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Restorative dentistry III.
5 th lecture

1. Periodontal diseases related to restorative treatment
2. Management of deep caries
3. Preparation trauma
4. Postoperative sensitivity
5. Miniinvasive treatment

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Restorative dentistry III.
5 th lecture

1. Periodontal diseases related to restorative treatment

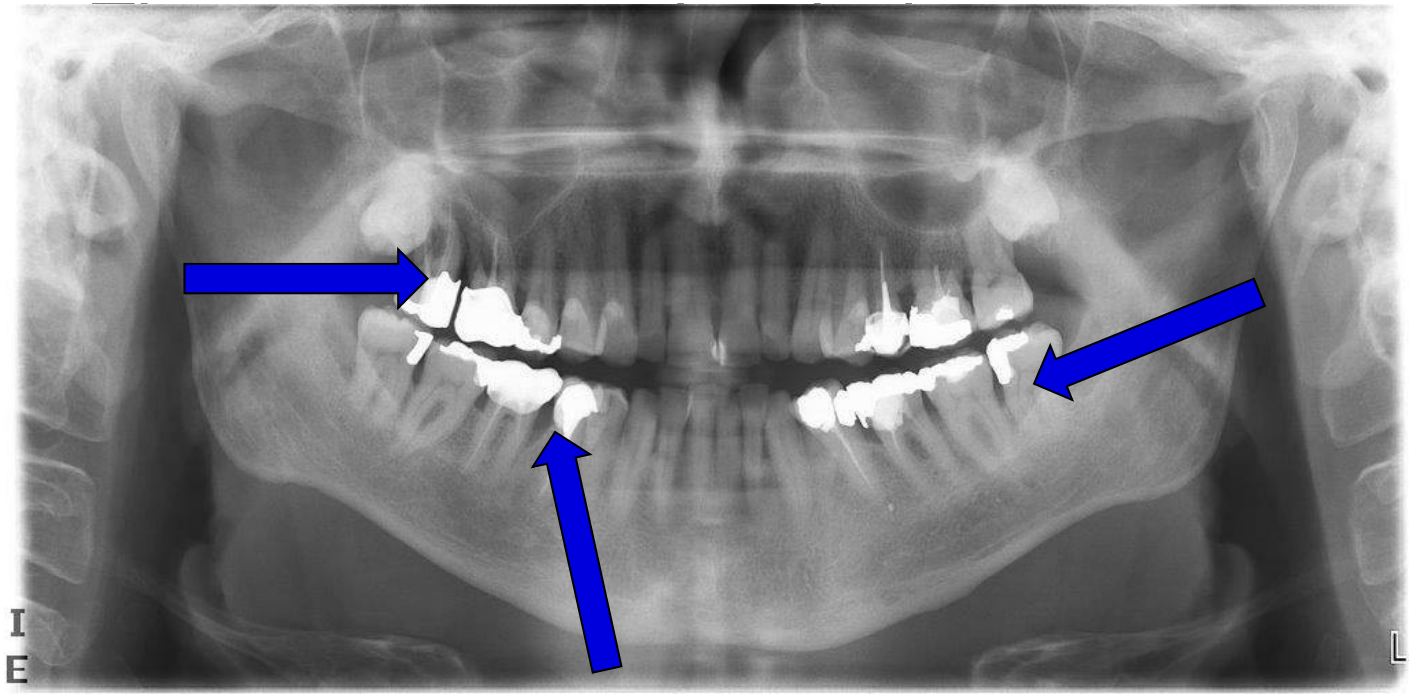
Mistakes of making filling can cause periodontal diseases

- Reconstruction of the contact point:
- Contact point – contact area!
- The space below the contact area is a caries danger area – plaque accumulation!
- The interdental papilla is retracting during ageing – interdental oral hygiene is important!

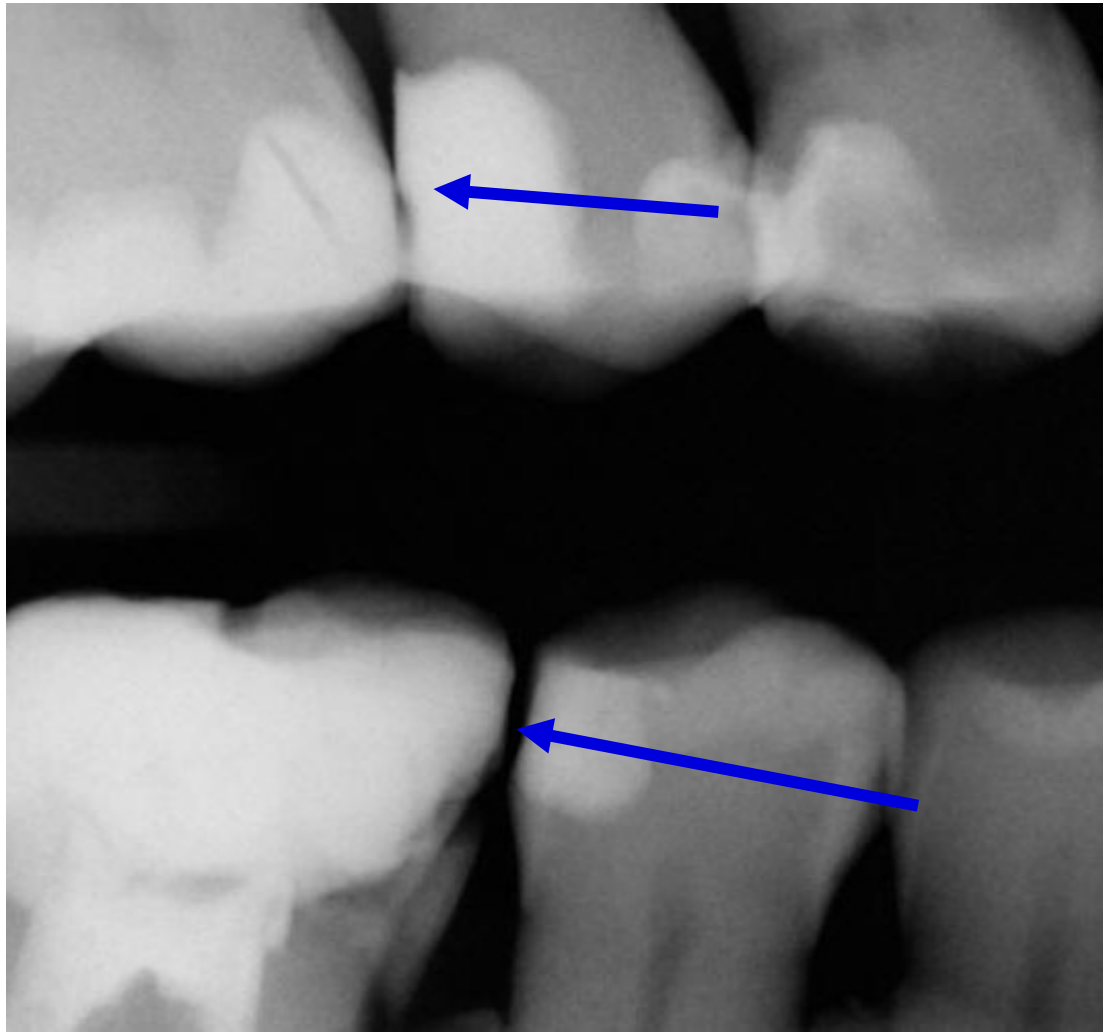
Mistakes of making filling can cause periodontal diseases

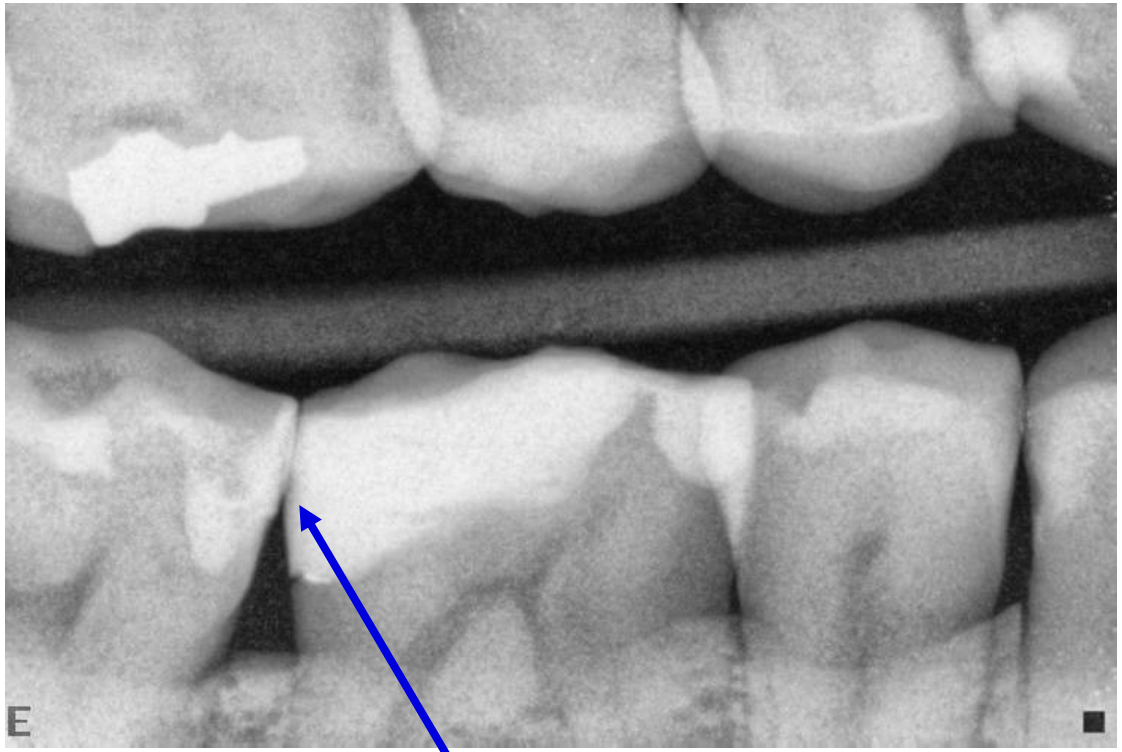
- Reconstruction of the contact area is very important!
- Remember – by reconstruction the contact area remember that:
- Contact area is made of the filling material only. The axial walls are situated 0,5mm from the natural contact area.
- By reconstruction is important to study the contact area!

Clinical conseqences of the most common mistakes – the contact point is missing

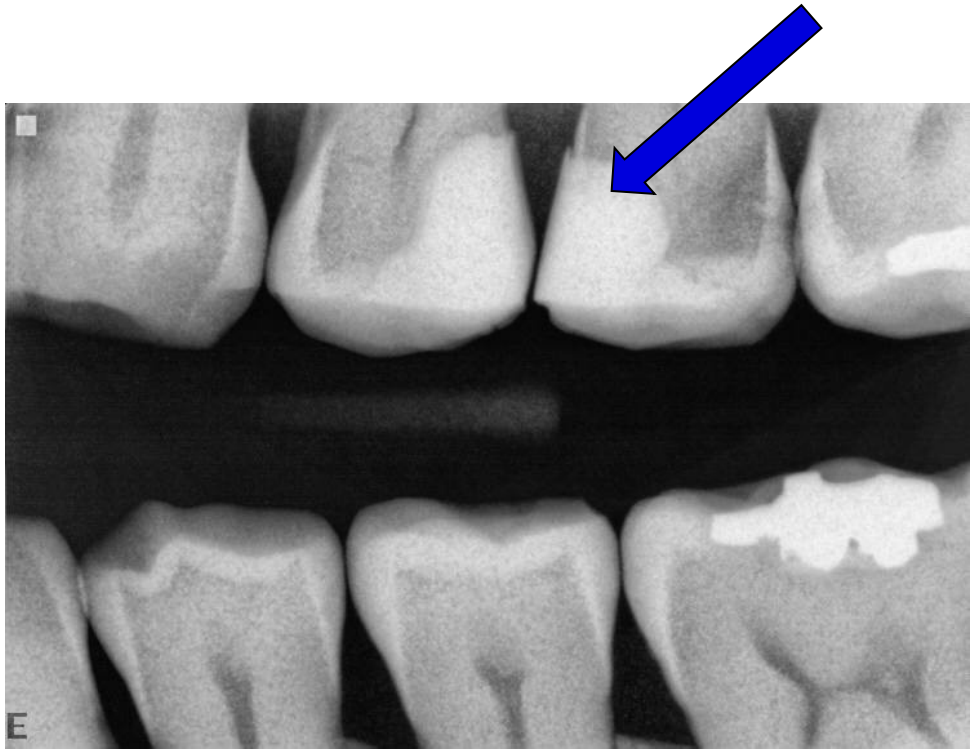


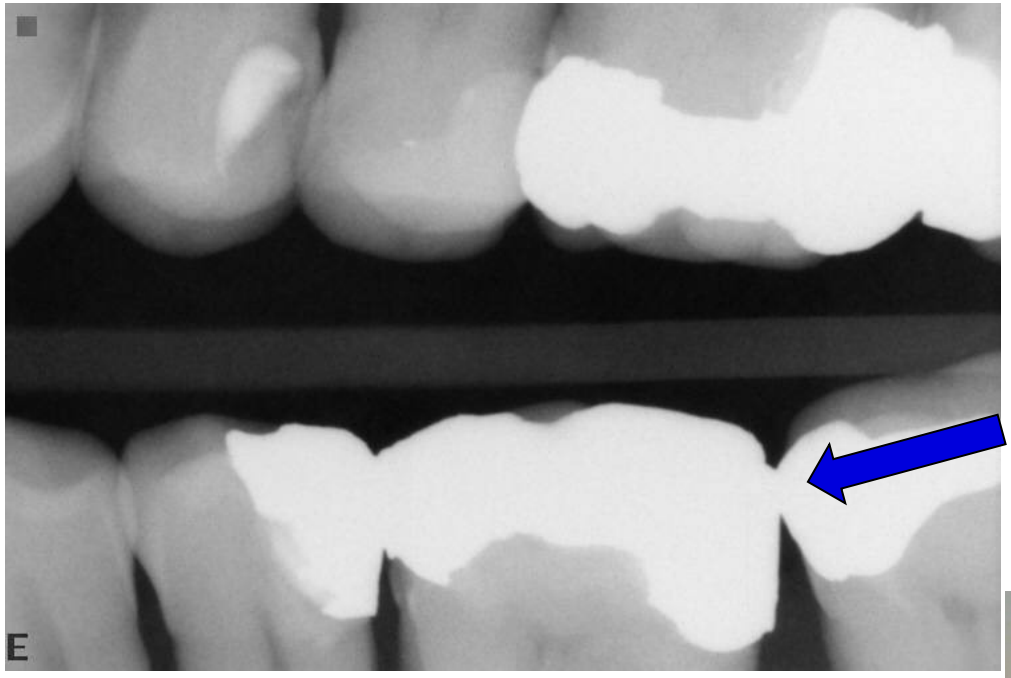
Retention of food
Plaque accumulation
Inflammation
Bone resorption
Periodontal pocket





