Caries
and the extraction of teeth

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250 years of EXCELLENCE in medical education, research & innovation and healthcare

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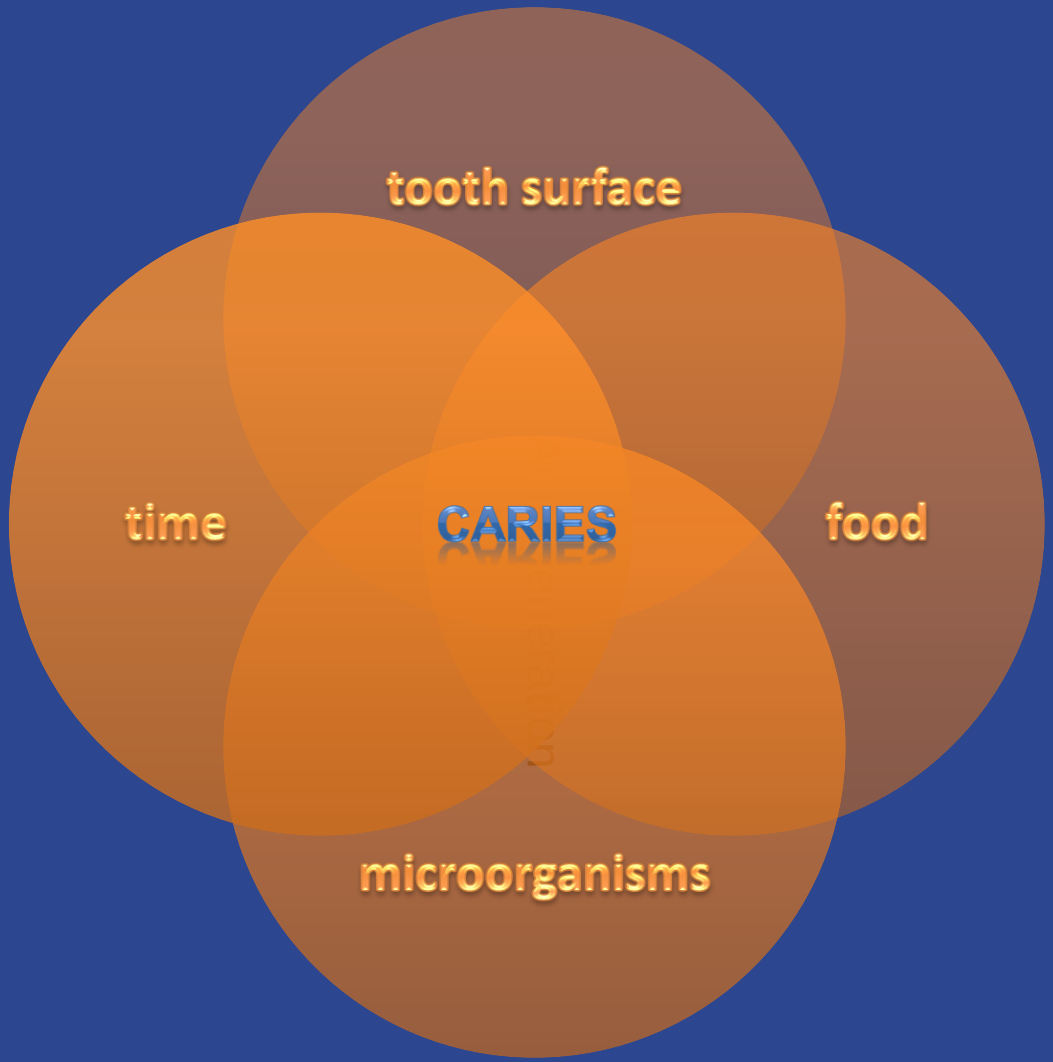
to be faithful to the title...

how to treat?



Caries on susceptible tooth surface

MULTIFACTORIAL

etiology

- Streptococcus mutans, Actinomyces Viscosus
- 95% of the population
- pH of 5,5 =>demineralization of enamel
- predilection places

classification of carious lesions

- occlusal, proximal, buccal, lingual, root surface
- Course:
  - → usually slow ⇔ rampant caries
  - → recurrent: next to the filling
  - → arrested
- Special cases:
  - → After radiotherapy in case of head and neck tumors
    - » xerostomia=dry mouth. destruction begins at cervical region and may encircle the tooth very soon, leading to the loss of the entire crown
    - » X-ray film : we see radiolucent shadows at the neck of teeth.
  - → Rampant caries:
    - » acute, 6-8 year old children without proper toothbrushing, todays it is less common due to education and fluorid. PREVENTION!!!!
    - » X-ray film: extensive interproximal and smooth surface caries

3 2 1 | 1 2 3

Rampant caries

acute course

uncontrollable teeth destuction.

deep approximal caries on the maxillary incisors.

caries lesion on radiographs

sound tooth

caries=demineralization

radiolucent
on radiograph

It is possible to make mistake in two diffreent way: false positive diagnosis or fals negative diagnosis
It is well known that caries progression is slow, so the dentist should be conservative during caries diagnosis and treatment.
DON'T MISS THE CHANCE!

...but how to find?

Periapical radiograph

- Is there any changes in periapical and interradicular **bone**?
- Affected pulp:
  - radicular cyst
  - granuloma, etc.

Bitewing radiograph

- distal third of **canine** and the interproximal and occlusal surfaces of **premolars** and **molars**

How often should we perform radiographic examination?

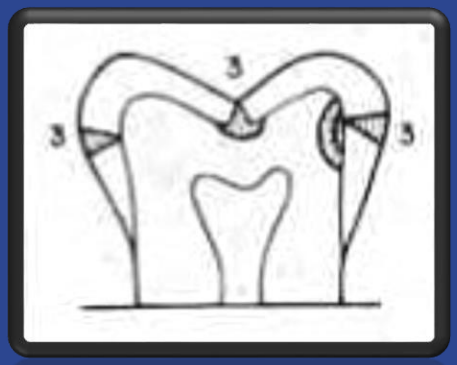
bitewing films

- the upper and lower teeth **on the same film**
- **approximal** surfaces well visualized
- *good to know*: more than half of all proximal surface lesion can not be seen clinically and may be detected only with radiograph

4 x

extension and the shape

ENAMEL	E+DENTIN
• D1: enamel caries penetrating **less than half way** through enamel, notch shape • D2: enamel caries penetrating **more than half way** through enamel, BUT not envolving dentinoenamel junction, triangular shape	• D3: caries of enamel and dentin, extending **less than half way** to pulp cavity, triangular shape (duo) • D4: caries of enamel and dentin, penetrating **more than half way** dentin toward pulp cavity



hystology, just a bit...

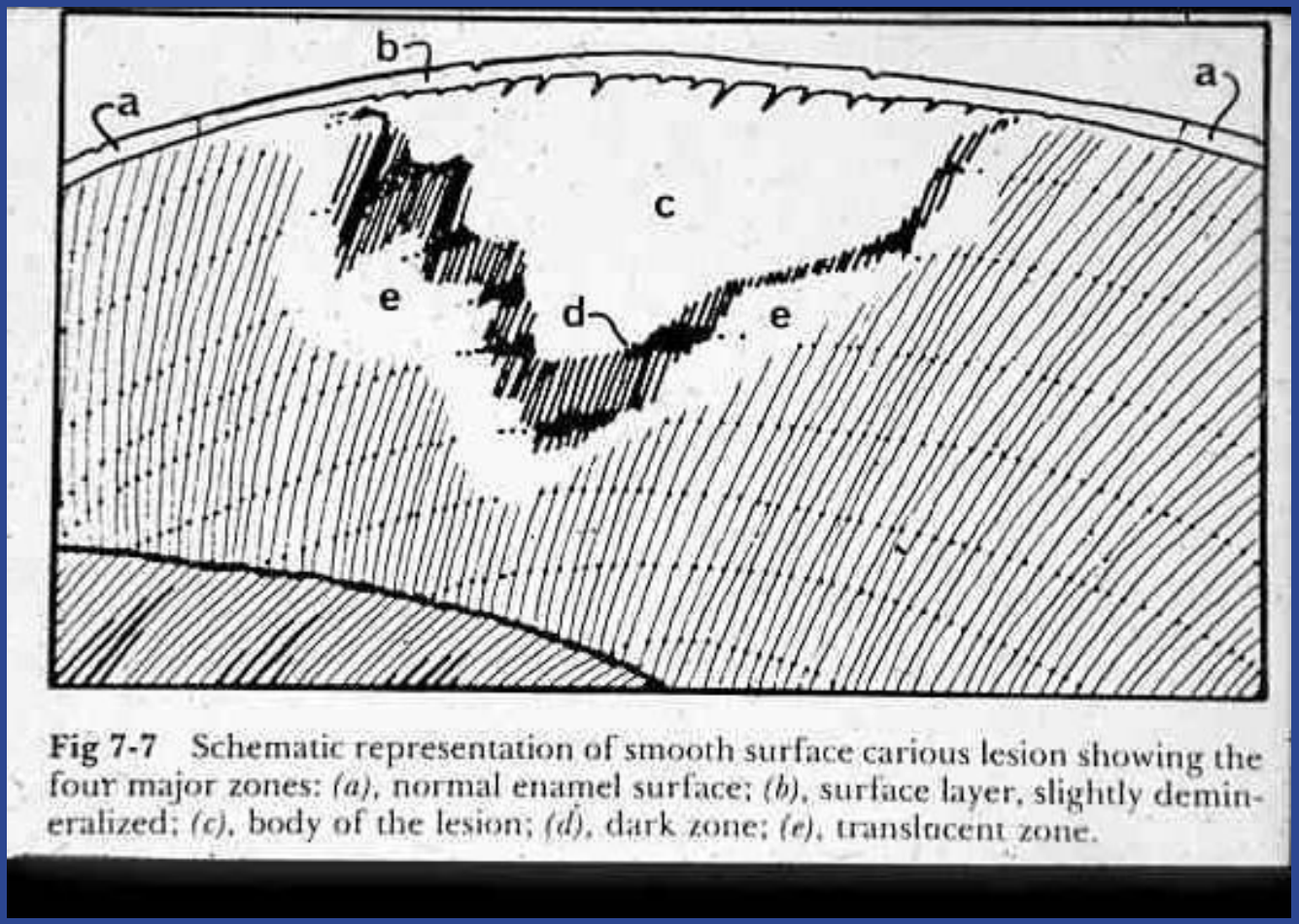


Fig 7-7 Schematic representation of smooth surface carious lesion showing the four major zones: *(a)*, normal enamel surface; *(b)*, surface layer, slightly demineralized; *(c)*, body of the lesion; *(d)*, dark zone; *(e)*, translucent zone.

radiographic appearance of occlusal caries

- usually more extensive, borders not so well defined.
- pitfalls during the interpretation of the radiograph:
  - superimposition
  - buccal and occlusal caries.

radiographic appearance of proximal caries

- MAGNIFICATION!!!
- actual depth of the caries is deeper than the radiographically detected deepness.
- develop slowly: 3 years to clinically apparent (white spot)
- pitfalls:
  - cervical burnout
  - concavities produced by abrasion (flossing)

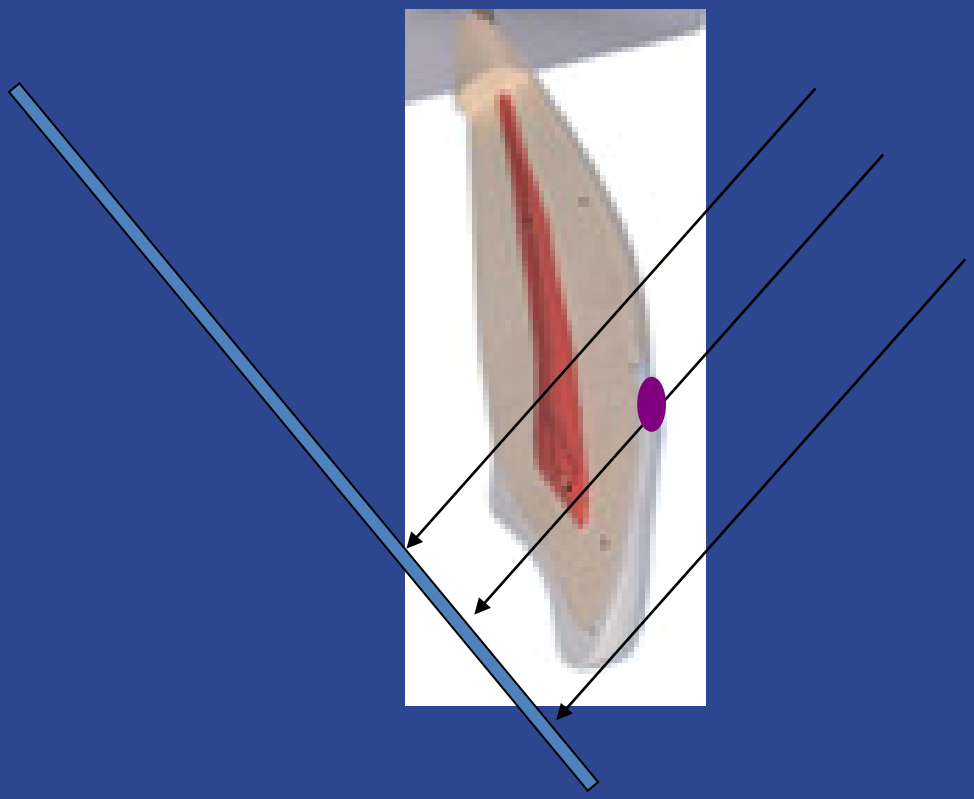
radiographic appearance of facial, buccal and lingual caries

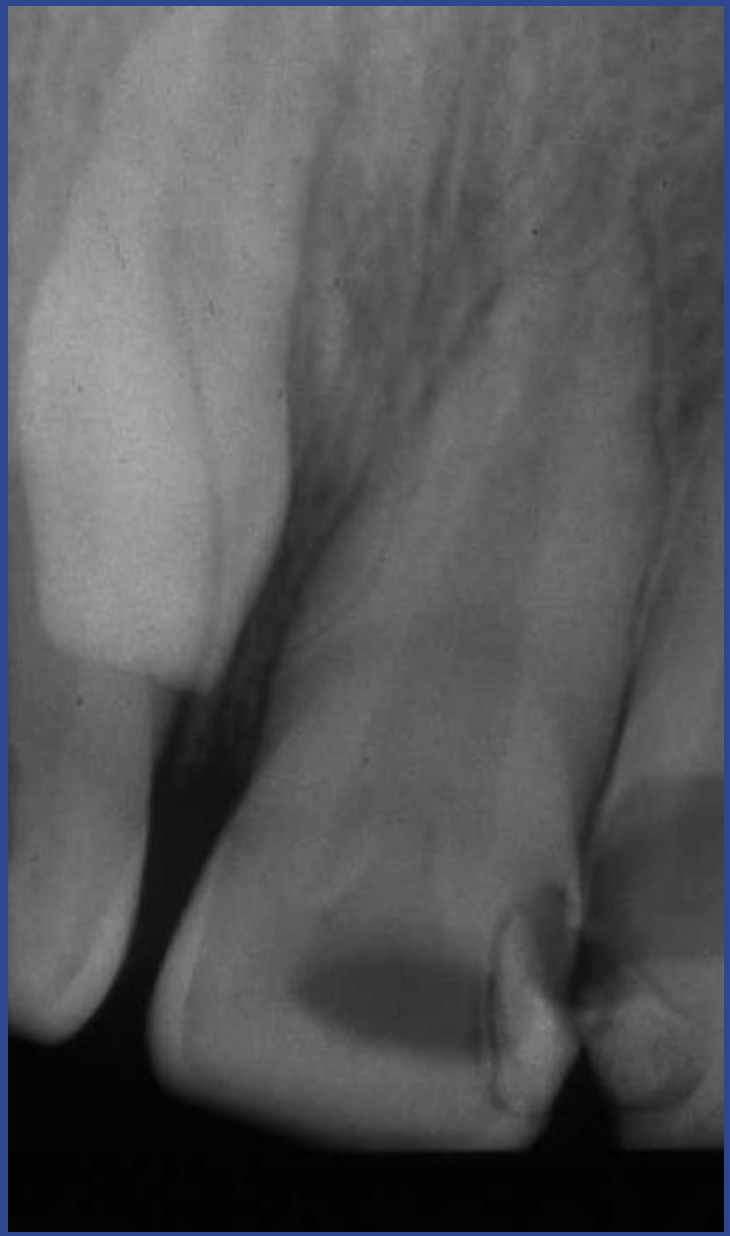
- in enamel pits and fissures (premolars, molars, incisors, foramen coecum!)
- till small: round shape, later: elliptic/semilunar
- sharp borders (⇔ occlusal caries)
- DANGER! USE MORE VIEWS! lesion can superimpose to the CEJ or to the proximal surface => *false occlusal or proximal caries*.
- differentiation between buccal and lingual caries… more than a piece of cake….
- **Clinical evaluation and probing are necessary!**

location

vestibular surface caries

oval transparency projected in the middle of the crown





3 2 1

coecum caries

(foramen coecum is usually on the second incisors)

radiographic appearance of root surface caries

- =cemental caries
- Involves both CEMENTUM DENTIN !!!
- Enamel is also affected in a special case: when the lesion extends into the dentin under the enamel along the CEJ.
- In elderly people it has a frequency of 40-70 %
- Associated with gingival recession and horizontal bone loss
- Affected surfaces in a decreasing order: buccal, lingual, proximal
- On radiograph: ill defined, saucerlike or notched radiolucency
- Pitfalls: false positive : cervical burn out

location

radiographic appearance of recurrent caries

- next to the restoration
- direction of the beam!
- recurrent lesions at the mesiogingival, distogingival and occlusal margins of a restoration are frequently discovered on radiograph.
- BUT: we miss relativly big lesions around the buccal, lingual or facial restorations
- causes:
  - poor adaptation of a restoration-marginal leakage
  - inadequate extension of a restoration
  - the original lesion is not completly evacuated

=> residual or recurrent caries???

8 7 6 5

8: mesioangular retention, 7: occlusal caries, 6: MO amalgam filling, sec. caries on the approximal and lingual surface

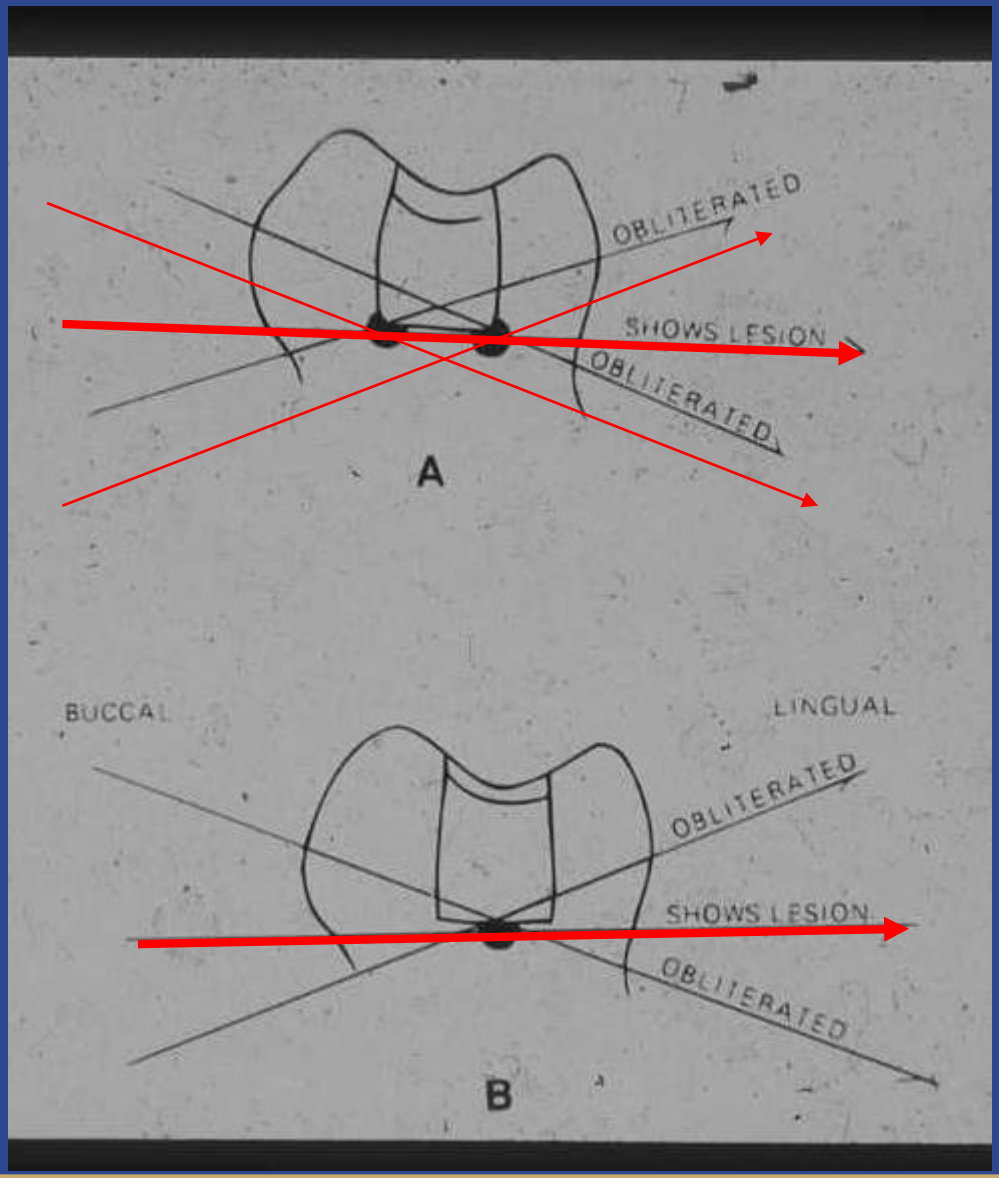
When can you see the secondary caries under the filling?

Wherever the restoration is, we will see the caries under it if the X-ray beam is parallel with the approximal surface.

B: The secondary caries will not be visible if it is situated in middle and the beam comes from above or from beneath.

A: The secondary caries in the buccal corner will not be visible if the beam comes from beneath, but we will see it if the beam comes from above.

