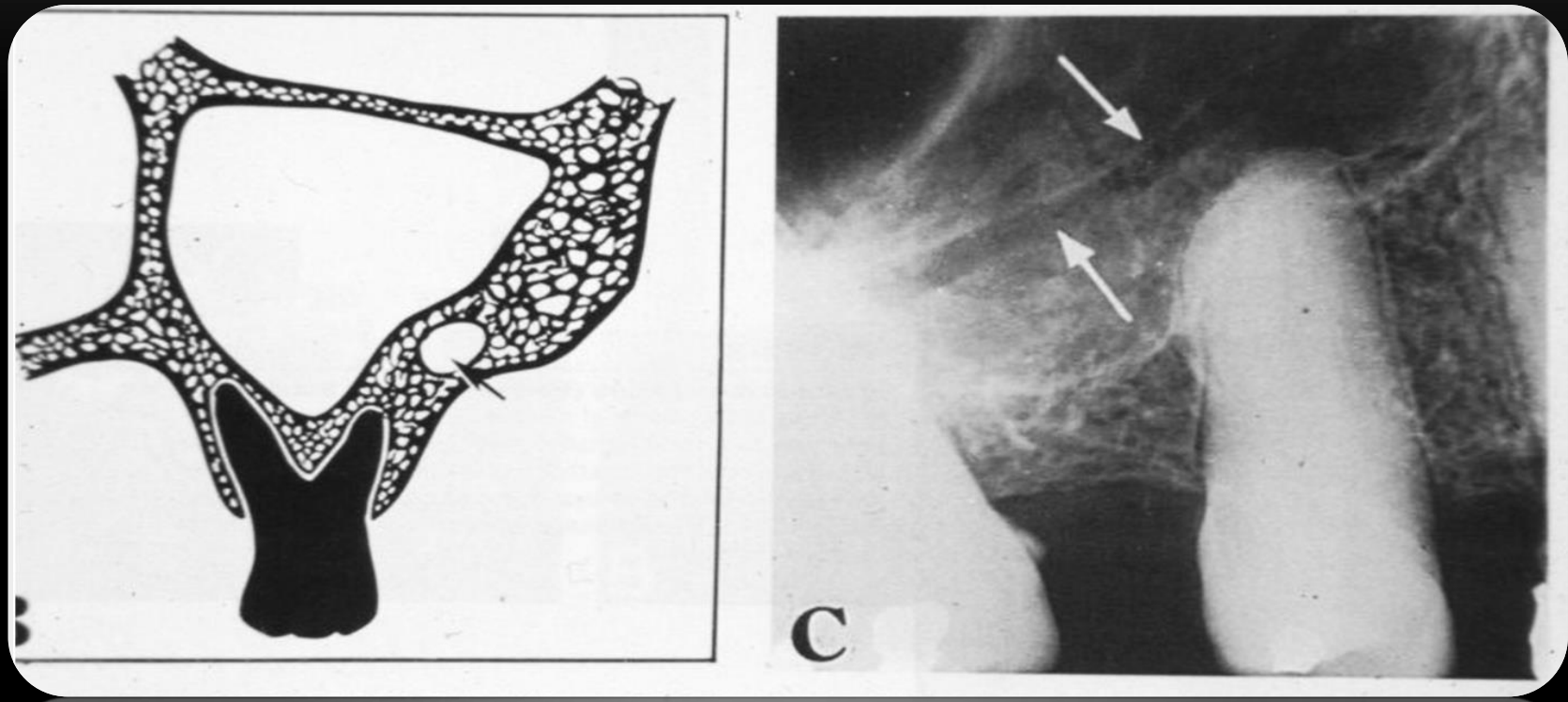


EXTENSIONS OF THE ALVEOLAR RECESS

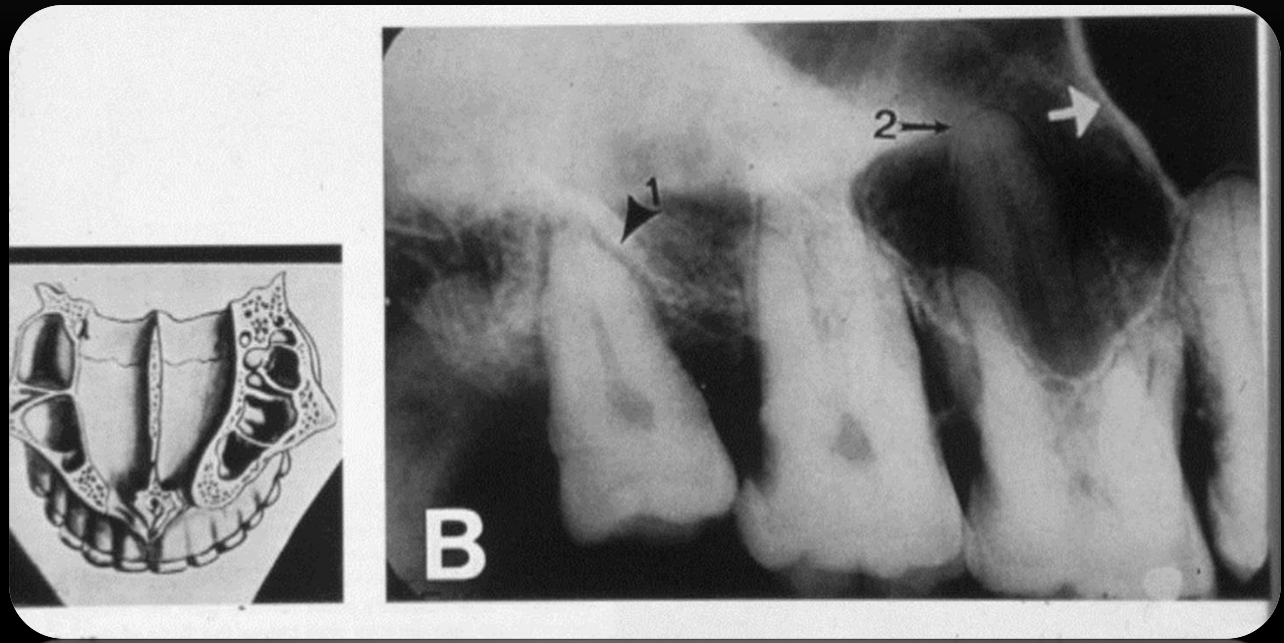
- extensio frontalis
- extensio basalis
  - sinus interradicularis
  - sinus interdentalis
  - sinus alveolaris (Due to secondary pneumatization following extraction)
- extensio tuberalis

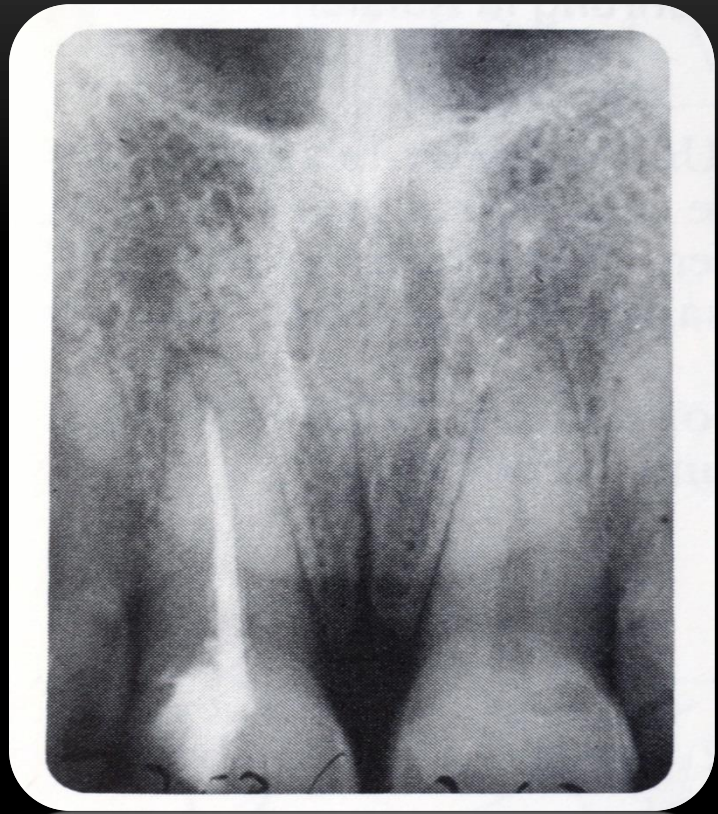
plexus dentalis

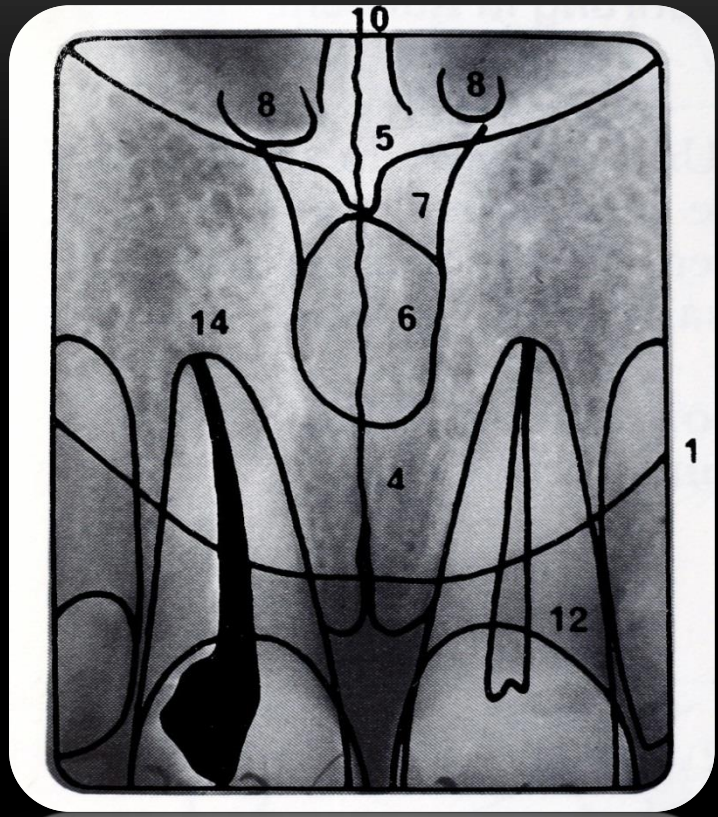



C

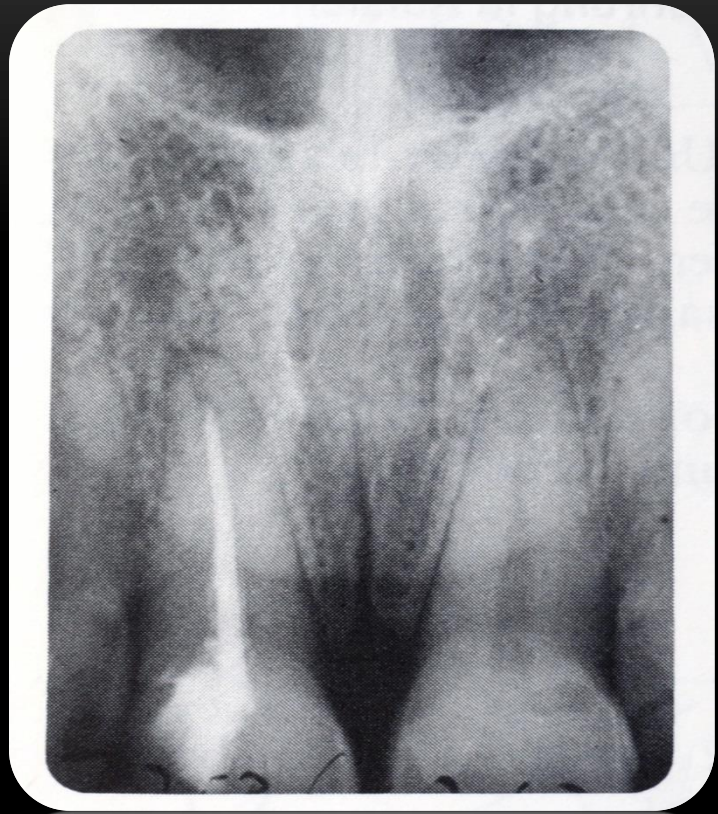
SEPTUMS

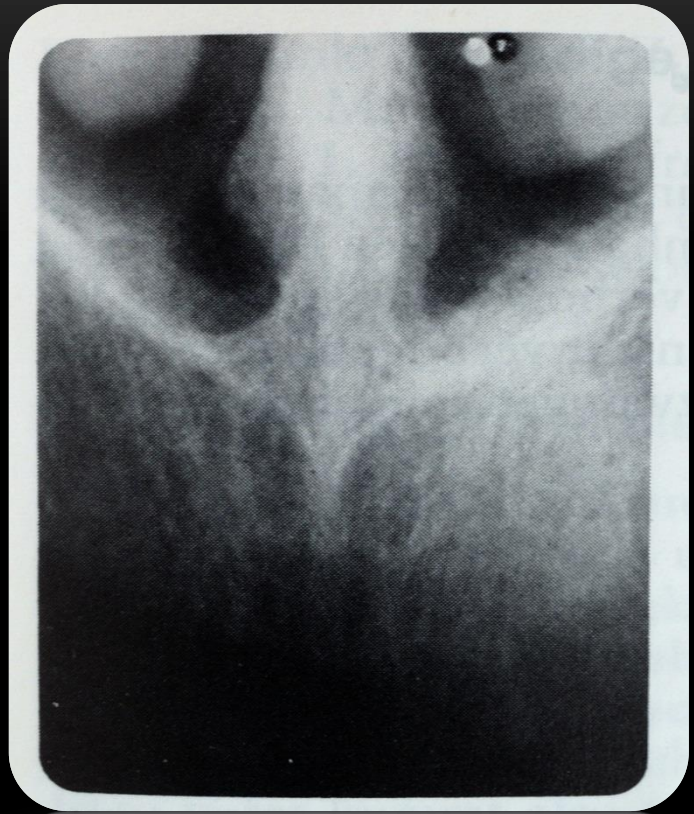


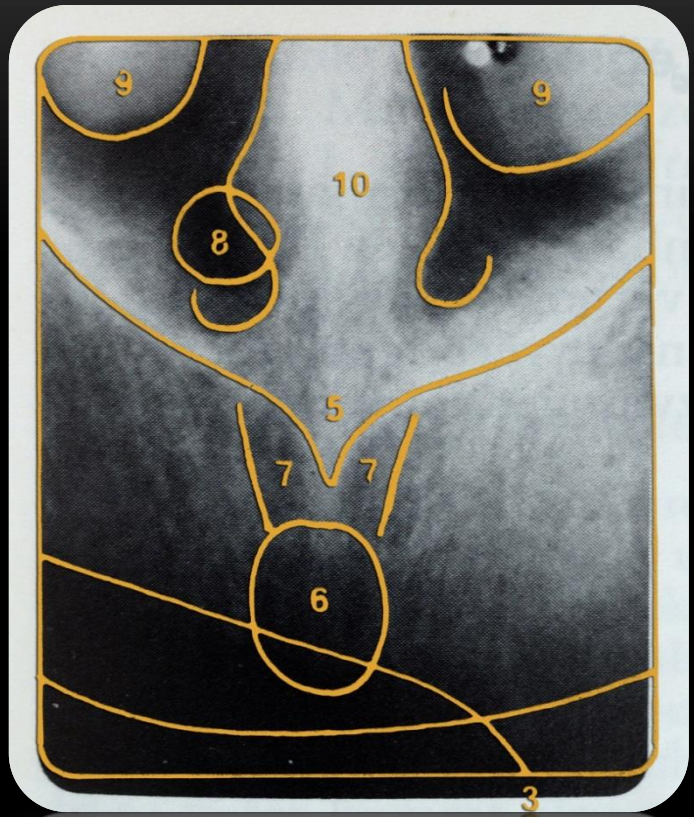




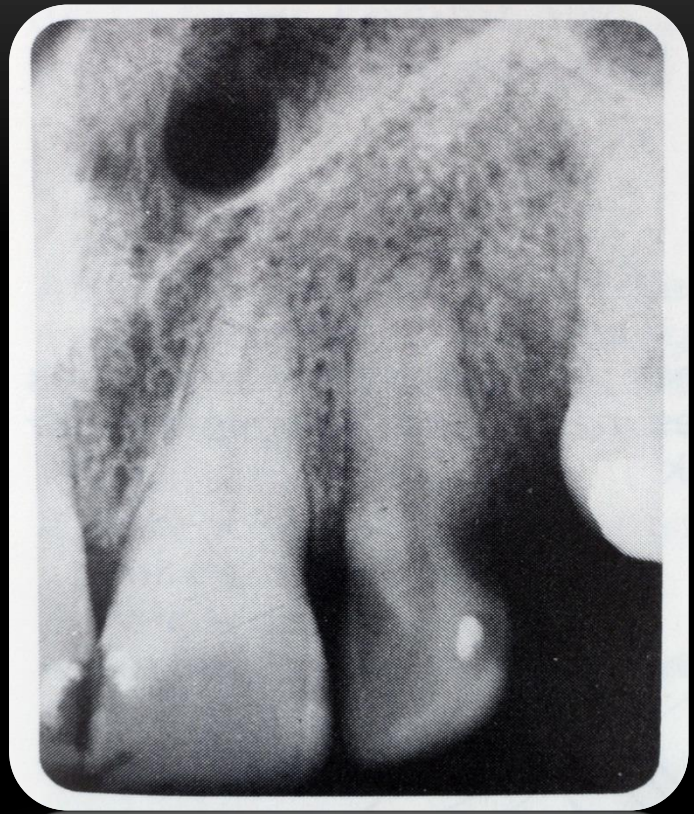
1. Tip of the nose
4. Intermaxillary suture
5. Anterior nasal spine
6. Incisive foramen
7. Incisive canal
8. Nasal foramen
10. Nasal septum
12. Cervical burnout
14. Root canal filling