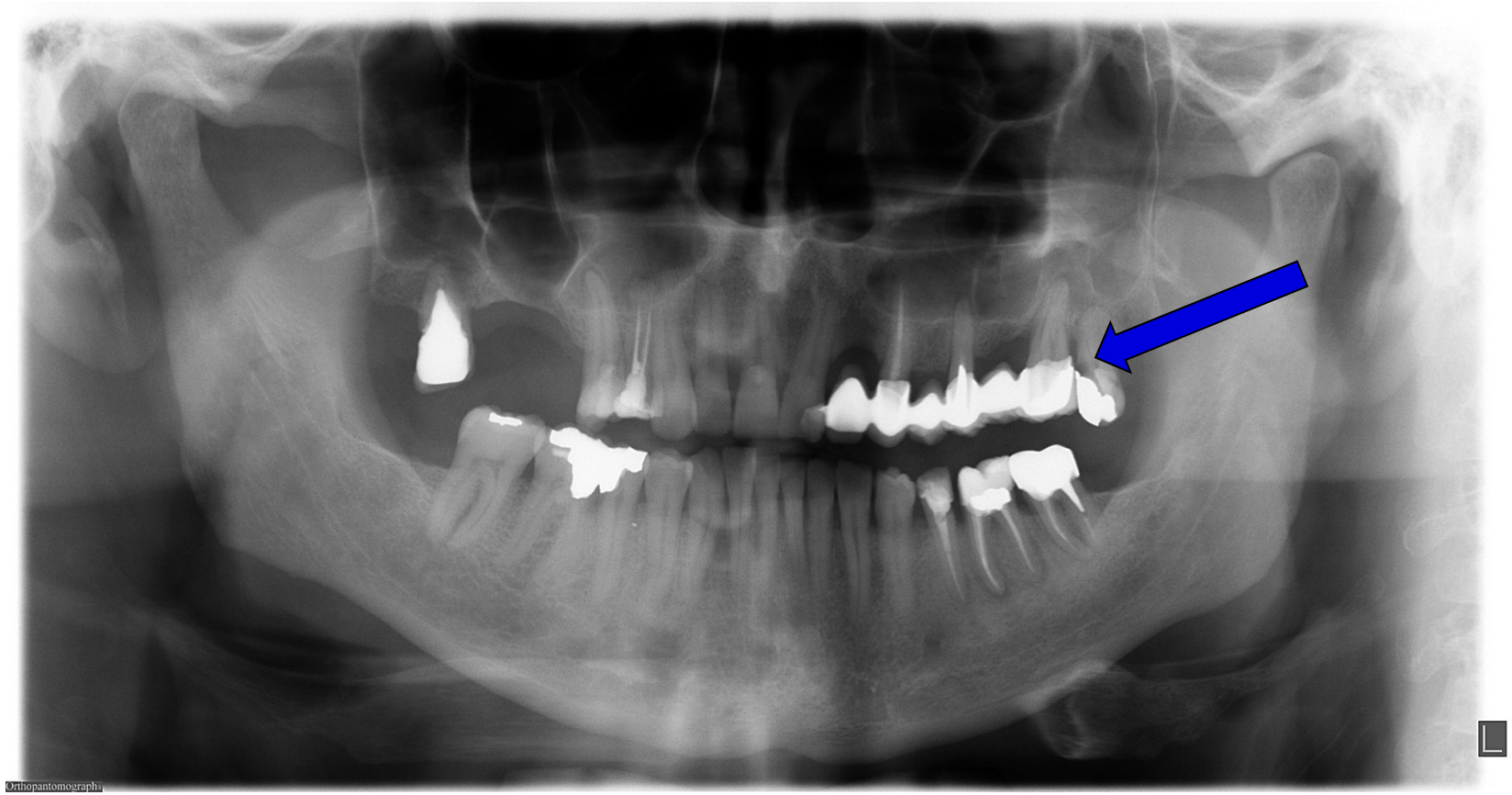
Bad contour, overhang



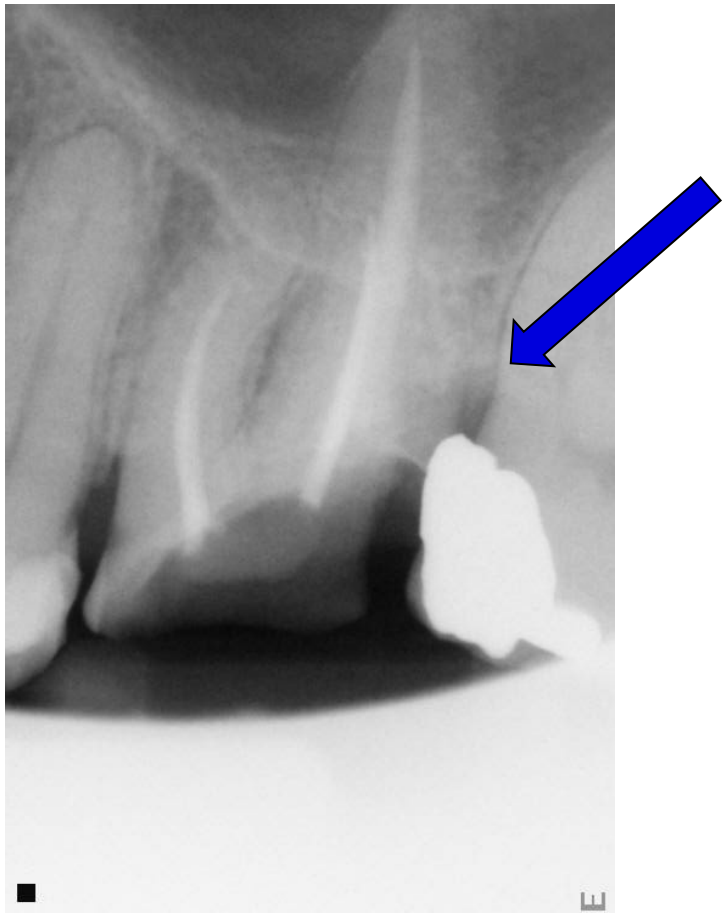


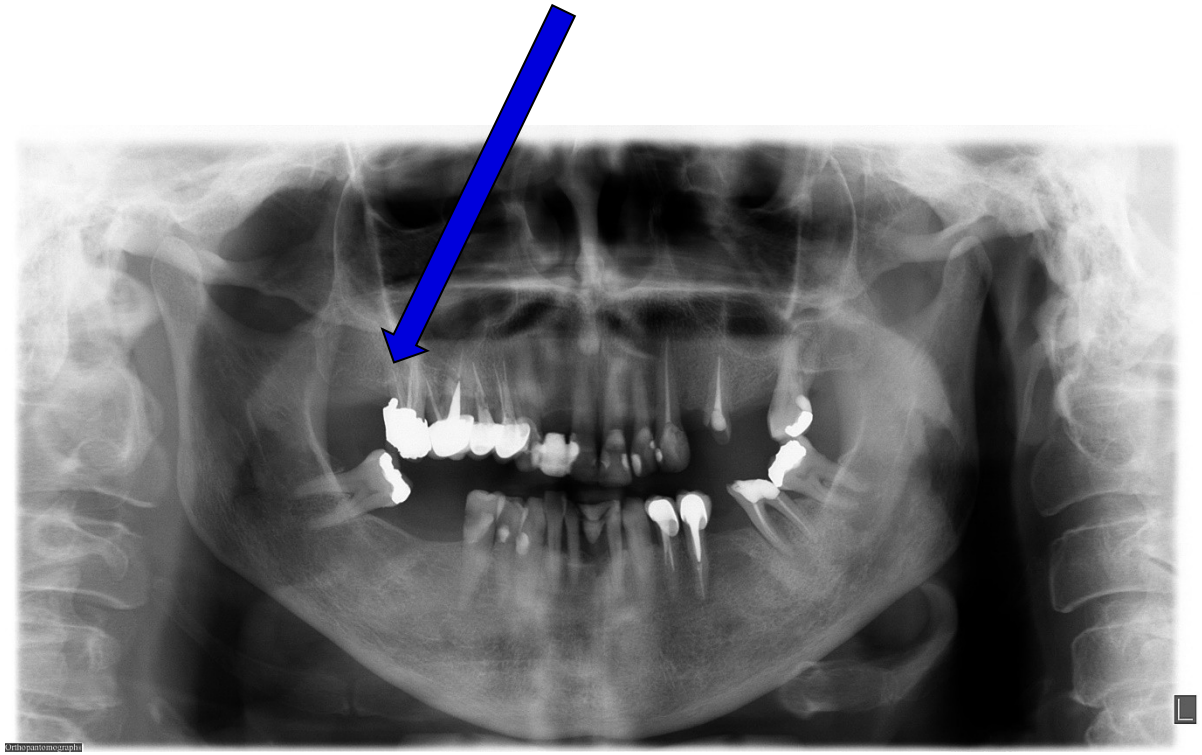
Contact area too narrow

Clinical conseqences of the most common mistakes – the overhang



Retention of food
Plaque accumulation
Inflammation
Bone resorption
Periodontal pocket
Mechanic irrtiation
Secondary caries





Clinical conseqences of the the other mistakes – trauma

Separation ring

Matrix band

Preparation instruments

Wedges

Necrotizing agent – necrosis of papilla od bone.

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Restorative dentistry III.
5 th lecture

1. Management of deep caries

Deep caries – D4

- Caries pulpae proxima

- Caries ad pulpam penetrans

Caries pulpae proxima

- Dentine between the caries lesion and dental pulp
- No symptoms
- Indirect pulp therapy: indirect pulp capping

Calcium hydroxide cement, premanent filling.

Caries ad pulpam penetrans

- Soft carious dentine is reaching the pulp
- No symptoms
- Symtomatic (pulpitis?)