A:The secondary caries in the lingual corner will not be visible if the beam comes from above, but we will see it if the beam comes from beneath.



filling materials on X-ray film

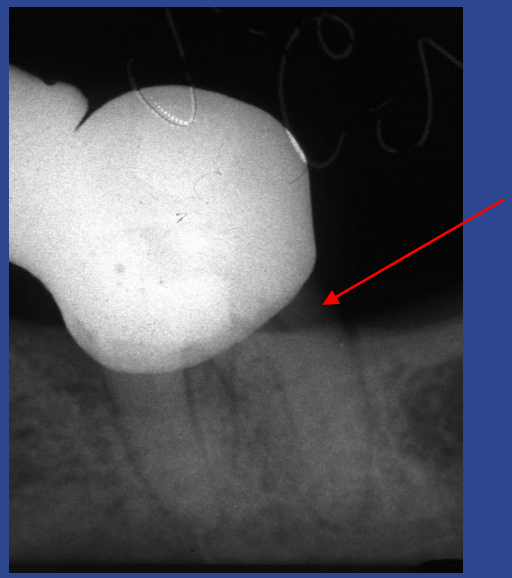
- atomic number thickness quality of X-ray
- RADIOPAQUE = RADIODENS = WHITE:
  - amalgam
  - gold
  - calcium hydroxide
  - guttapercha
  - silver point
- RADIOLUCENT = TRANSPARENT = BLACK:
  - silicate
  - Composite resin
  - porcelain

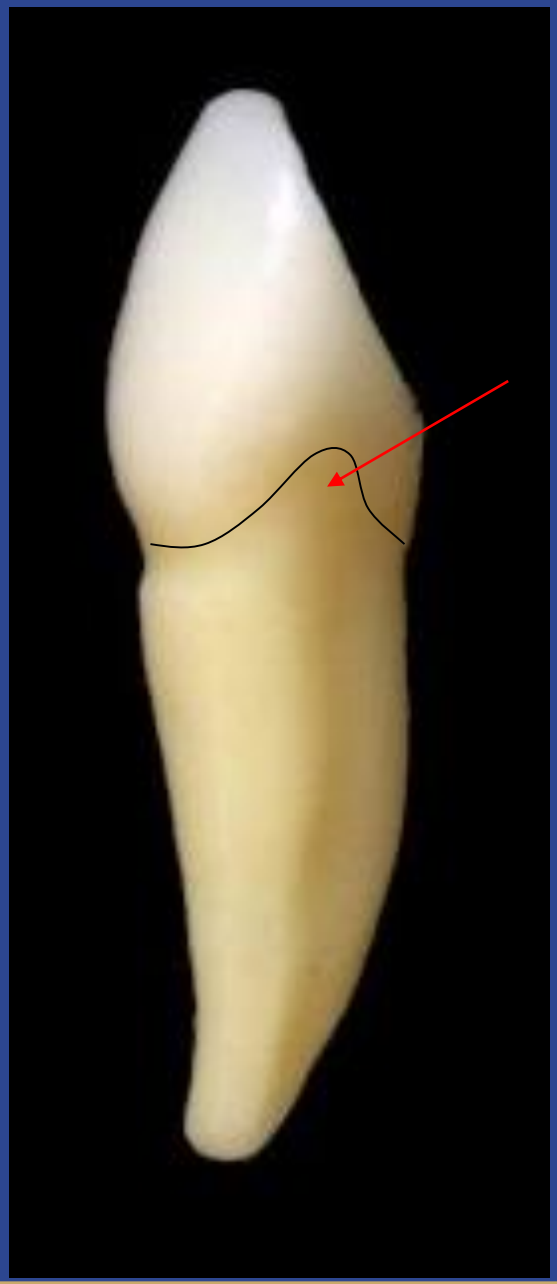
DANGER: FAILURES

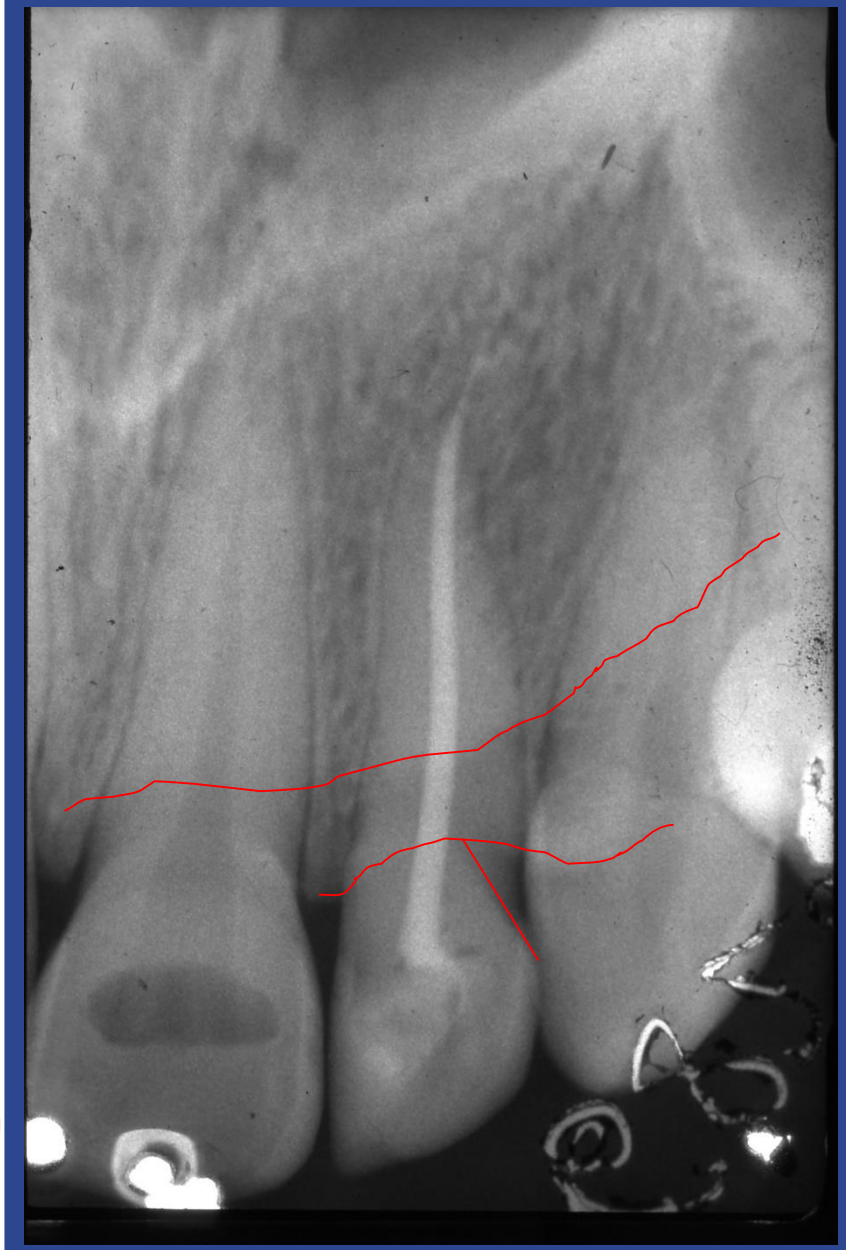
- Dg.: no caries, but we discribe something as a caries (false positive):
  - cervical burnout
  - pseudotransparency
  - mach bands
- Dg.: caries, but we miss it (false negative):
  - X-ray beam is not ortoradial, the crowns can overlap eachother (superimposition), and hide the approximal caries.
  - external oblique ridge can superimpose to a lesion, or cusps can hide occlusal caries

cervical burnout

- beam is not ortoradial or the tooth is in torsion
- CEJ has a sinus wave shape
- triangular shape transparency







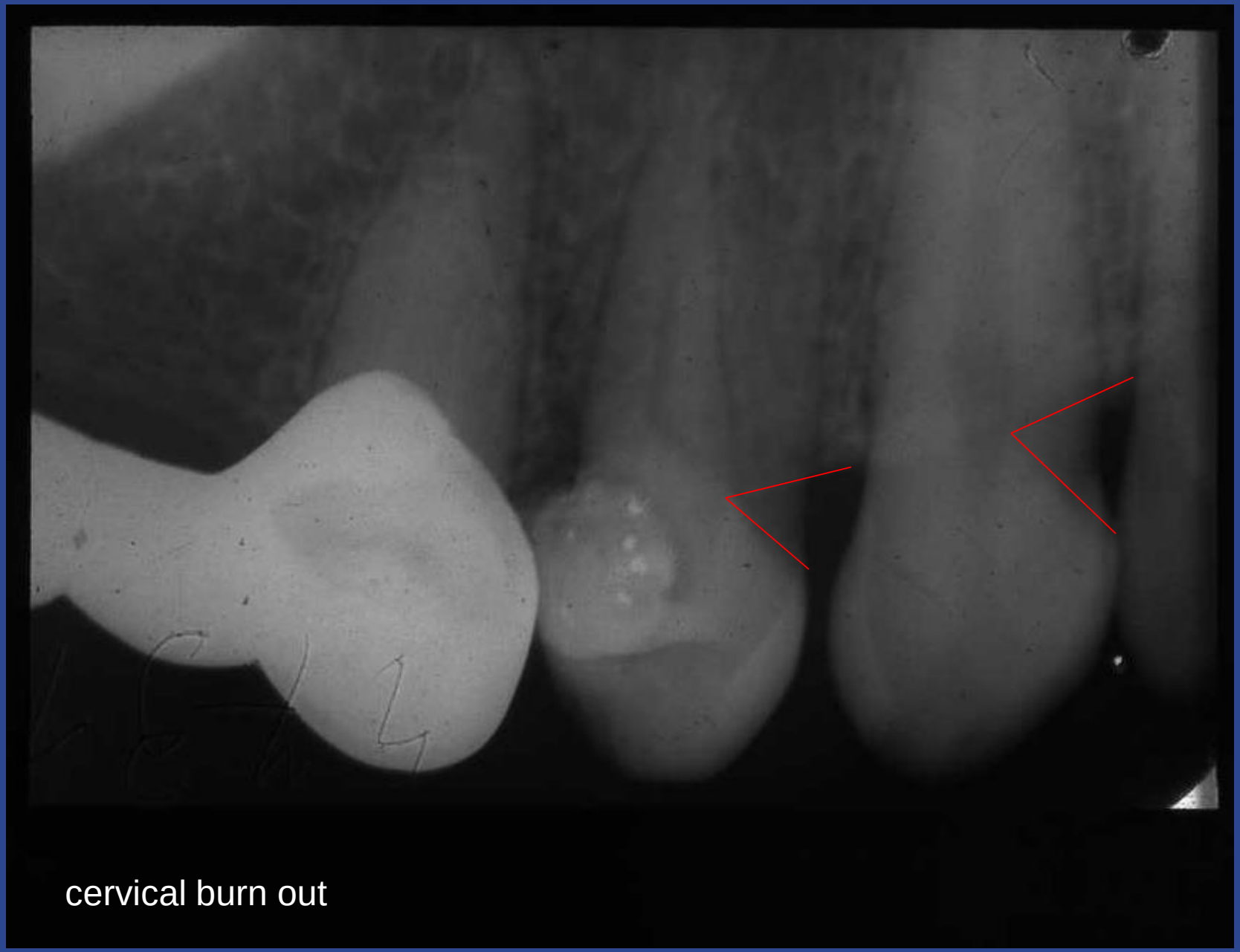
cervical burnout

BORDERS:

(nose)

alveolar processus

CEJ



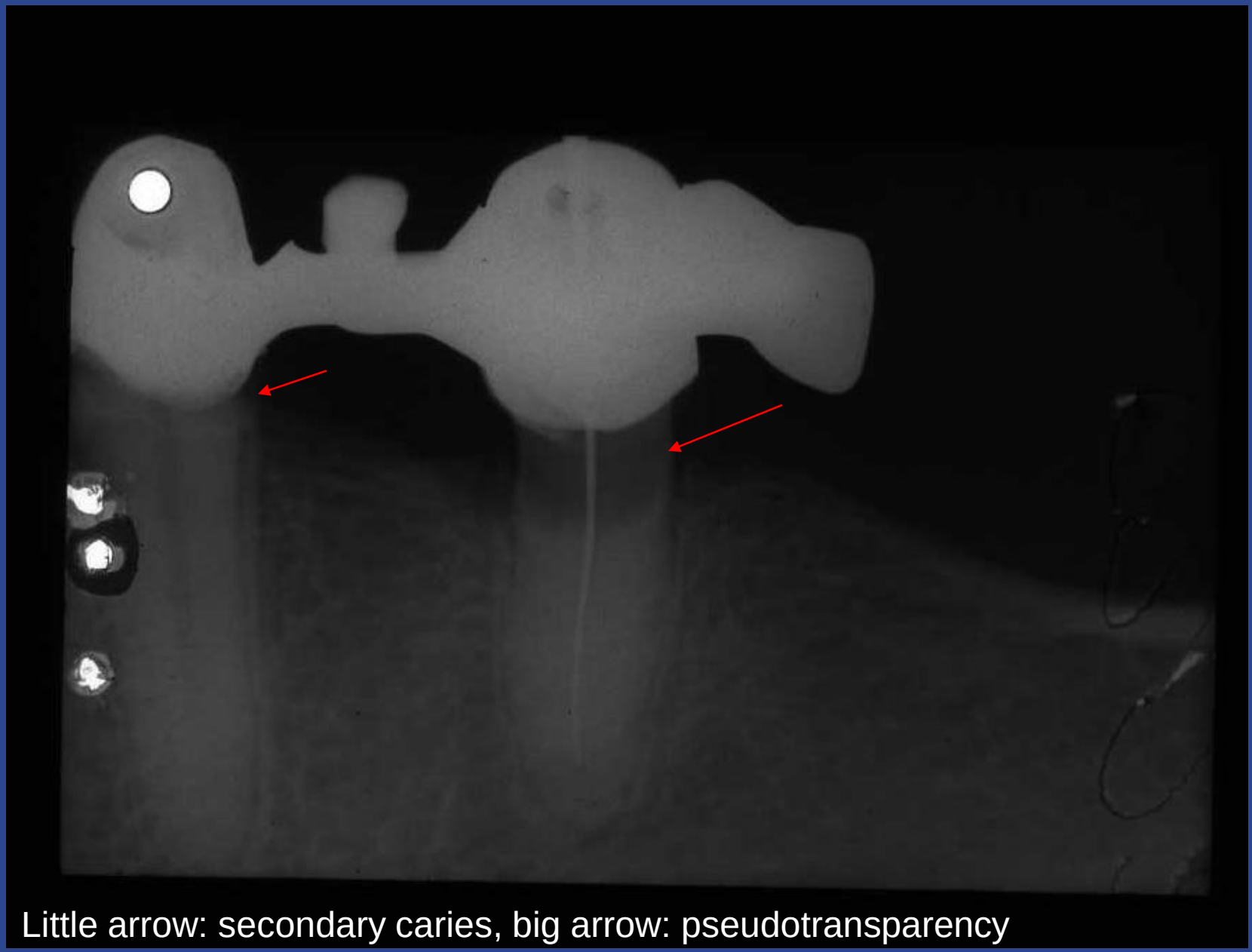
cervical burn out

pseudotransparency

- cervical part of the tooth is free due to horizontal bone loss
- not covered by enamel,

=> is relatively darker

remember: **X-ray summarizes**



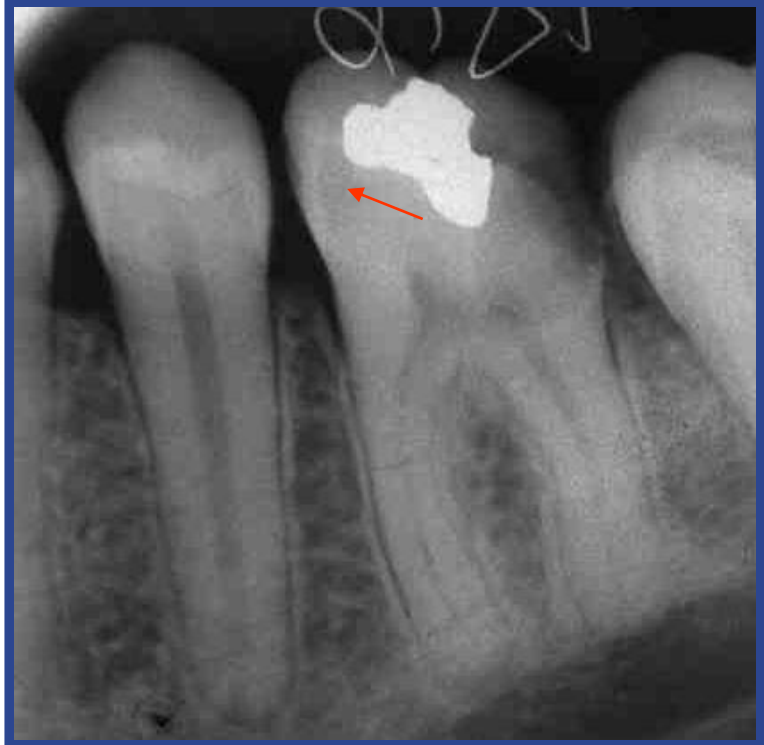
Little arrow: secondary caries, big arrow: pseudotransparency

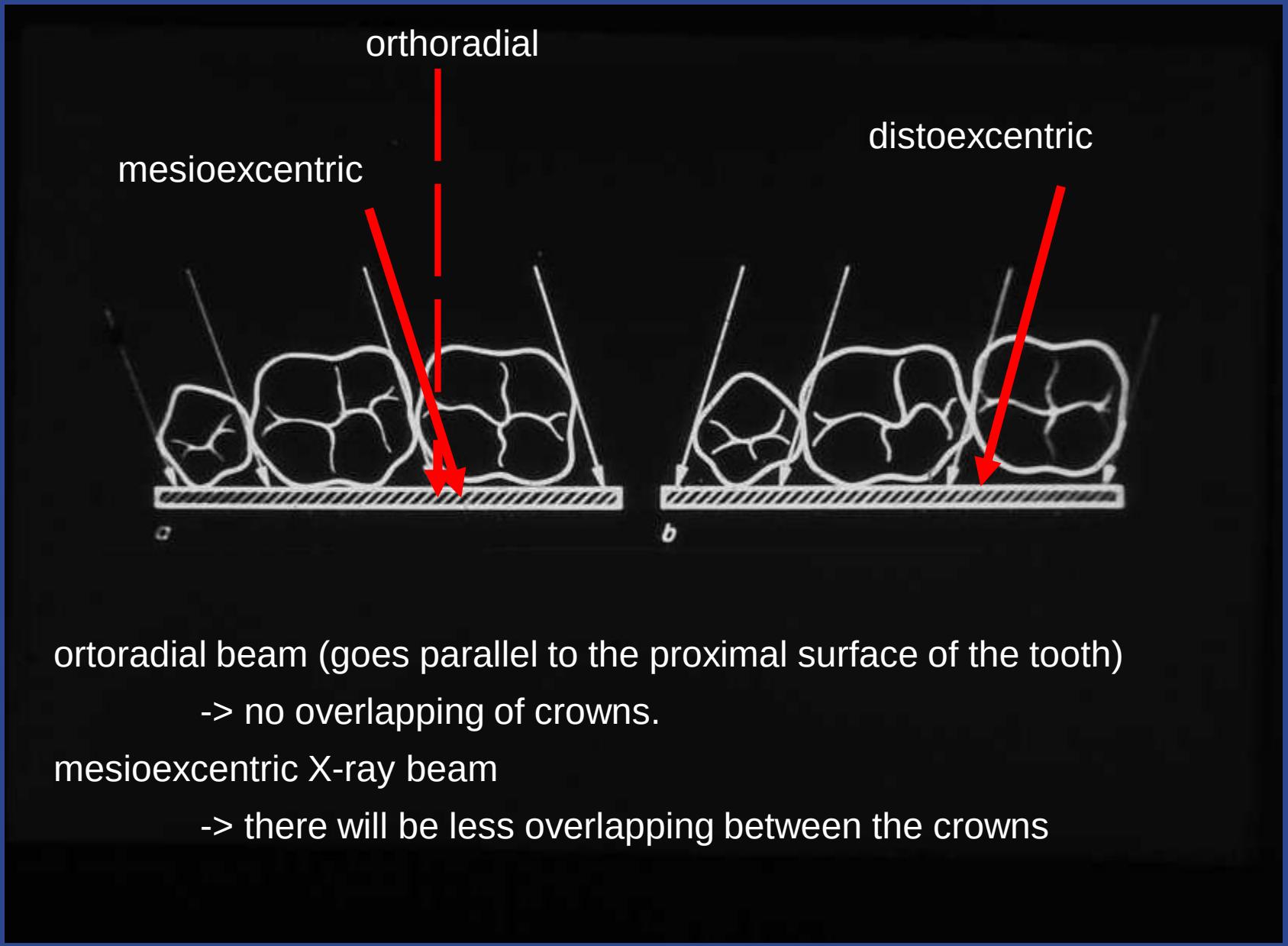
1 2 3 4 5 and a supernumerary tooth

pseudotransparency

Band

Mach Band





ortoradial beam (goes parallel to the proximal surface of the tooth)

-> no overlapping of crowns.