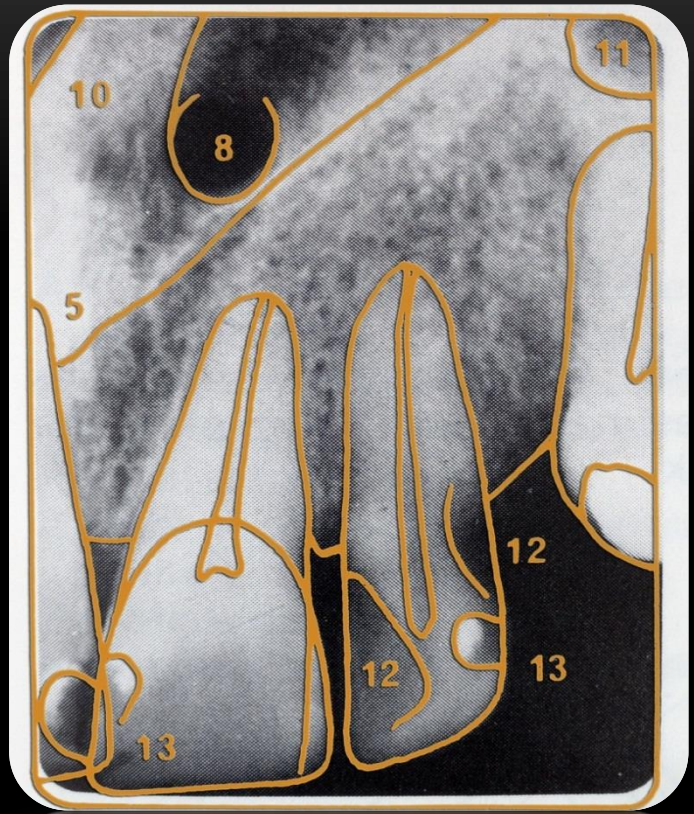






3. Labium superius
5. Spina nasalis anterior
6. Foramen incisivum
7. Canalis incisivus
8. Foramen nasale
9. Concha nasalis inferior
10. Septum nasi

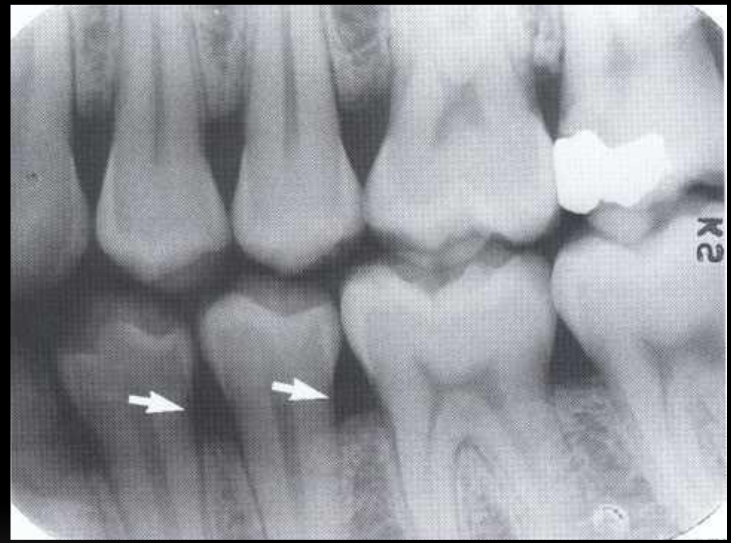


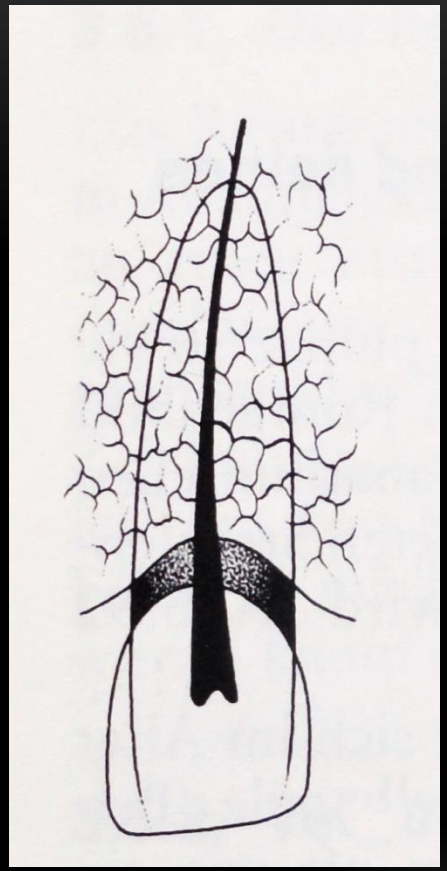


5. Anterior nasal spine
8. Nasal foramen
10. Nasal septum
11. Maxillary sinus
12. Cervical burnout
13. Composite filling with cement underlying

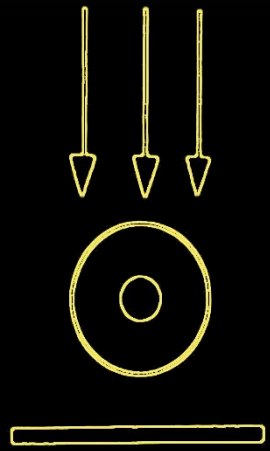
CERVICAL BURNOUT PHENOMENON

- Diffuse radiolucent areas with ill-defined borders on the mesial or distal aspects of teeth in the cervical regions between the edge of the enamel cap and the crest of the alveolar ridge
- This phenomenon caused by the normal configuration of the affected teeth, which results in decreased x-ray absorption in these areas.
- The perception of these radiolucent areas results from the contrast with the adjacent, relatively opaque enamel and alveolar bone.

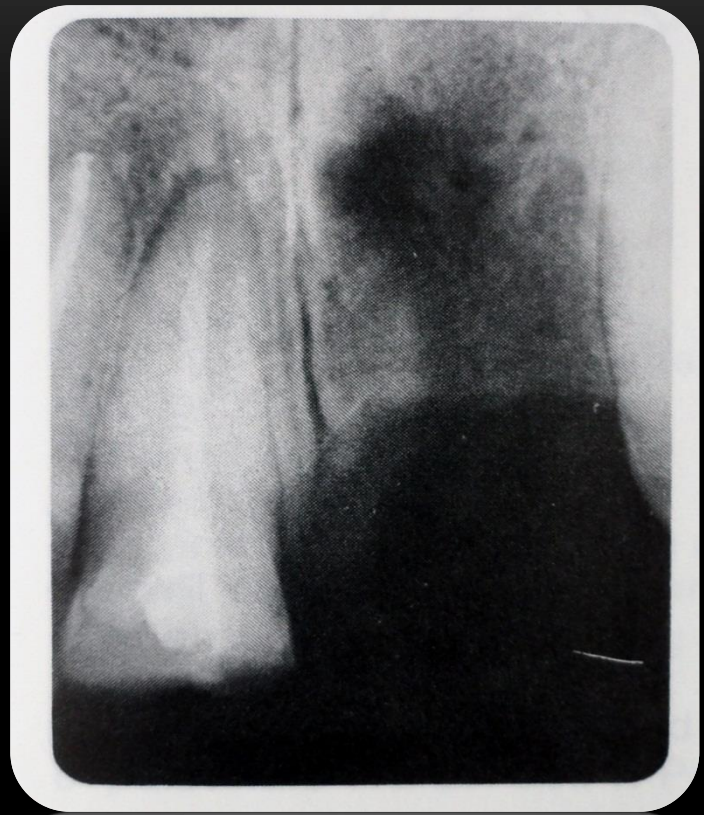


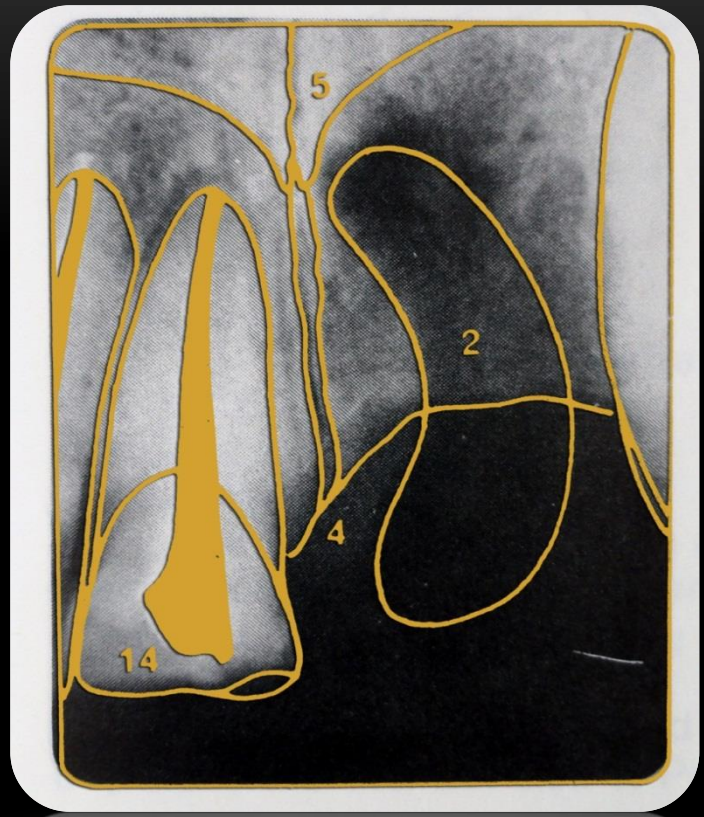


Cervical burnout

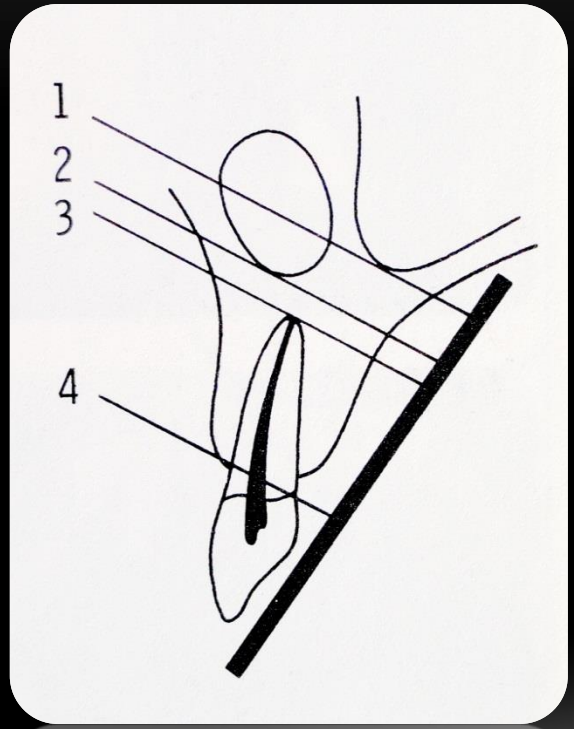


Cervical burnout caused by overexposure of the lateral portion of teeth between the enamel and alveolar crest





2. Nasal transparency
4. Intermaxillary suture
5. Anterior nasal spine
14. Root canal filling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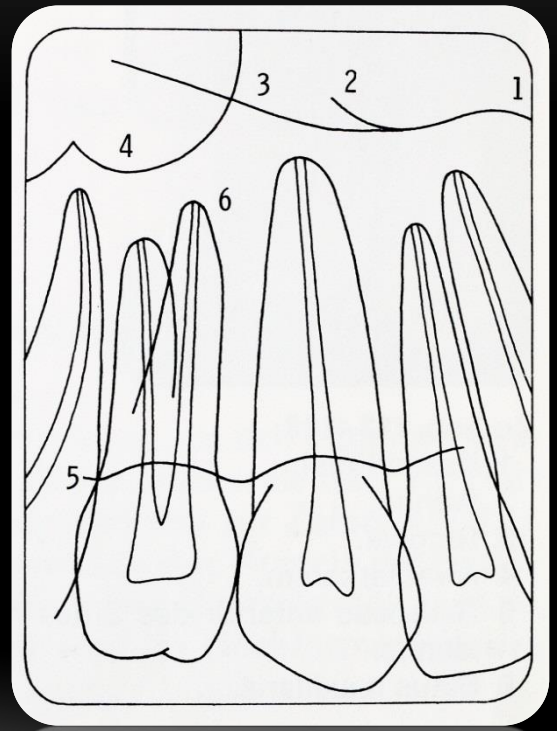
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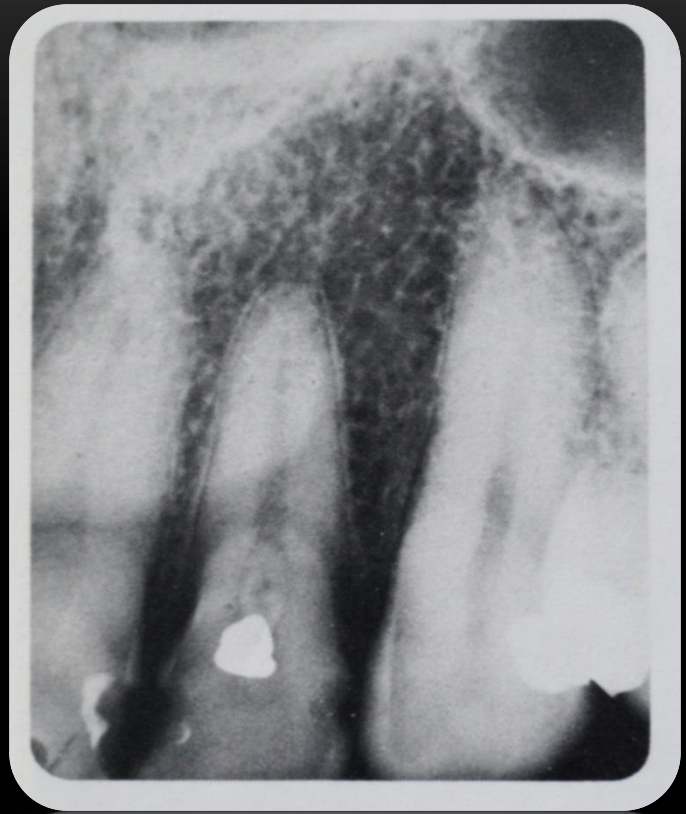
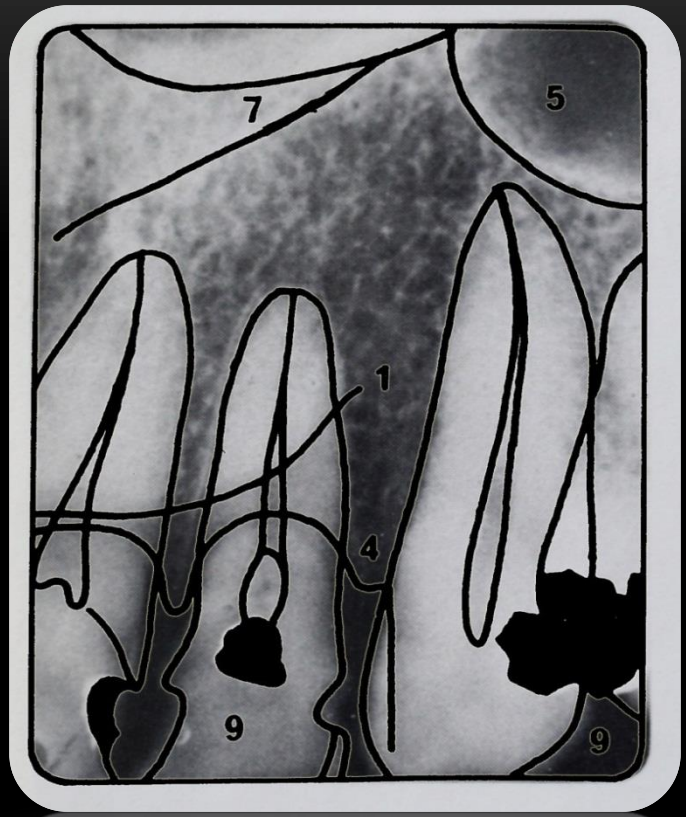
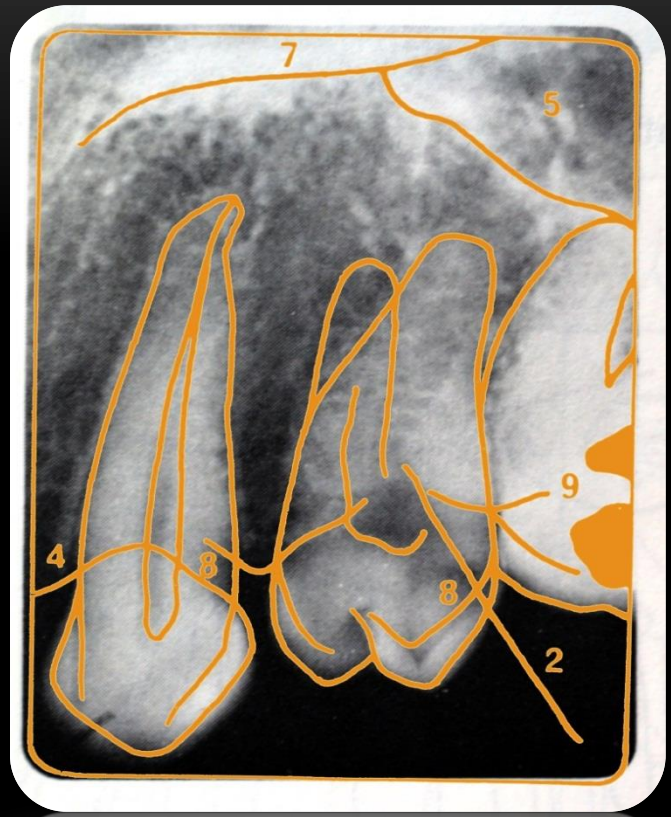
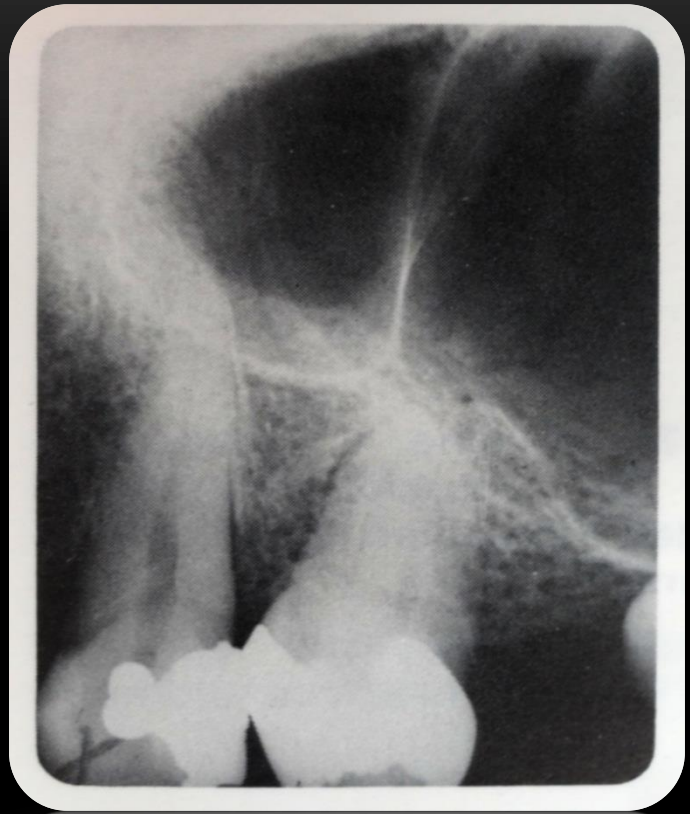