Caries ad pulpam penetrans

- No symptoms

Vitaliy +:

1. Indirect pulp capping (intermittent excavation)
2. Pulpotomy (aseptic approach, rubber dam)

Caries ad pulpam penetrans

- Symptoms

Vitaliy +:

1. Pulpotomy (aseptic approach, rubber dam)

- Partial
- Coronal
- Deep

Caries ad pulpam penetrans

- No symptoms

Vitality - :

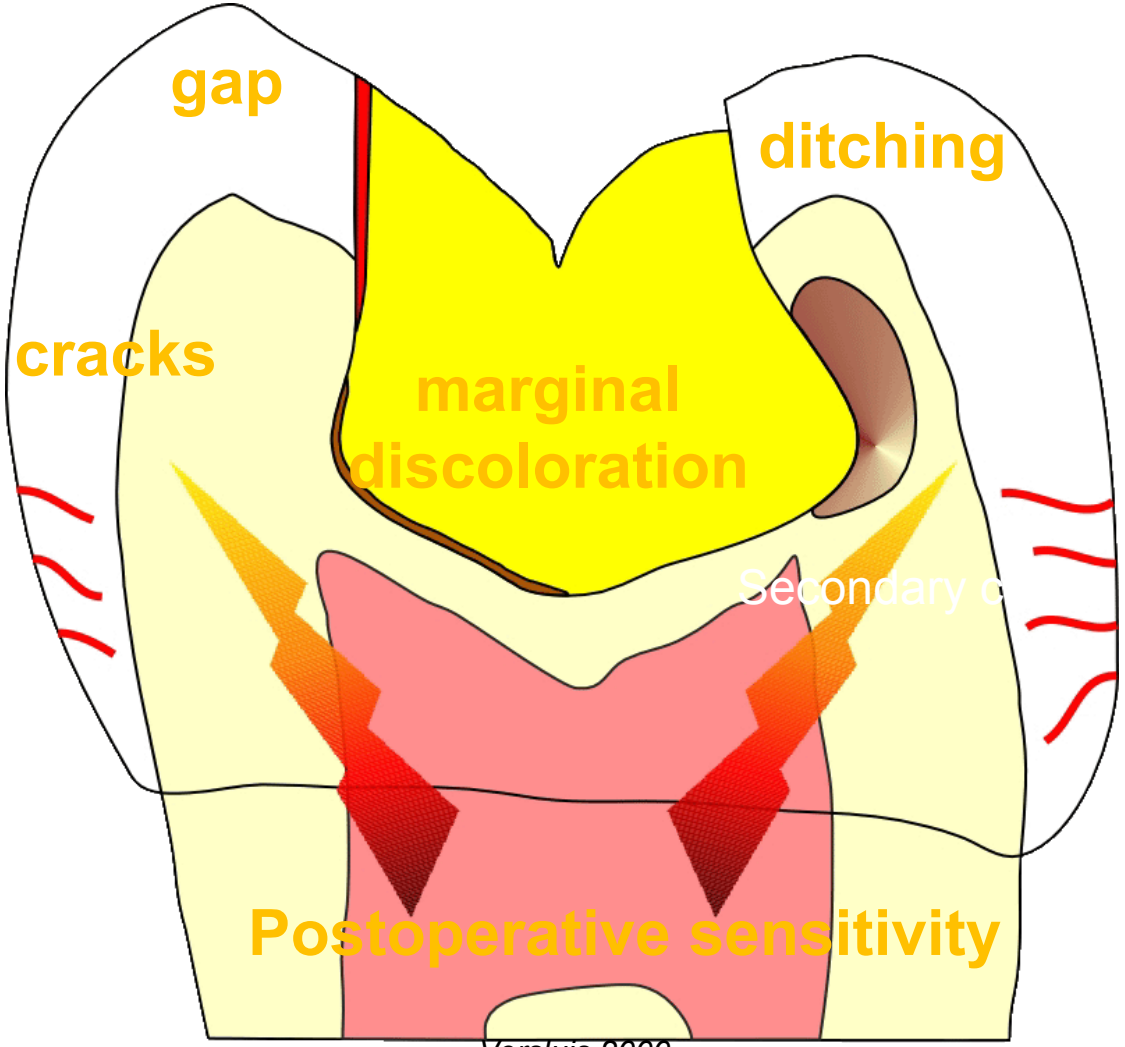
Endodontic treatment

Postoperative sensitivity

- Pain occuring after the placement of composite restoration
- Studies have reported the frequency of postoperative sensitivity to be low 5% and high 30%

Postoperative sensitivity - reasons

- Polymerization shrinkage
- Marginal gap
- Suboptimal adhesion
- Inadequate polymerization
- Unvfavourable C- factor and residual dentin thickness
- Pre-existing tooth related factors, such as cracks



Versluis 2000

Postoperative sensitivity - reasons

- Polymerization shrinkage and polymerization stress

- Gap in dentin
- Cracs in enamel
- Cuspal deflection – enamel crazes or fracture lines

Cracs may increase flexure of tooth structure under occlusal loading or become an avenue for bacterial ingress.

Moreover dentinal fluid in association with the cuspal deflection can potentially induce post op sensitivity depending on the rate and direction of fluid movement.

Postoperative sensitivity

- The risk and the intensity of postoperative sensitivity is not associated with the filling materials.

(Silorane, bulkfill – no effect)

Postoperative sensitivity - reasons

- Marginal gap

Marginal gap is a potential site for bacterial ingress, a portal for fluid exchange leading to the movement of dentinal fluid – post op sensitivity, marginal discoloration, secondary caries

Postoperative sensitivity - reasons

- Factors affecting the marginal adaptation
- Contamination
- Inadeguate bonding application
- C- factor
- Absence of enamel at the restorative margin

Postoperative sensitivity - reasons

- Factors affecting the marginal adaptation
- Enamel still remains the most favorable substrate for bonding, long term bond longevity in dentine remains questionable due to hydrolytic degradation of the hybrid layer components.

Postoperative sensitivity - reasons

- Suboptimal adhesion

A gap forms beneath the restoration and fills with dentinal fluid,

sudden movement of dentinal fluid causes pain.

Postoperative sensitivity - reasons

- Suboptimal adhesion

The gap formation

- A void in the composite materiál being placed on the floor of the cavity
- Pulling away of composite from pulpal wall due to shrinkage stress
- Gap in the hybrid layer due to insufficient resin infiltration resulting in formation of hybroid layer.

Postoperative sensitivity - reasons

- Suboptimal adhesion

Flowable at the bottom?

Inadequate permeation of the demineralized dentin during the restorative procedure is a significant contributor to postoperative sensitivity.

Selfetching adhesive systems?

No significant association between the bonding strategy with risk and intensity od postoperative sensitivity.

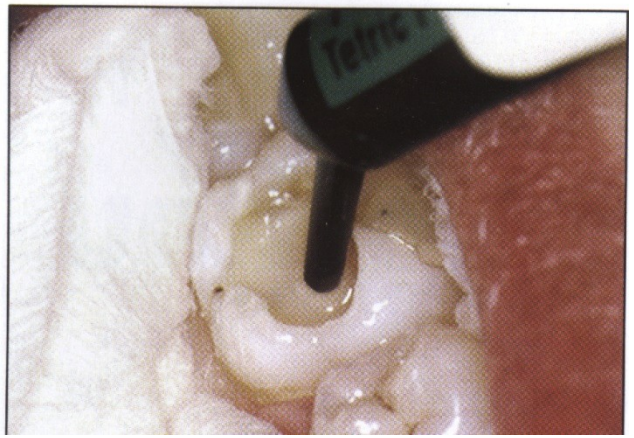
Postoperative sensitivity - reasons

- Suboptimal adhesion

No significant association between the bonding strategy with risk and intensity od postoperative sensitivity.

Flowables - importance

1. Excellent marginal adaptation
2. Protection of the adhesive
3. Elastic layer ?



Postoperative sensitivity - reasons

- Inadequate polymerization

Composites are relatively flexible in comparison to the stiffness of tooth enamel (modulus elasticity)

The flexure of composite restorations in relation to the tooth can produce pressure changes in the dentinal tubular fluid and subsequent fluid movement – can provoke pain on chewing.

Postoperative sensitivity - reasons

- Inadequate polymerization
- When adequate placement – the biting sensitivity is rare but if the degree of polymerization of the materiál is not in the acceptable limits – it leads to soggy bottom phenomenon.

Bulk fill materials x incermental techniques showed no significant difference in the occurence of reported post op sensitivity.

Postoperative sensitivity - reasons

- Inadequate polymerization

Biological consequences:

The process of polymerization is not complete in the set materiál.

25 – 50% od the monomer double bonds remain unreacted and this monomer has the potential to irritate the pulp.

Adequate polymerization is important!

Postoperative sensitivity - reasons

- Unvfavourable C- factor and residual dentin thickness

High C- factor – higher risk of gap formation as well as cracs (see the explanation in the first lecture)

Remaining dentin thickness:

Increased cavity depth and reduced dentine thickness – higher risk of postoperative sensitivity.

Base of GIC?