mesioexcentric X-ray beam

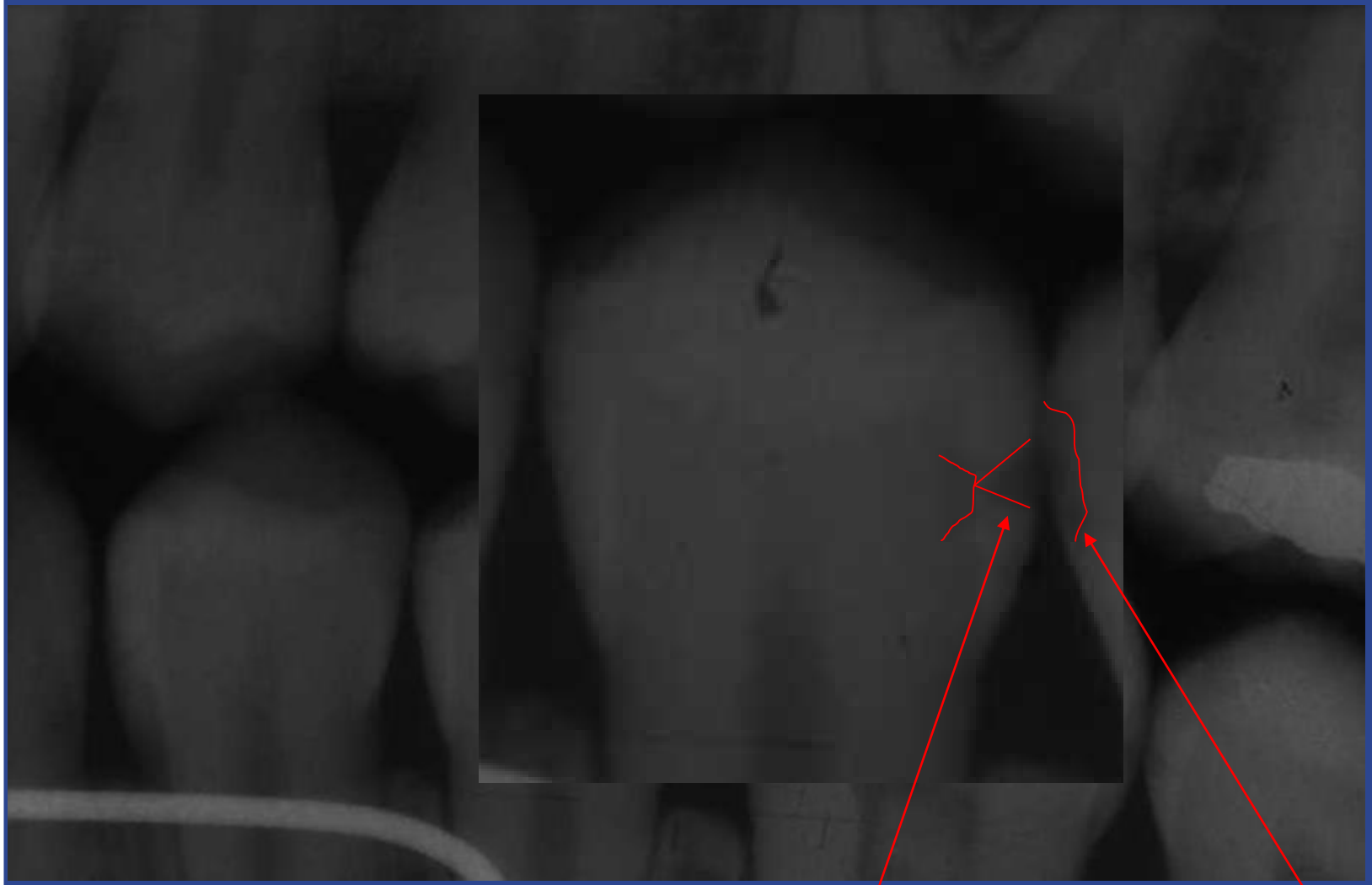
-> there will be less overlapping between the crowns

8 7 6

overlapping crowns: the x-ray beam is not ortoradial
failure possibility: approximal caries is not visible

anatomical landmarks: external oblique ridge is superimposed to a caries

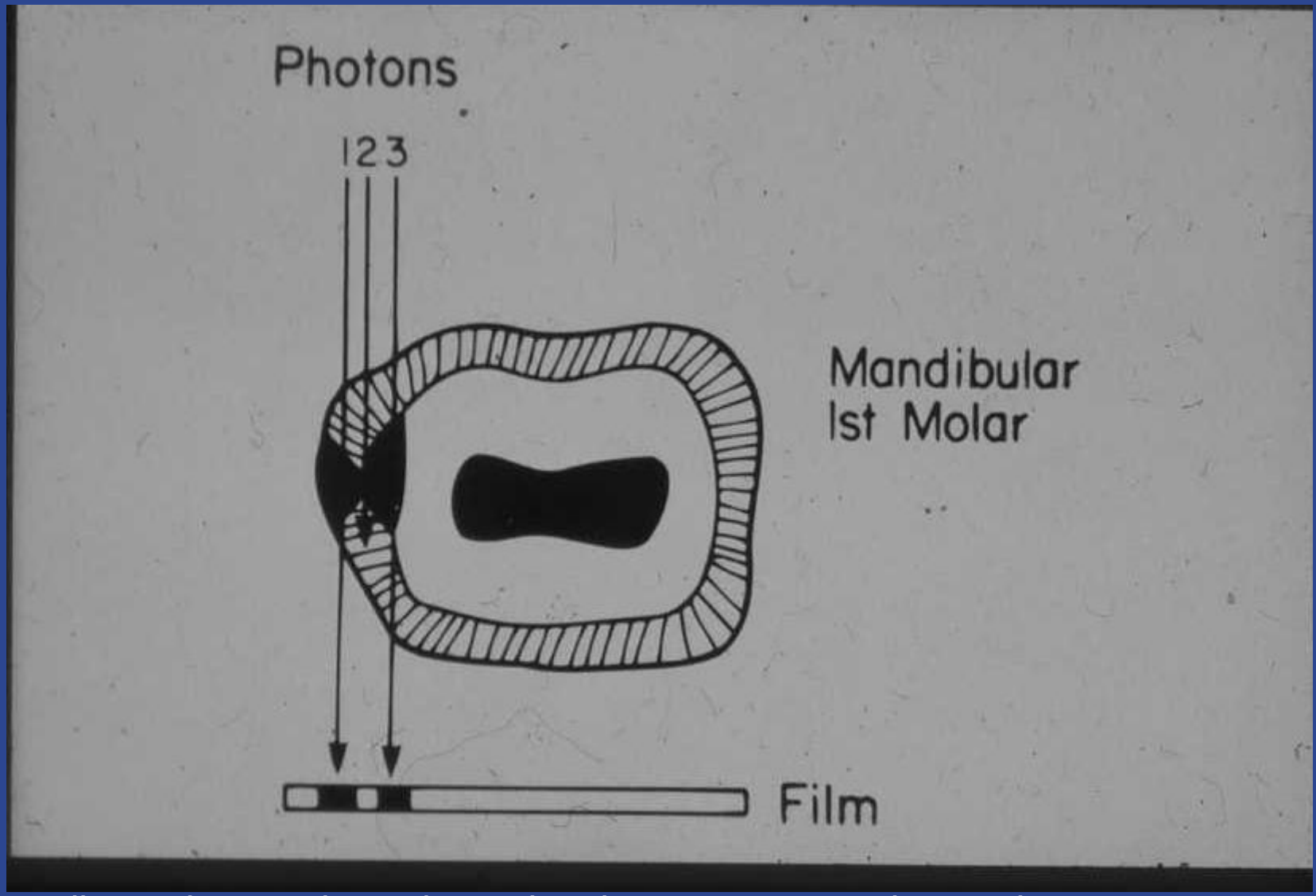
Transparent zone (hystologic terminus technicus):
opaque line/area under the occlusal caries = trasparent zone on histologic image
Cause: increased mineralization, narrowed dentin canaliculi



3 4 5 6 7

3 4 5 6 7

D3 **Use magnifying glass!** D1

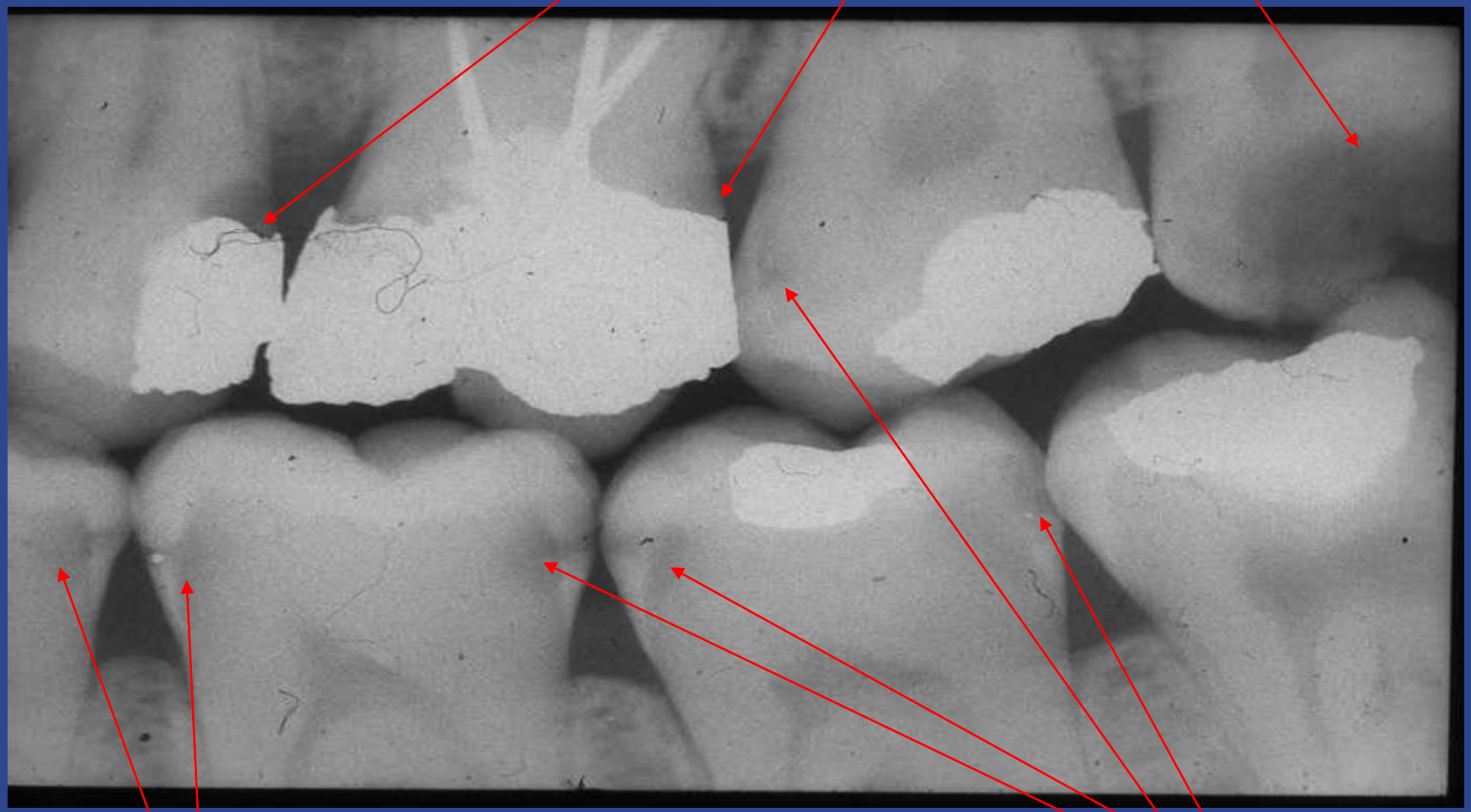


On radiograph sometimes the caries does not seem to be continous.

Remember: **X-ray summarizes**!

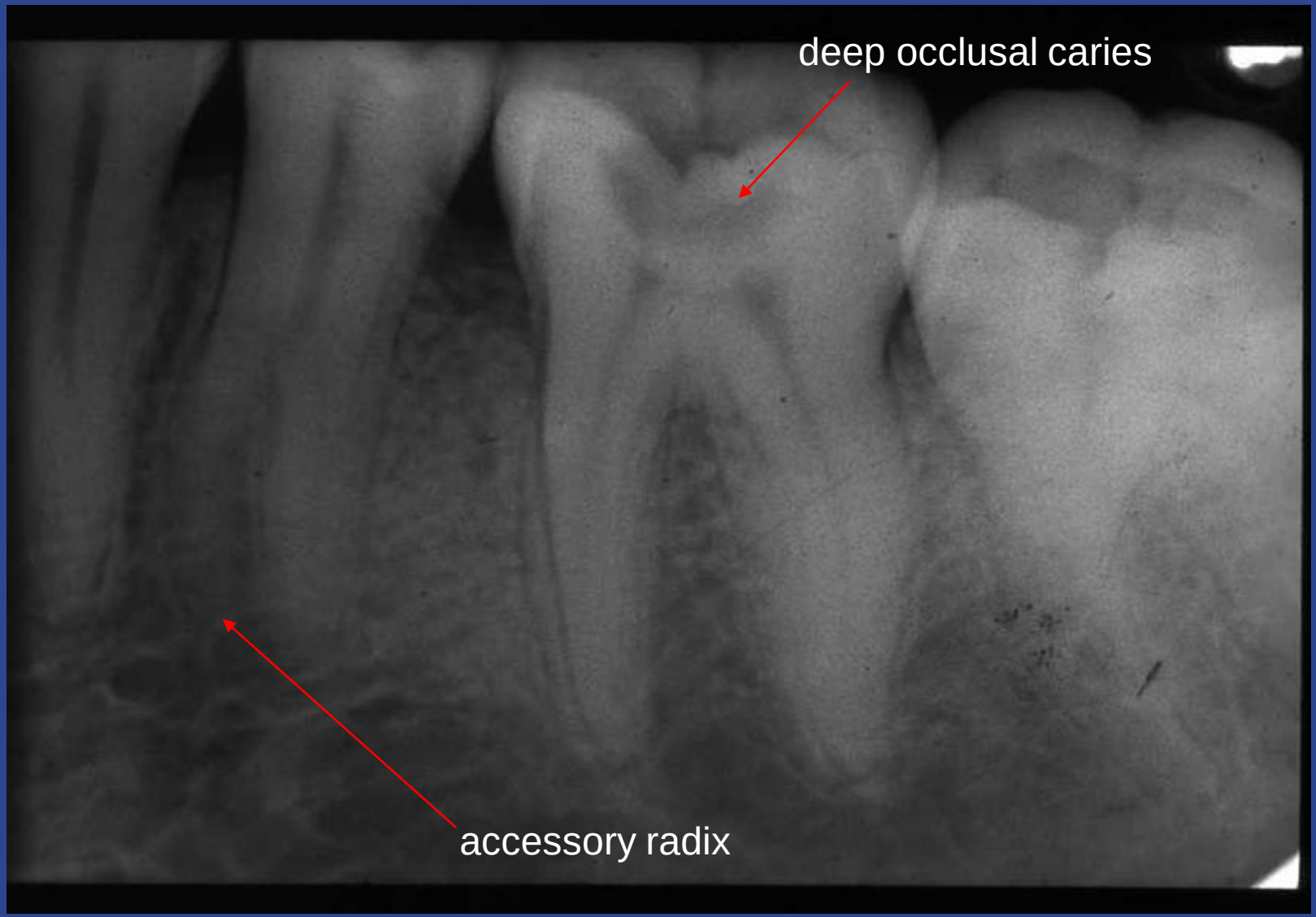
5 6 7 8

5 6 7 8


secondary caries
cervical burn out
deep occlusal caries
D3
D3

5: total destruction of the crown, 6: distoapproximal D3 caries,the lesion penetrate under CEJ-due to horizontal bone loss

deep occlusal caries (8): we examine whether the pulp is affected


deep occlusal caries
accessory radix

8 7 6

deep occlusal caries

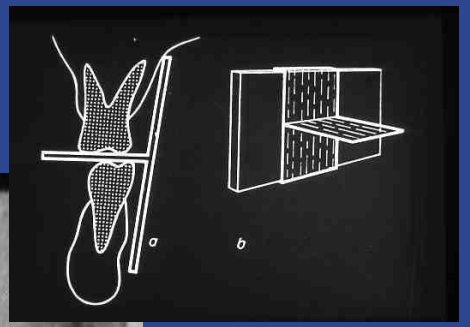
in the region of the contact point D2 & D3 carieses in the neighbouring teeth