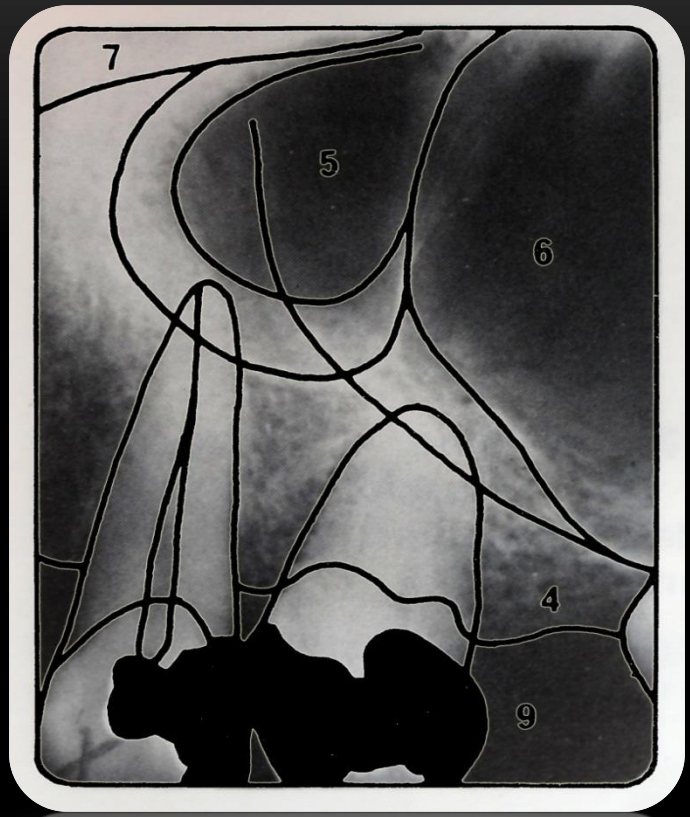


1. Nose
4. Alveolus dentalis
5. Sinus maxillaris
7. Cavum nasi
9. Amalgam/gold filling

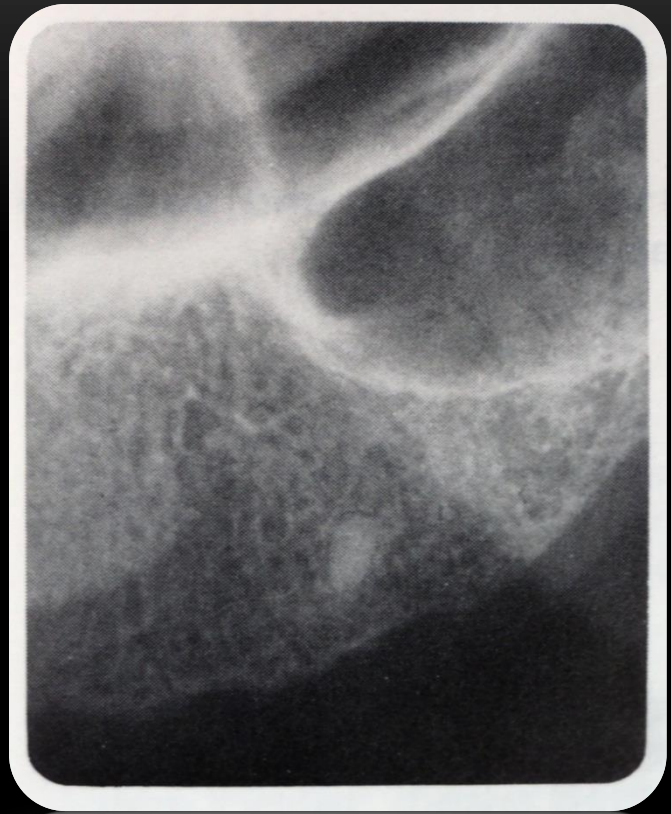


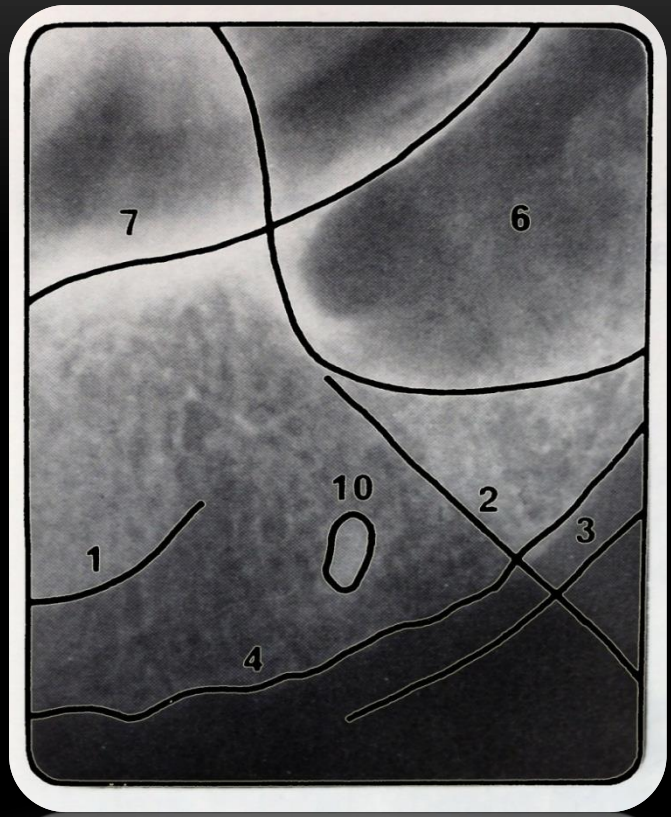
2. Lip
4. Alveolus dentalis
5. Sinus maxillaris
7. Cavum nasi
8. Burn-out effect
9. Amalgam filling





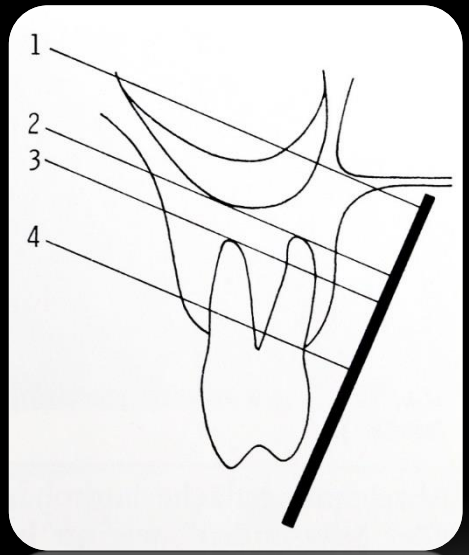
4. Alveolus dentalis
5. Sinus maxillaris recessus anterior
6. Sinus maxillaris
7. Cavum nasi laterobasal wall
9. Amalgam filling

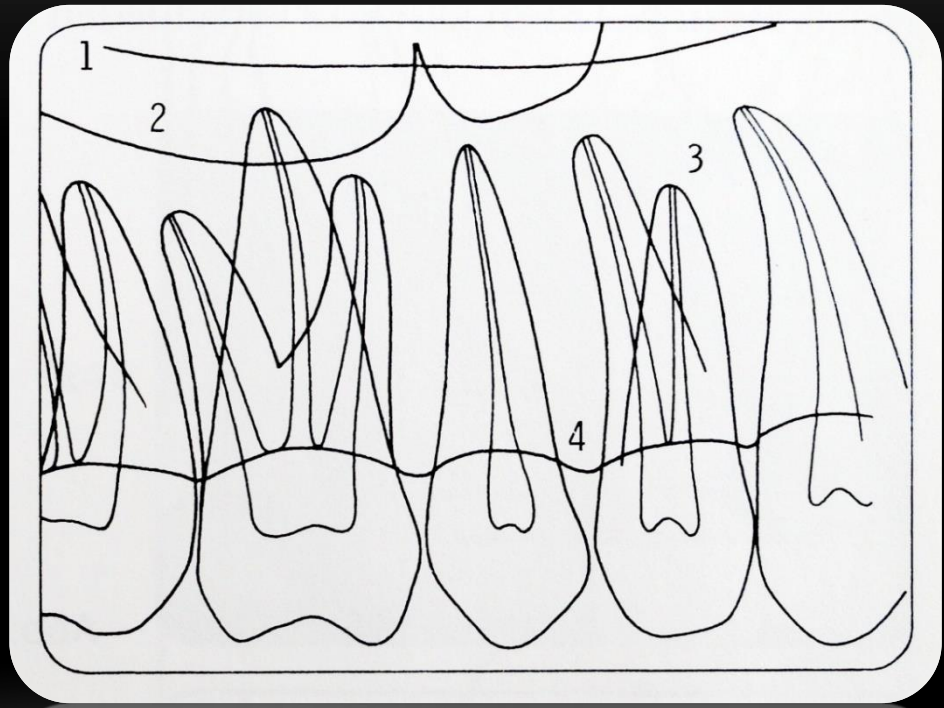


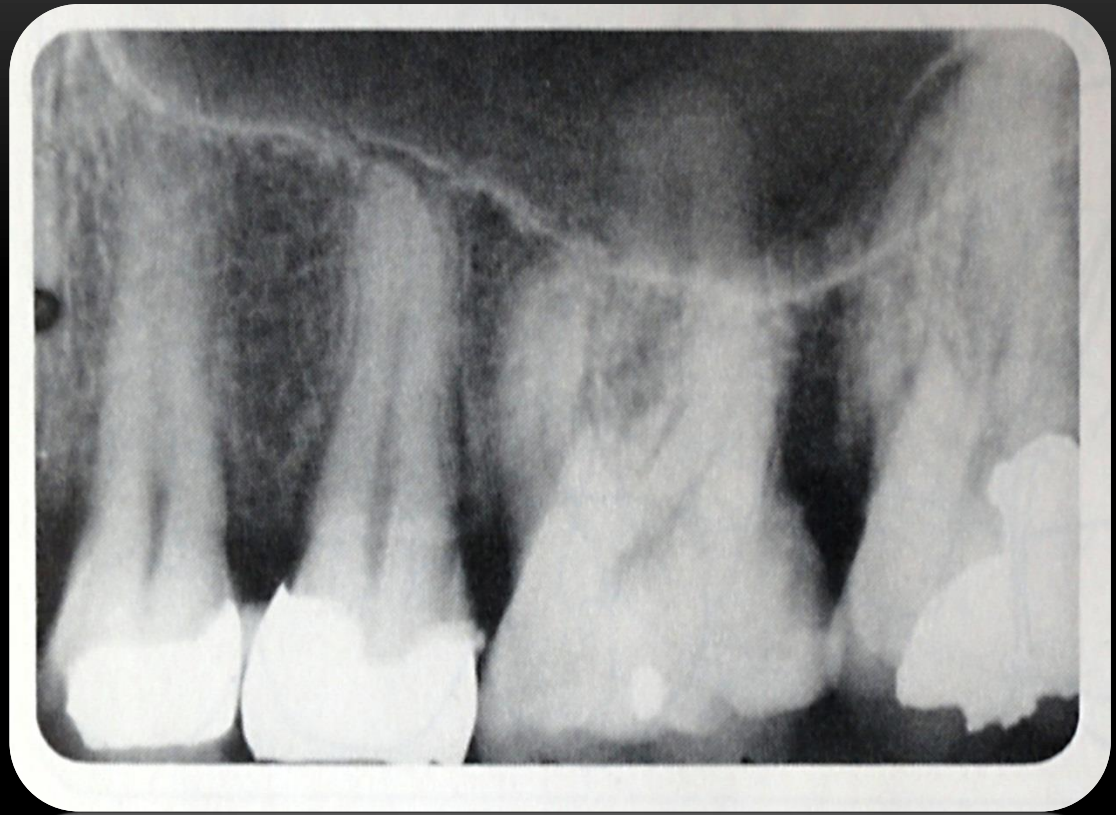


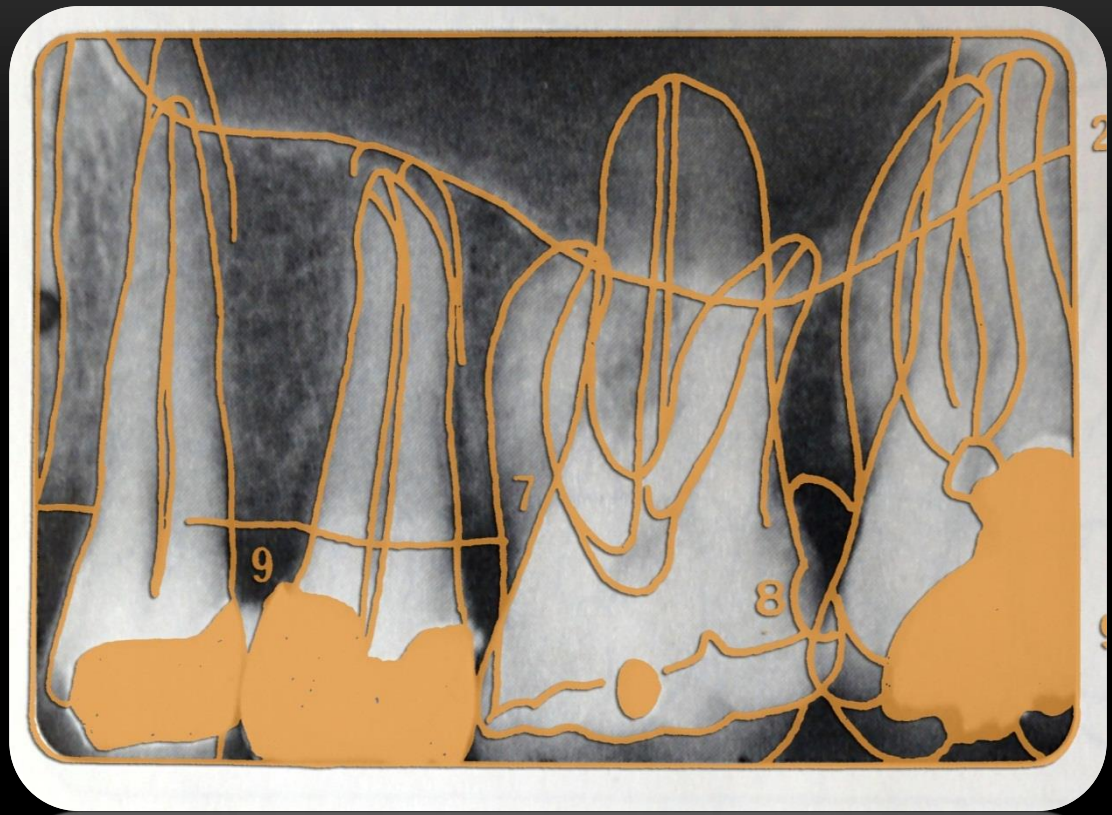
1. Tip of nose
2. Lip
3. Gingiva / mucosa
4. Alveolus dentalis
5. Sinus maxillaris
7. Cavum nasi
10. Fractured root remnant of the first praemolar

