Caries and extraction of teeth

dr. Bence Tamás Szabó
Department of Oral Diagnostics
Faculty of Dentistry
to be faithful to the title…

how to treat?
Acid generation
Caries on susceptible tooth surface
MULTIFACTORIAL

tooth surface

CARIES

time

food

microorganisms

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, today's it is less common due to education and fluorid. PREVENTION!!!!
    - X-ray film: extensive interproximal and smooth surface caries
Rampant caries

acute course
uncontrollable teeth destruction.
deep approximal caries on the maxillary incisors.
It is possible to make mistakes in two different ways: false positive diagnosis or false 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!
How often should we perform radiographic examination?

...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
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

- D1: enamel caries penetrating less than half way through enamel, notch shape.
- D2: enamel caries penetrating more than half way through enamel, BUT not involving dentinoenamel junction, triangular shape.

E+DENTIN

- 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.
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
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 relatively 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 completely evacuated

=> residual or recurrent caries???
8. mesioangular retention, 7: occlusal caries, 6: MO amalgam filling, sec. caries on the approximal and lingual surface
When can you see the secunder 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 secunder caries will not be visible if it is situated in middle and the beam comes from above or from beneath.

A: The secunder 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 secunder 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 describe 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 each other (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
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
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
1.: Transparent zone (hystologic terminus technicus): on radiograph under the occlusal caries there is a white line which is equivalent with the transparent zone on histologic image. It is caused by increased mineralization, narrowed dentin canaliculi.
On radiograph sometimes the caries does not seem to be continuous.

Remember: X-ray summarizes!
Cervical burn out

deep occlusal caries

secunder

D3

5 6 7 8
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

radix accessorius
Deep occlusal caries

In the region of the contact point D2 carieses in the neighbouring teeth.
first molar: D4 caries on occlusal and lingual surface. pulp necrosis?, no periapical lesion
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.
X-ray 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.

Be careful! It is not possible to say whether the pulp is affected by alone the radiograph. It is just a 2D image!!!
Wisdom tooth: oclusal caries, external oblique ridge is superimposed, mesioangular impaction, resorptio semilunaris, pericoronitis (clinical sign could be: trismus)
Lingual caries, coecum caries
pseudotransparency
vestibular caries
approximal caries
butterfly retention: not useable technique any more
root surface caries: in case of horizontal bone loss the root is not surrounded by bone, usually not triangular shape.
Root caries
Cervical burnout borders of it: nose and CEJ

Little arrows: approximal caries D3-4
occlusal caries
secunder caries under the occlusal filling
Vestibular surface caries
occlusal D1-D2 caries can be diagnosed with difficulty, because the heavy enamel cusps hide it.
secunder caries
4: radix accessorius, total destruction of the crown
5: 2 roots, 6: distal secondary caries, D3, 7: mesioapproximal D3 caries
Second 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
curved root, maxillary sinus is close to the root: interdental and interradicularis sinus
radix accessorius: bigger chance to fracture
6: three rooted, radix accessorius
curved roots
curved roots
after endodontic treatment teeth have predisposition to fracture
bulge apex

hypercementosis:

extraction with a lot of bone fragment??
internal resorption:
the frequency of the fracture is bigger.
during the extraction the intraalveolar septum will fracture out
mesiangular impaction of the wisdom tooth + risk of injury of the mandibular canal!!!
long roots
dilaceration, curved roots
easy extraction

- thick, short root
- pyramid shape roots
- milk tooth with partly absorbed root
- partly absorbed apex or alveolar process
7: piramid shape root, 6: splayed roots
bone loss
partially absorbed alveolar process
the alveolar process is partly resorbed.
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 dense than the surrounding bone
  - enostosis (whiter than the surrounding bone)
median fracture of the root
the injury of the maxillary sinus is most common during the extraction of the first upper molar.
after the extraction, alveolar socket
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.

So not we are the cause of it. 😊
alveolar fracture
tuberal fracture, alveolar process fracture
mandibular and wisdom tooth root fracture with dislocation
radix relictâ: 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
fractured root passed in the sinus
opened sinus: SINUS APERTA! compacta line is not continuous!
opened maxillary sinus
CAVE: developing teeth could damage even extracted during milk tooth extraction. The developing teeth has not yet roots.
foramen mentale
milk molar with an accidentally extracted premolar.
Milk molars’ crown are destructured. Amalgam fillings, 6: mesioapproximal D2
bone fragments
bone fragments
amalgam particles and apical root fracture
recent extraction socket, the lamina dura is visible: thin opaque layer
apical fracture
cervical fracture of the roots
amalgam particules, apical fracture
apical root fracture
fractured instrument (drill bit)
fractured needle
radix relicta

fractured instrument
root caries

fractured instrument