3 4 5 6 7
3 4 5 6 7

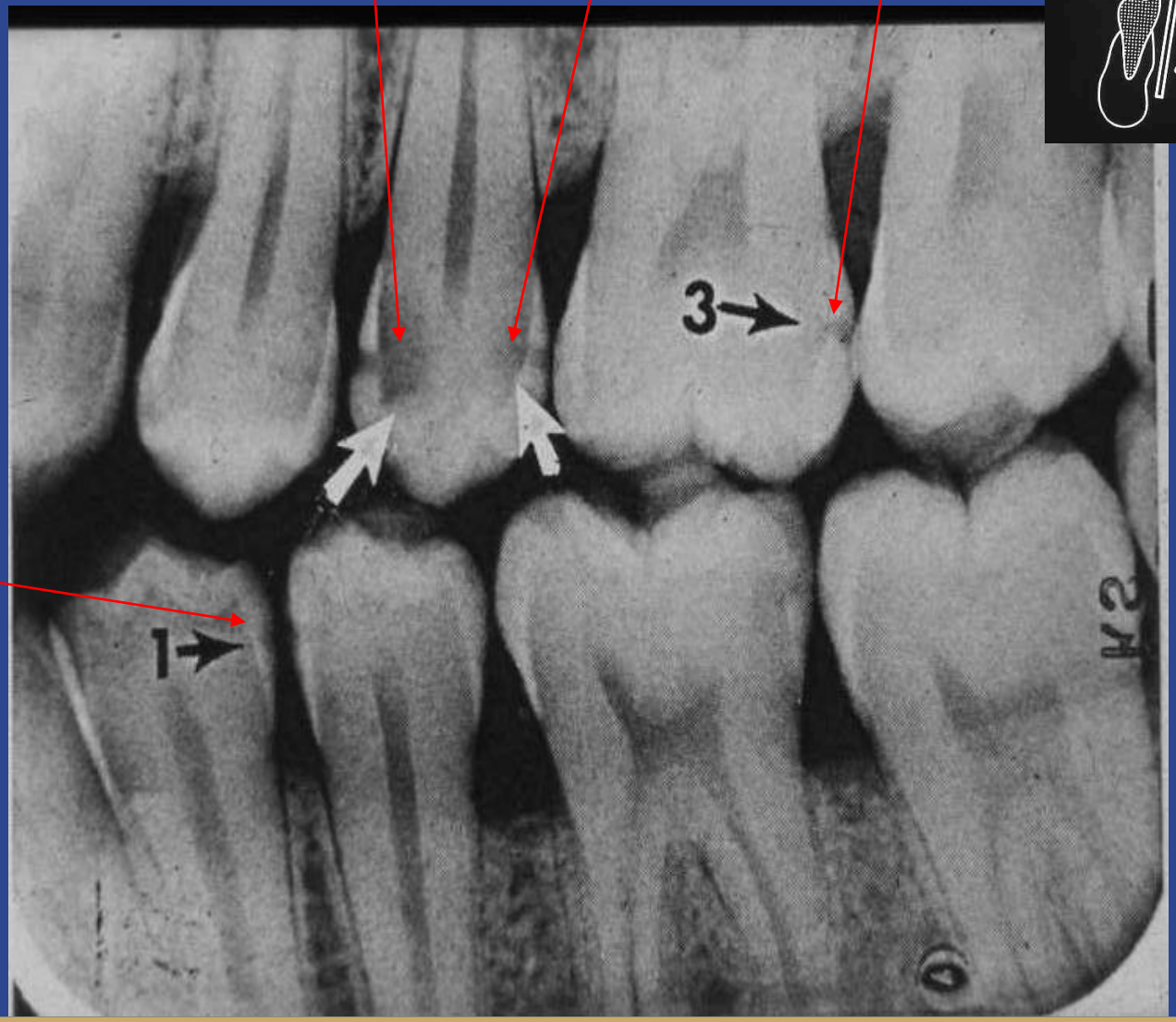
D4

D3

D3



D1

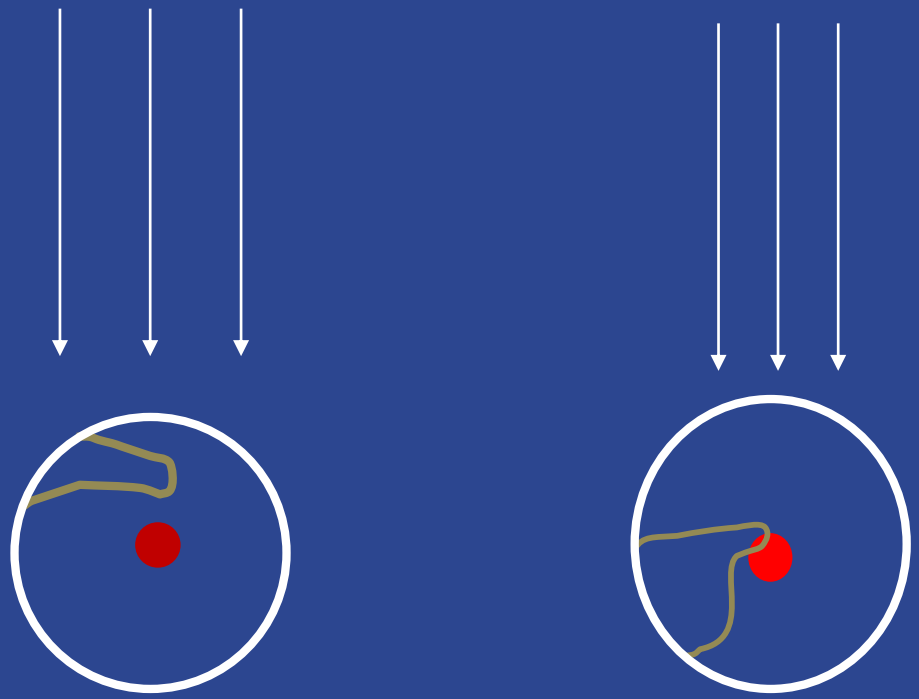


first molar: D4 caries on occlusal and lingual surface, no periapical lesion

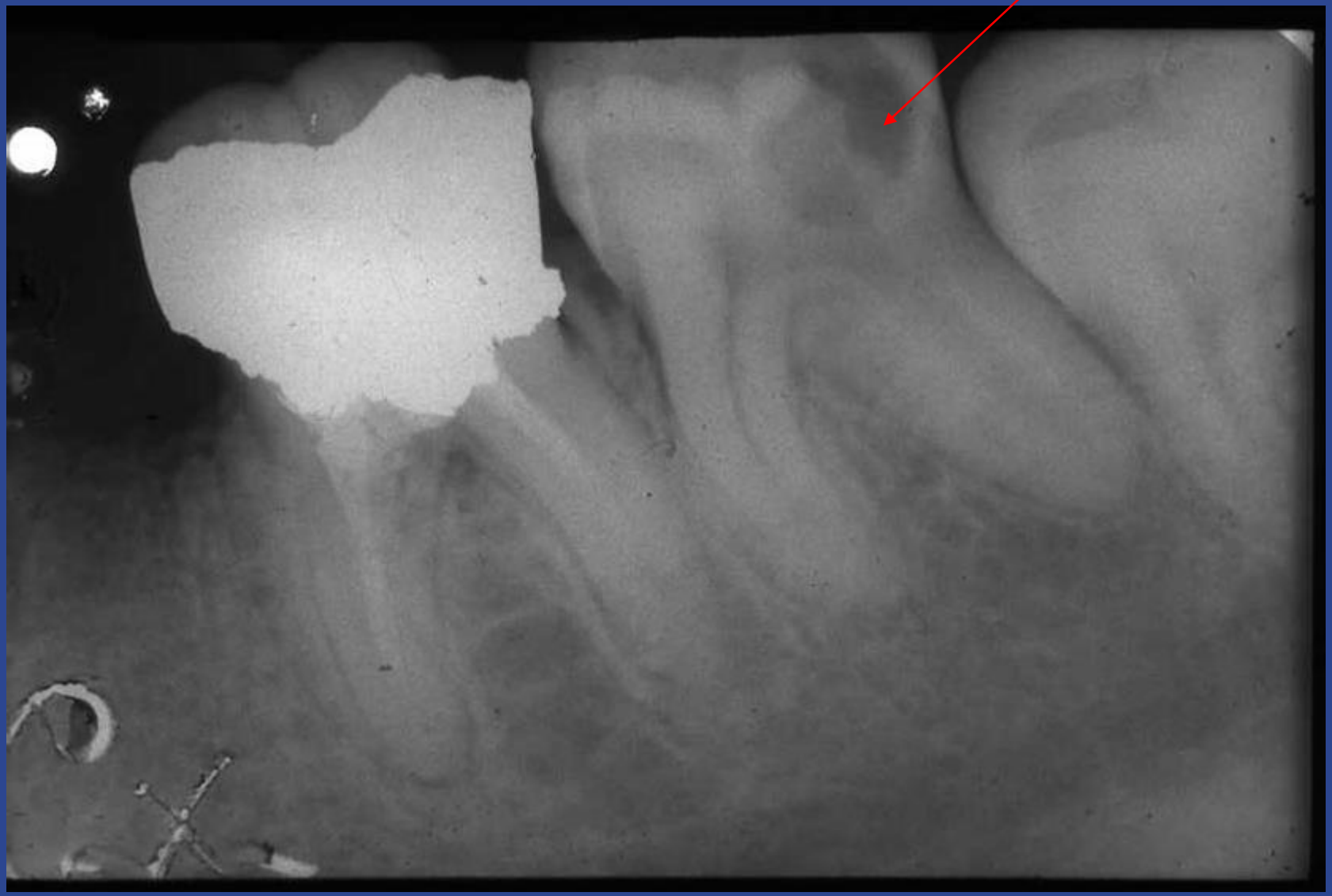
4567

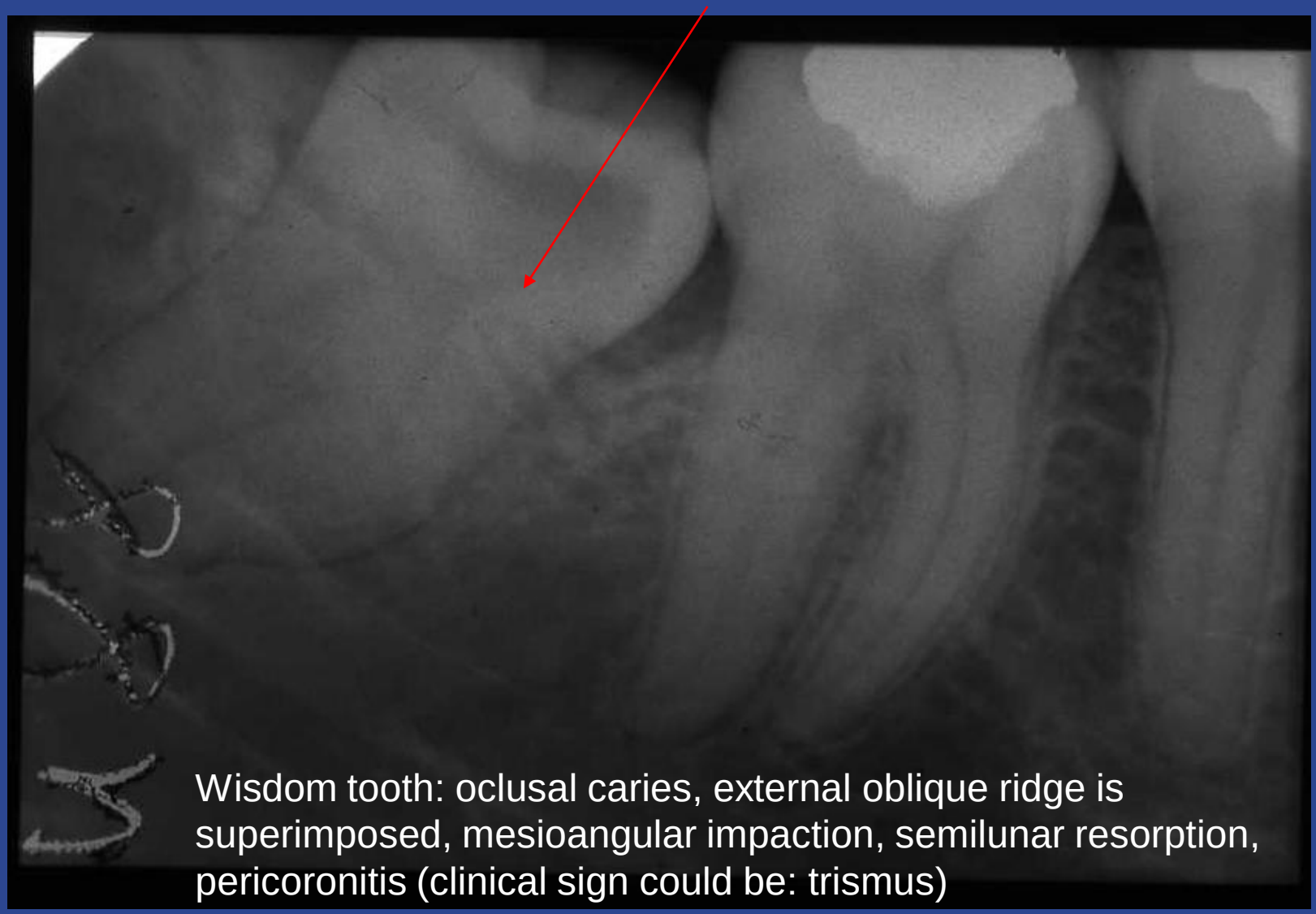
on the base of X-ray film we can not know about the pulp even in the case of very deep approximal caries. ODL D4 caries.

Be careful! It is not possible to say whether the pulp is affected by alone the radiograph.
It is just a 2D image!!!



X-rays summarize!! A relatively smaller carious lesion can project to the pulp ⇔ a bigger lesion which really affect the pulp can missed because of the big amount of sound enamel and dentin which surround it.


OLD caries



Wisdom tooth: oclusal caries, external oblique ridge is superimposed, mesioangular impaction, semilunar resorption, pericoronitis (clinical sign could be: trismus)

Lingual caries, coecum caries

pseudotransparency

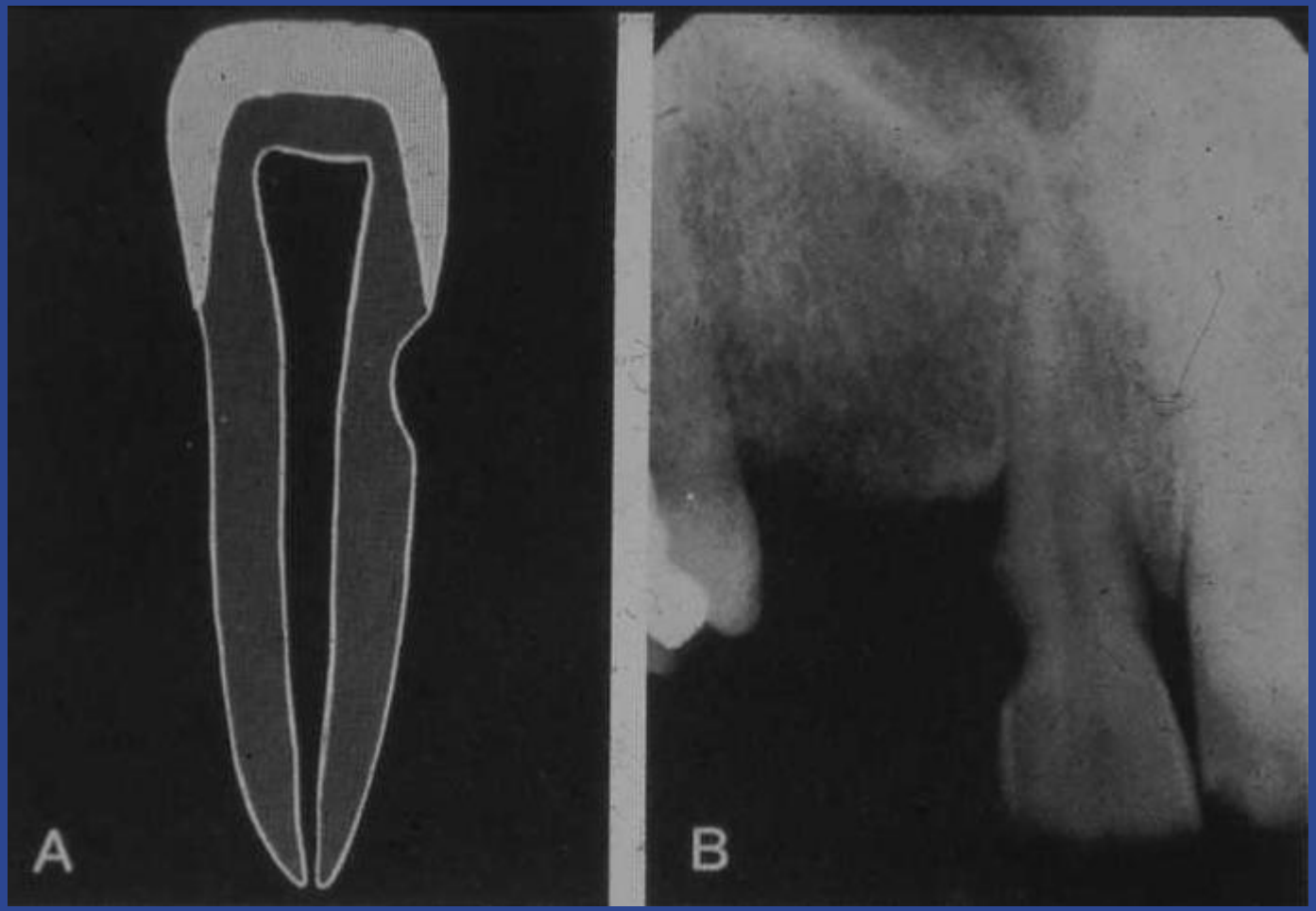
vestibular caries

approximal caries

butterfly retention: not useable technique any more

8 7 6 5

OD caries



root surface caries: in case of horizontal bone loss the root is not surrounded by bone, usually not triangular shape.

Root caries

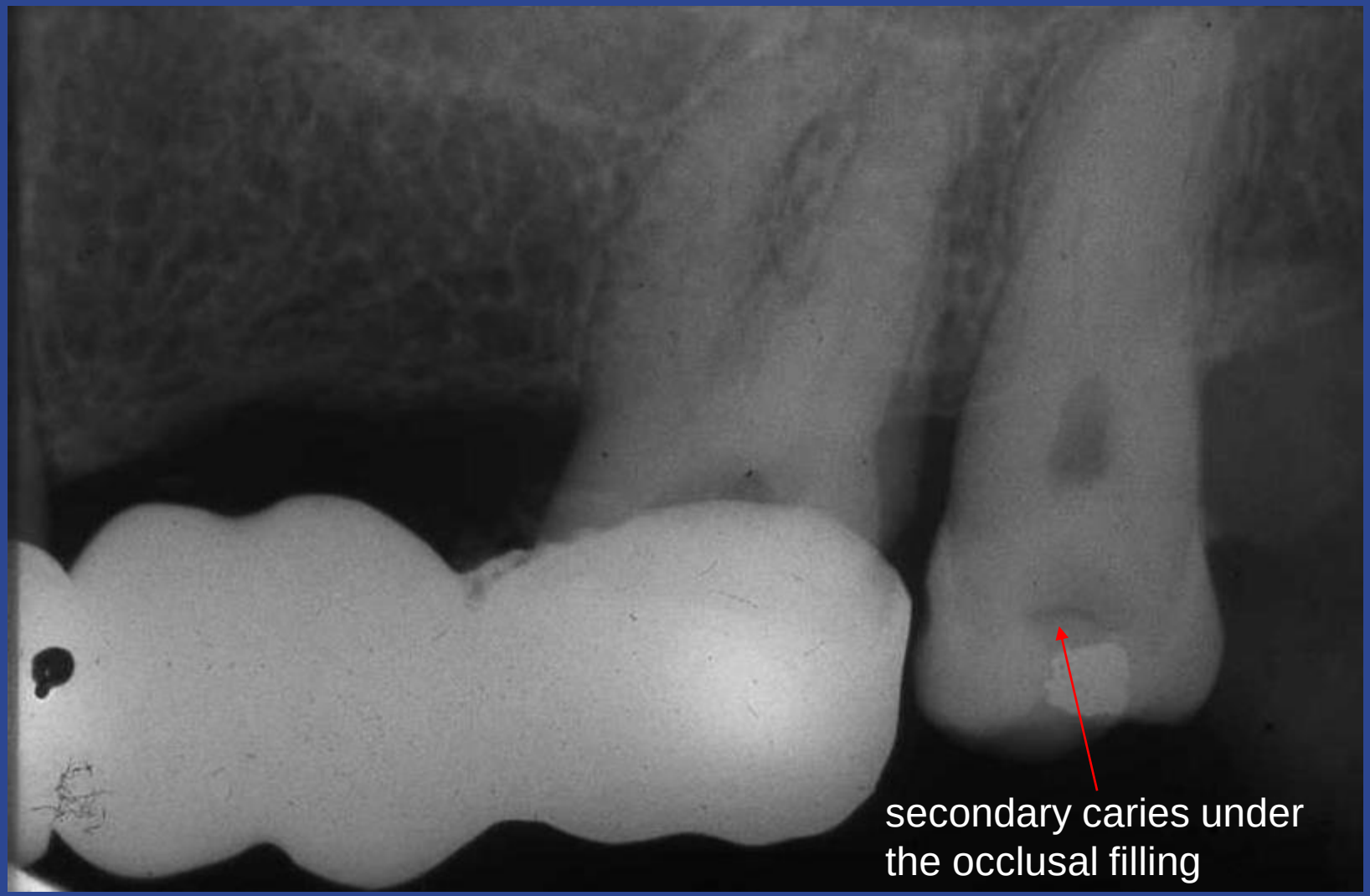
4 3 2 1

Cervical burnout
borders of it:
nose and CEJ

Little arrows:
approximal
caries D3-4

4 5 6

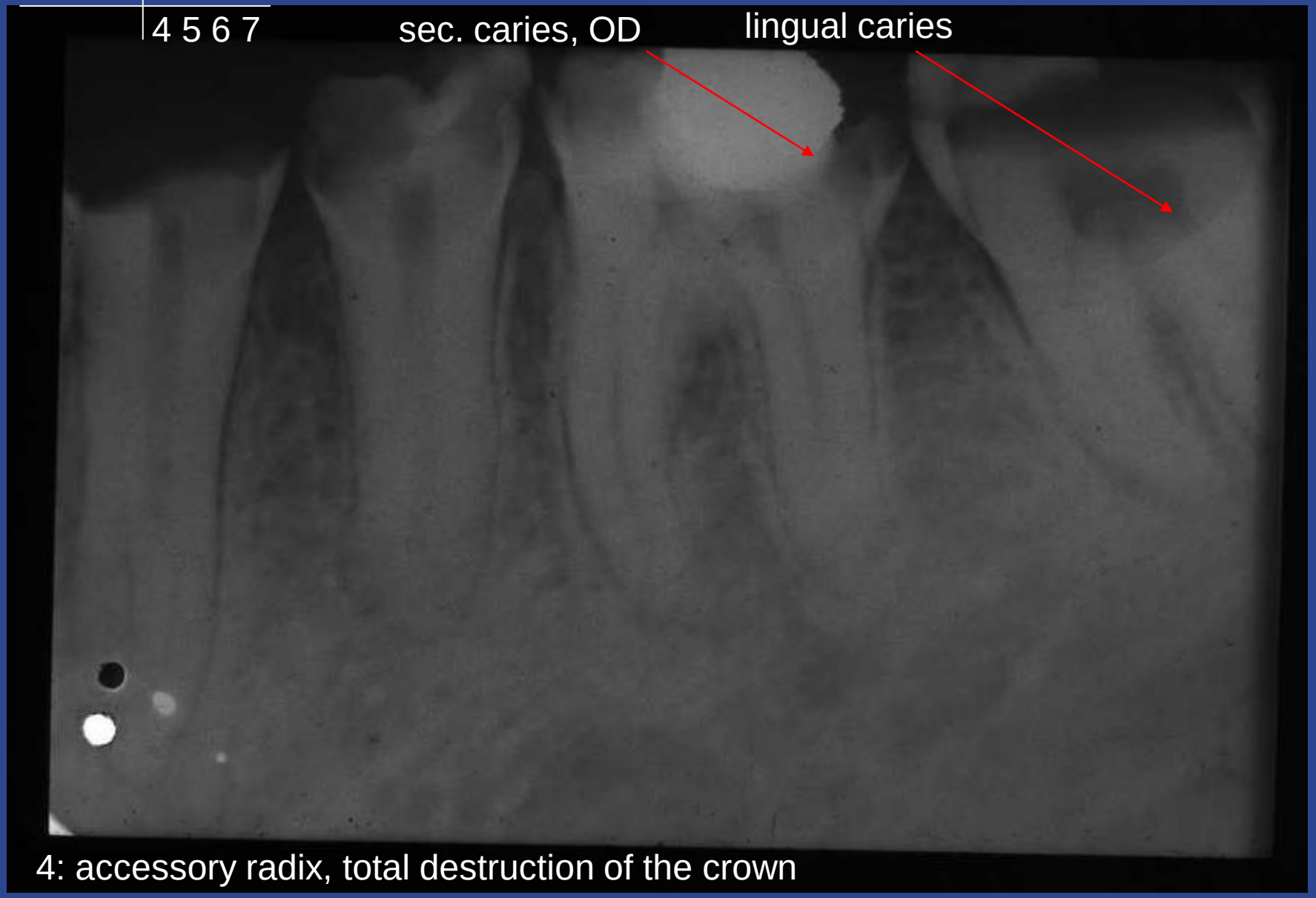
occlusal caries


secondary caries under
the occlusal filling

vestibular surface caries

occlusal D1-D2 caries can be diagnosed with difficulty, because the heavy enamel cusps hide it