Postoperative sensitivity - reasons

- Pre-existing tooth relatefd factors, such as cracks

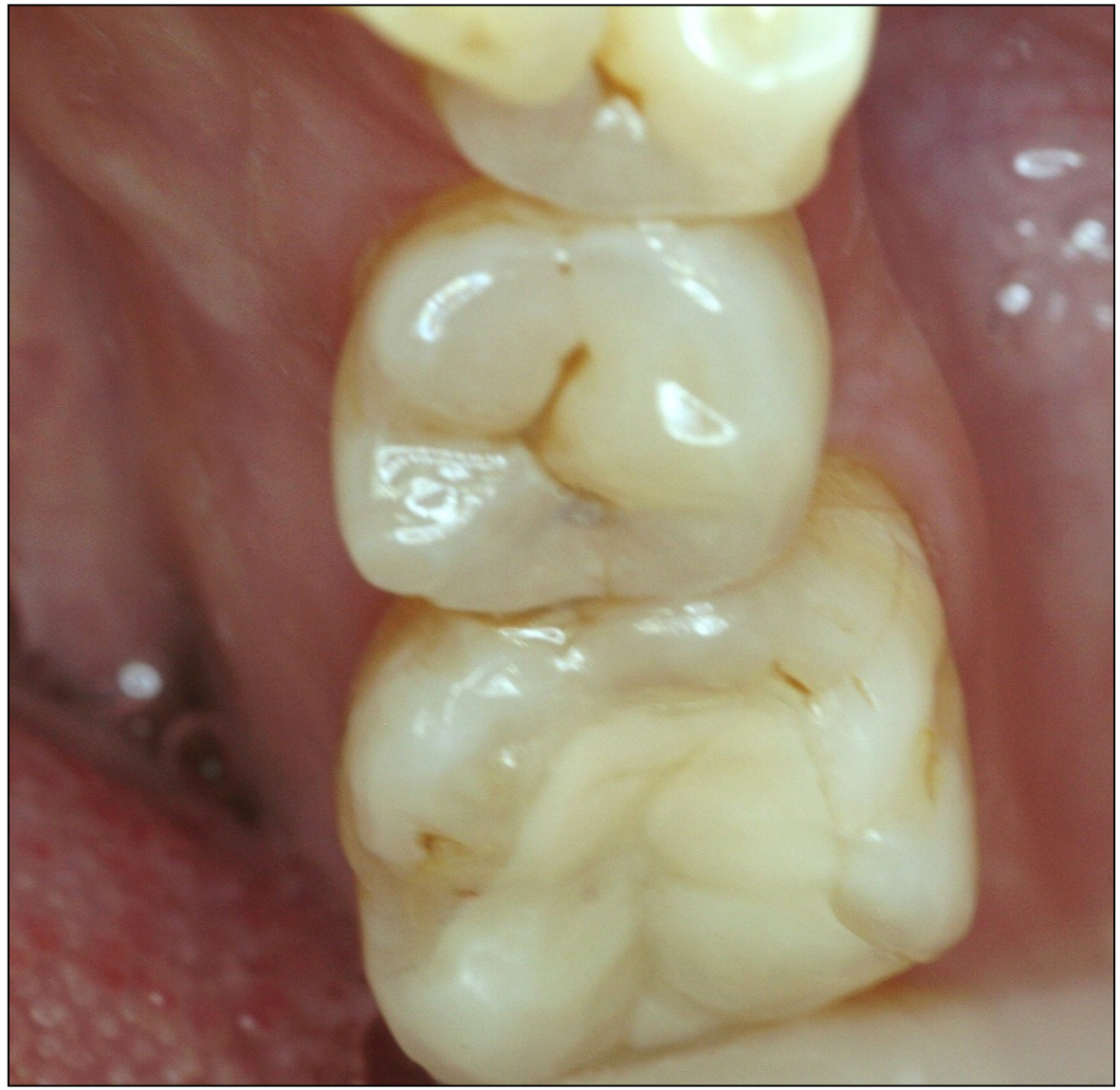
Postoperative sensitivity - reasons

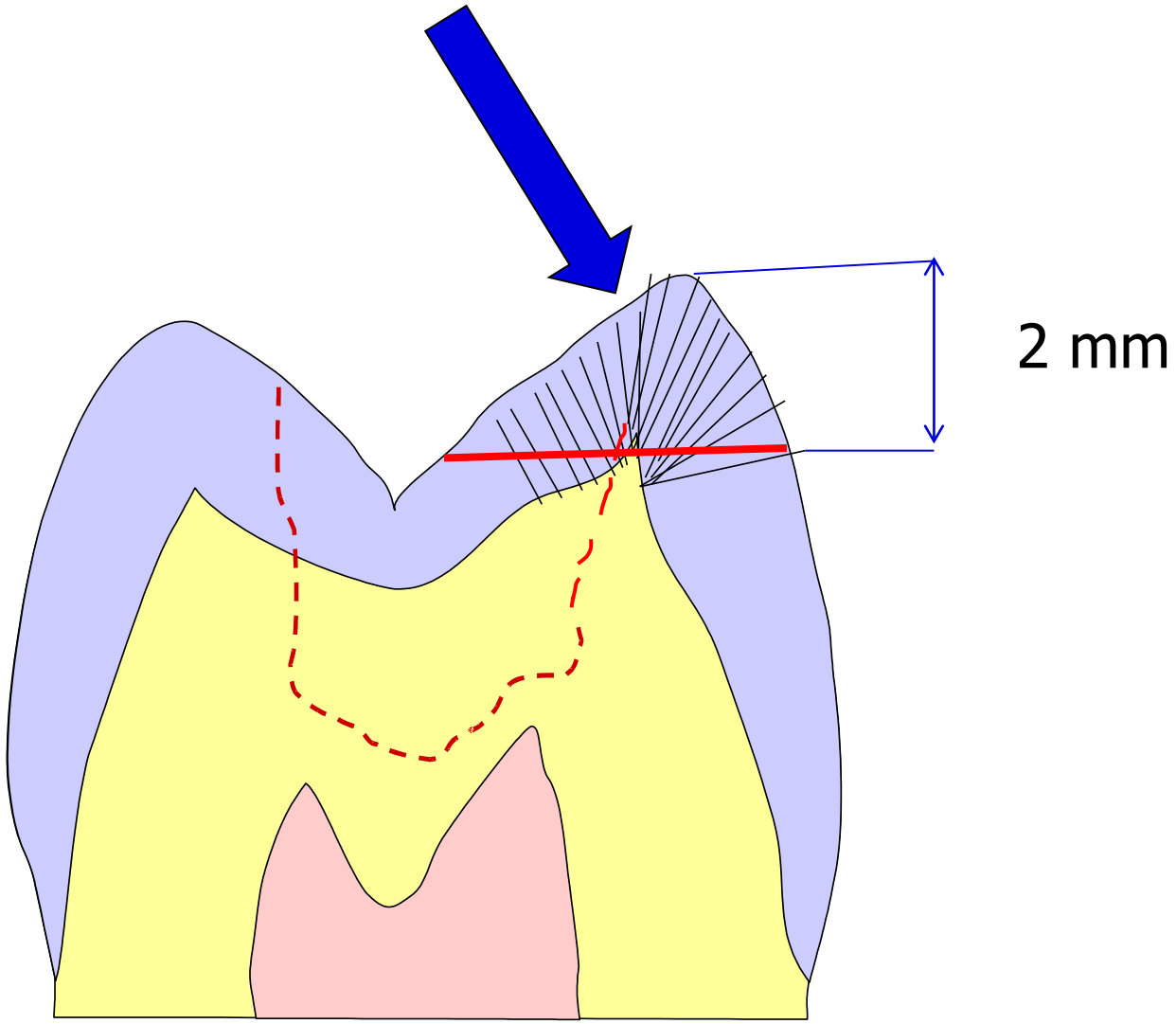
- Pre-existing tooth relatefd factors, such as cracks

Restoration of a tooth with an unidentified crack can result in symptoms that can be confused with postoperative sensitivity.

Postoperative sensitivity - reasons

- Pre-existing tooth relatefd factors, such as cracks
- Cracs can be developed in the tooth structure due to masticatory insults over the period of time. Cavities with an intercuspal width exceeding one quarter are at increased risk of crack development.
- Consider cuspal coverage!




2 mm

Clinical symptoms

- Pain
  - usually by chewing
  - on cold or hot stimuli
  - on tactile stimuli
  - spontaneus

Postoperative sensitivity strategy

- Perfect investigation
- Check occlusion
- Check margins (sealing?)
- Check tooth structure

If some reason is found: remove it

If not – we can wait for appr. 6 weeks

Postoperative sensitivity strategy

- If the symptoms are getting worse
- remove the filling, check the tooth structure carefully,
- use calcium hydroxide with the temporary filling material or bioactive materiál (Biodentine),
- Make a new filling.

Postoperative sensitivity prevention

- Correct indication
- Excellent isolation
- Careful investigation using magnification and illumination
- Proper etching
- Proper drying
- Proper curing

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Preparation techniques and their clinical consequences – preparation trauma

Preparation

Power driven

- Rotary
- Alternative

Hand

- Excavator
- Chisel

Preparation techniques

- Pressure – max hand preparation – risk of excavators
- Vibrations
- Heat – due to friction

    - increases with rpm (turbine max)

Consequences in enamel, dentin, cementum

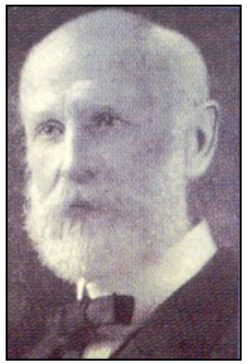
- Rotary preparation with high speed handpiece, turbine:

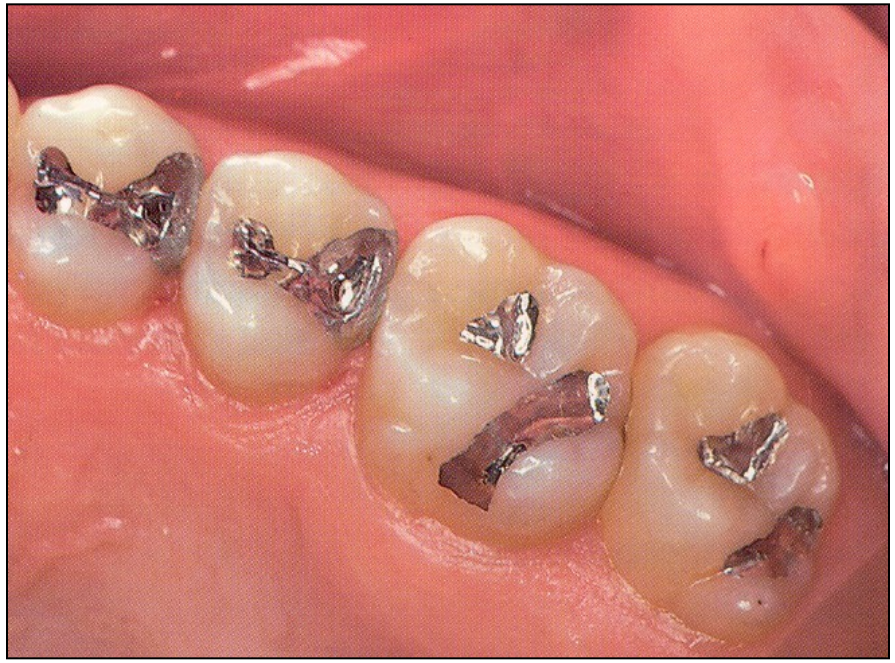
- Enamel :shattered borders, cracs. Prevention: gentle interrupted preparation, water cooling.
- Dentine: burnt areas, denaturation of protein.
- Dental pulp: aspiration of odontoblasts into dentine tubules, hyperaemia, infiltration, inflammation.

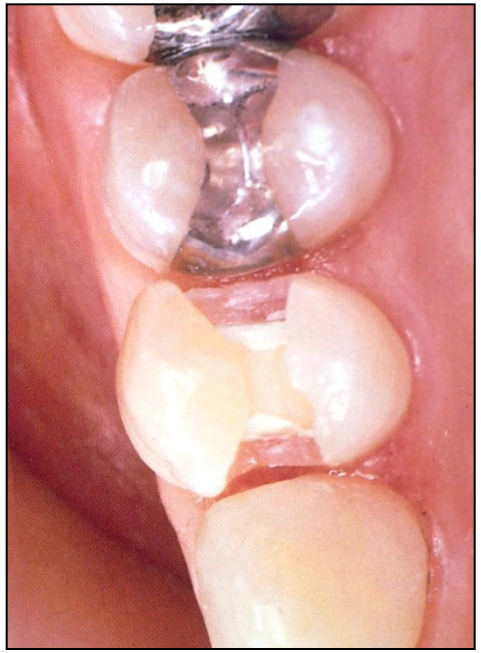
Prevention

- Gentle interrupted preparation
- Sharp instruments, well centered
- Sufficient watercooling by using highspeed rpm (50ml/min)
- The biggest preparation instruments for the excavation of carious dentin

From extension for prevention to prevention of extension !







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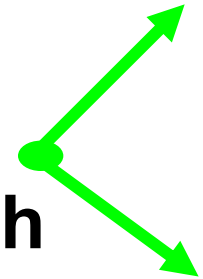
Primum non nocere !

Minimal intervention

=

Non invasive



Approach

Minimally invasive

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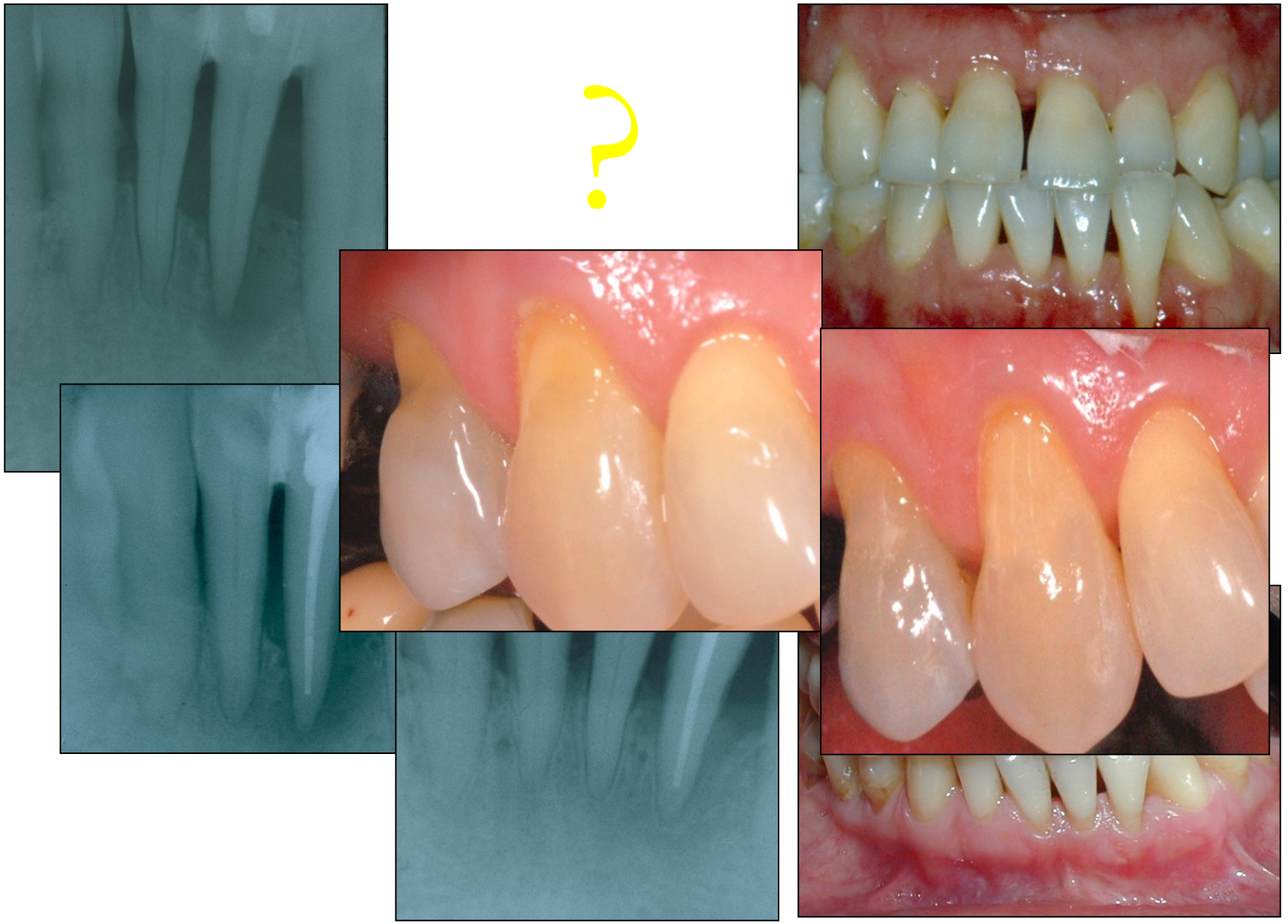

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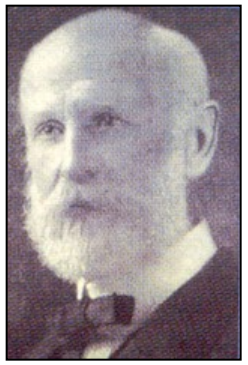
Prevention od extension



- Ethiology and patogenesis of dental caries
- Biomechanical properties of the tooth
- Diagnosis
- Filling materials
- Preparations techniques

Changes in the treatment concepts, size and shape of cavities

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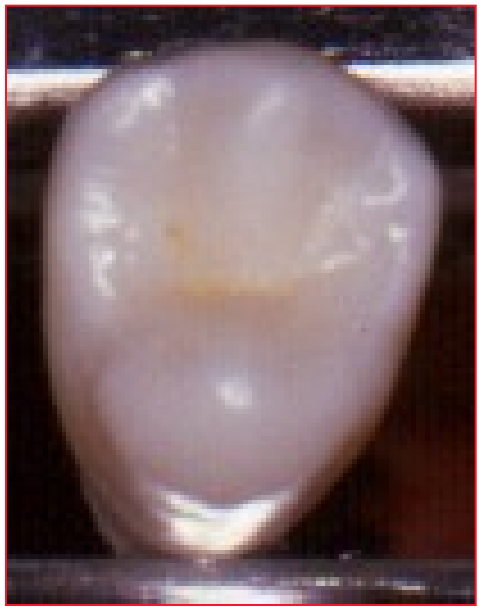
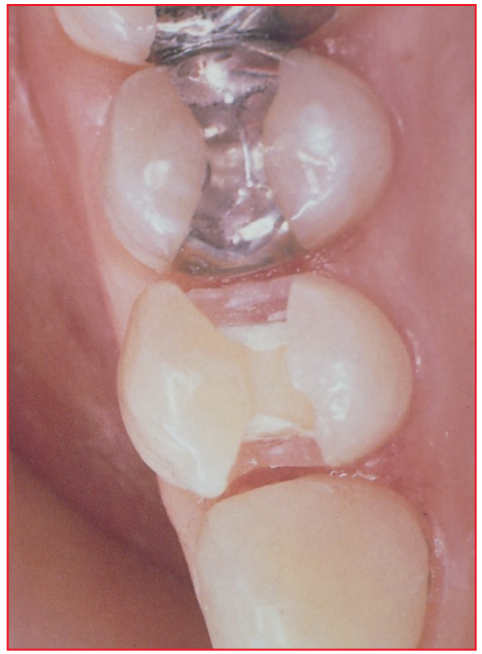
Biomechanics