1. Nasal line
2. Sinus line





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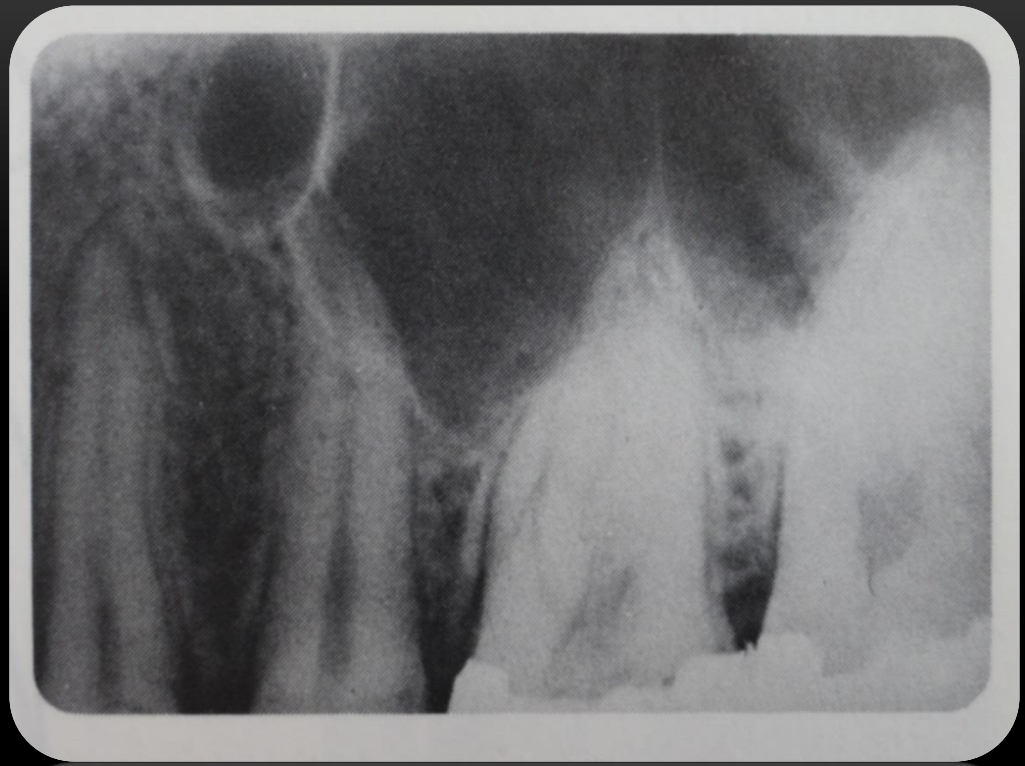

2. Interdenal extension of maxillary sinus
3. Anterior lobe of the maxillary sinus
5. Maxilary sinus septum
10. Zygomaticomaxillary suture


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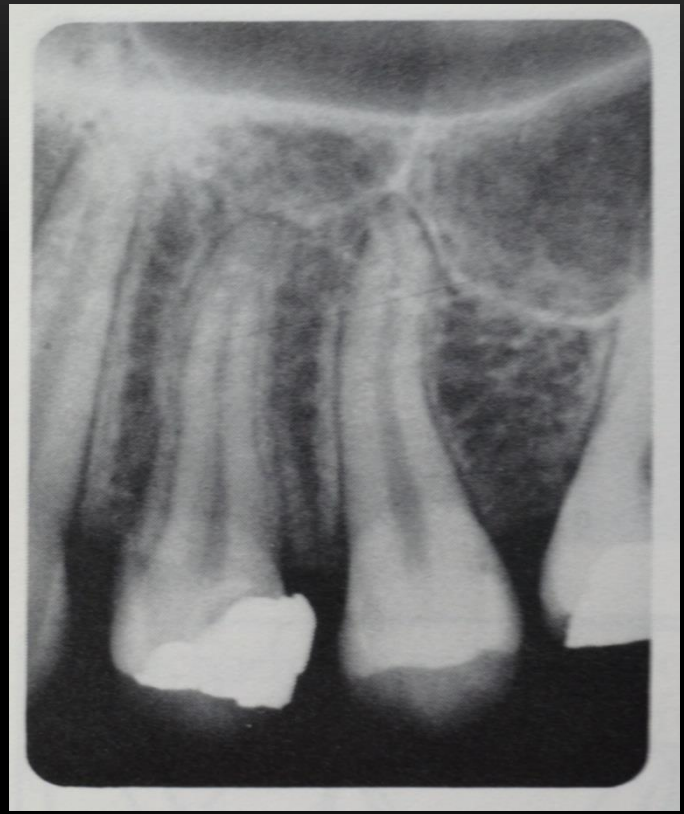
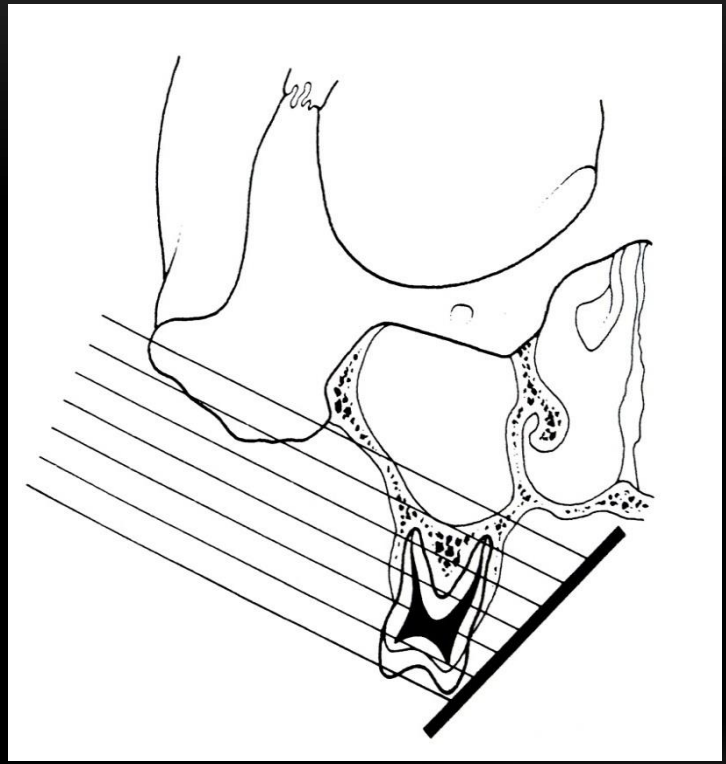
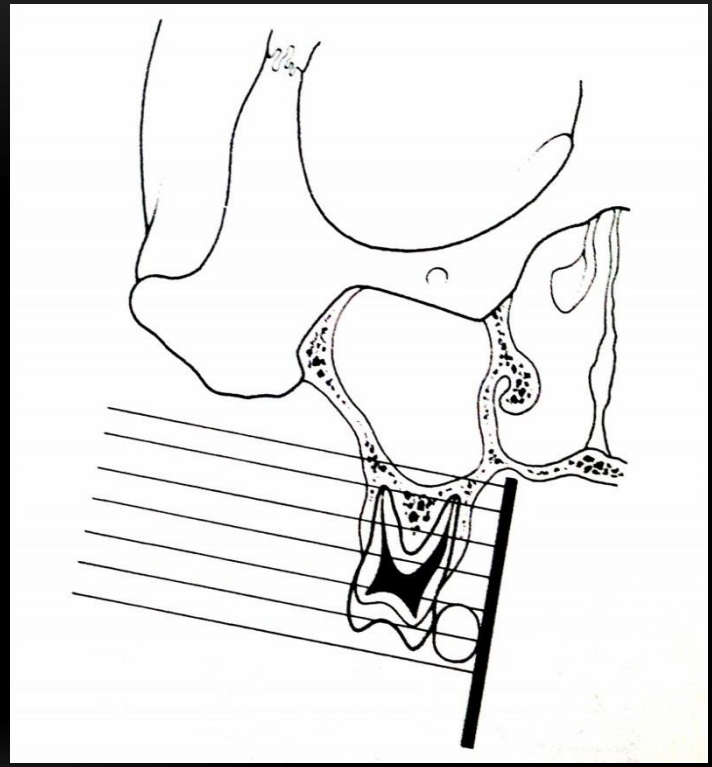
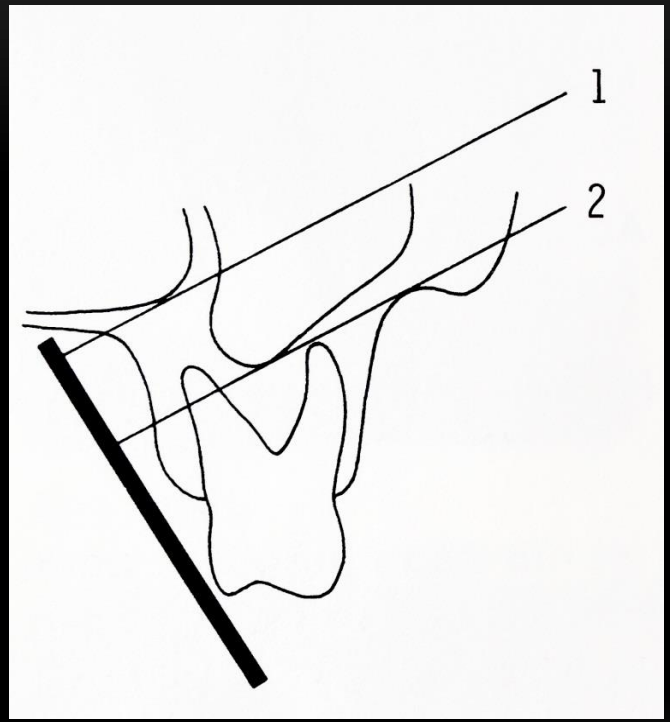


2. Sinus line
3. Anterior lobe of the maxillary sinus
5. Maxilary sinus septum
6. Nasal line

8. Secondary caries
9. OD Amalgam fillings



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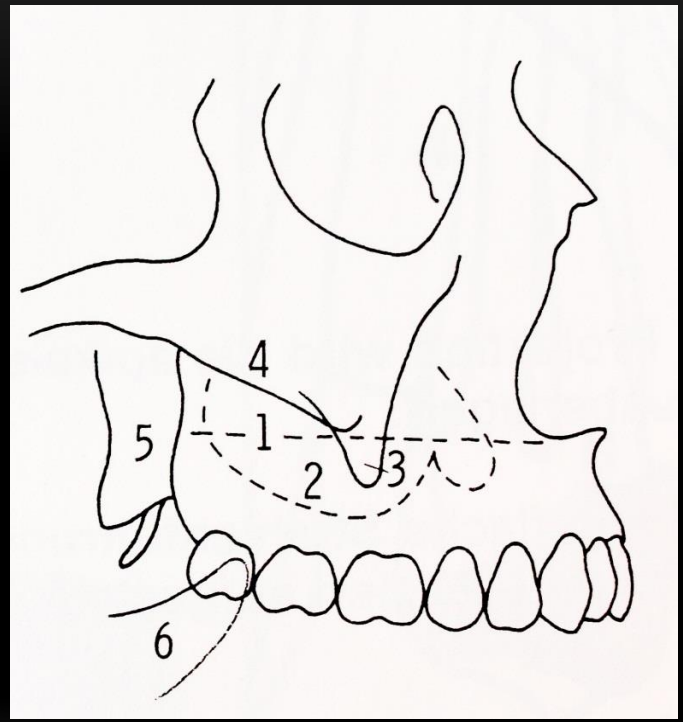
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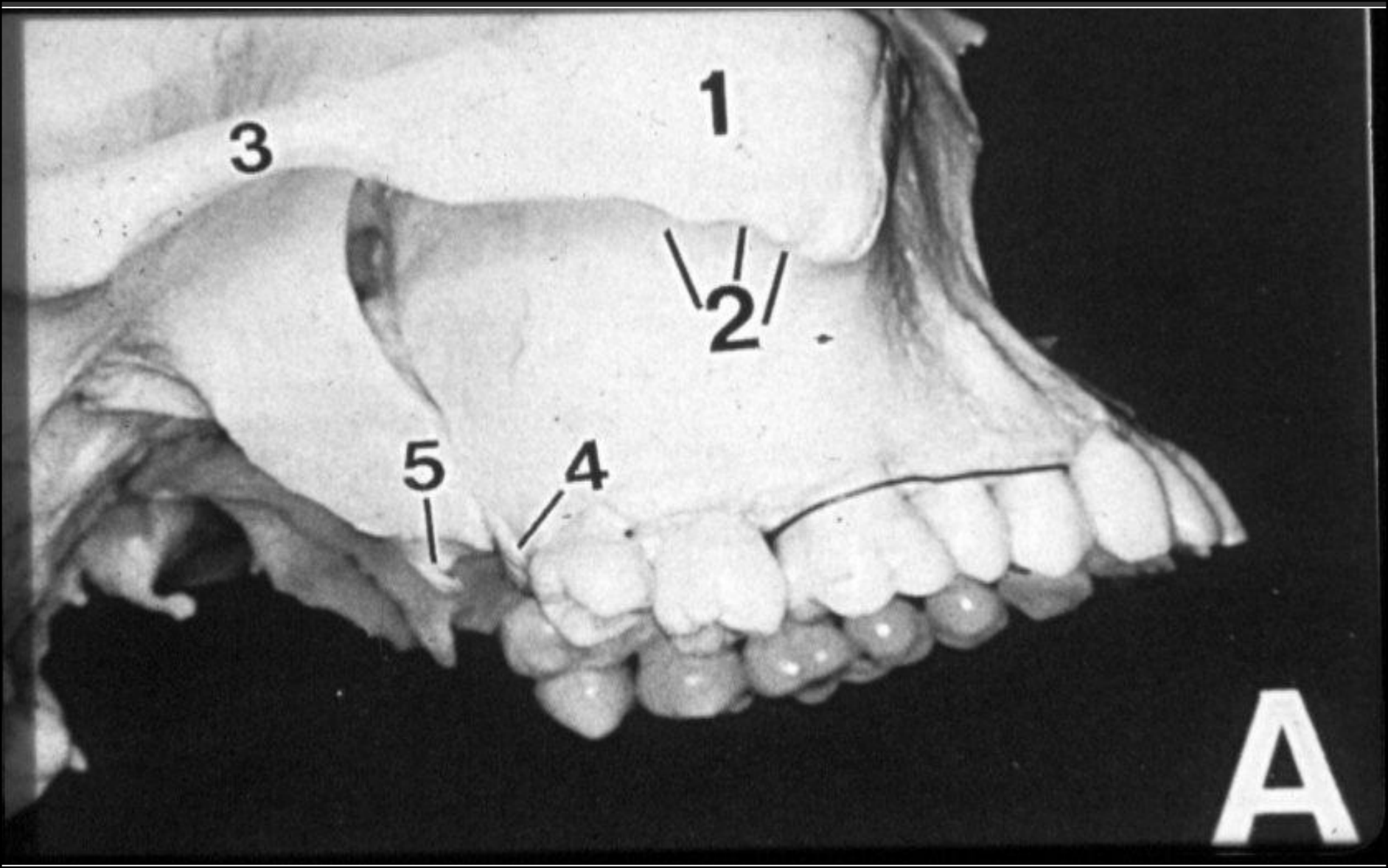
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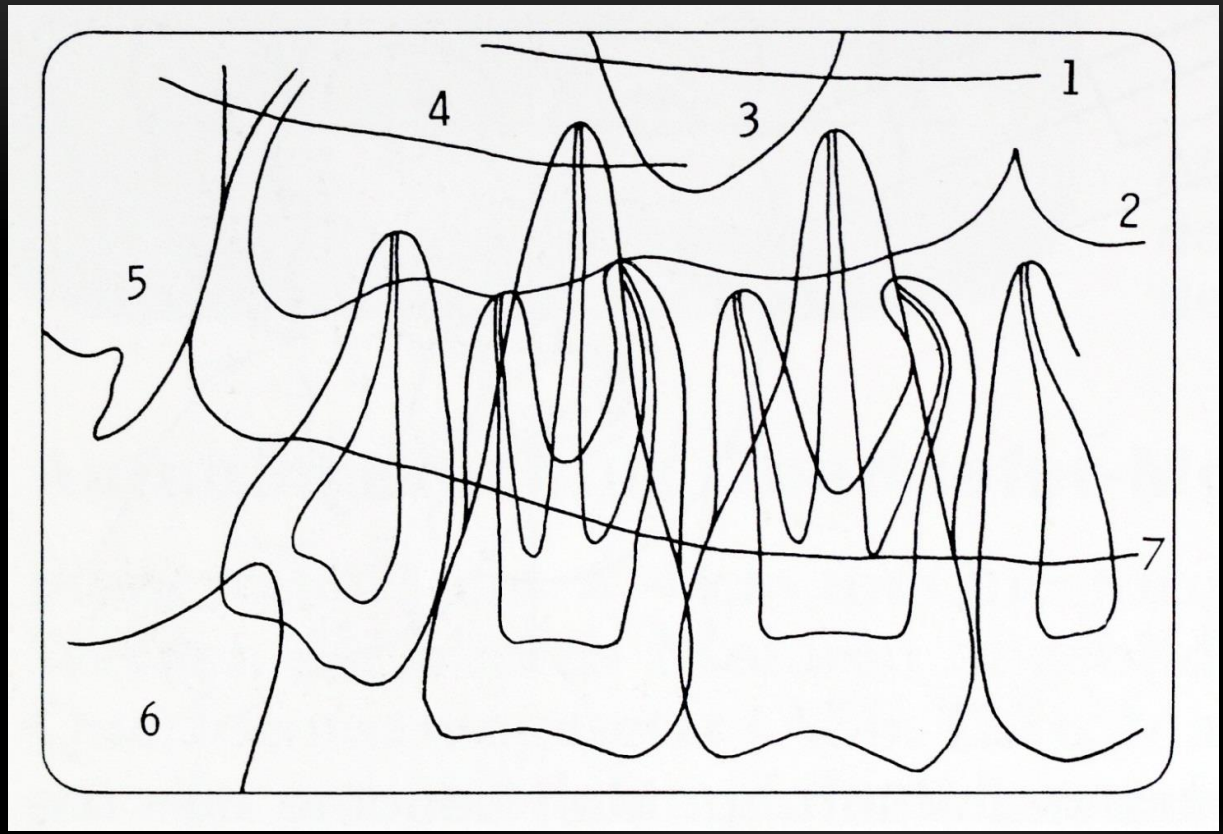
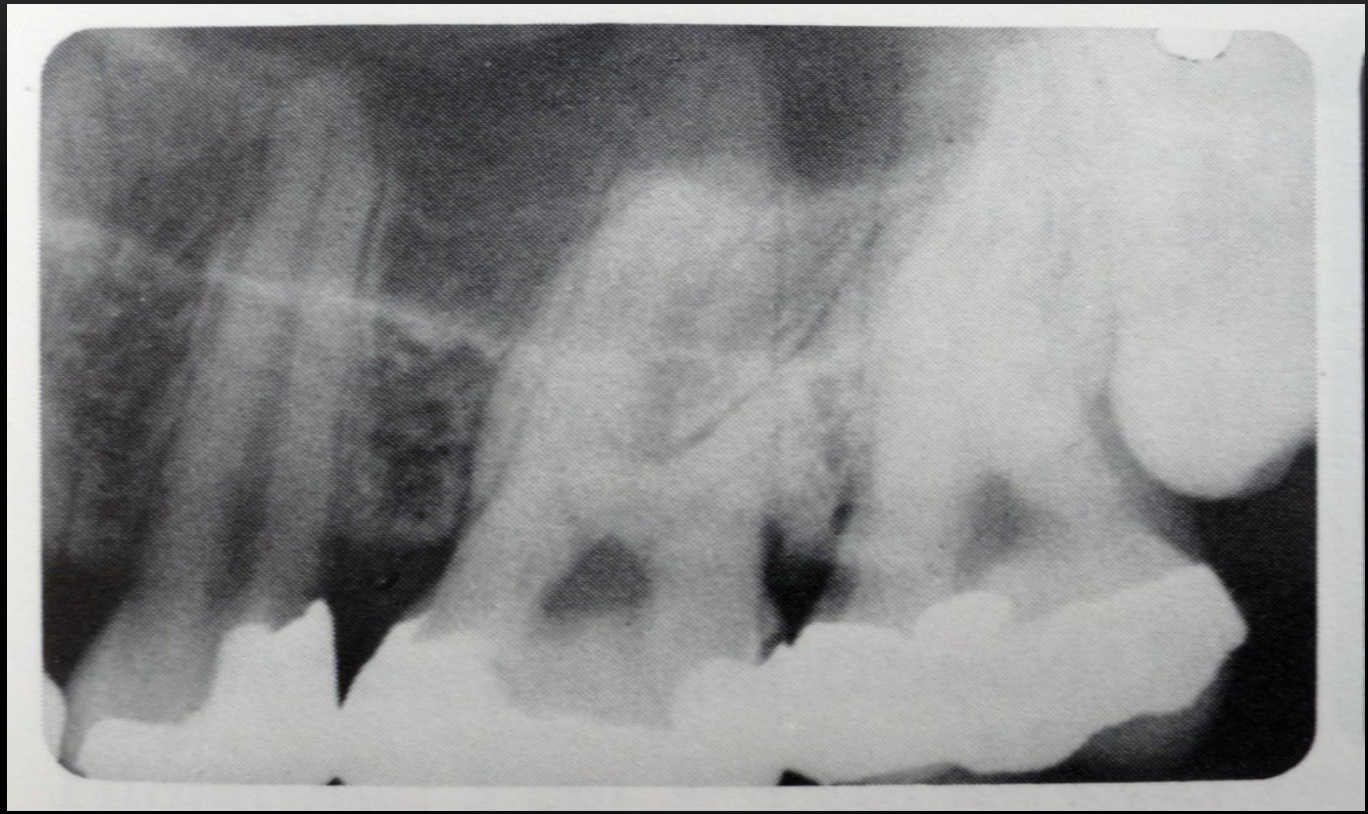