8 7 6 5



4: accessory radix, total destruction of the crown

5: 2 roots, 6: distal secondary caries, D3 , 7: mesiaoapproximal D3 caries

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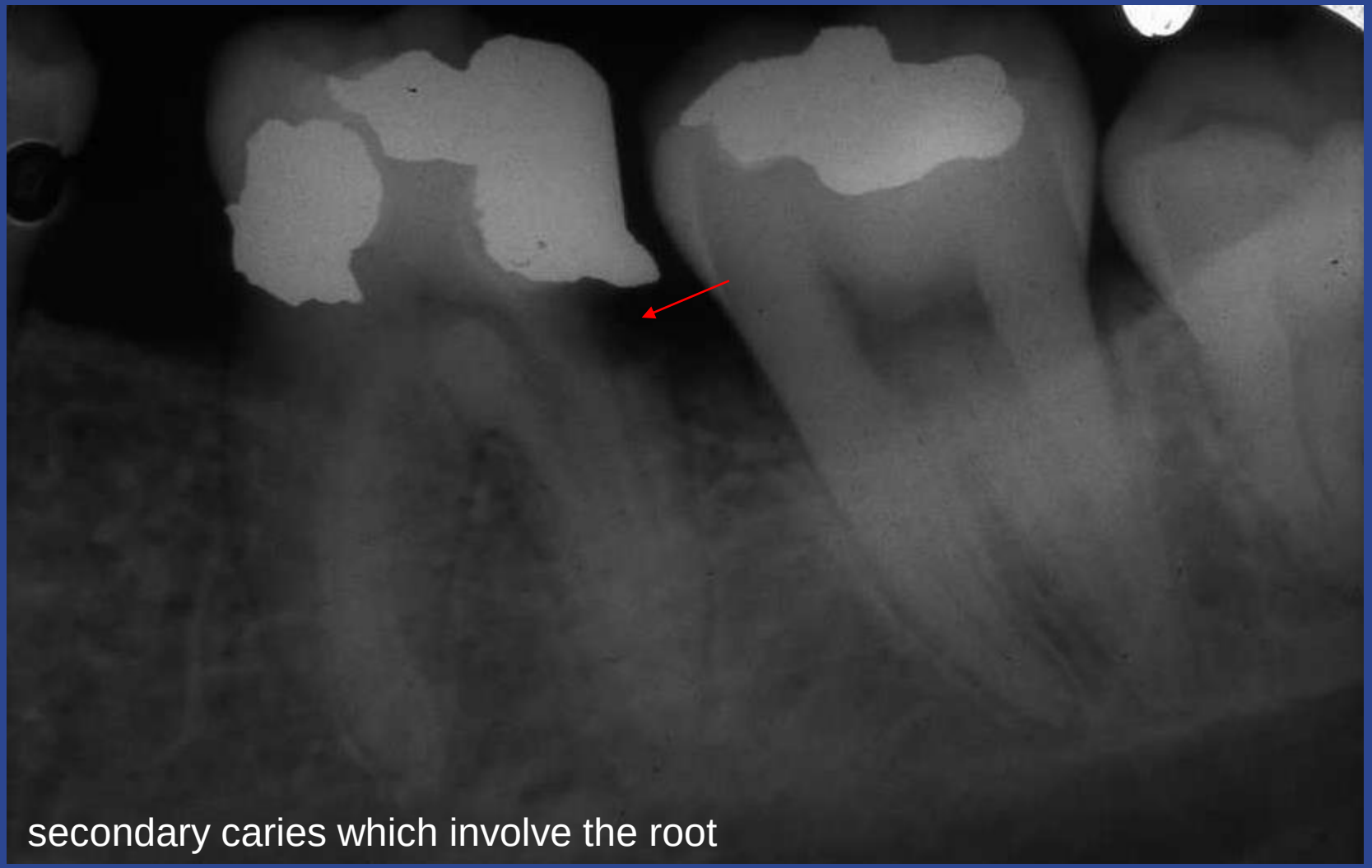
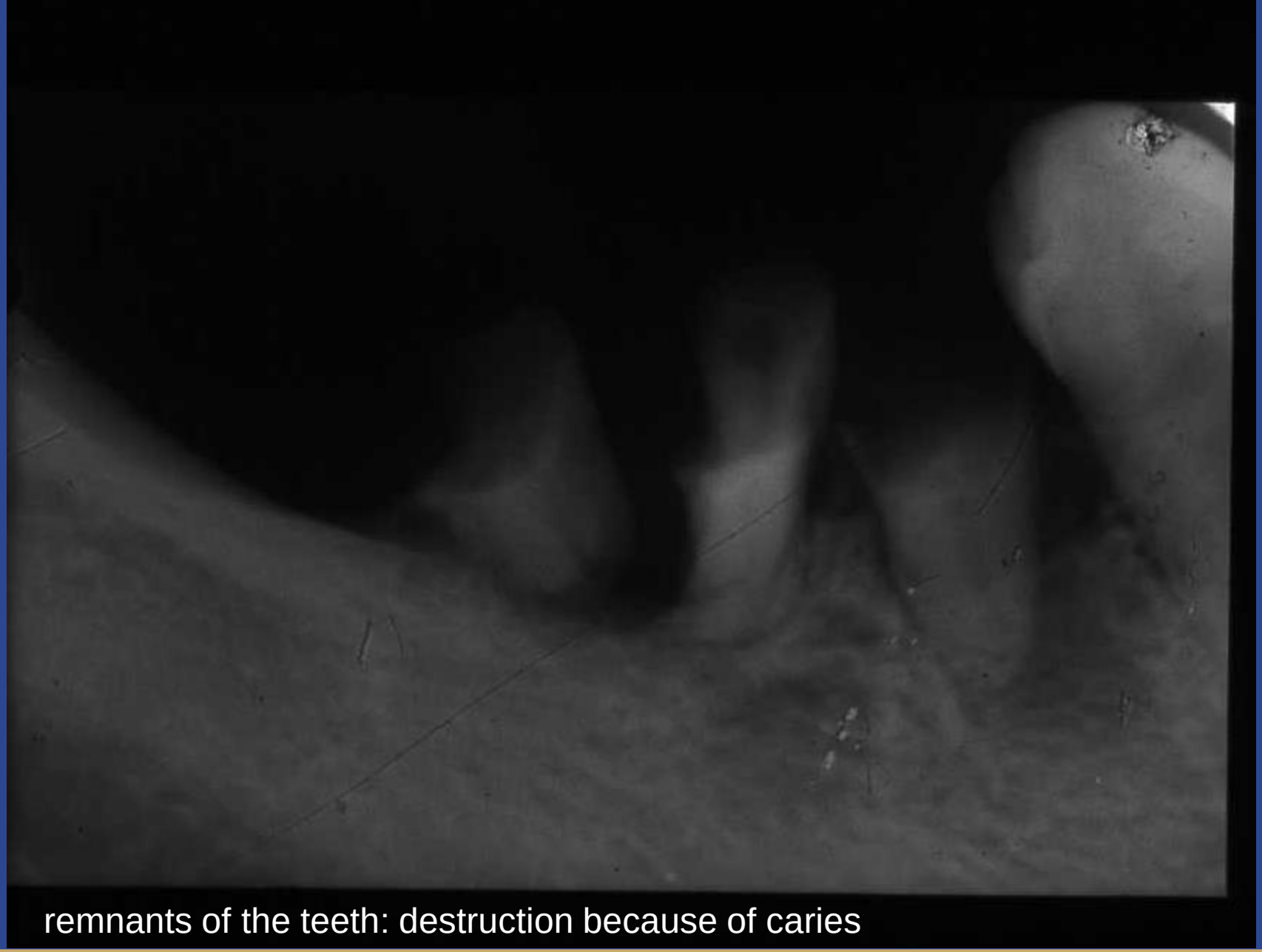


secondary caries which involve the root



remnants of the teeth: destruction because of caries

extraction

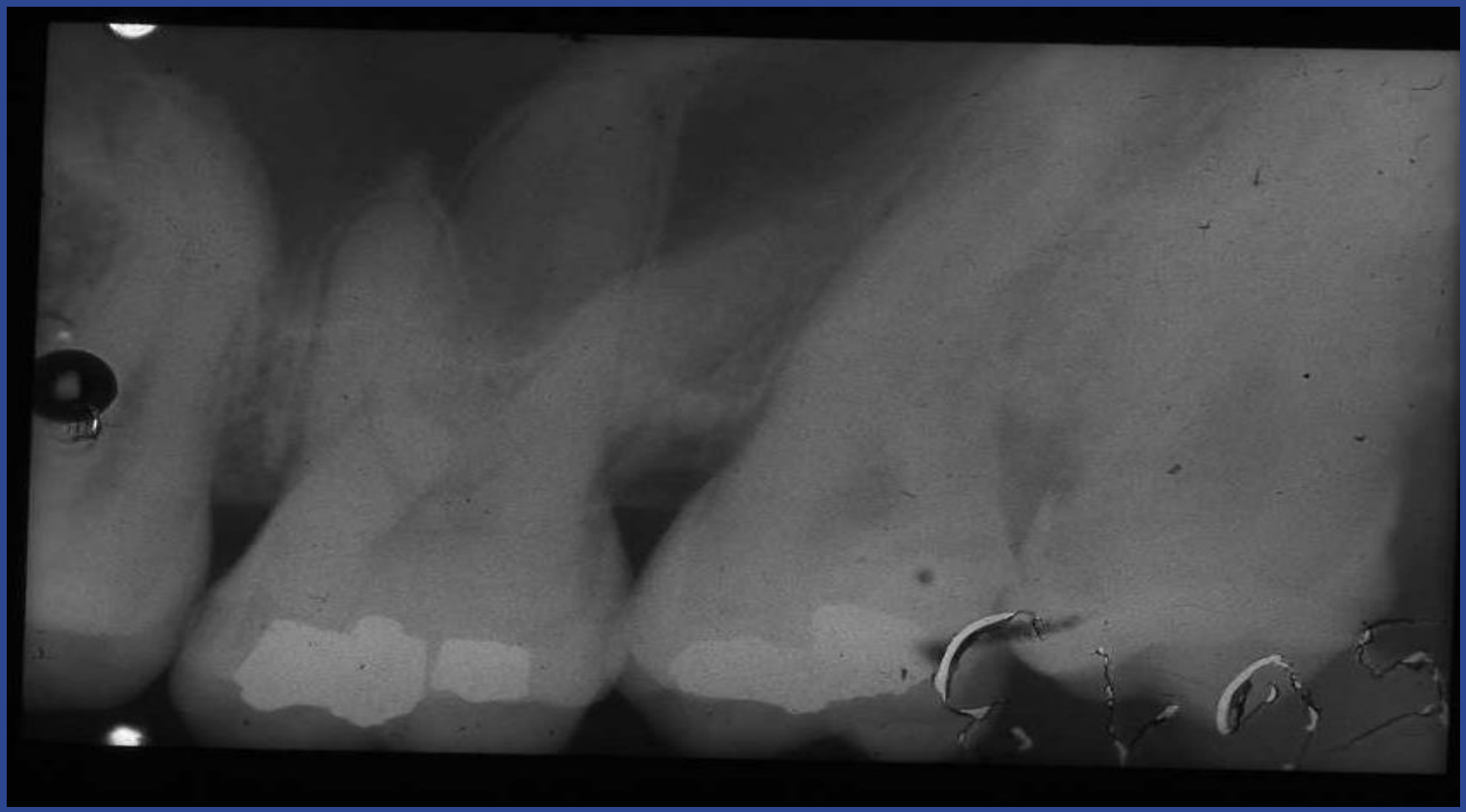
difficult extraction

- what can we expect?

X-RAY!

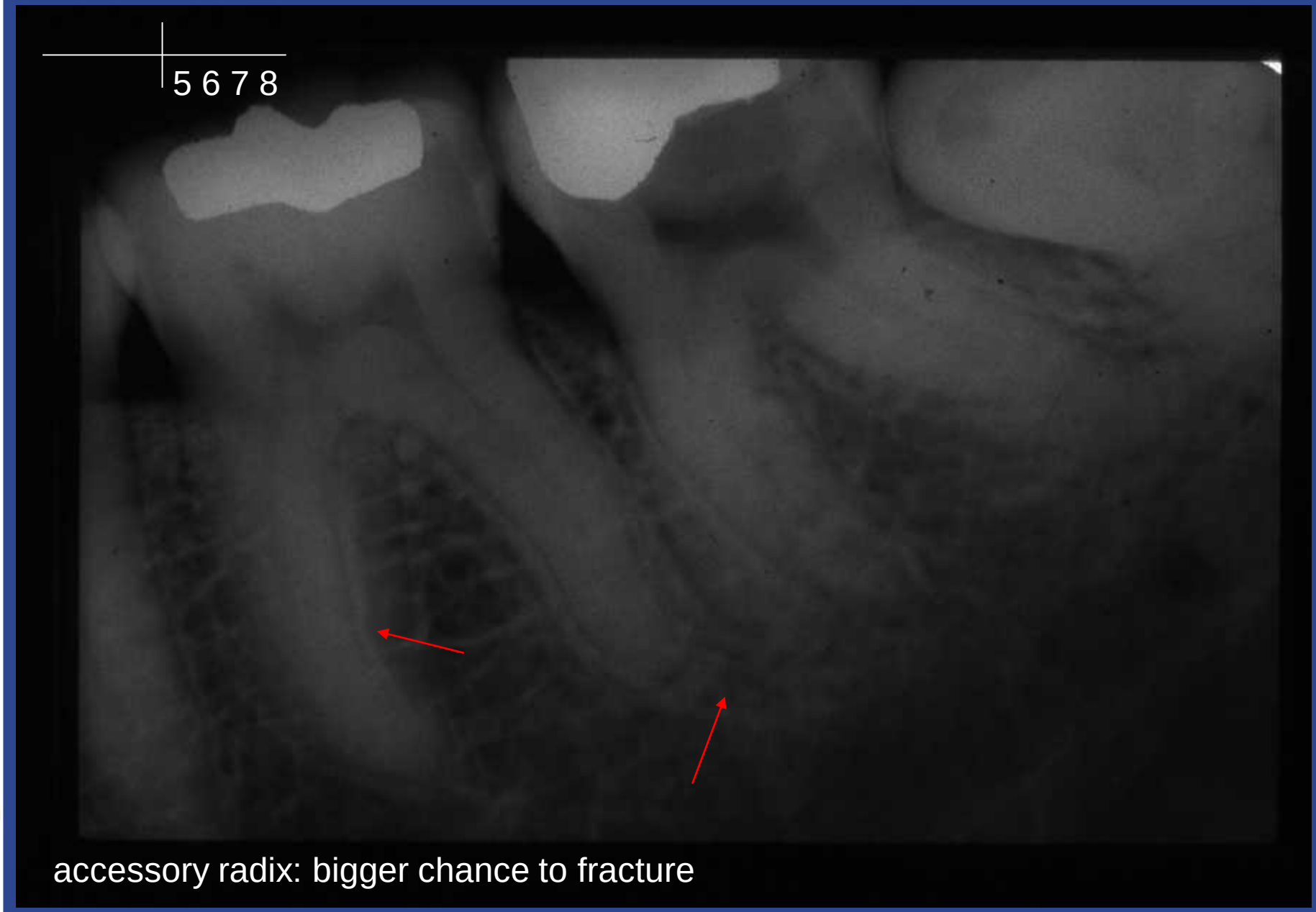
- long, slim and/or curved root
- hypercementosis
- splayed roots
- total retention : the tooth is totally surrounded by bone
- impacted tooth
- predisposition for fracture: endodontic treatment, resorptio dentis
- closeness of the sinus
- closeness of the mandibular canal

5 6 7 8



curved root, maxillary sinus is close to the root: interdental and interradicularis sinus

5 6 7 8



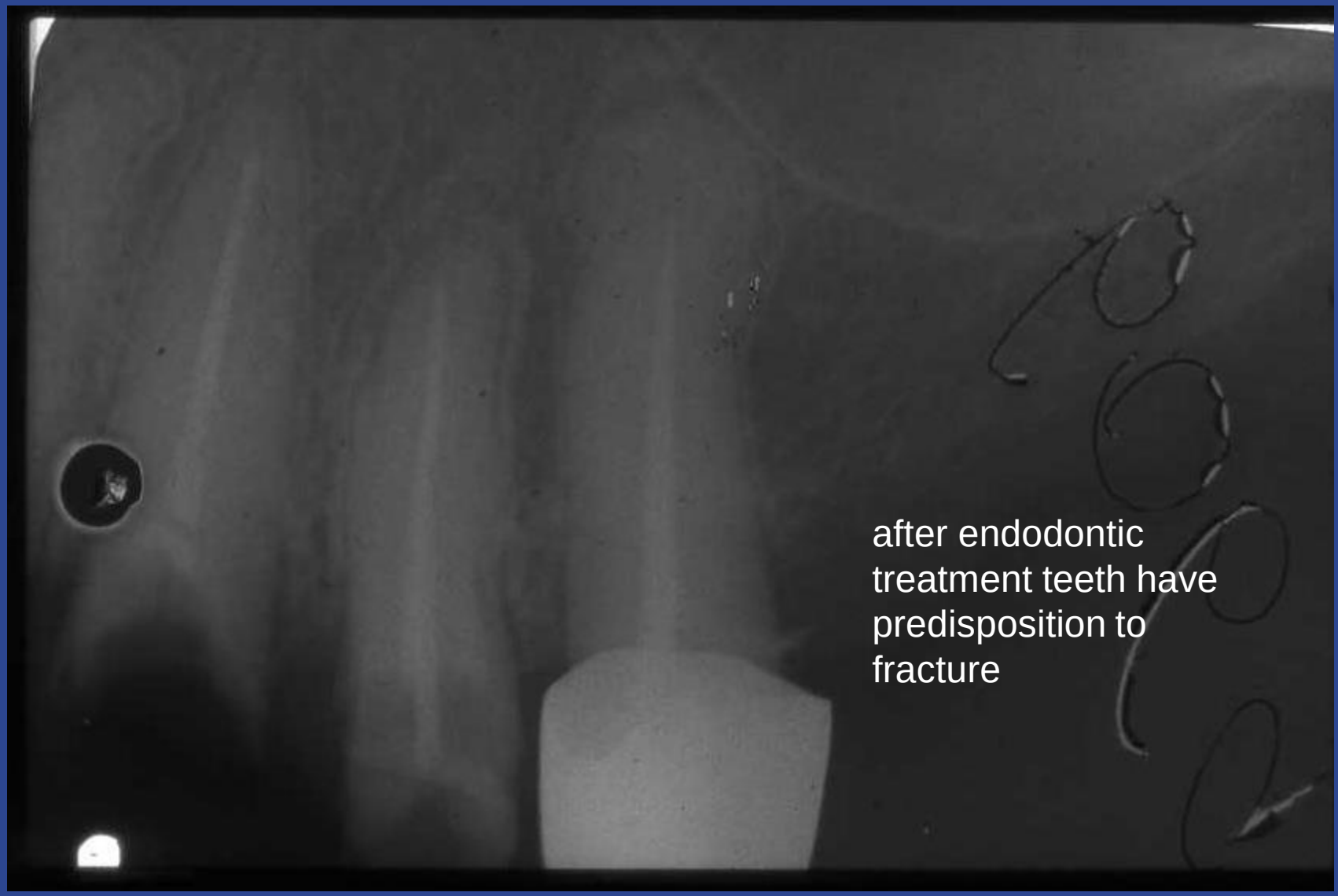
accessory radix: bigger chance to fracture

6: three rooted, accessory radix


5 6 7 8
curved roots

7 6 5 4 3

curved roots

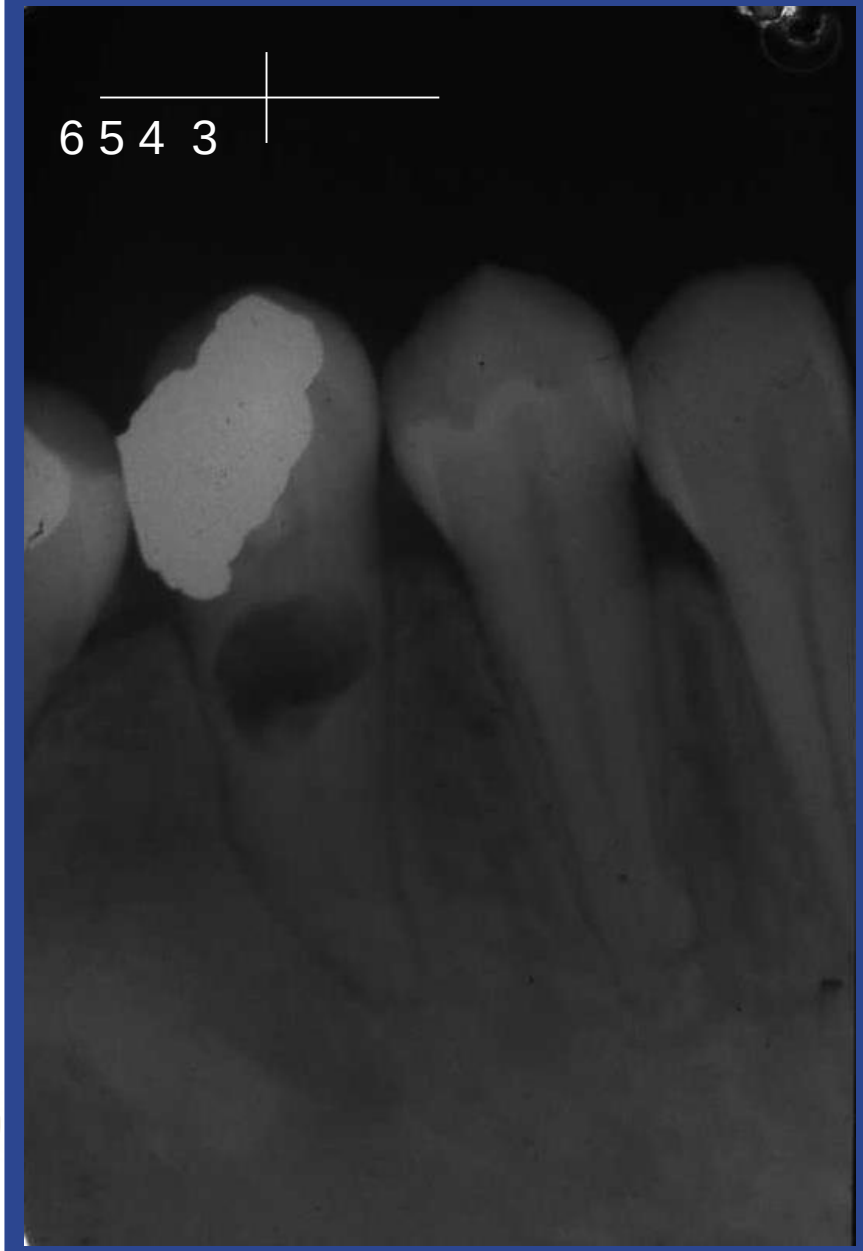

after endodontic
treatment teeth have
predisposition to
fracture

7543

bulge apex

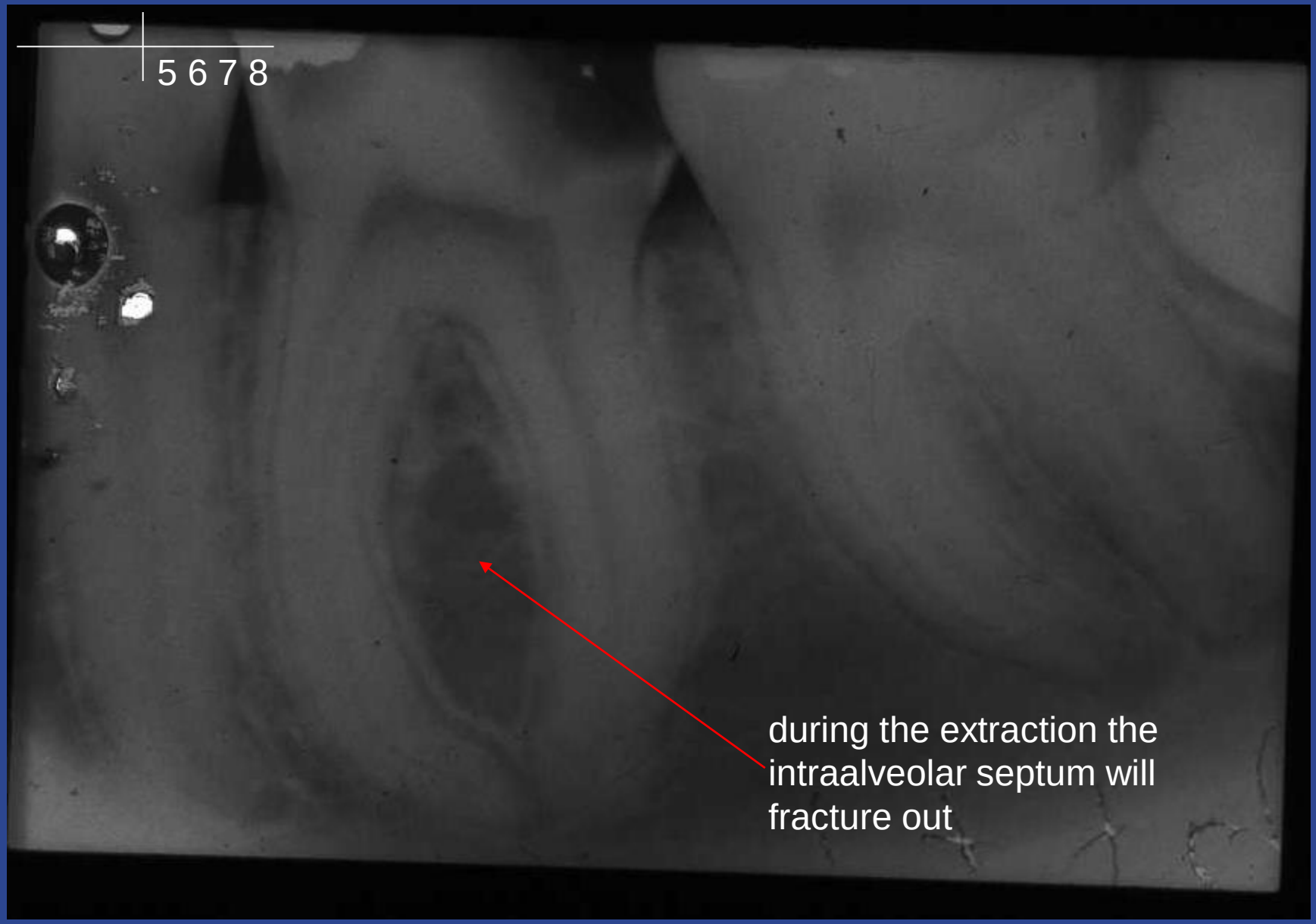
hypercementosis:

extraction with a lot of bone fragment??



internal resorption:

the frequency of the fracture is bigger


5 6 7 8
during the extraction the intraalveolar septum will fracture out

mesiangular impaction of the wisdom tooth + risk of injury of the mandibular canal!!!