MOD - 63%
Endodontics - 9%
Dehydratation -14%



Ferrari M, Scotti R. Fiber posts. Characteristics and clinical applications. Milano: Masson,2002.c

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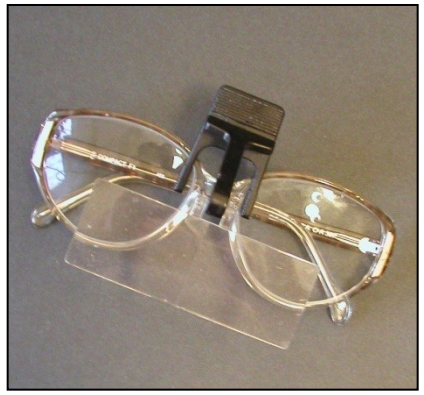
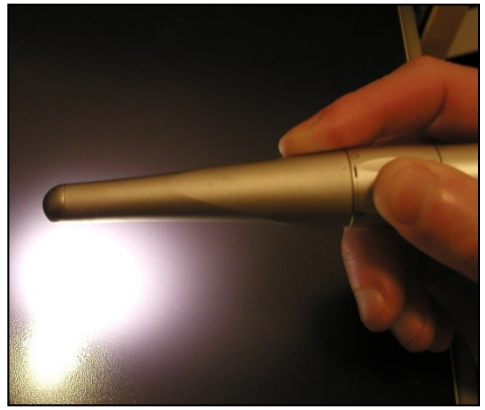
Illumination, magnification





~~Dry field~~

Clean surfaces

Dry field

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Miniinvasive treatment - techniques

- Mechanical
- Chemo – mechanical
- Kinetic
- Laser

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❑Mechanical preparation

- *Rotary*
- *Sonic , ultrasonic*
- *ART*

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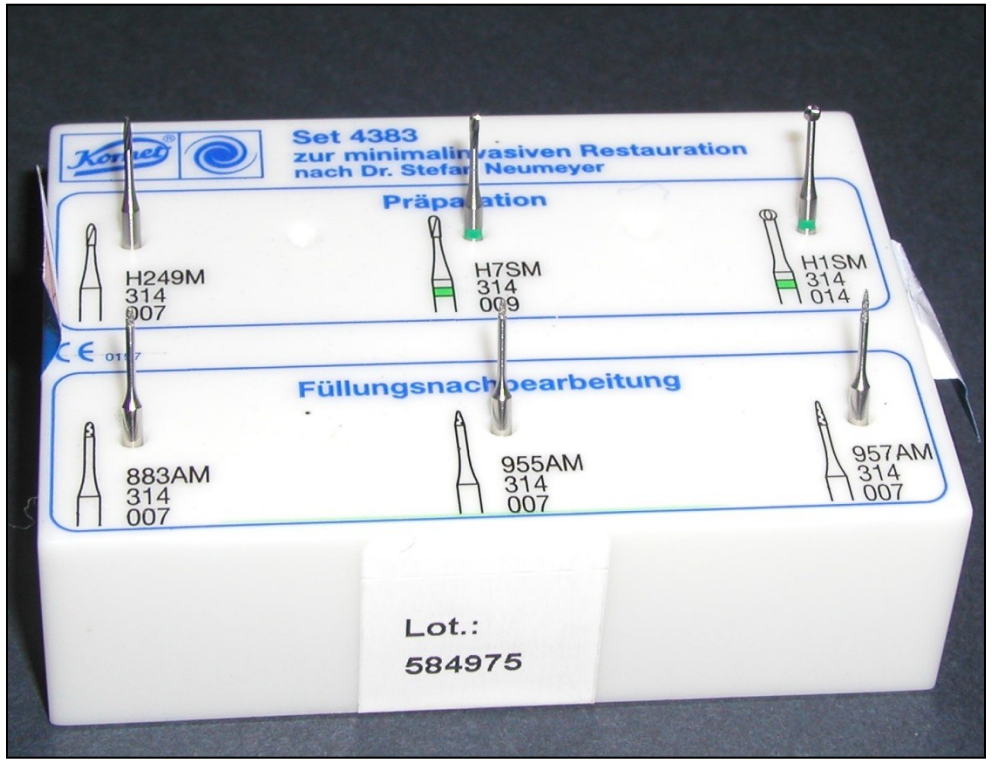
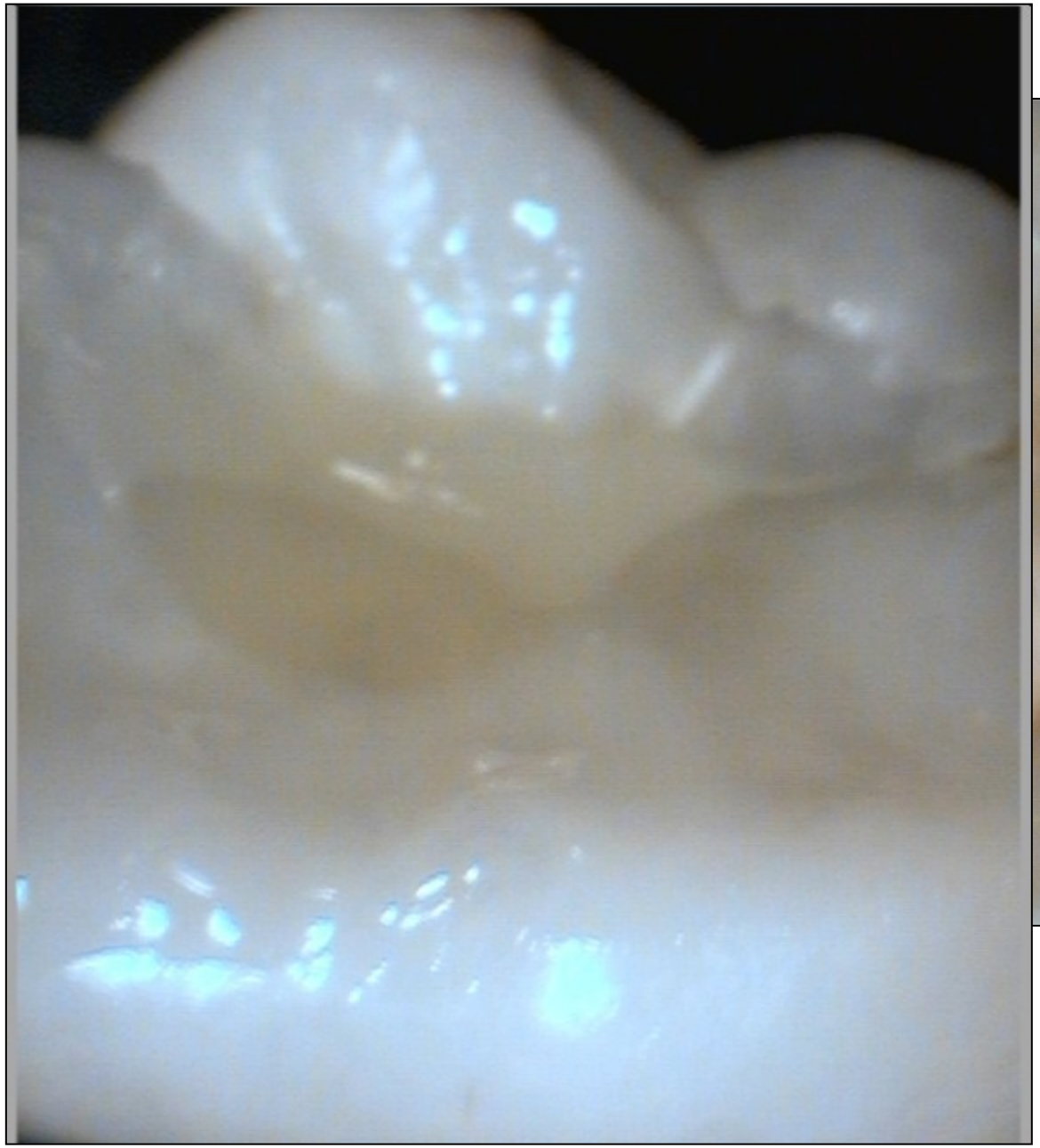
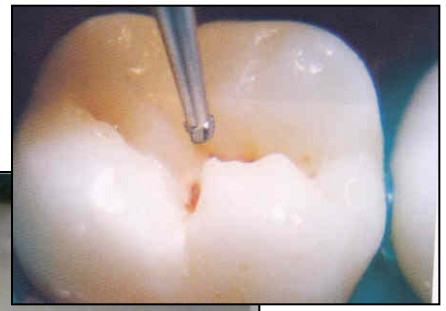
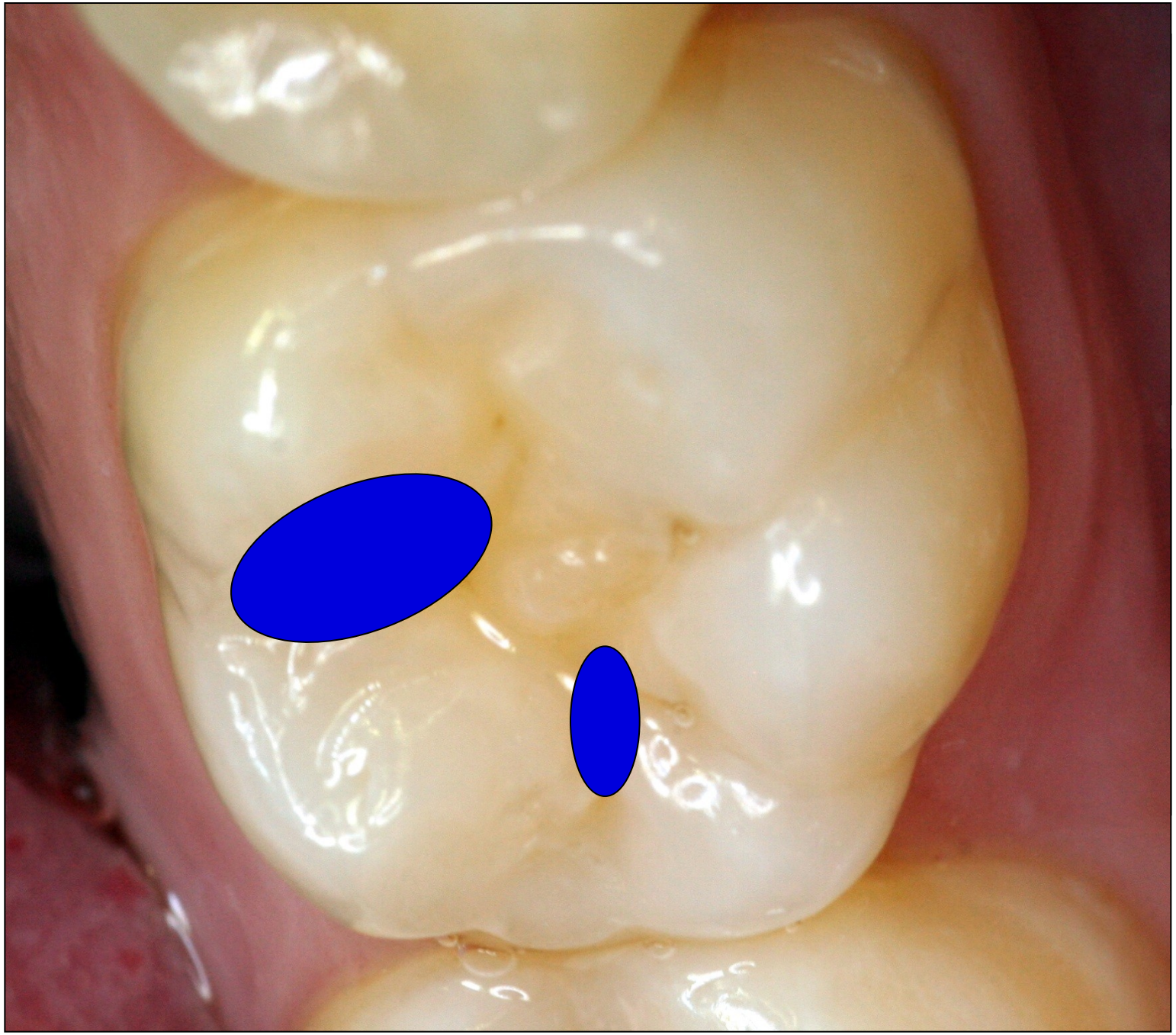
- Rotary (micro and miniinstruments)