1. Nasal line
2. Sinus line
3. Zygomatic process
4. Zygomatic bone
5. Pterygoid process with hamulus pterygoideus
6. Coronoid/muscular process of the mandible

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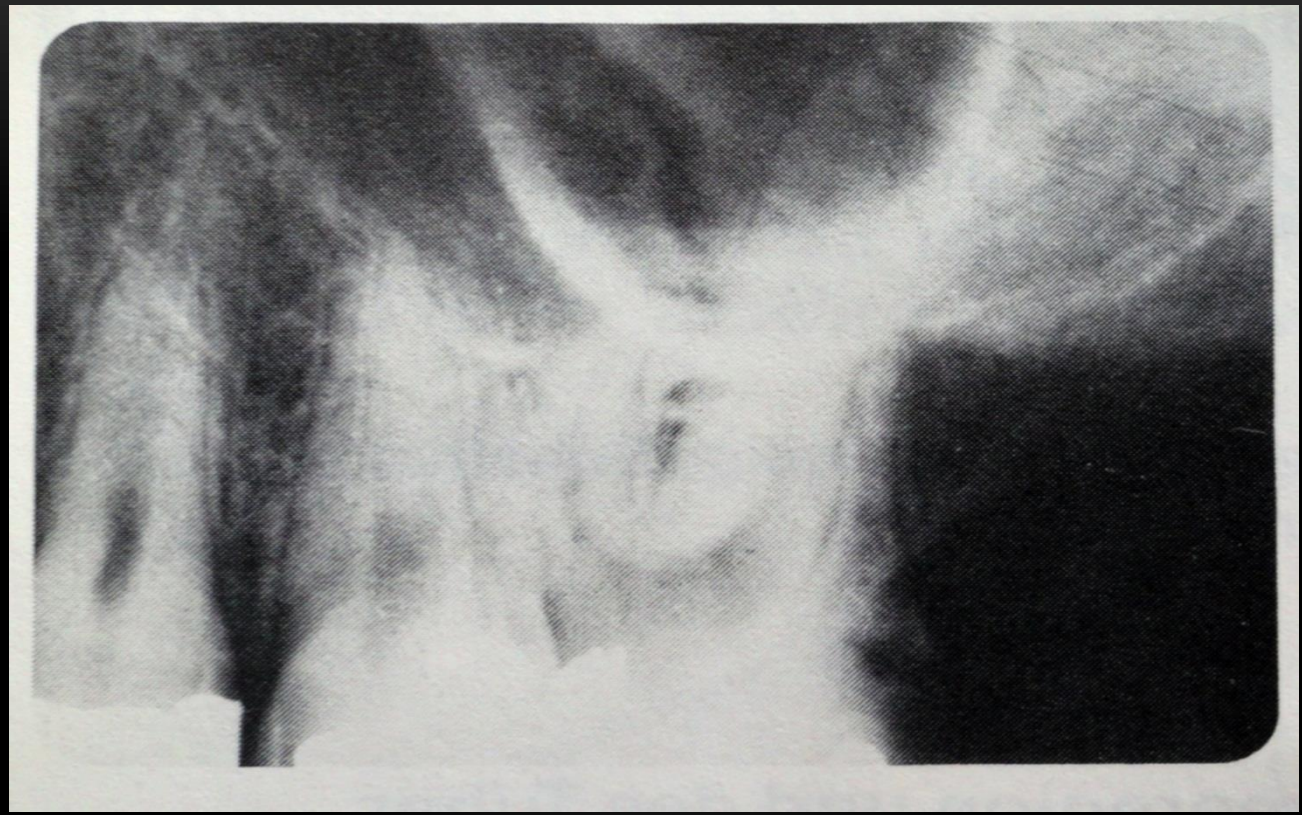


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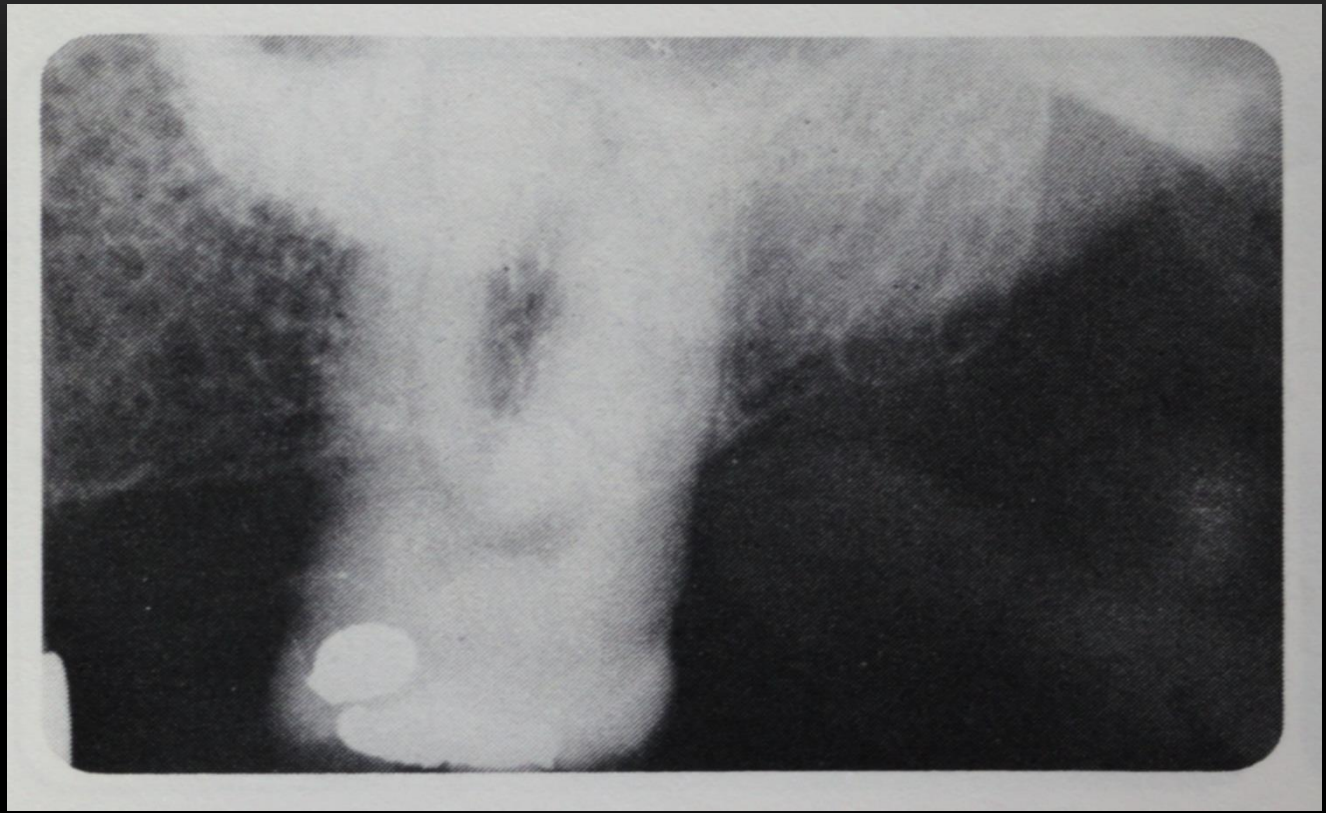

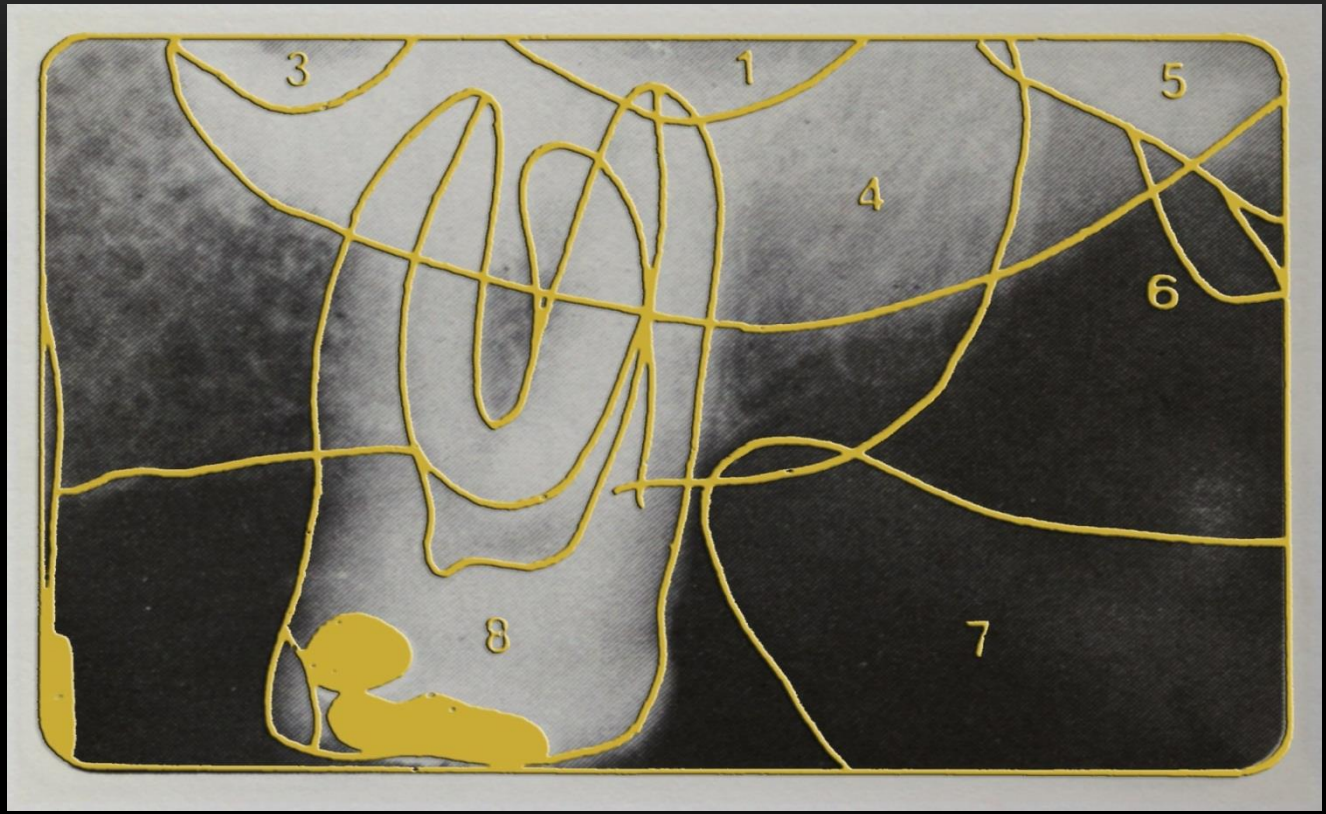
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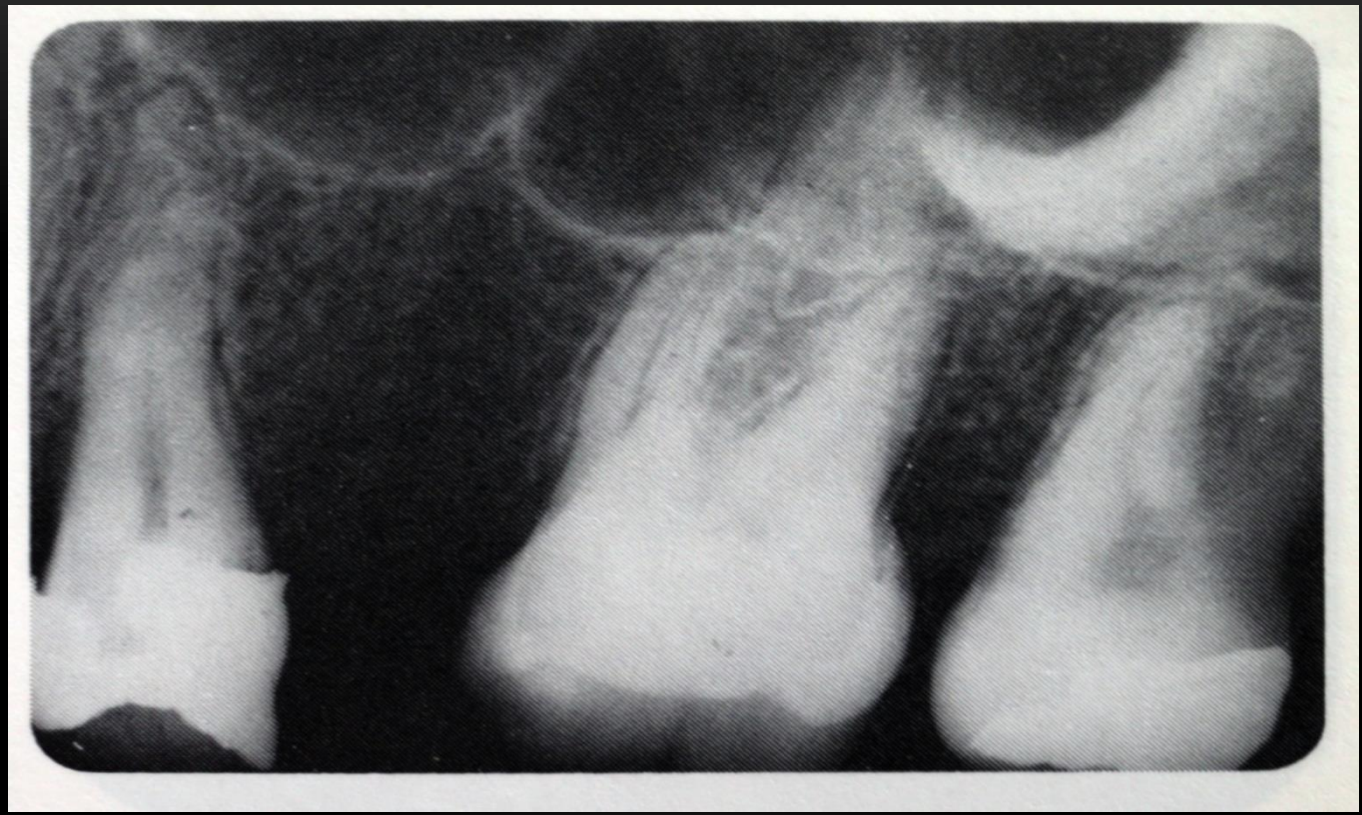