8 7 6 5

1 | 1 2

dilaceration, curved roots

easy extarction

- thick, short root
- piramid shape roots
- milk tooth with partly absorbed root
- partly absorbed apex or alveolar process

7: piramid shape root, 6: splayed roots

bone loss

partlially absorbed alveolar process

the alveolar process is partly resorbed.

5 6 7 8

pyramid shape root: easier extraction

extraction: complications ☹

- during the extraction:
  - collapse
  - root fracture – the fractured fragment can pass into the sinus, soft tissue, mandibular canal
  - aspiration of the root
  - alveolar fracture, the bone fragment can pass into the maxillary sinus
  - fracture of the maxillary tuberosity
  - soft tissue damage
  - the antagonistic or neighbouring tooth could tip out
  - opening of the maxillary sinus
  - during the local anesthesia could damage the plexus venosus,or vessels
  - heavy bleeding from bone or soft tissue

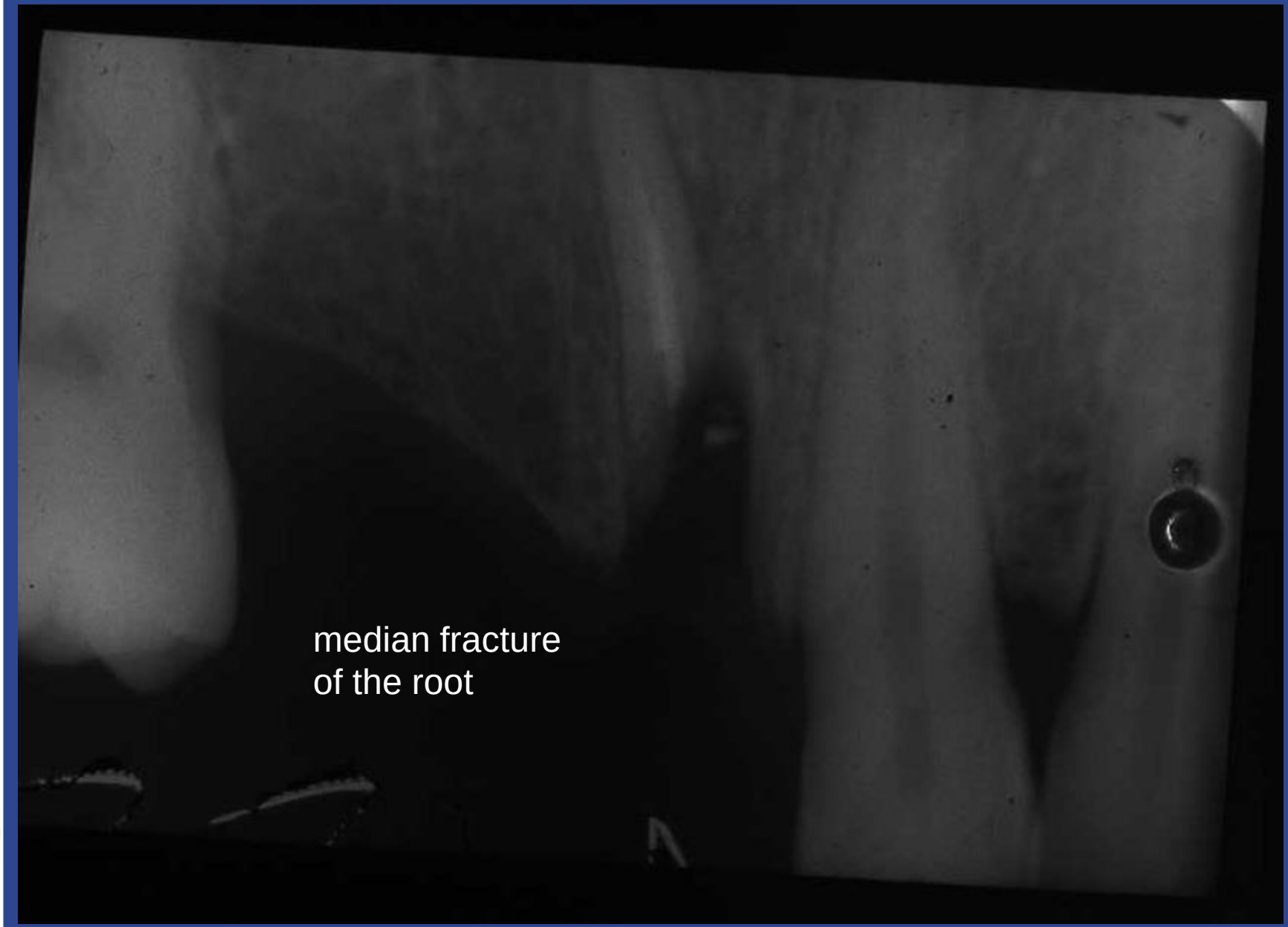
- after the extraction:
  - periostitis, phlegmone
  - bleeding
  - pain

During the extraction you can make X-ray film and you will see the complications

- **damage of anatomical structures**
  - **fracture of the alveolar process:** more or less unavoidable
  - **fracture of the root:**
    - neck region: **cervical** fracture,
    - body of the root: **median** fracture,
    - apex region: **apical** fracture.
      - Difficult situation if the zygomatic arch superimpose to that region, slim apicis frequently hardly visible, it could seem like if it were in the sinus
  - **damage of neighbouring tooth or developing tooth: accidental extraction**
  - **fracture of the mandibule**
- **fracture of instruments**

after the extraction

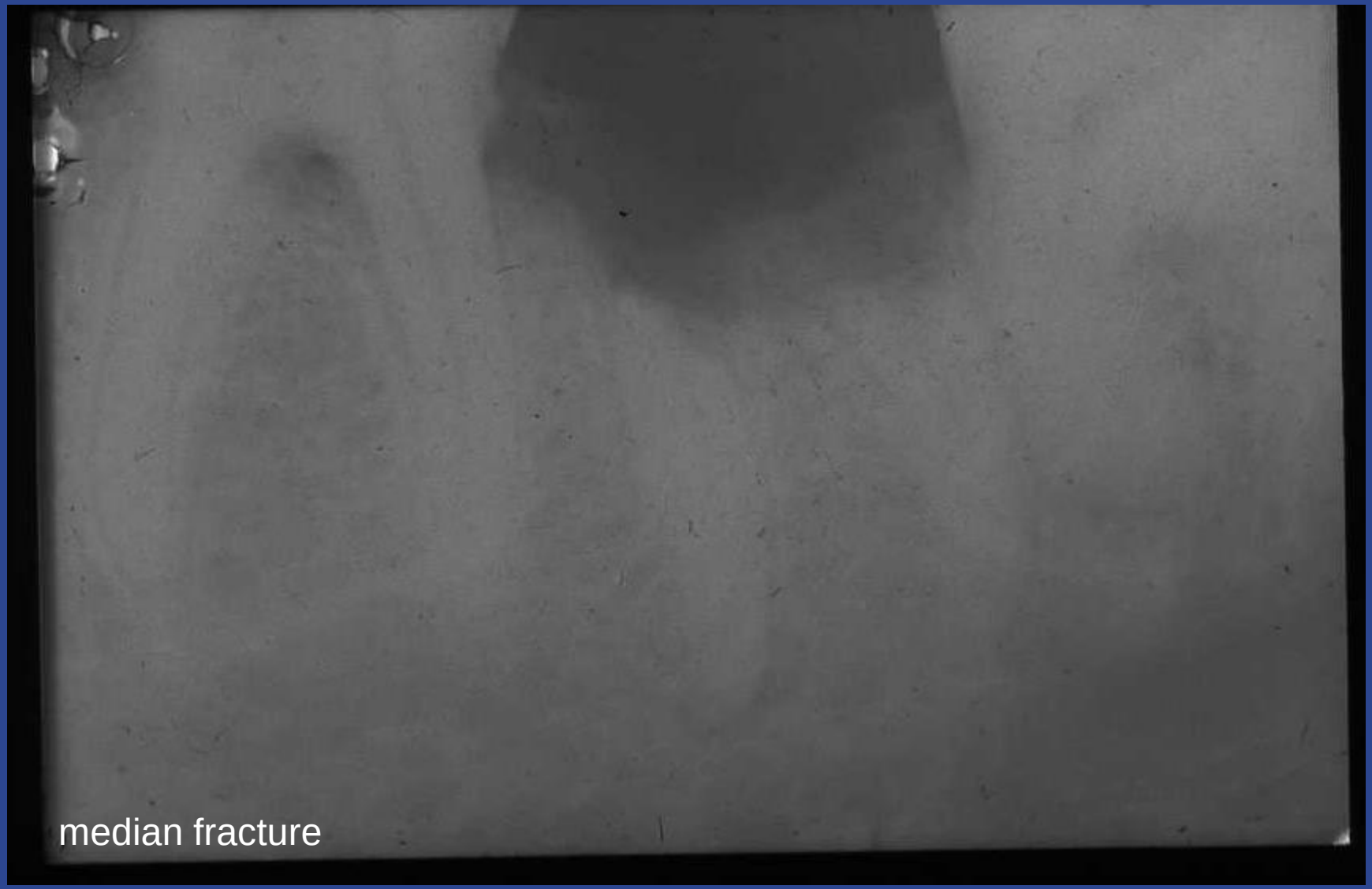
- on the fourth day: ostitis alveolaris
- after a few weeks-months: lamina dura yet visible
- after months-years:
  - reossification: commonly it has a smaller density due to smaller calcium content, so it looks like less dens than the surrounding bone
  - enostosis (whiter than the surrounding bone)

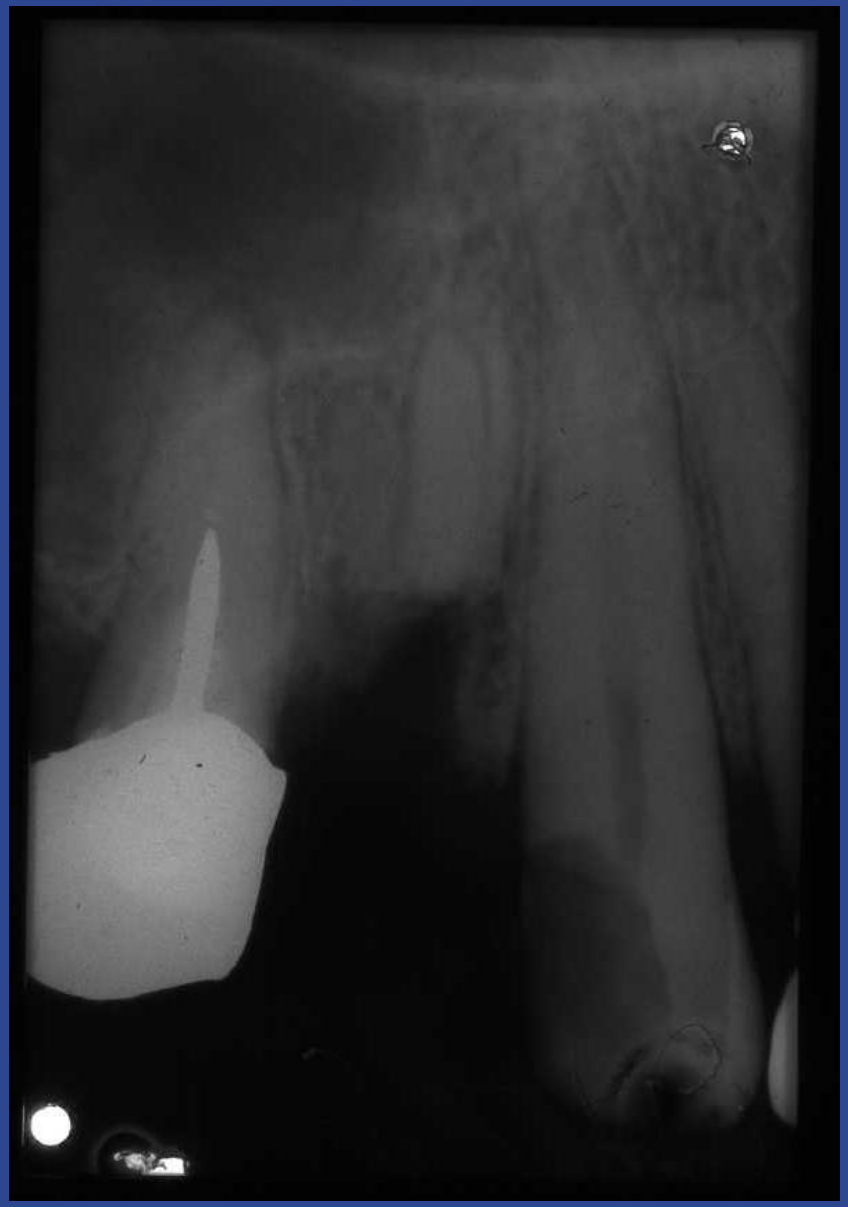

median fracture
of the root

after the extraction,alveolar socket

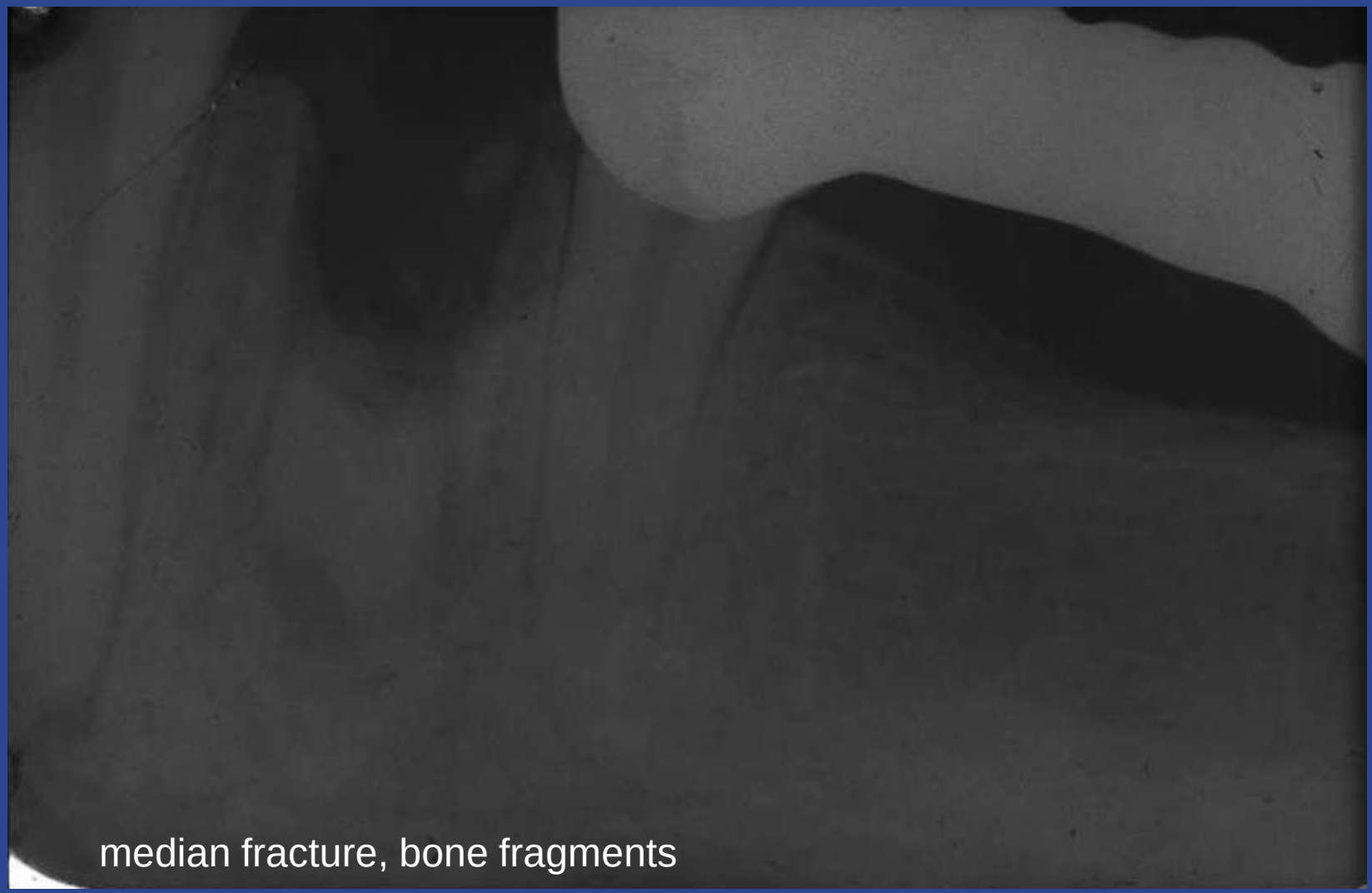
2 2

reossification in the previous place of the two central incisors.