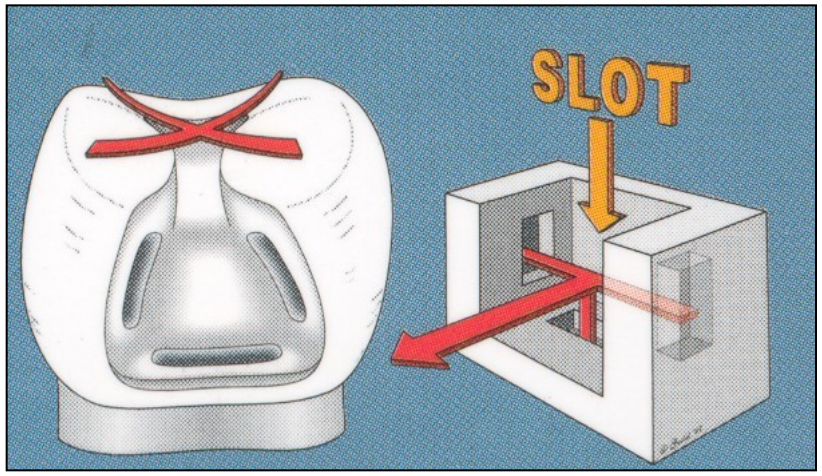


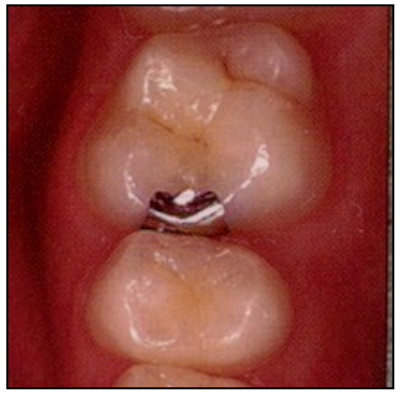




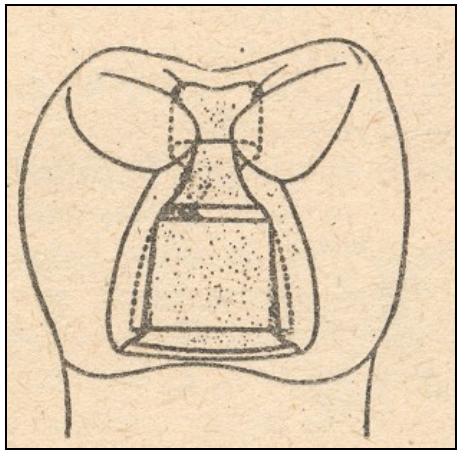


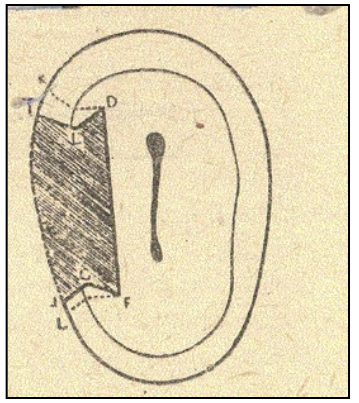
Slot preparation with macroretention





Sedelmayer J. Amalgám – zapomenuté řemeslo. Brno, 2000.

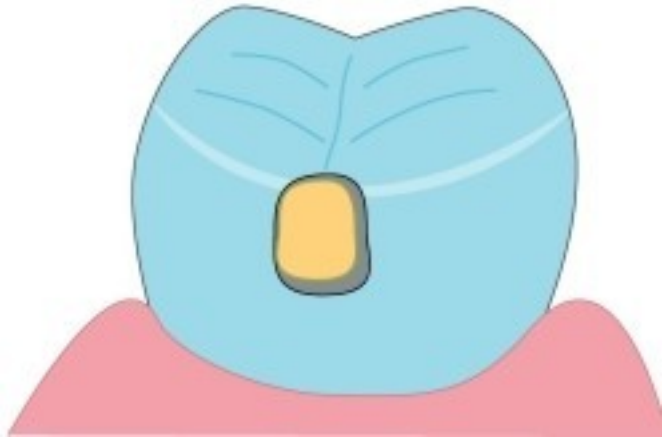


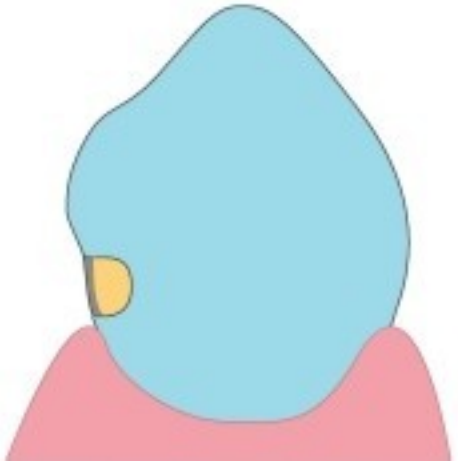


Bažant V.

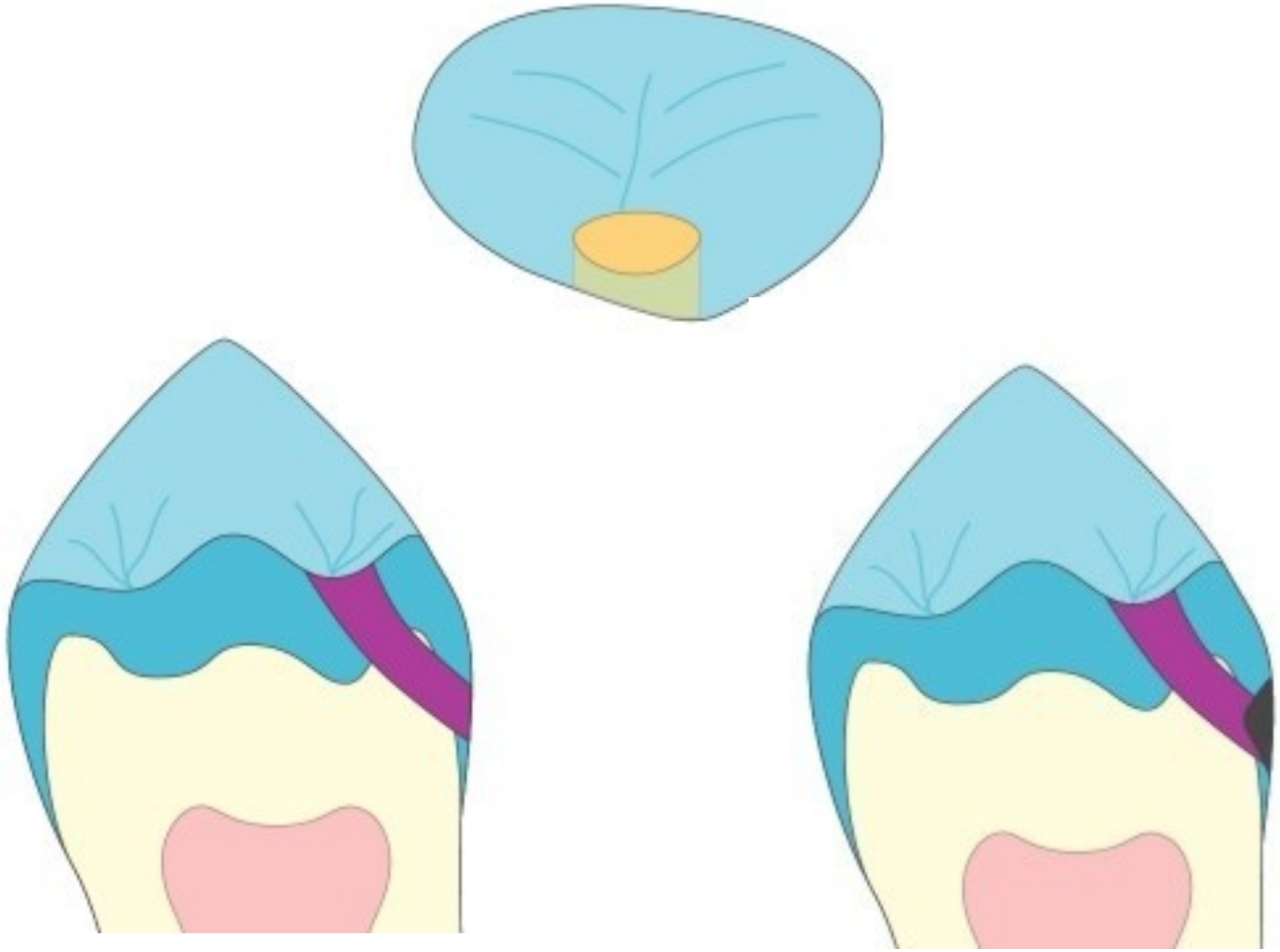
Konservační zubní lékařství, SPN Praha,1962.