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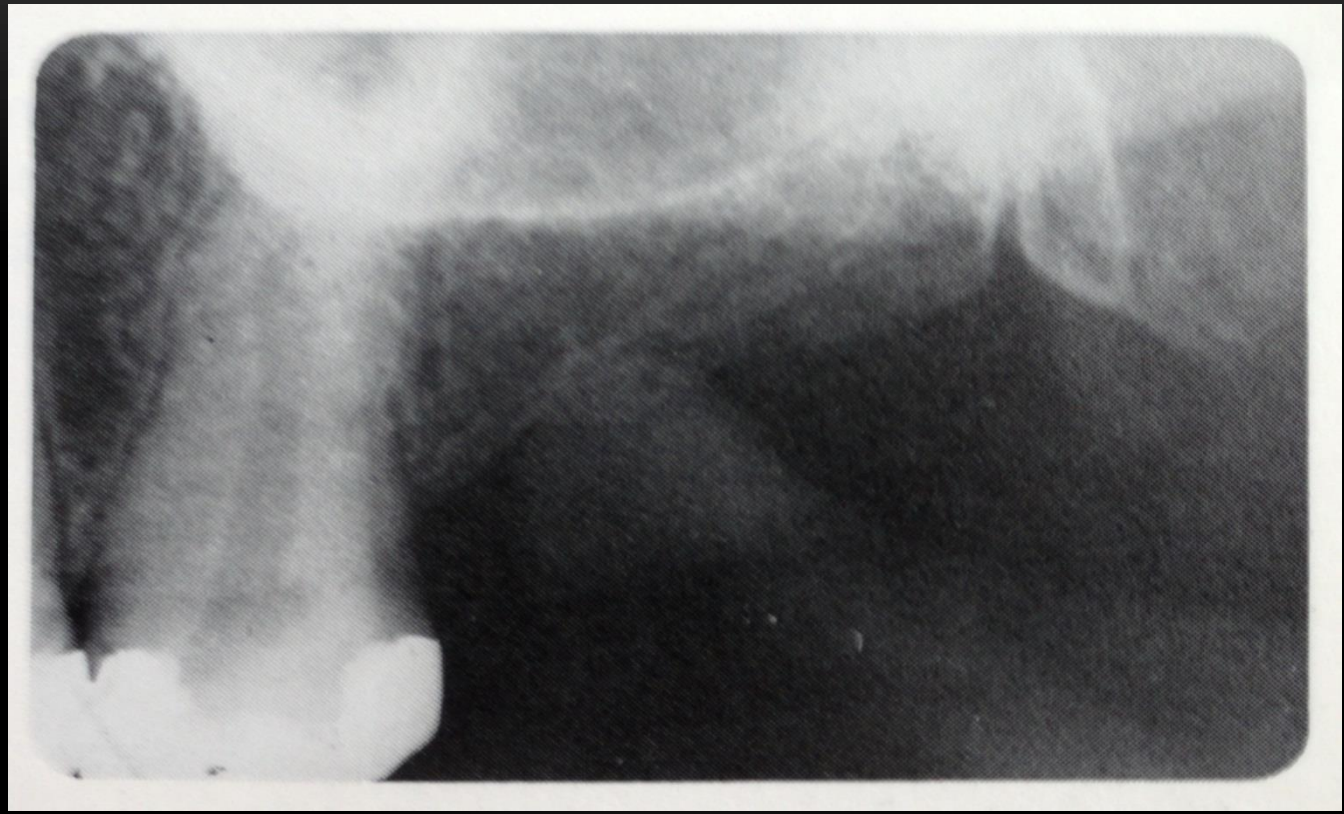

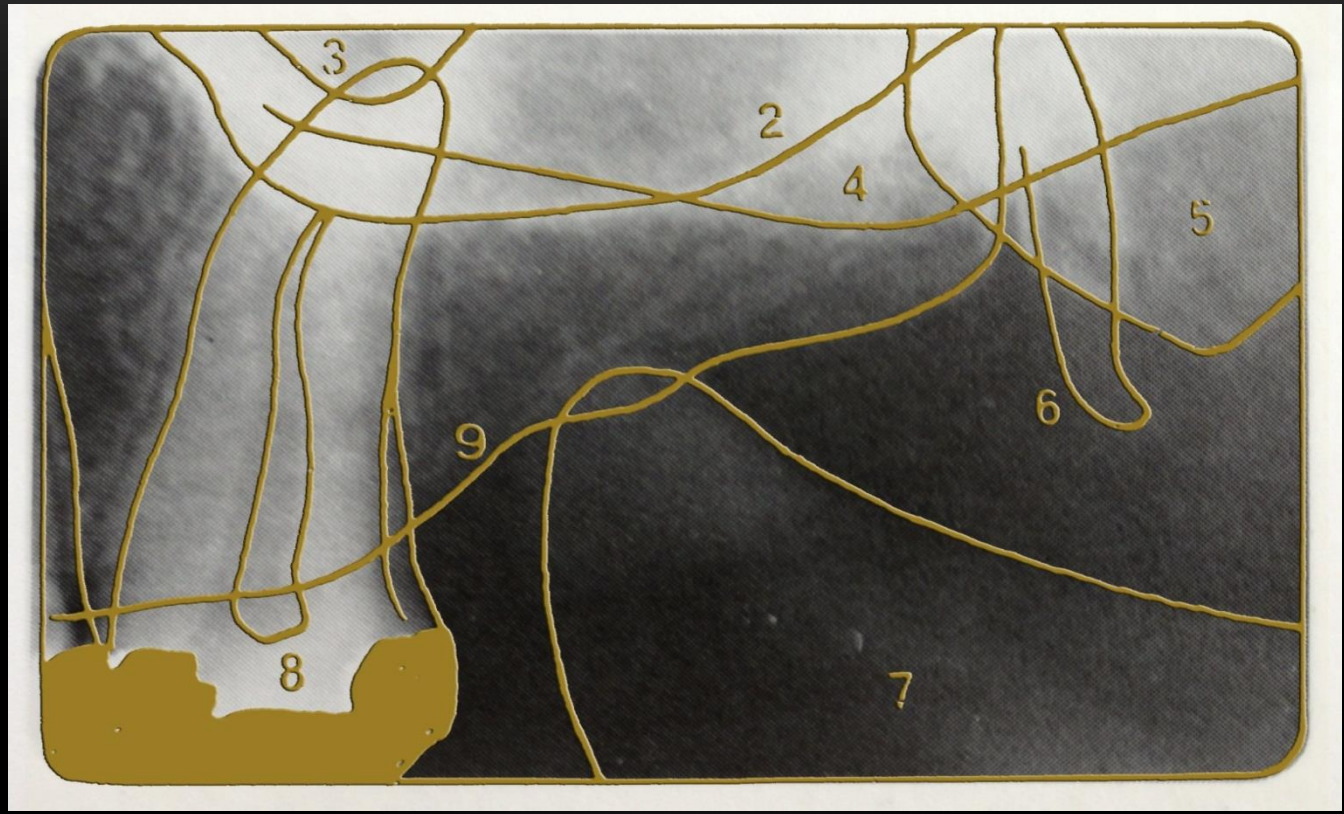
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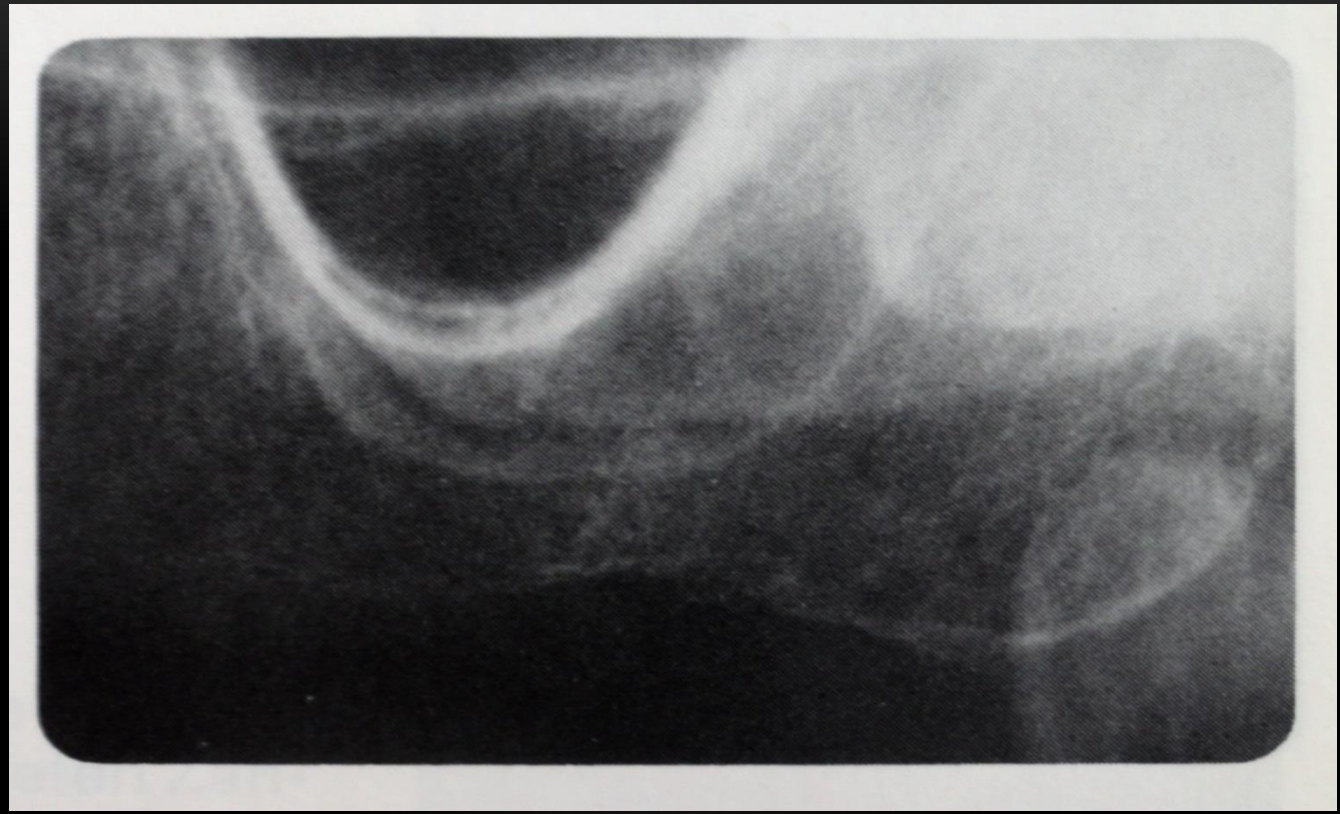

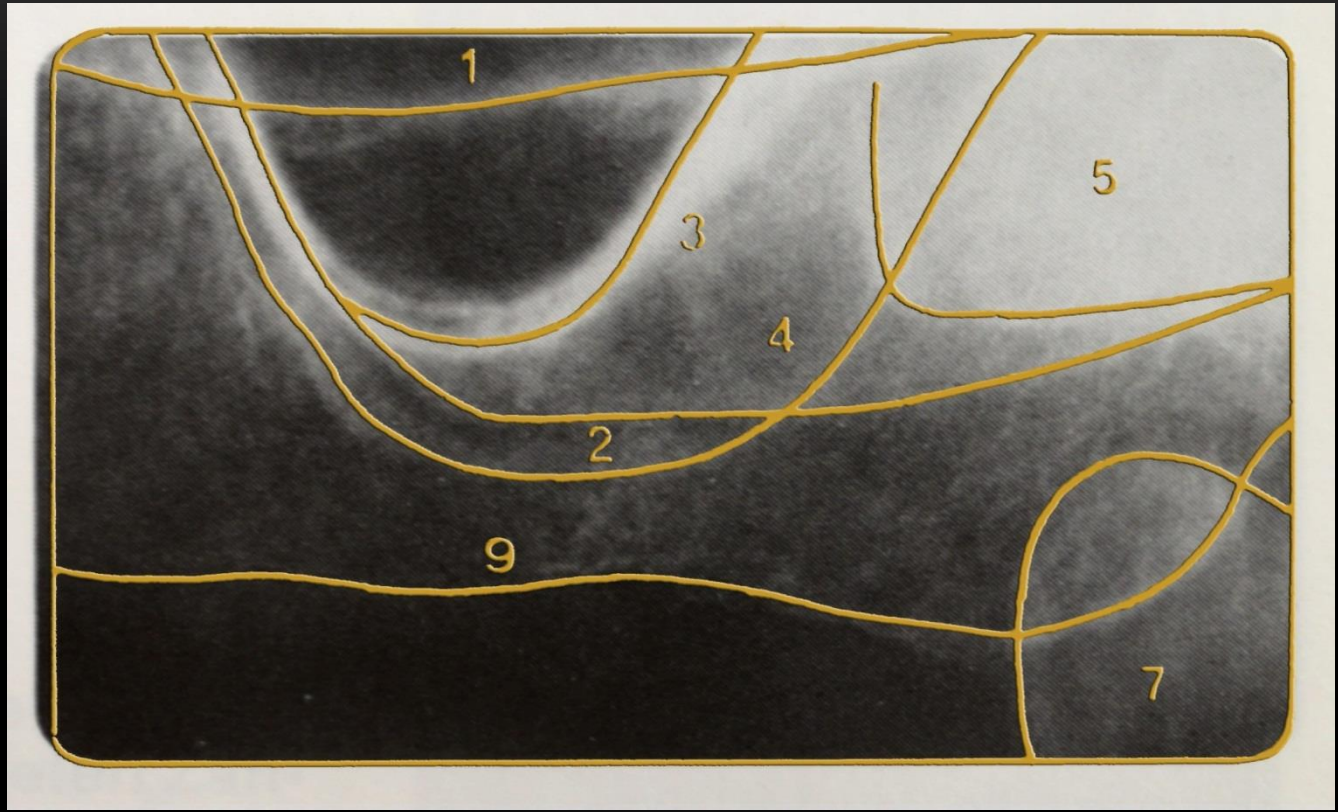
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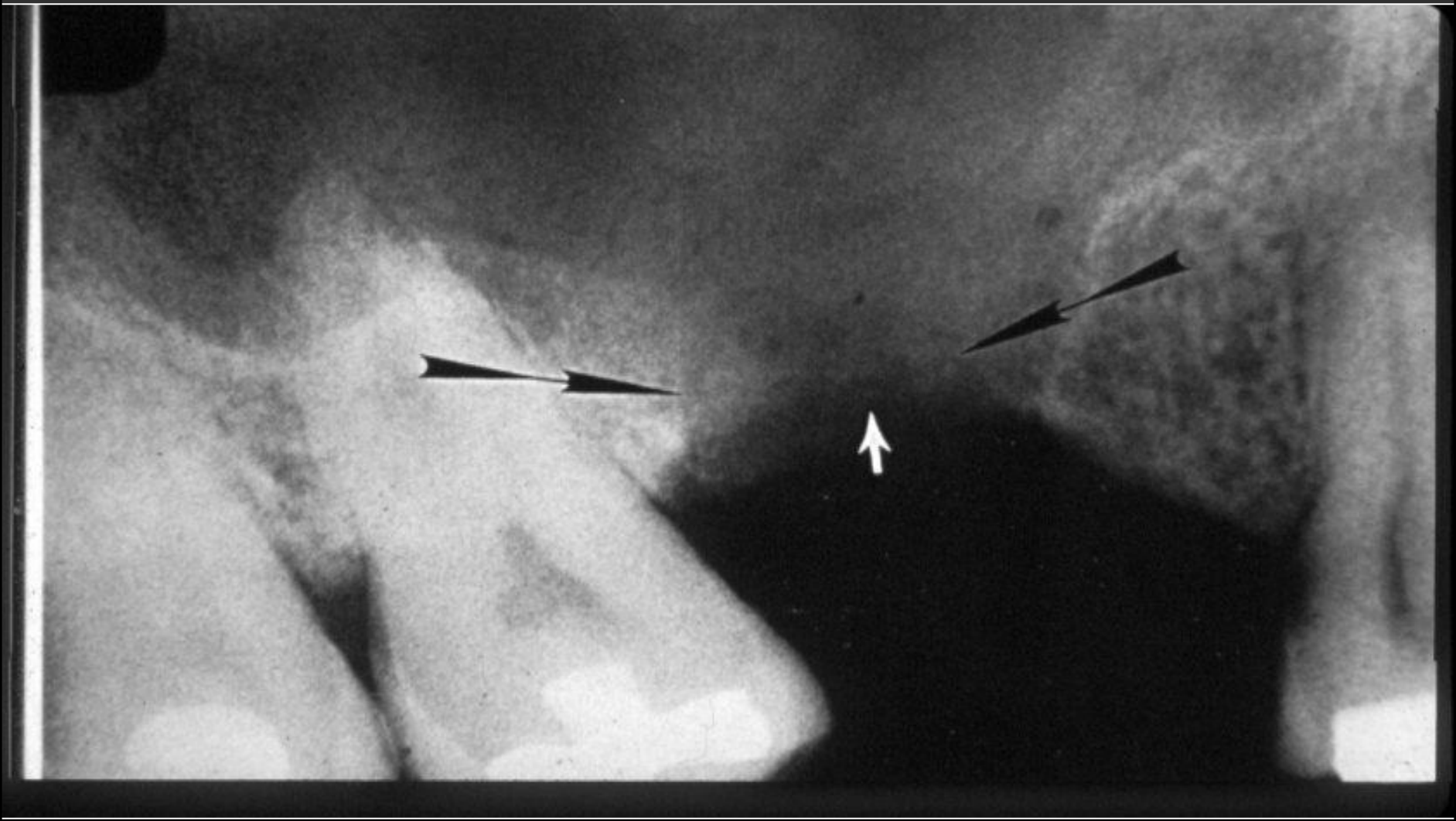