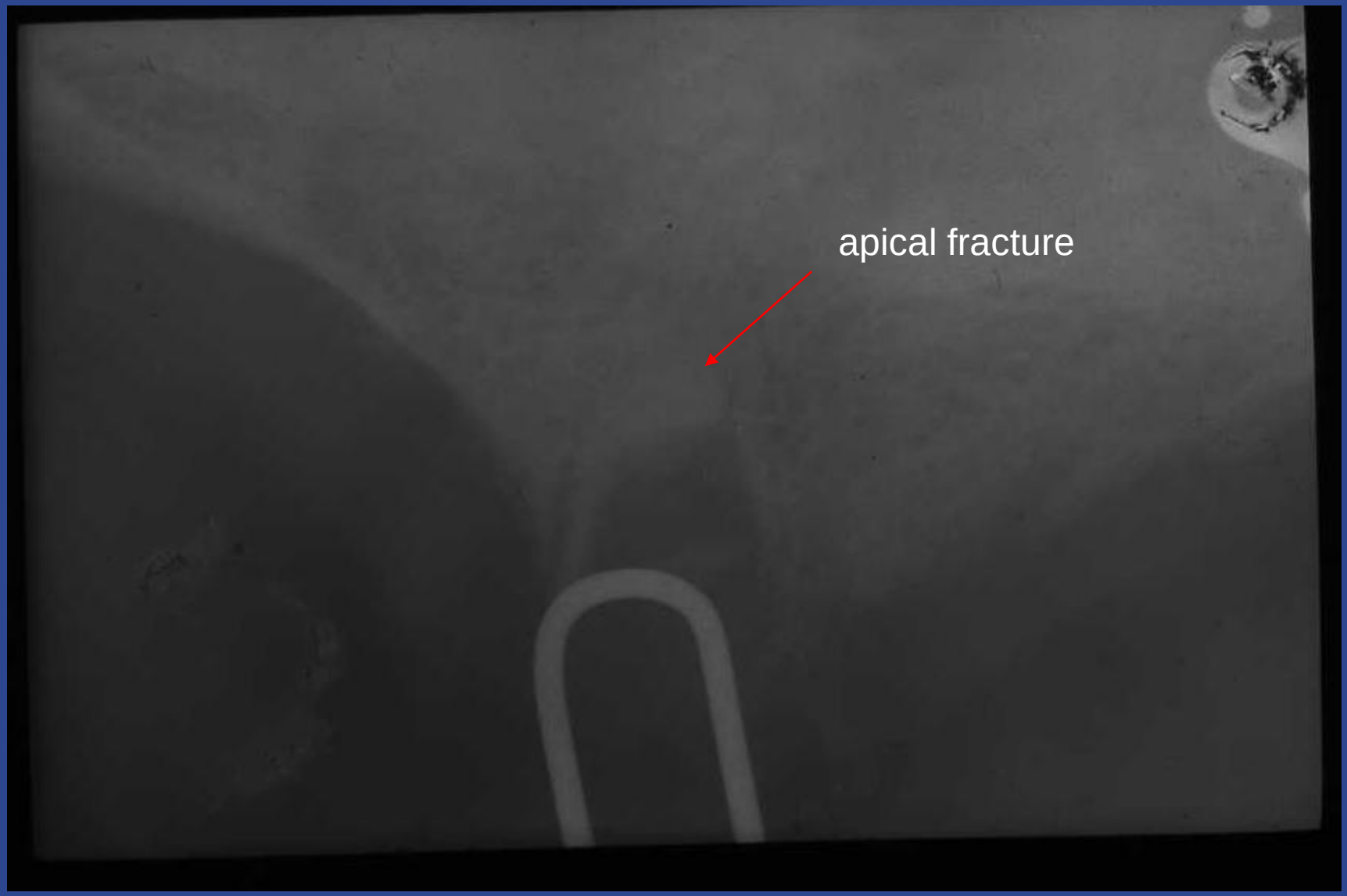

median fracture



median fracture

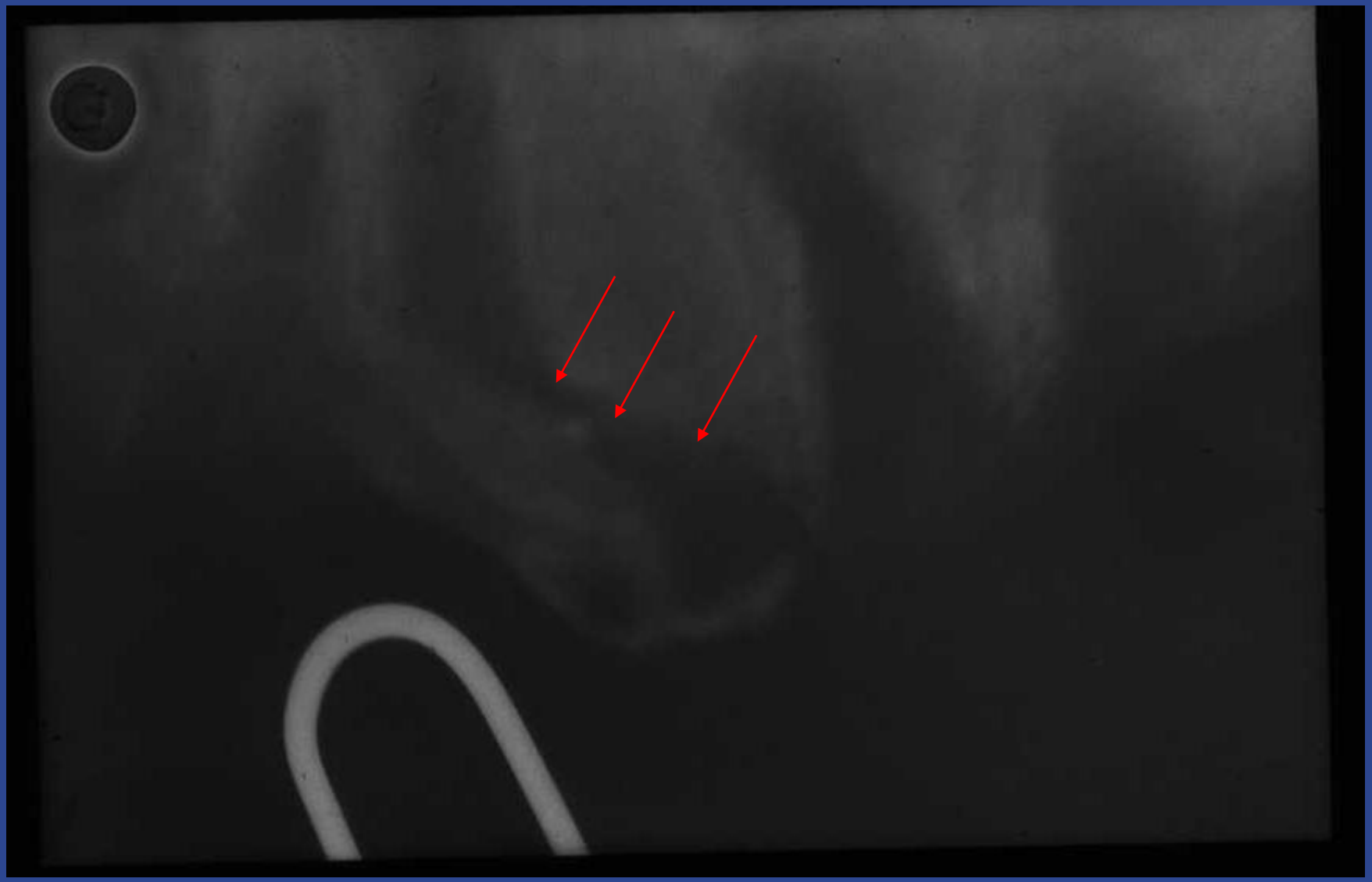


median fracture, bone fragments

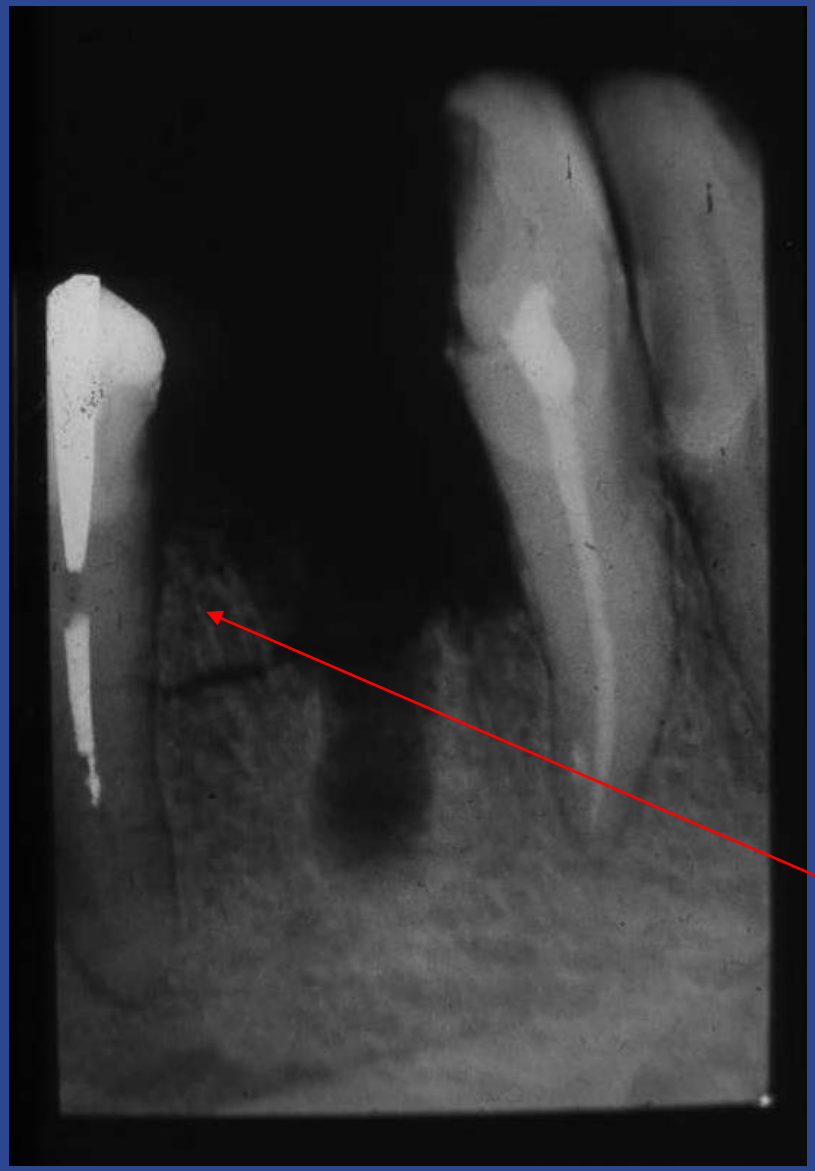

apical fracture

fracture

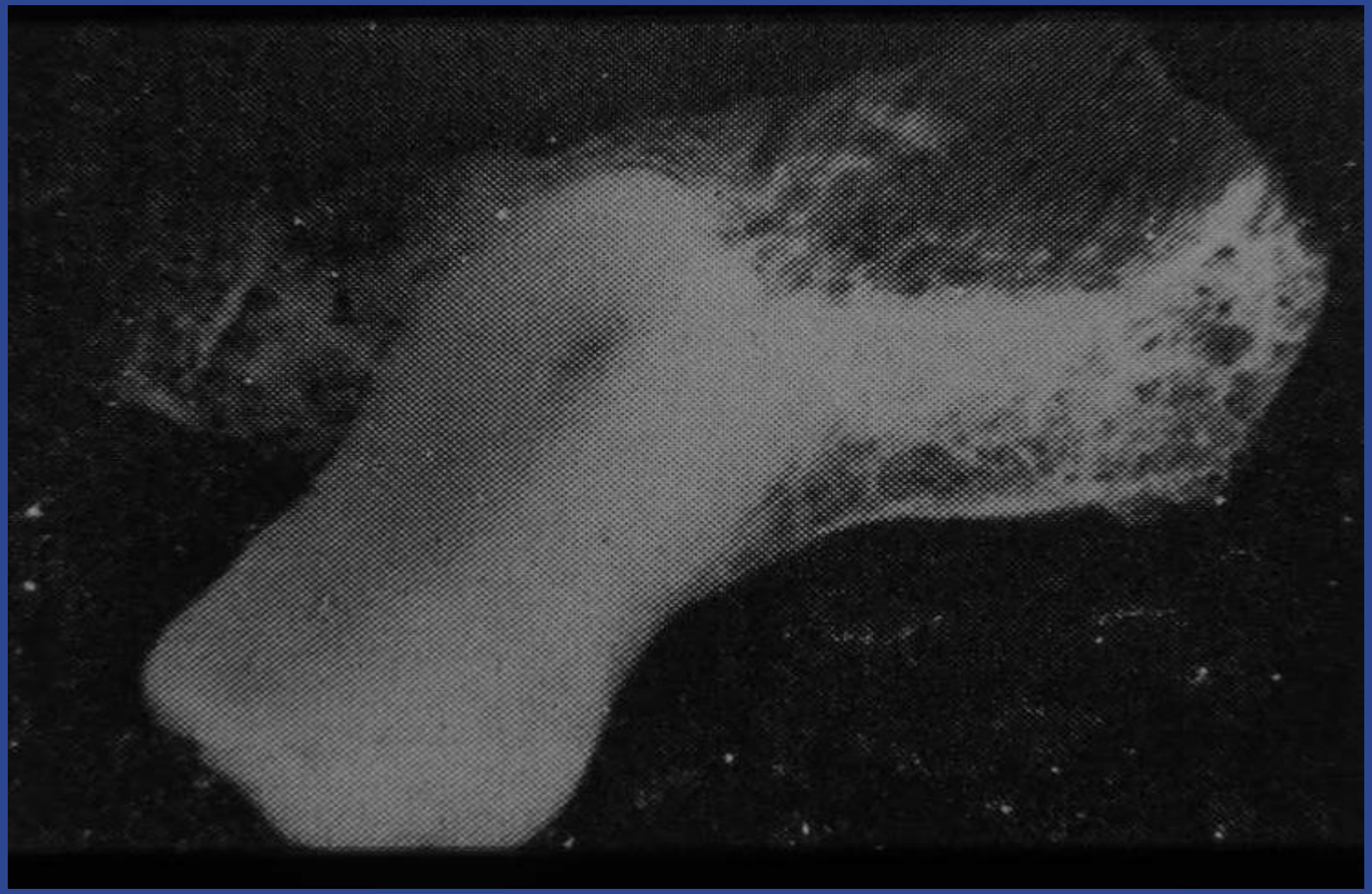
It is visible on the X-Ray film previous the extraction.



alveolar fracture


fracture

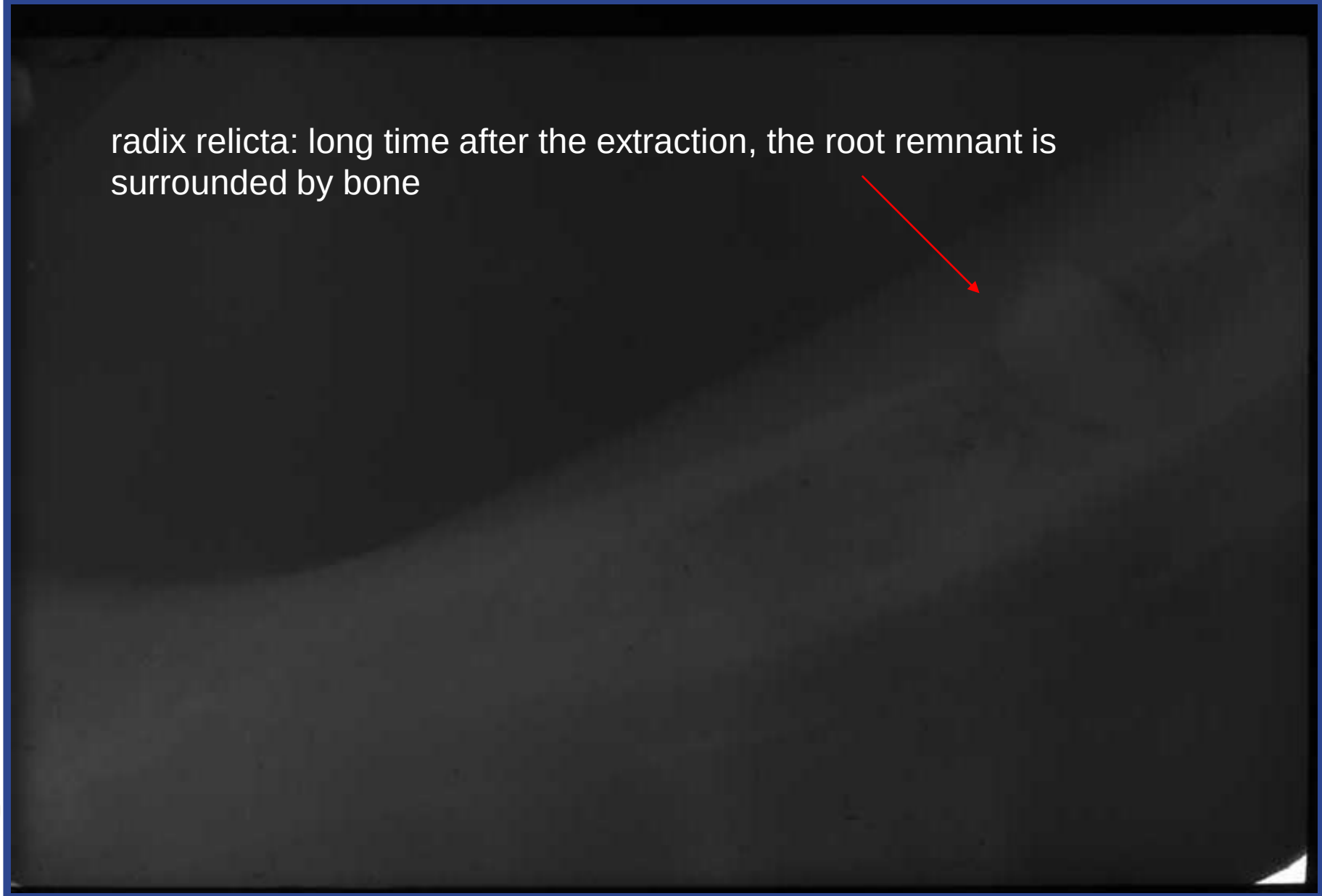
the injury of the maxillary sinus is most common during the extraction of the first upper molar.



tuberal fracture, alveolar process fracture

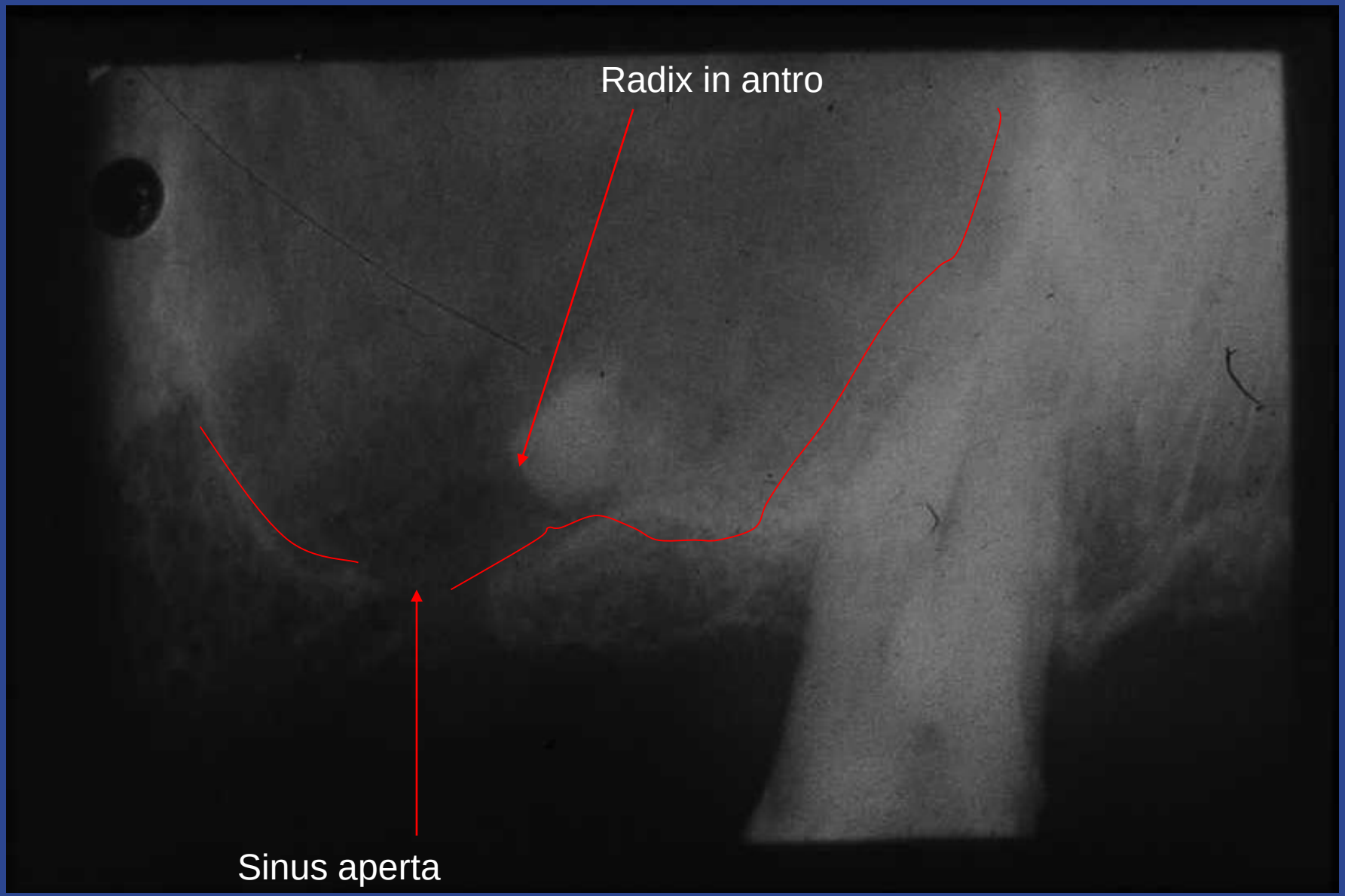
mandibular and wisdom tooth root farcture with dislocation

radix relicta: long time after the extraction, the root remnant is surrounded by bone



increased risk of tuber fracture: the maxillary sinus has a big tuberal recess.

maxillary sinus has a big tuberal recess

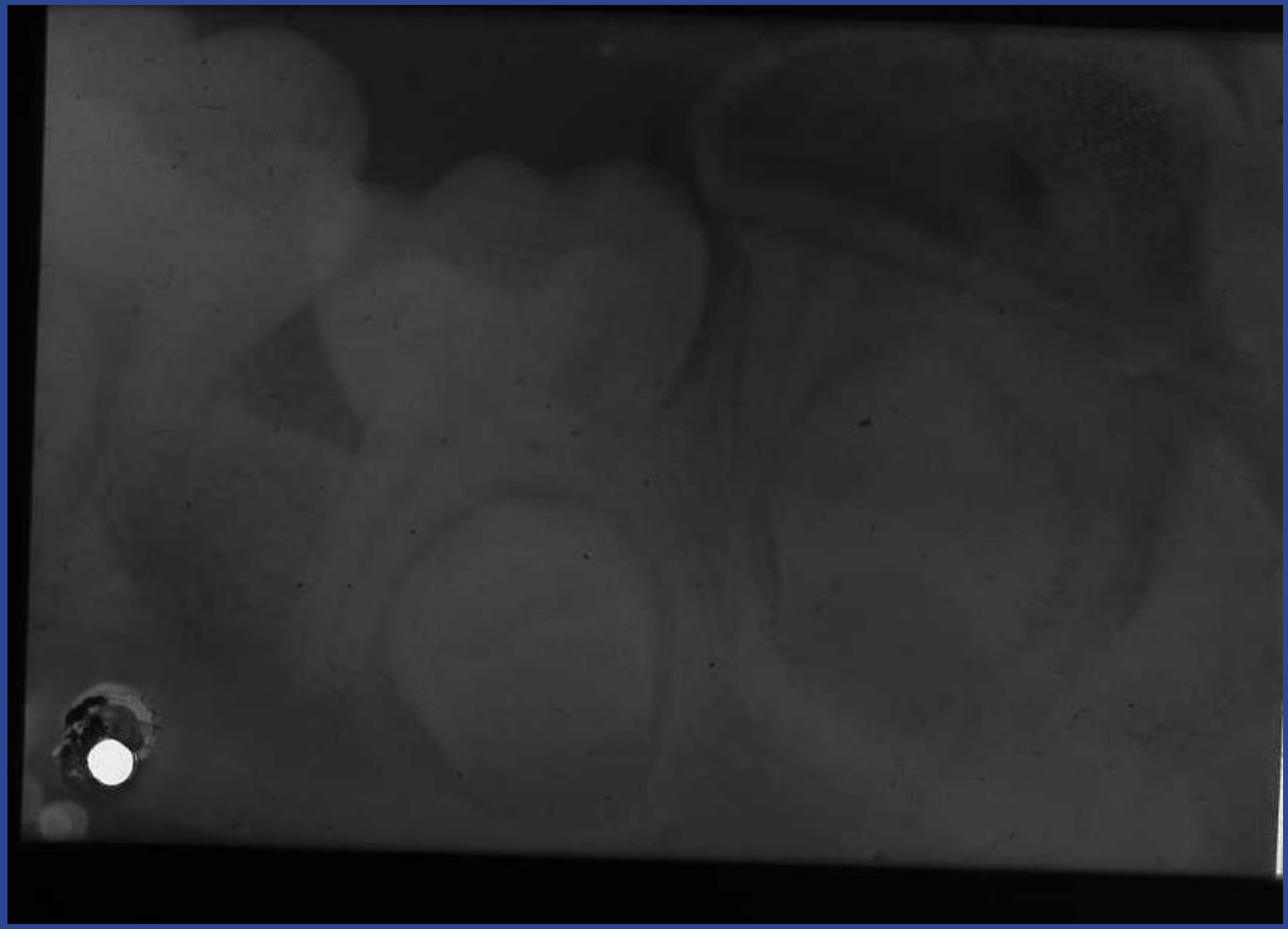

Radix in antro
Sinus aperta


radix in antro

fractured root passed in the sinus

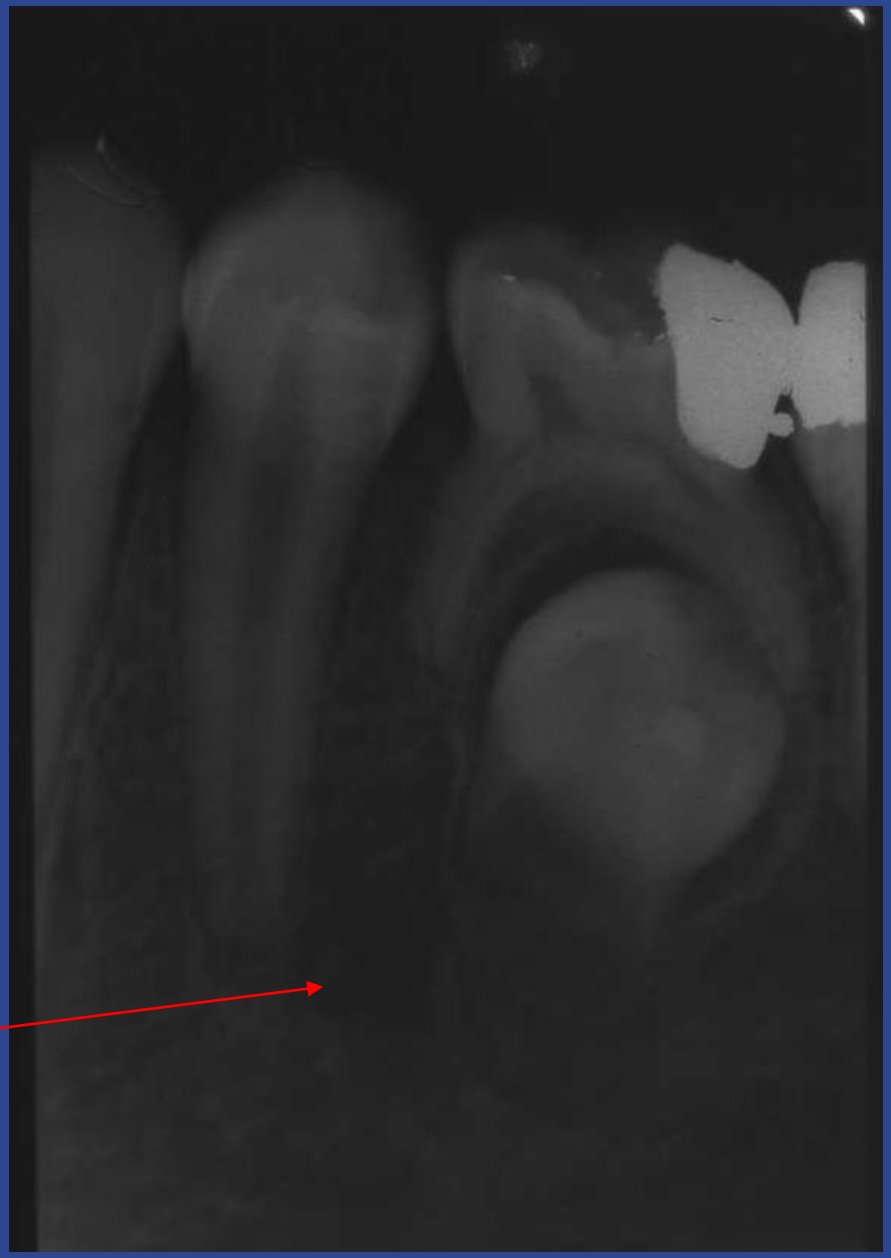
opened sinus: SINUS APERTA! **compacta line is not continous!**

opened maxillary sinus



CAVE: developing teeth could damage even extracted during milk tooth extraction. The developing teeth have not yet roots.