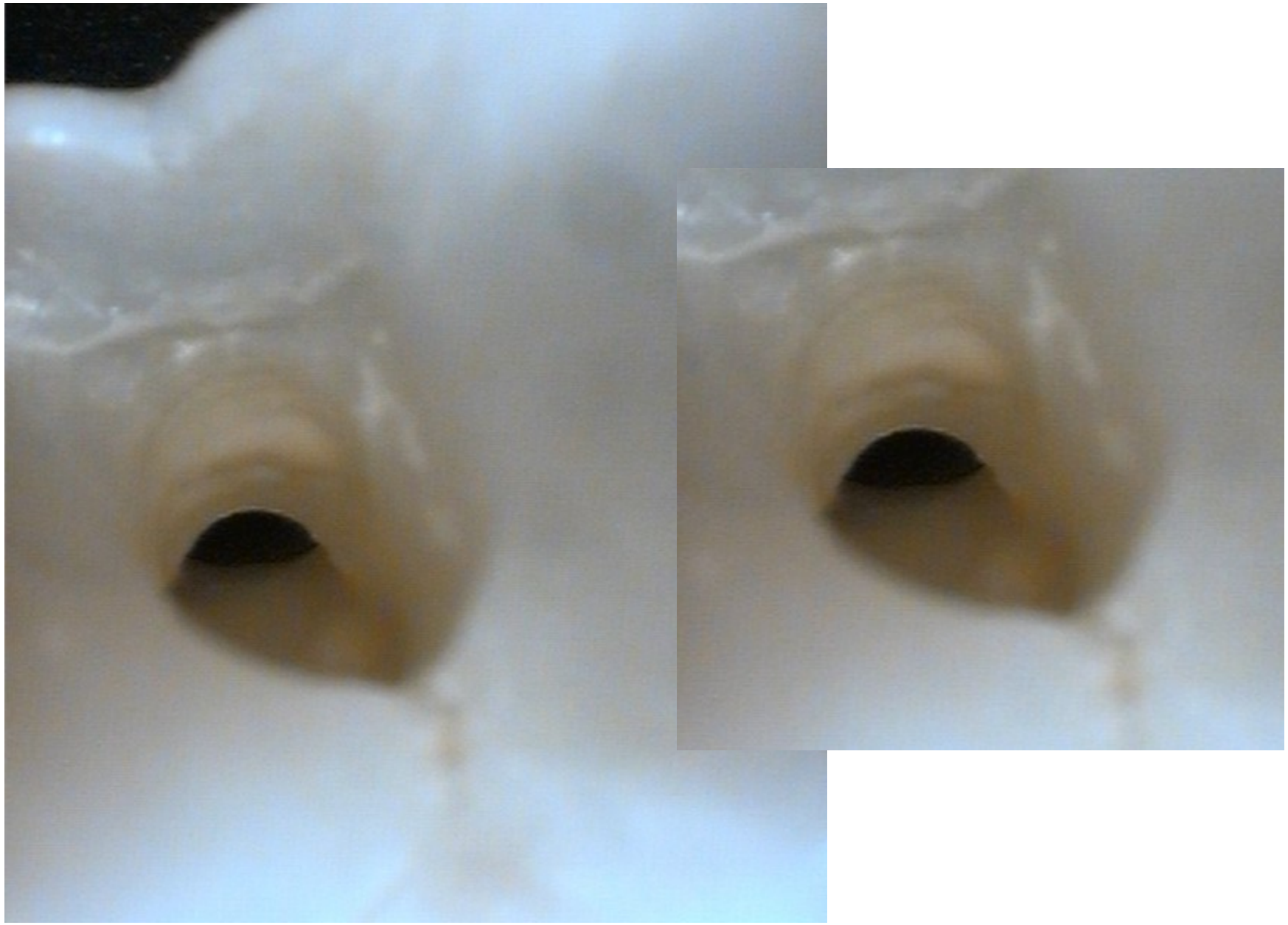
Adhesive slot

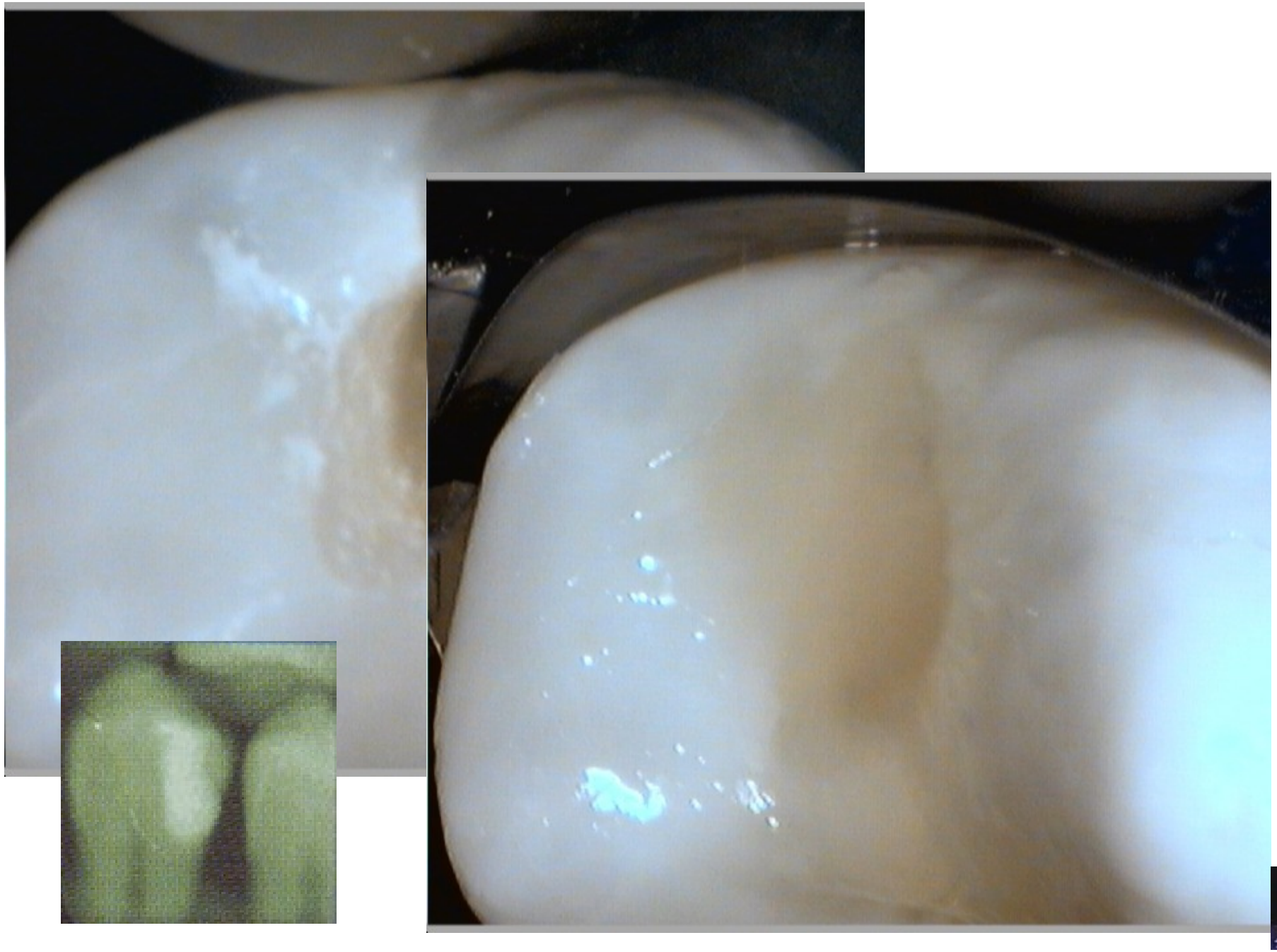


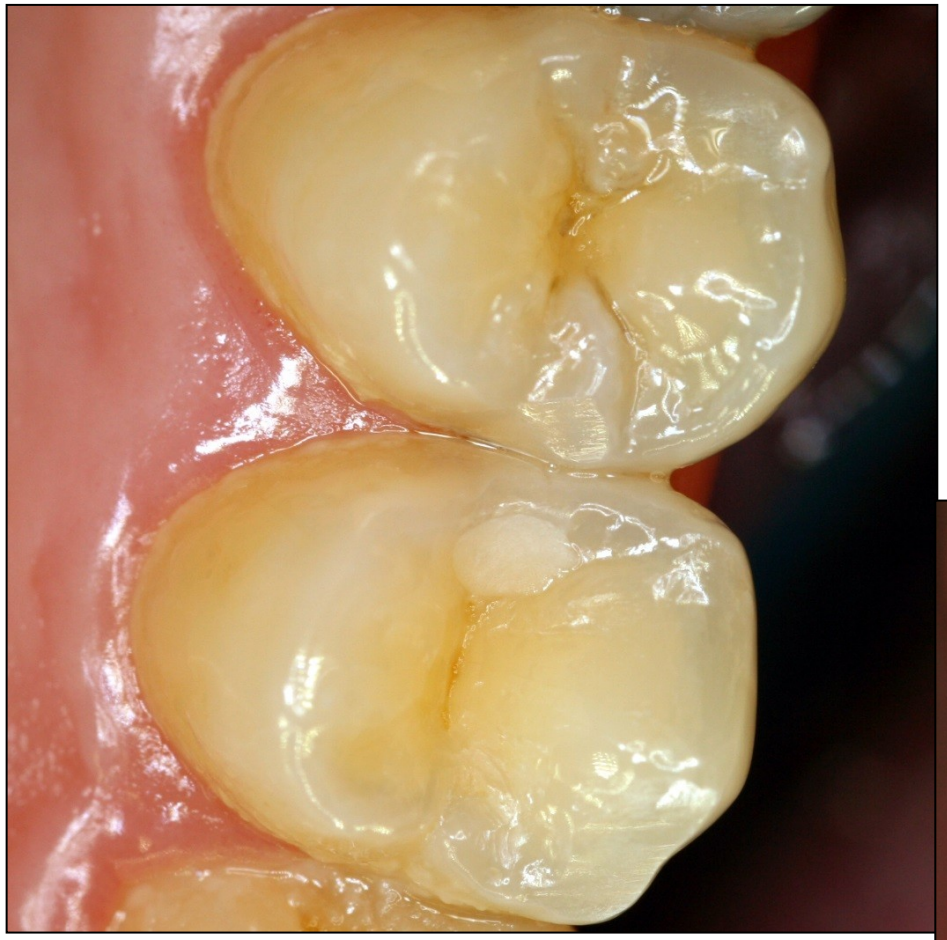


Tunnel preparation



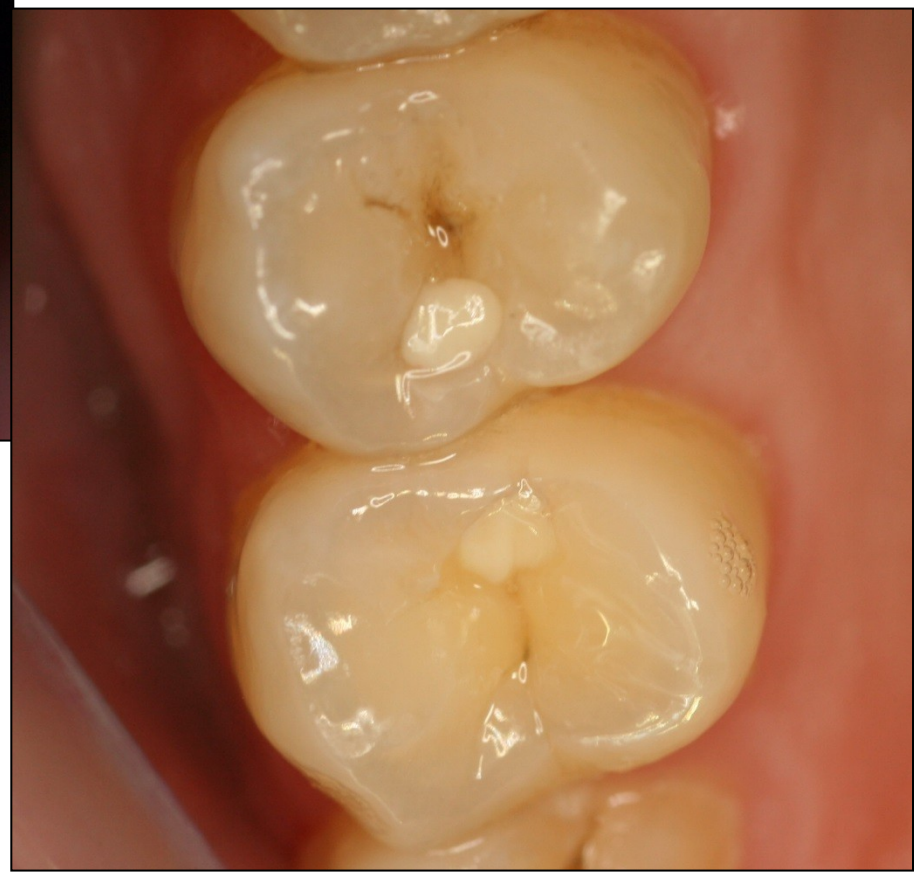






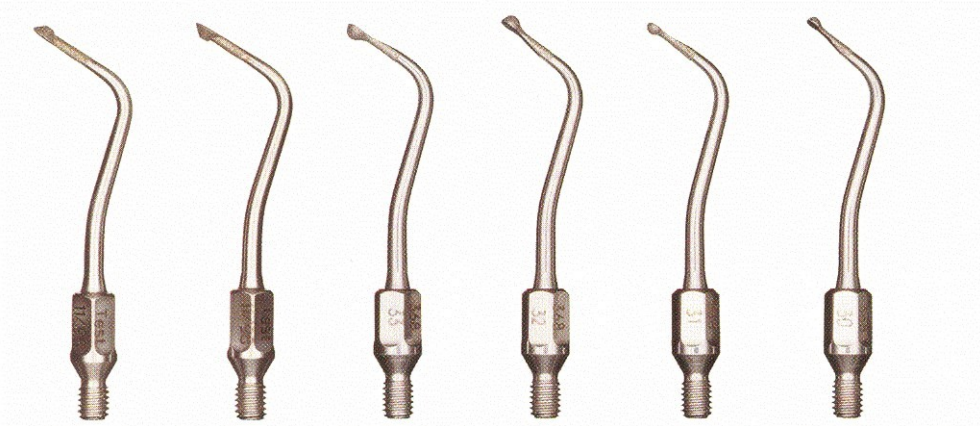
Success?

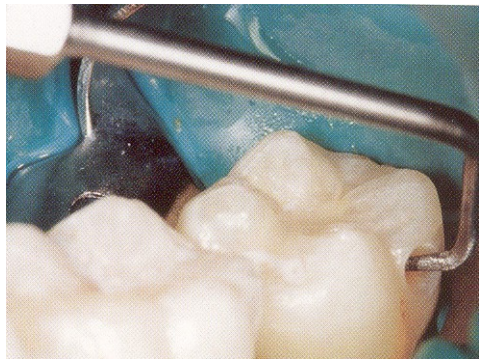
1. Low caries risk
2. Compliance
3. Marginal ridge without infraction
4. D3

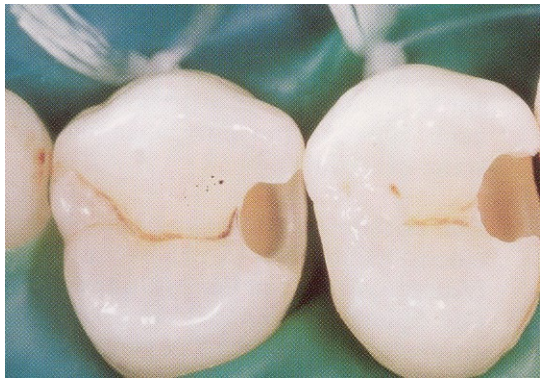


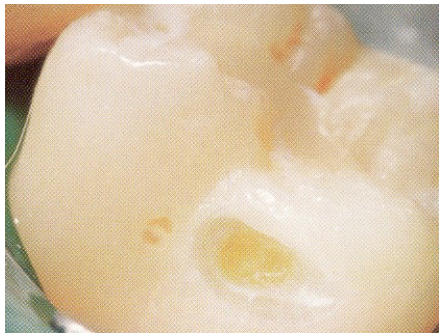
1. Magnification
2. Miniinstruments
3. Disinfection of cavities
4. GIC or composite
5. BW post op