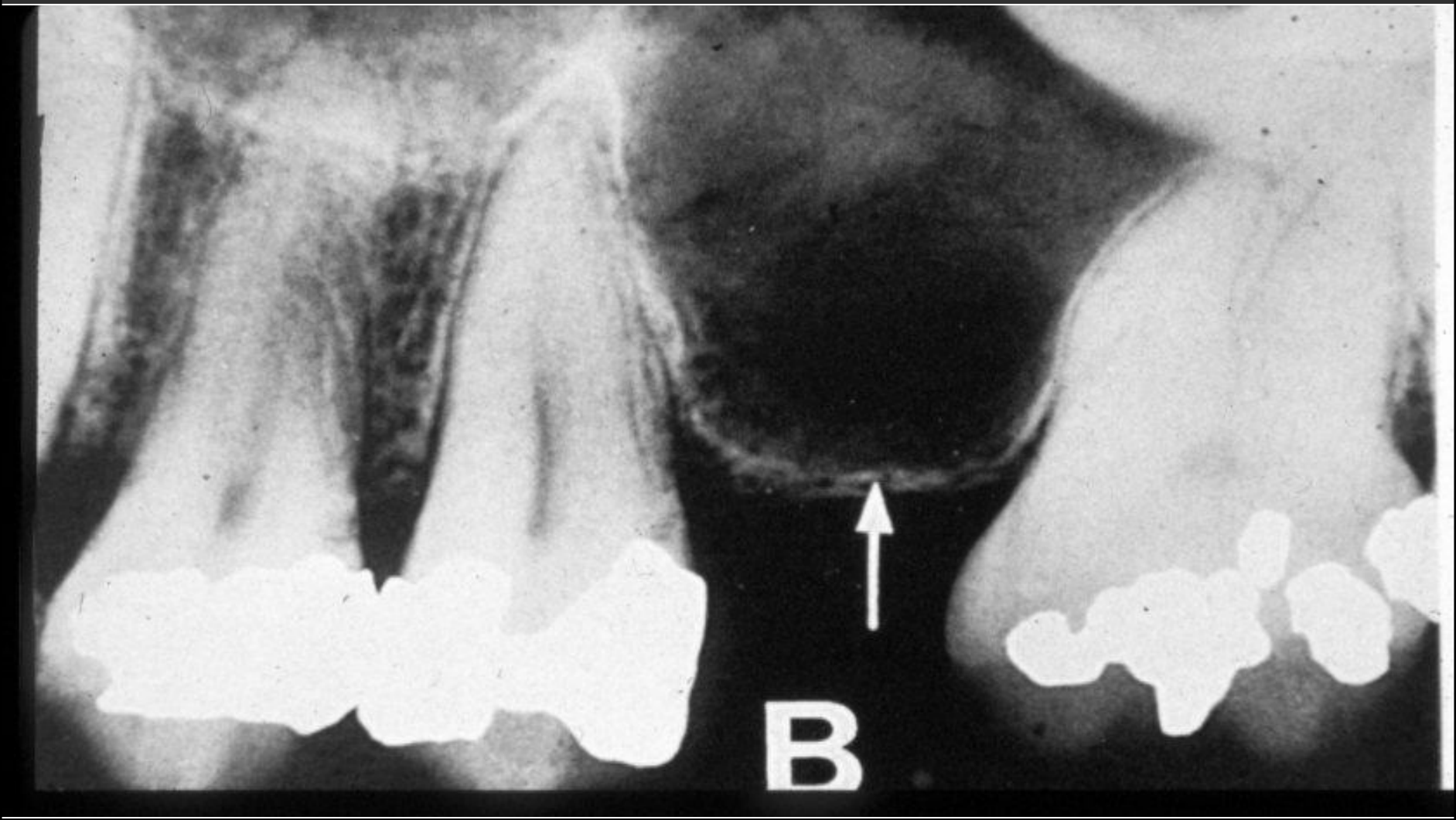
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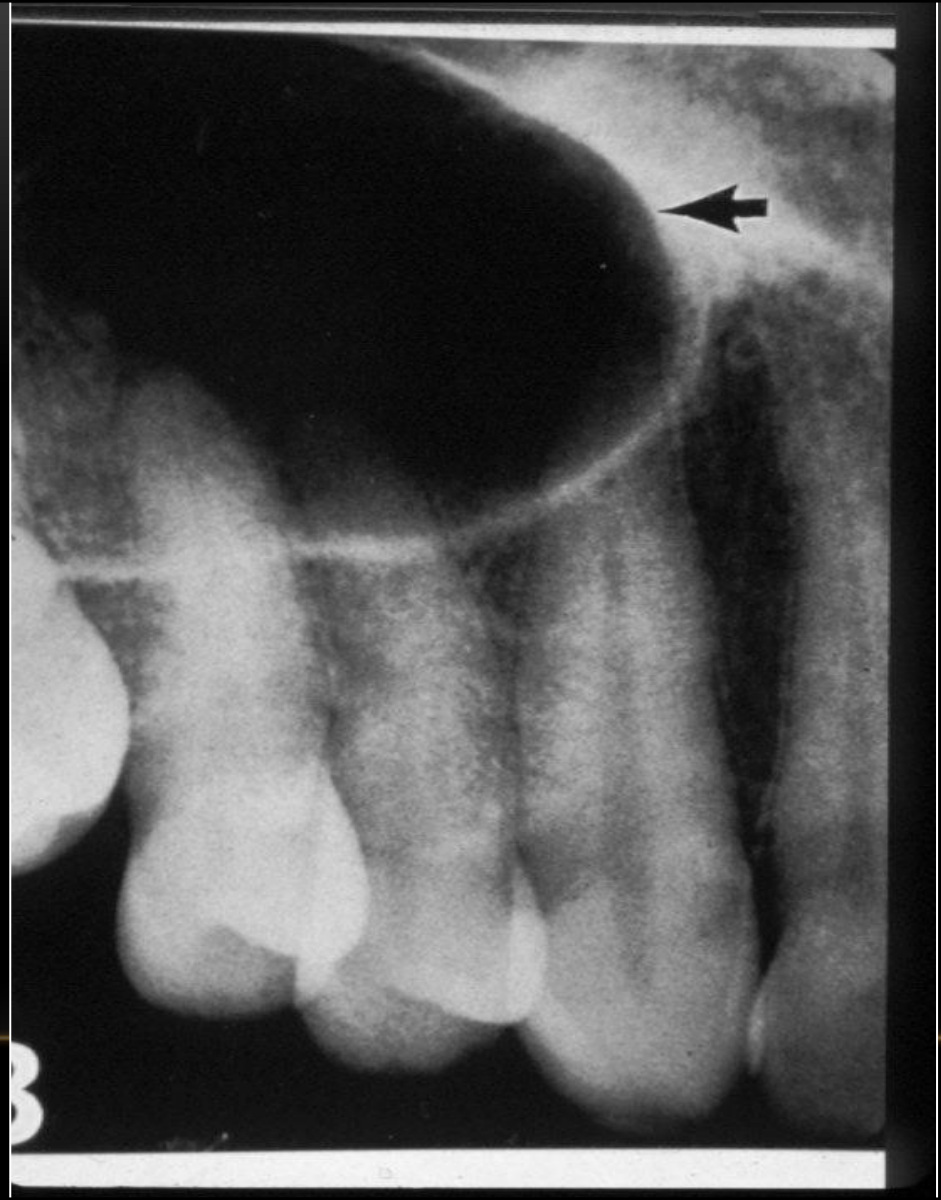

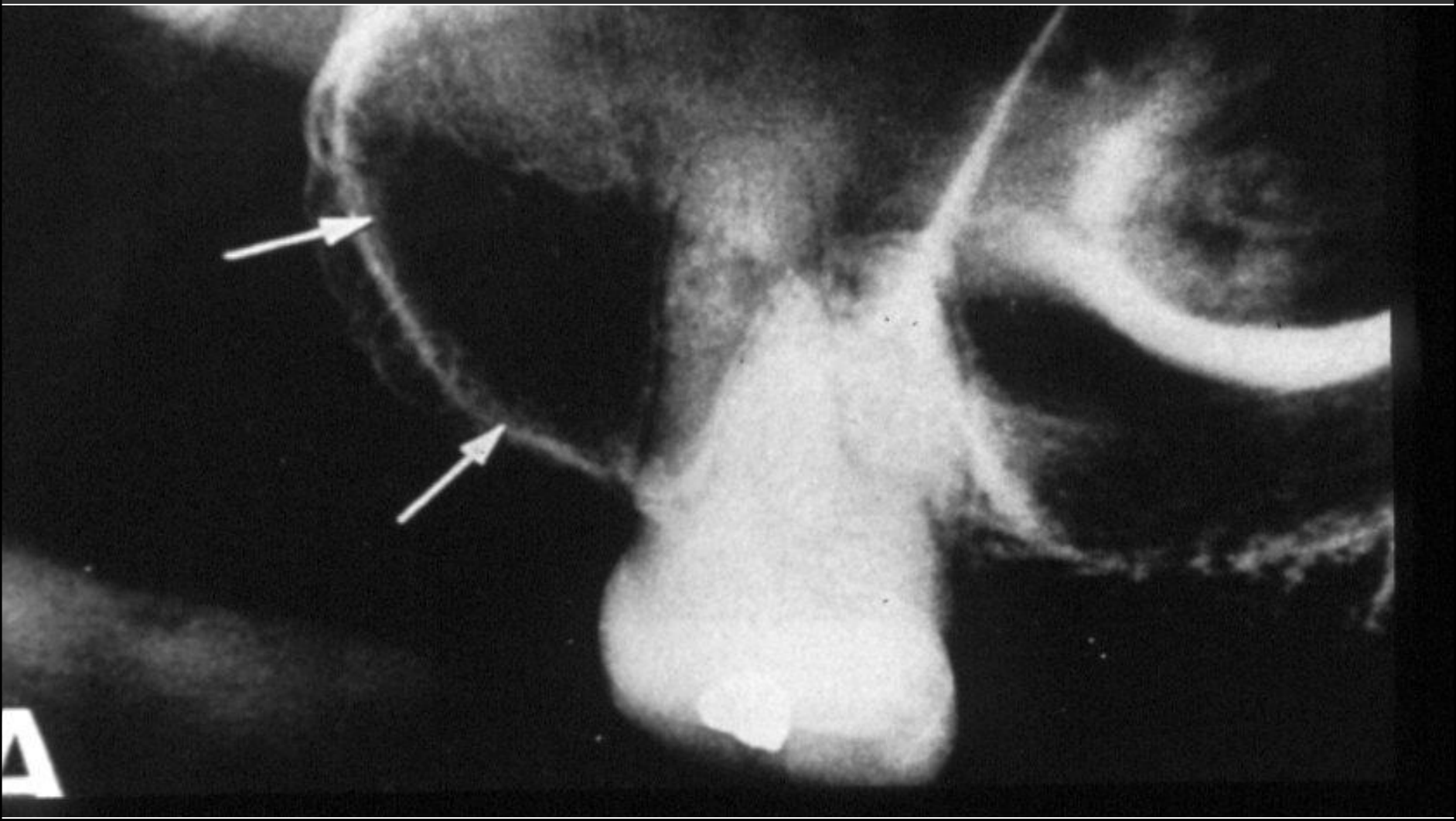
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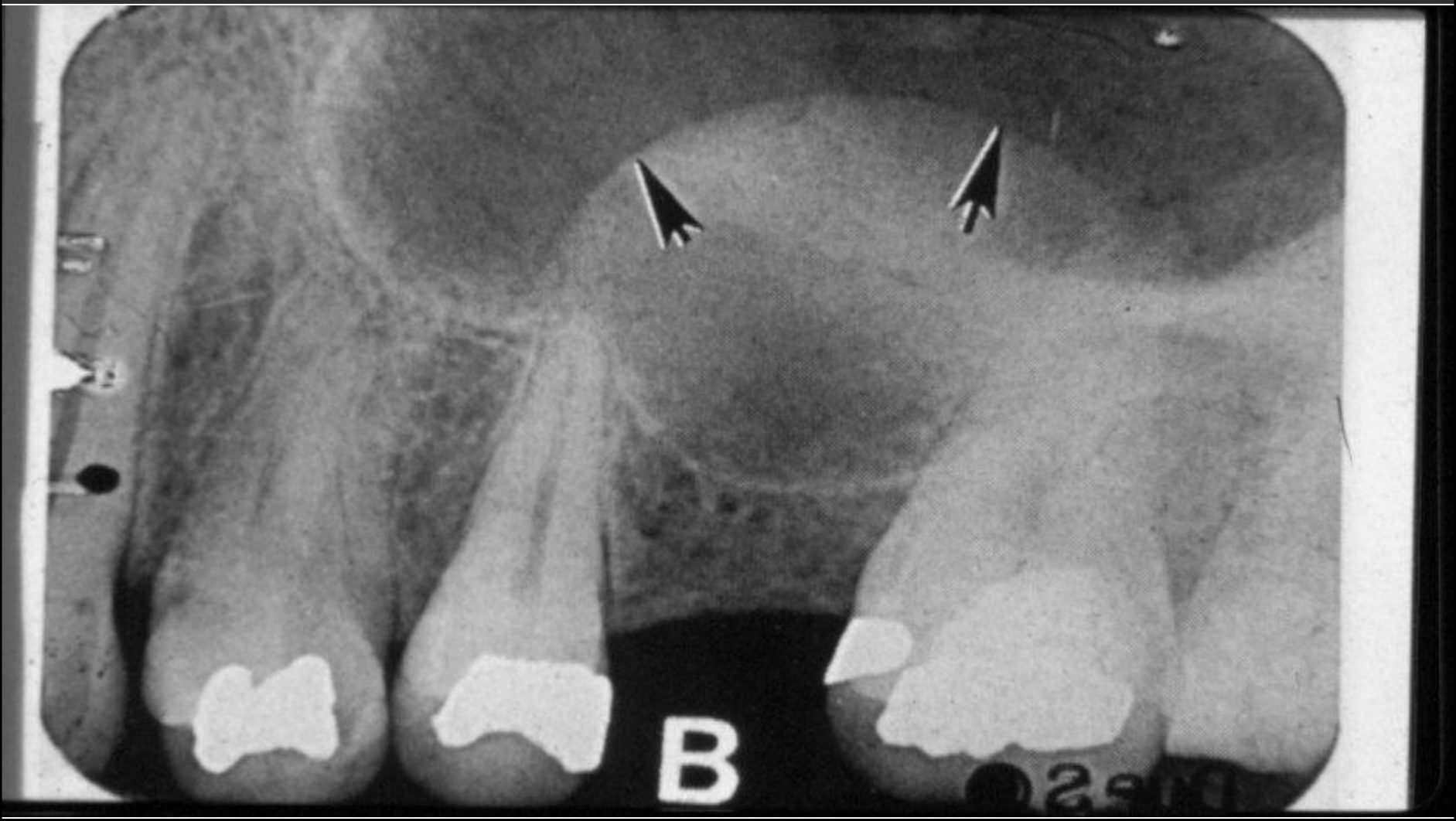
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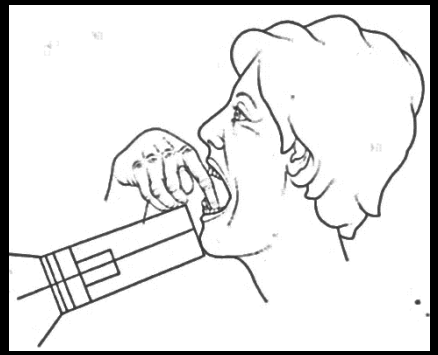
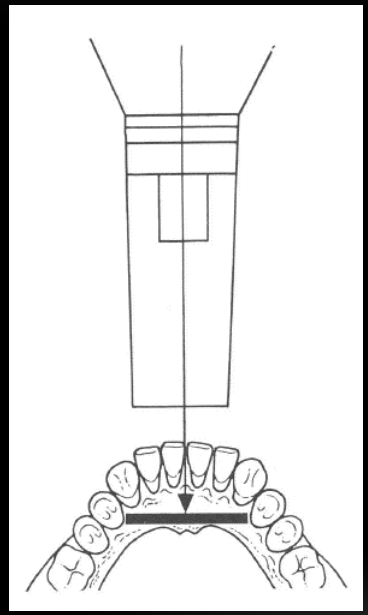
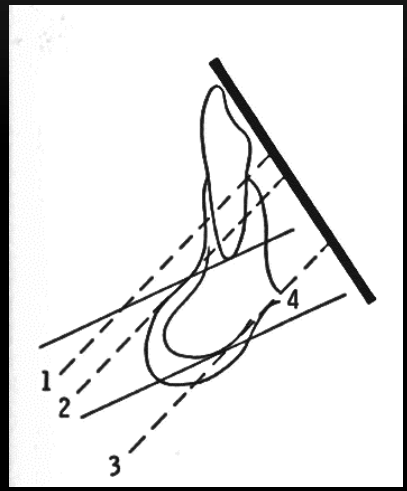
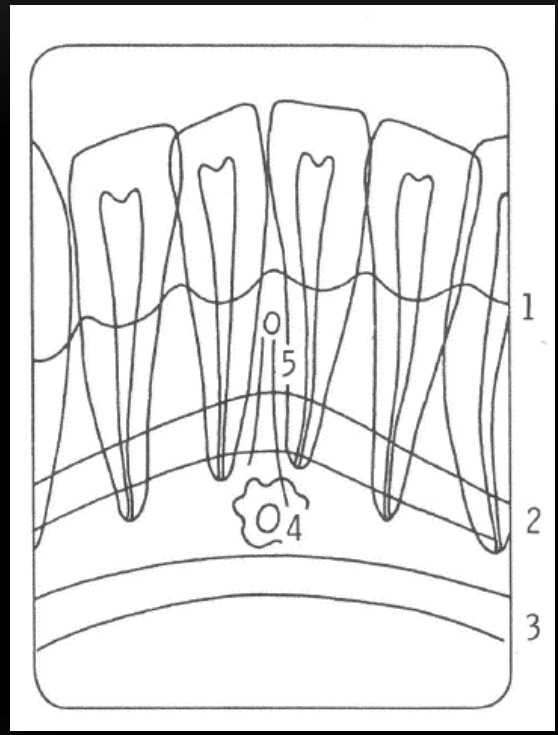
LOWER JAW