3 4 5 V 6



foramen mentale

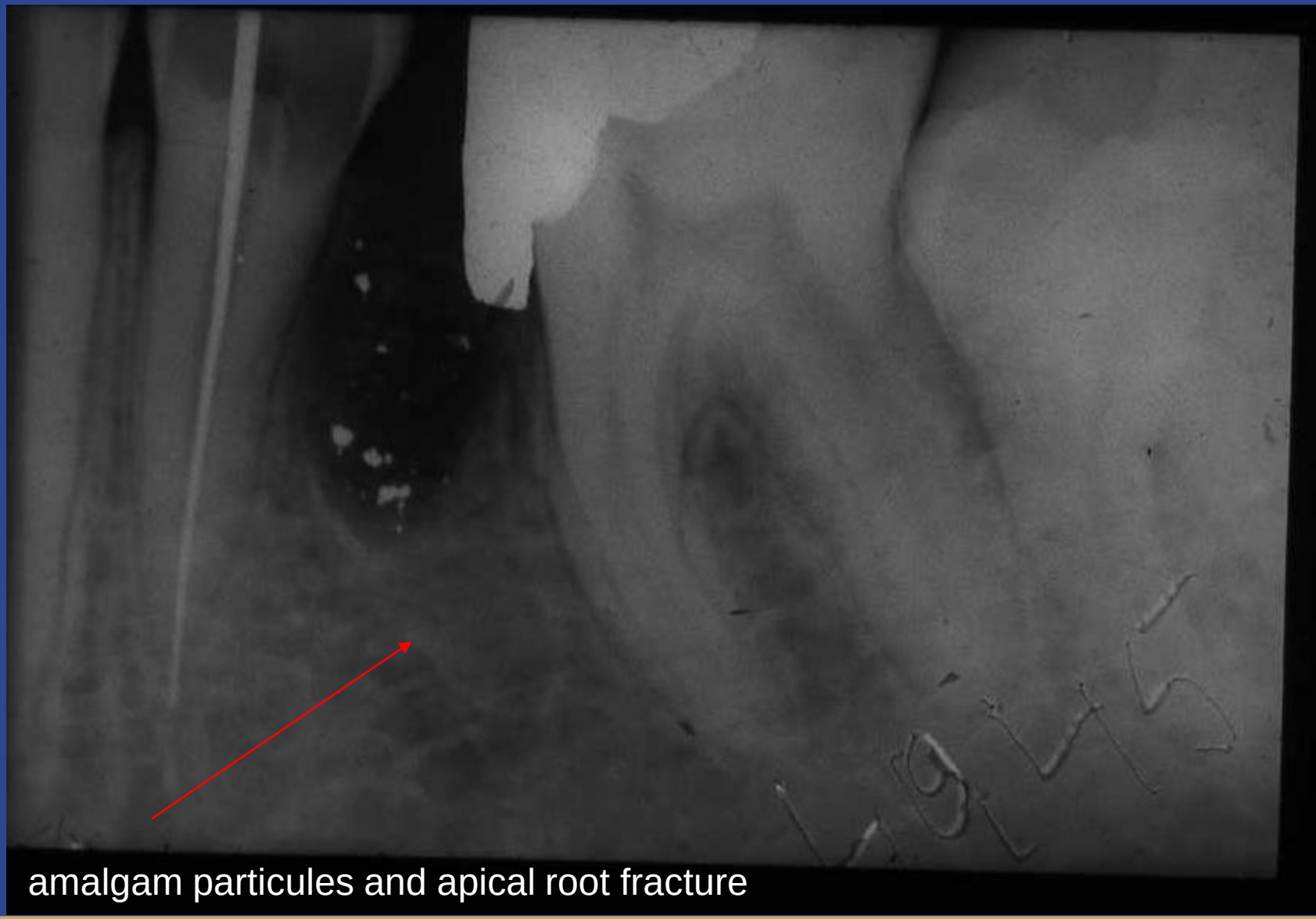
milk molar with an accidentally extracted premolar

Milk molars' crown are destruated. Amalgam fillings, 6: mesioapproximal D2

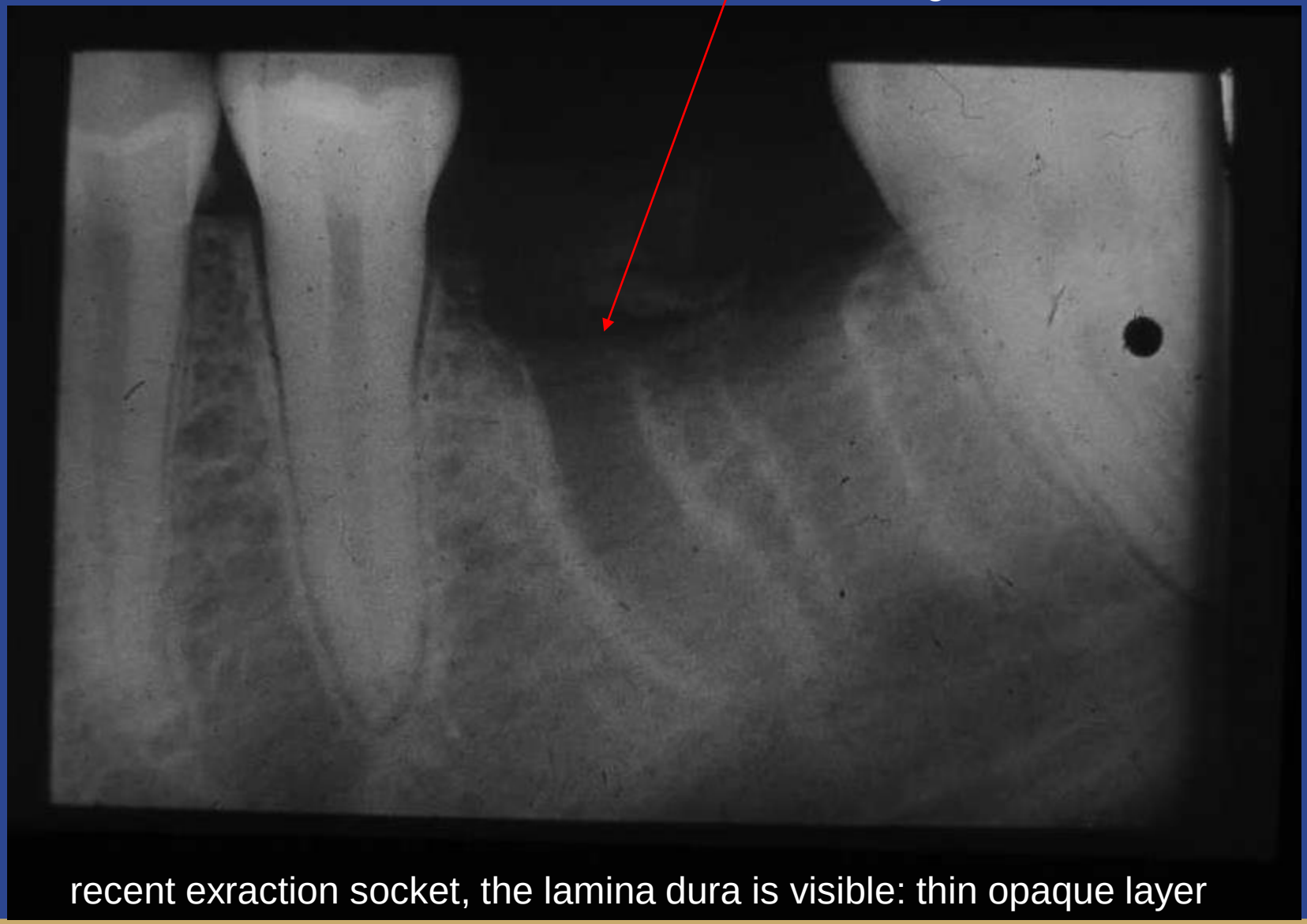
bone fragments

bone fragments

3467



amalgam particules and apical root fracture



recent exraction socket, the lamina dura is visible: thin opaque layer

2 | 1

apical fracture

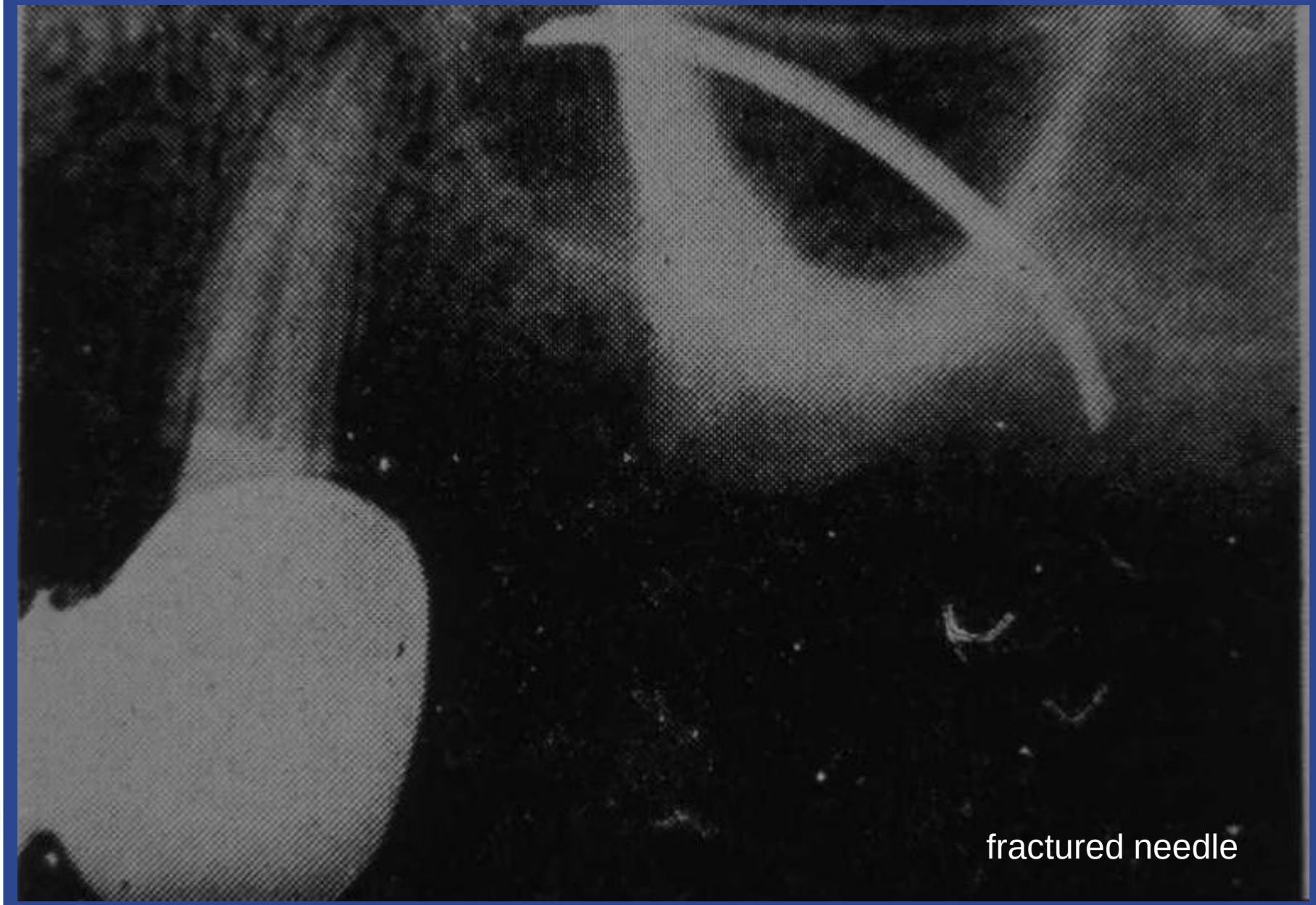
5 6 7 8

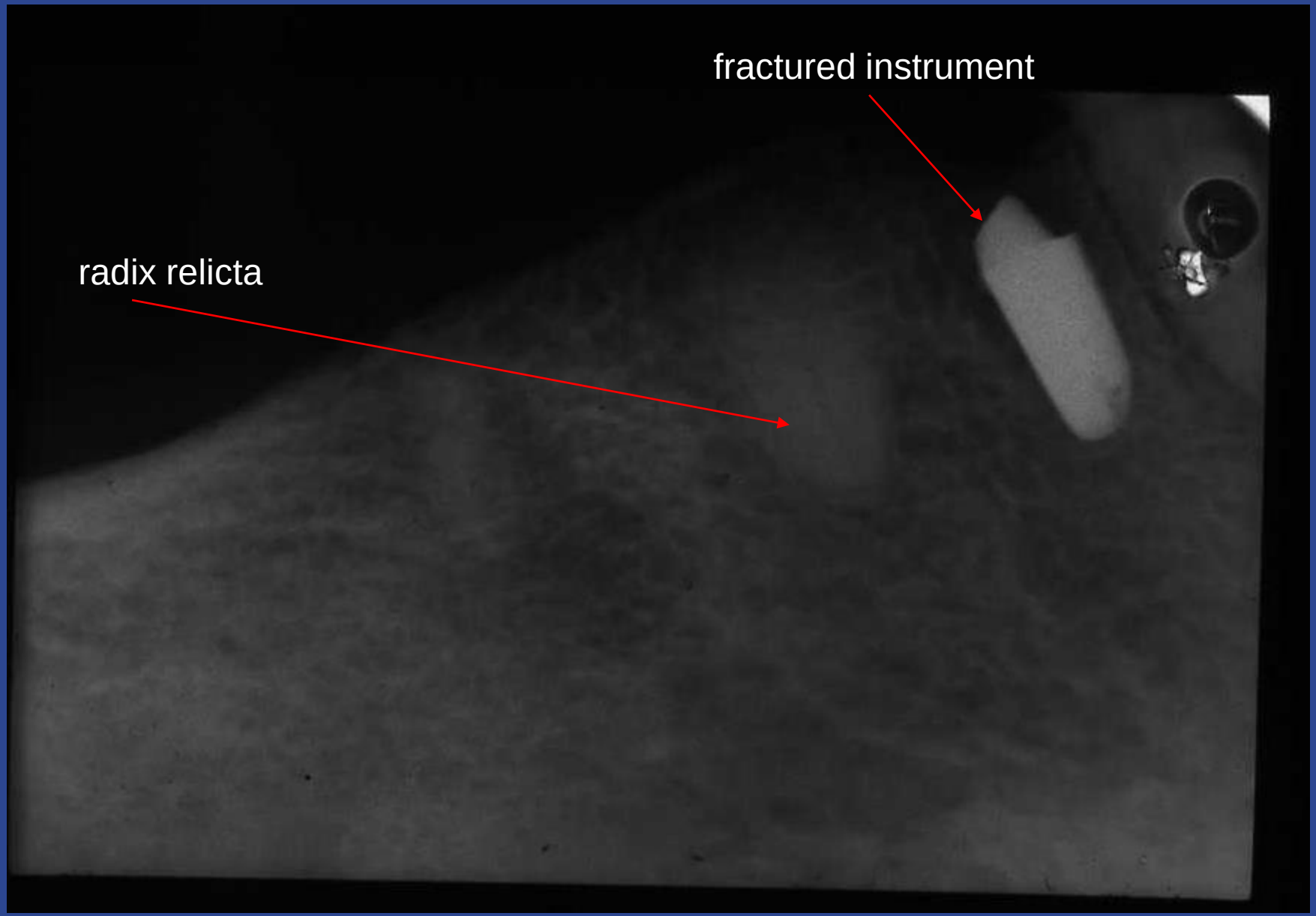
cervical fracture of the roots

amalgam particules,
apical fracture


apical root fracture

fractured instrument
(drill bit)

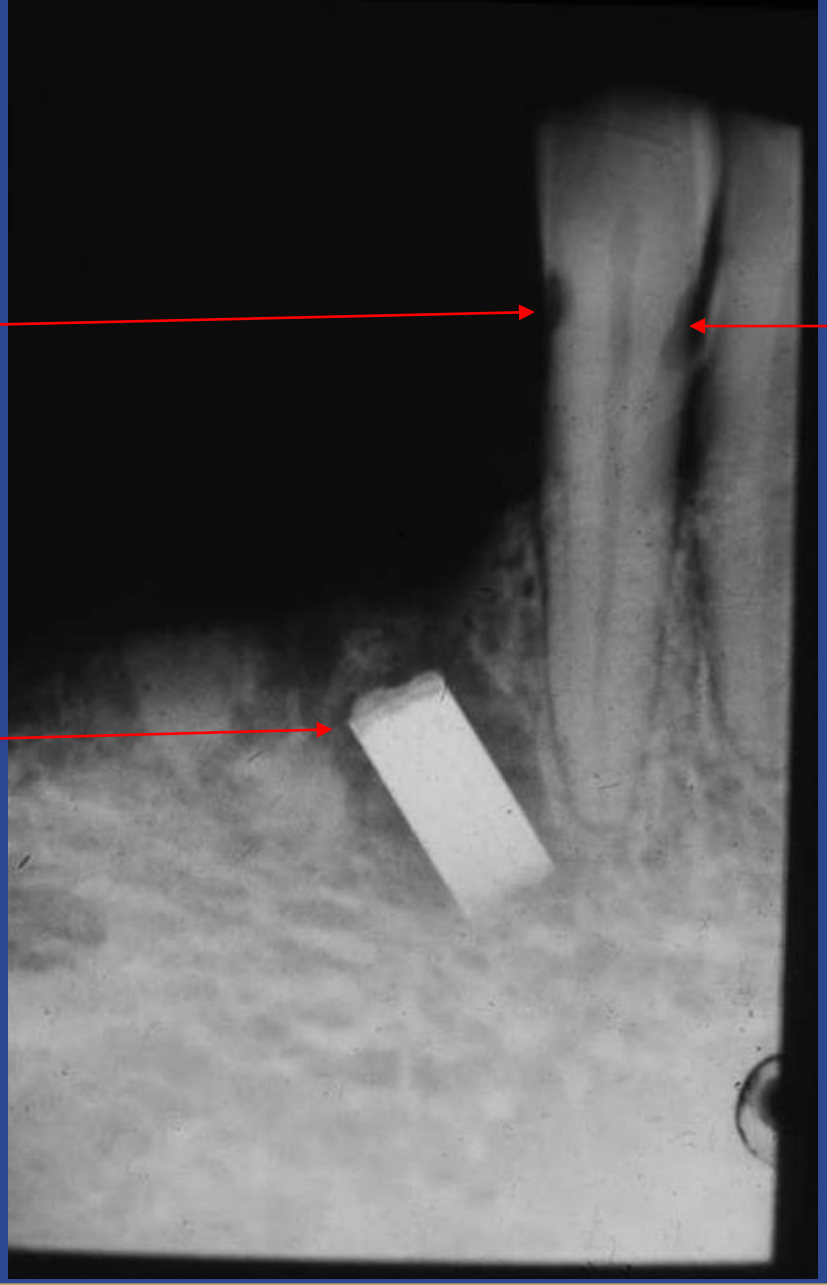

fractured needle


fractured instrument
radix relicta

2 1

root caries

fractured instrument



THANK YOU VERY MUCH FOR YOUR KIND ATTENTION!