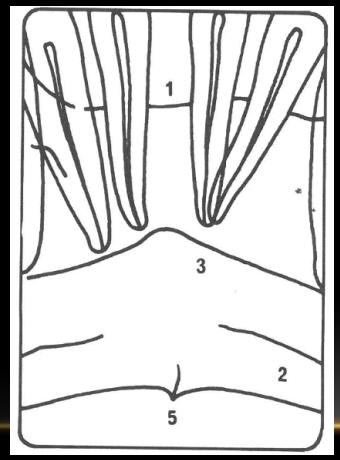






1. Limbus alveolaris
2. Protuberantia mentalis
3. Basis mandibulae
4. Spina mentalis





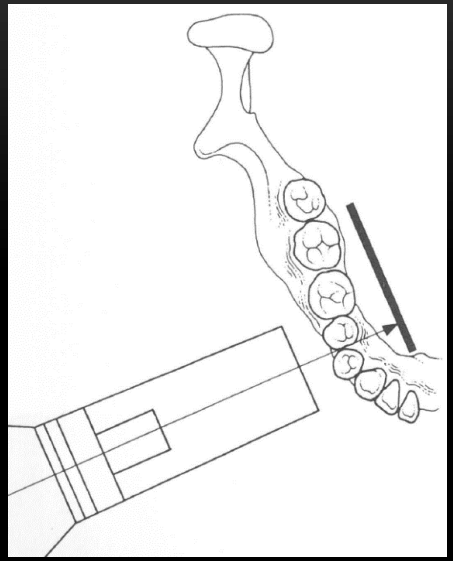
REGIO INCISIVA MANDIBULAE

1. Limbus alveolaris
2. Basis mandibulae
3. Protuberantia mentalis

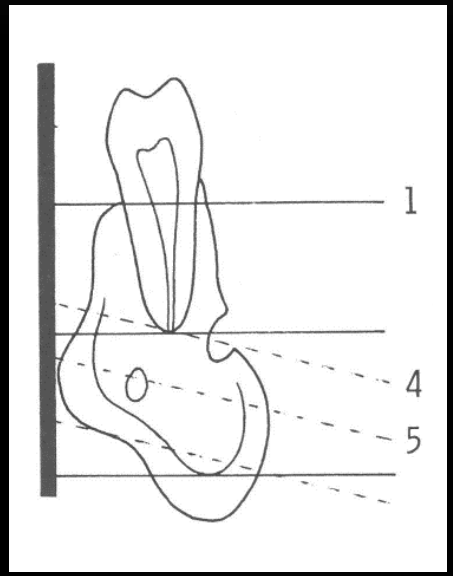
5. Spina mentalis

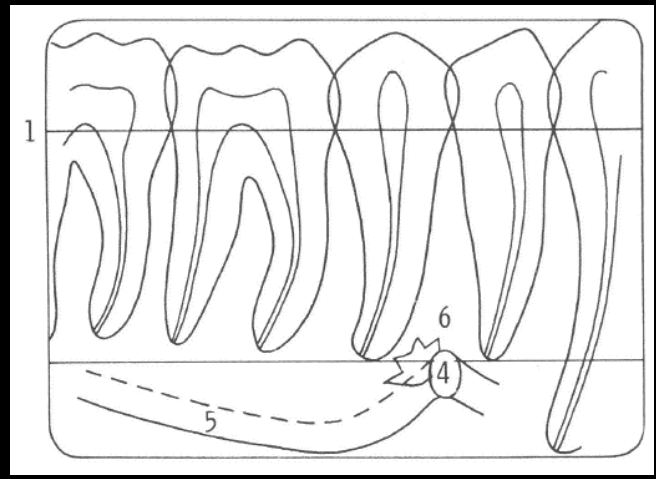
7. Foramen mentale mediale

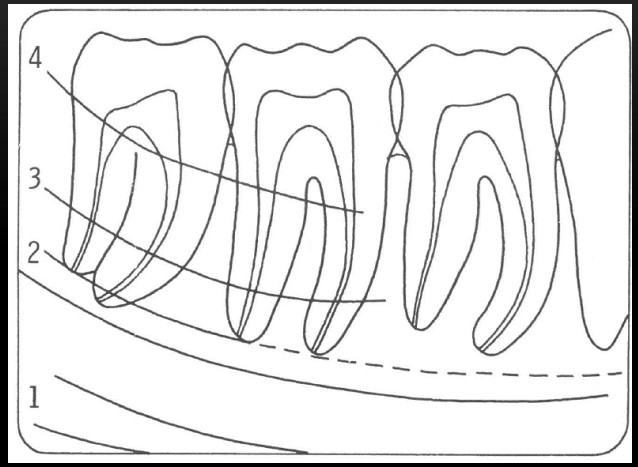
REGIO PRAEMOLARIS ET MOLARIS MANDIBULAE LAT. DEXTRI



1. Limbus alveolaris
4. Foramen mentale
5. Canalis mandibulae





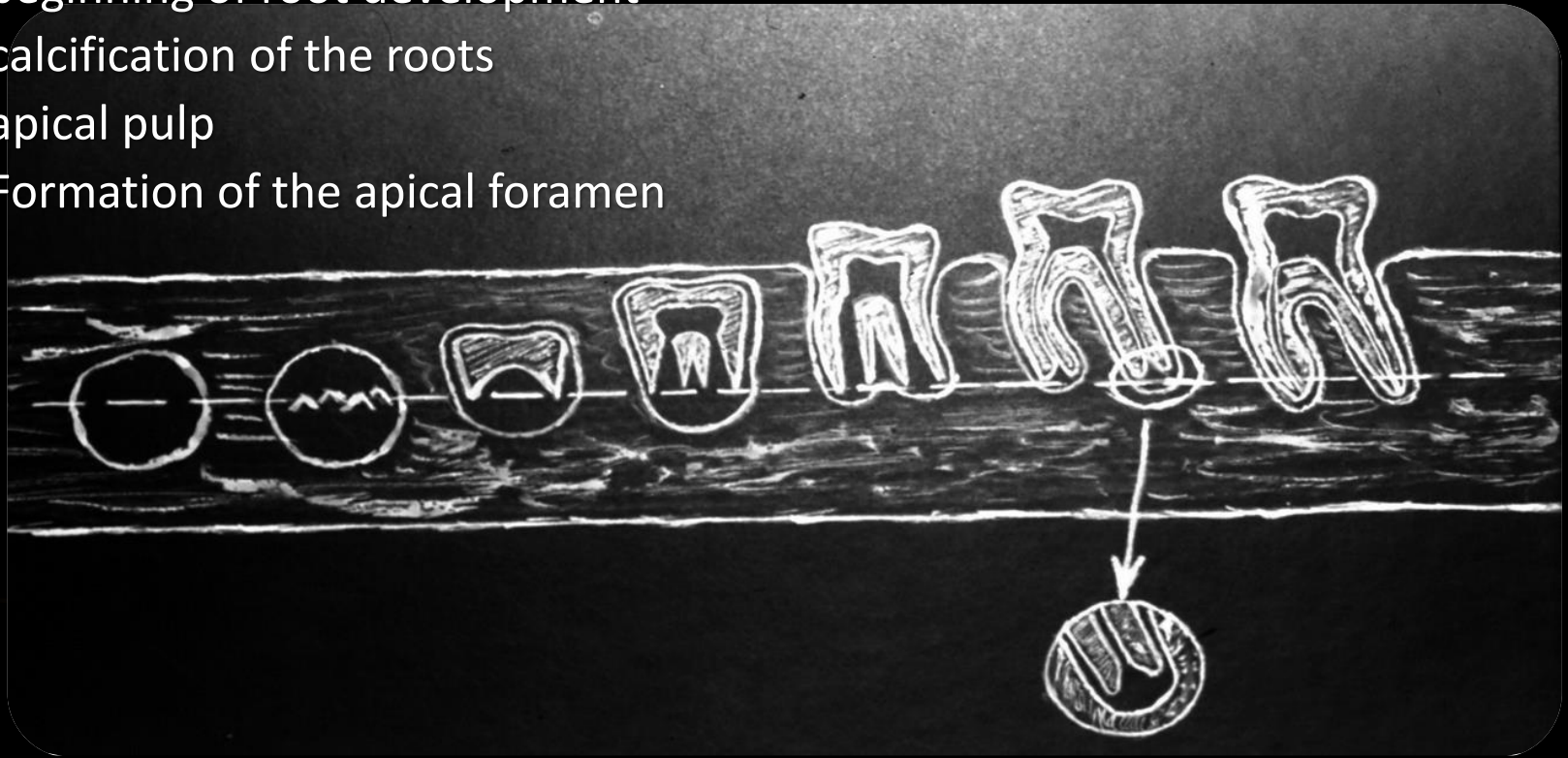


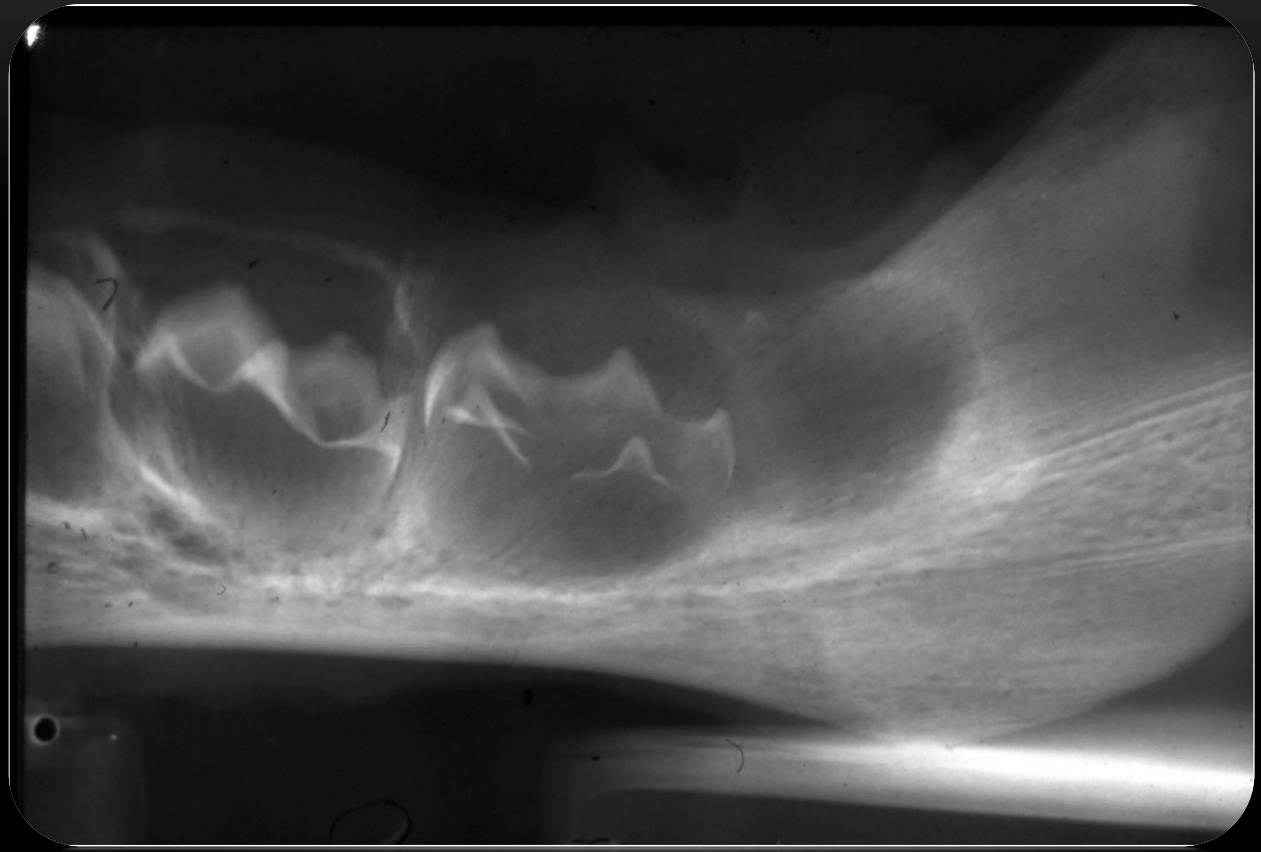
1. Basis mandibulae
2. Canalis mandibulae
3. Linea mylohyoidea
4. Linea obliqua externa

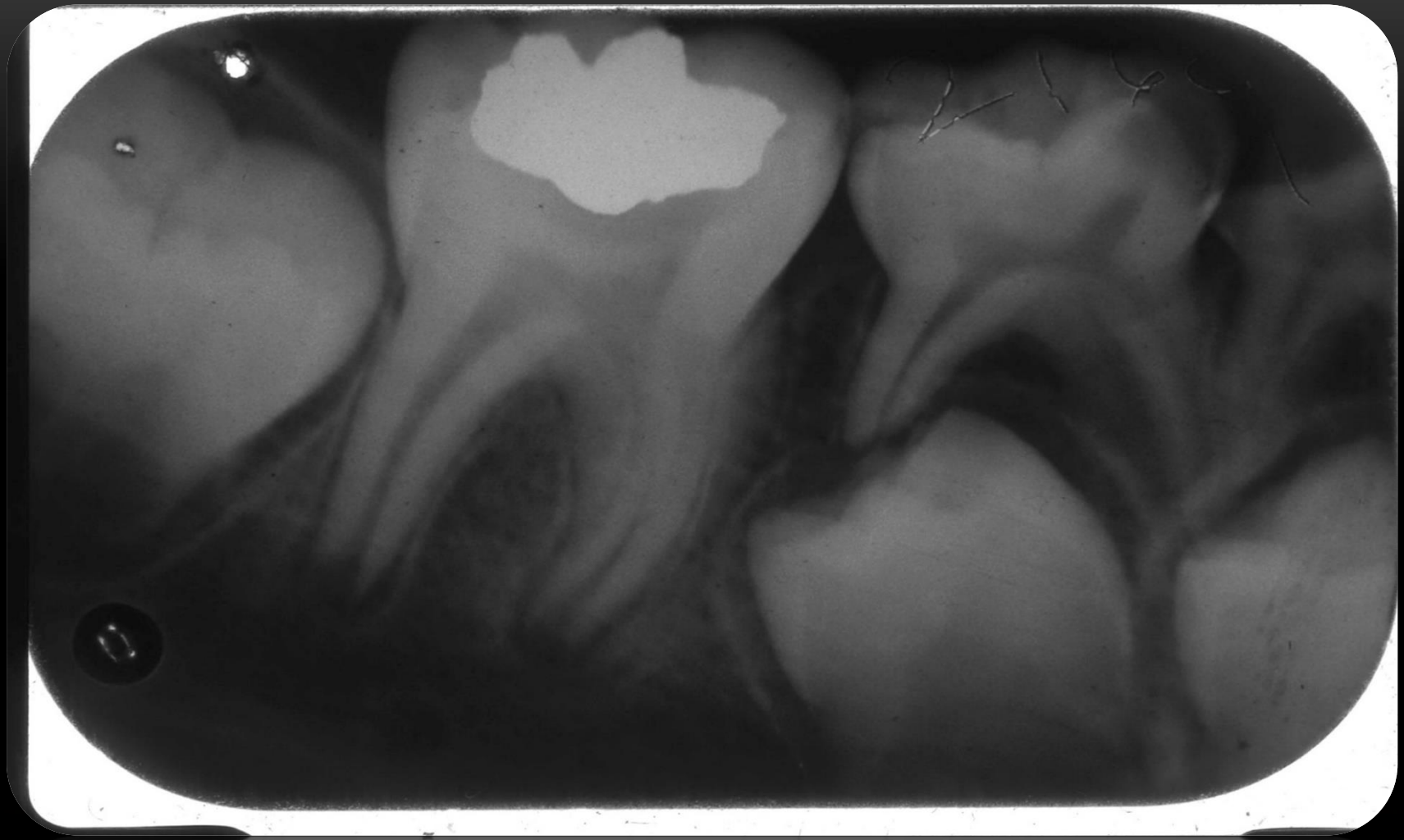
DEVELOPMENT OF TEETH

Stages of tooth development from a radiological point of view

- Bone crypt
- calcification of the cusps
- cap
- bell
- beginning of root development
- calcification of the roots
- apical pulp
- Formation of the apical foramen





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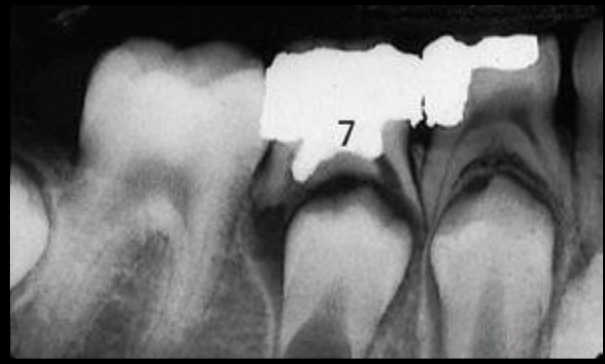
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