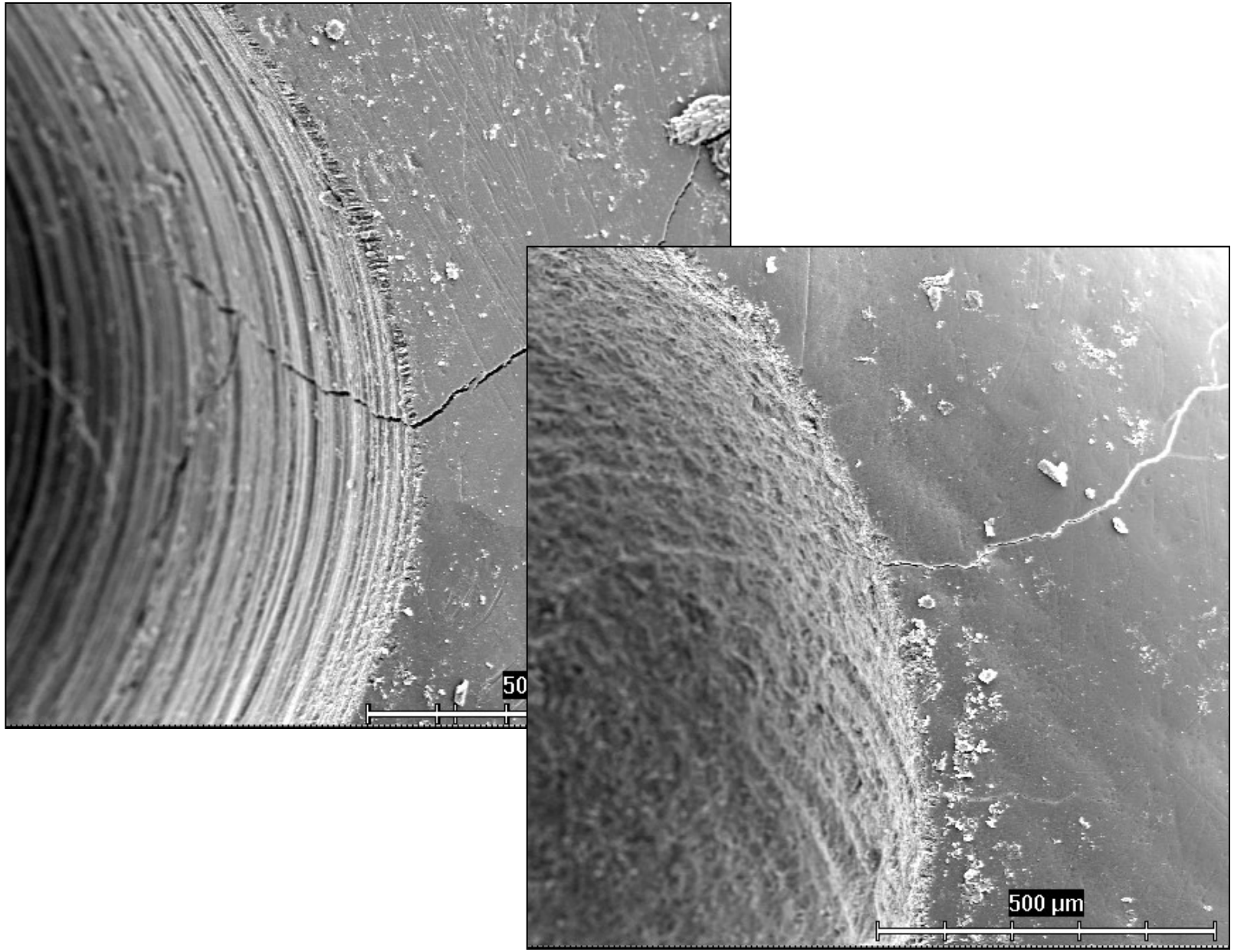
➢Sonic and ultrasonic preparation – oscillating instruments

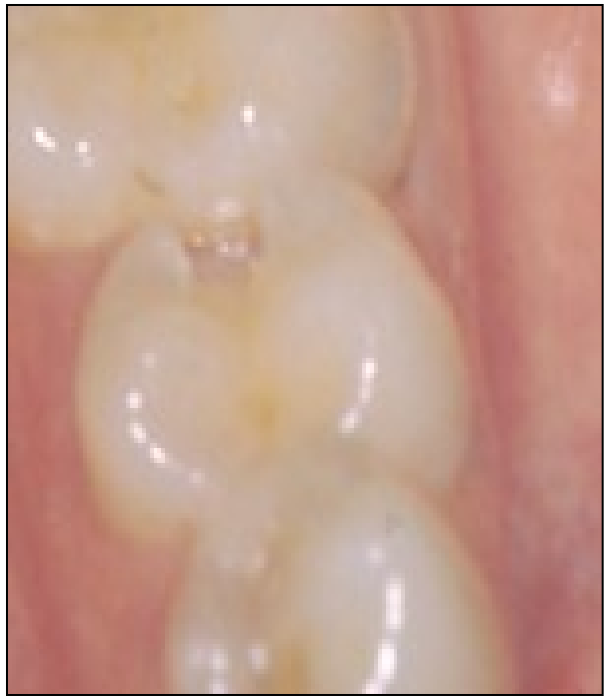
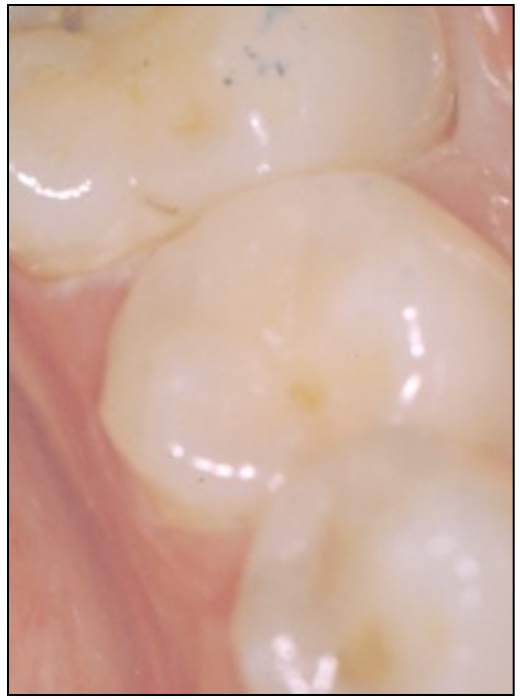
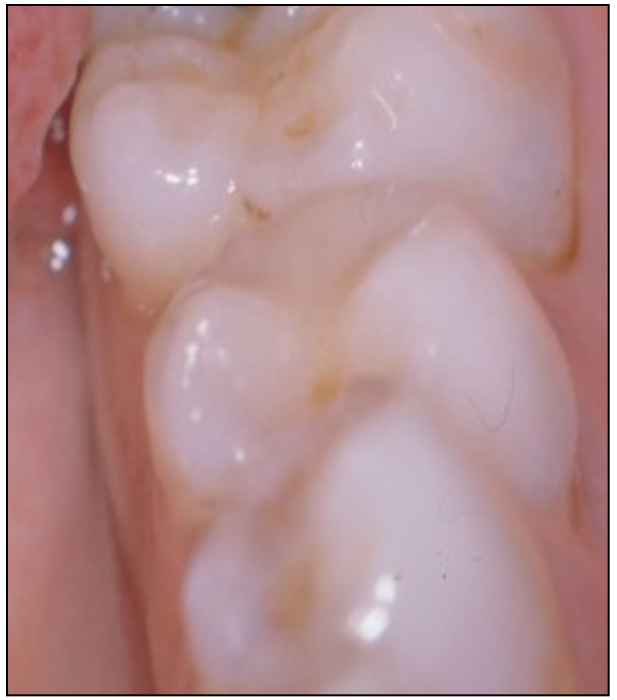









500 µm

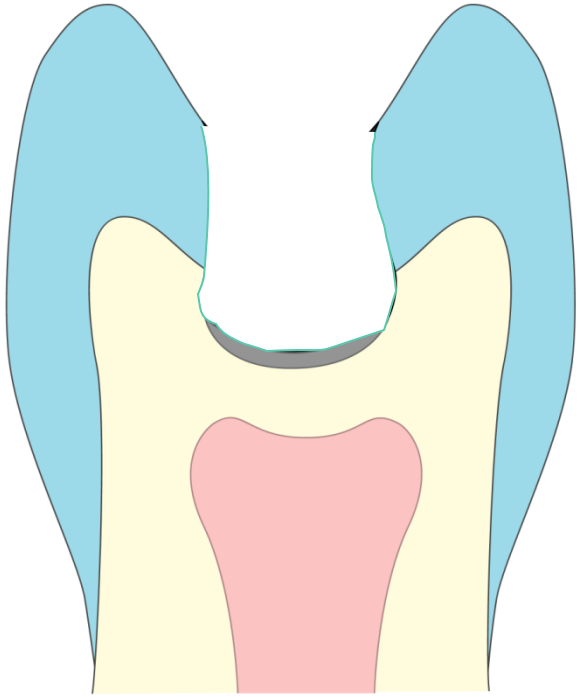




Ultrasonic preparation

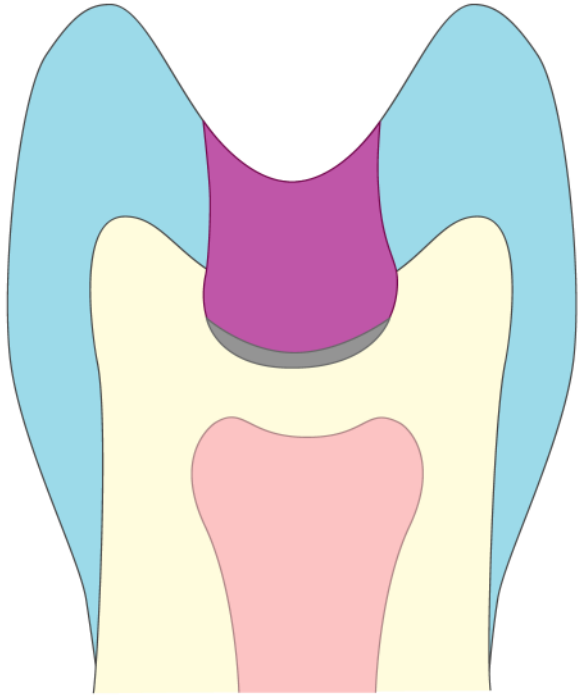
- ✓*Walls are smoother in comparison to rotary preparation*
- ✓*Time of the preparation is significant longer*
- ✓*Exkavation of carious dentin is nor sufficient*
- ✓*Marginal adaptation of composite filling is not significantgly better*

Roubalíková L. Ultrasonická preparace v ošetření zubního kazu , PDD 2004.

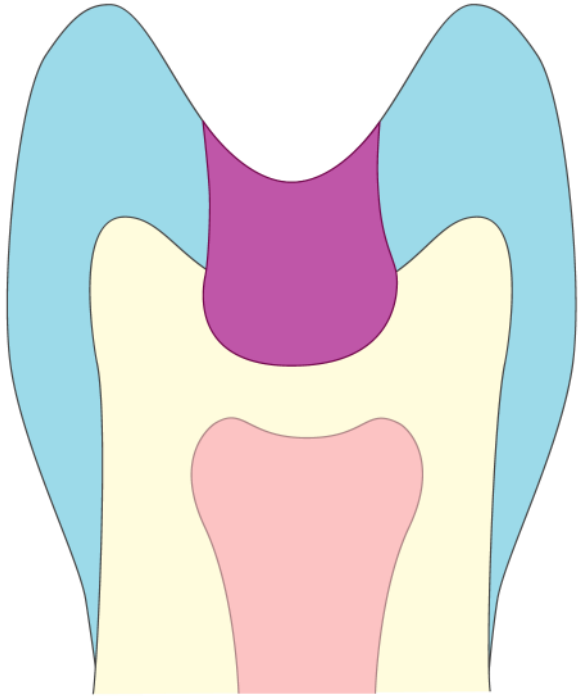
➢ART



➢ART

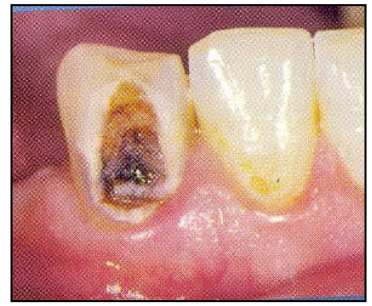


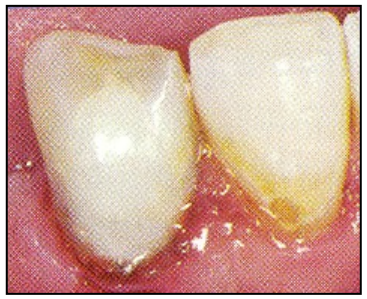
➢ART –atraumatic restorative technique



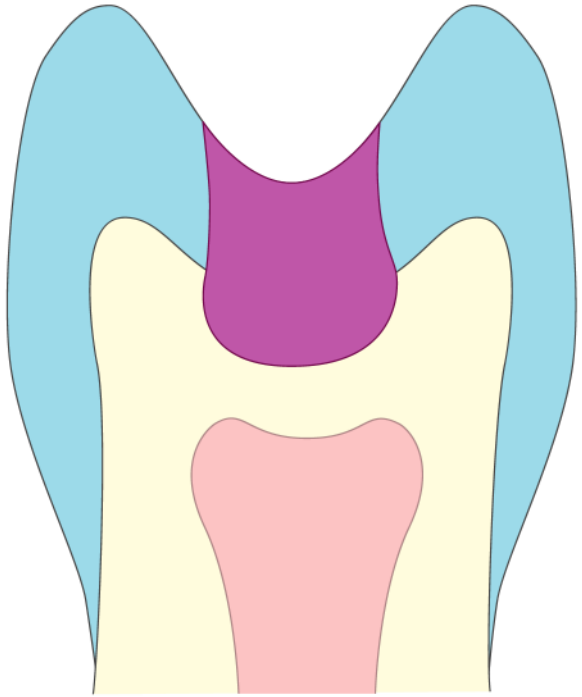
ART

- ✓Miniinvasive
- ✓Remineralization
- ✓Large lesions
- ✓Children
- ✓Disabled patients

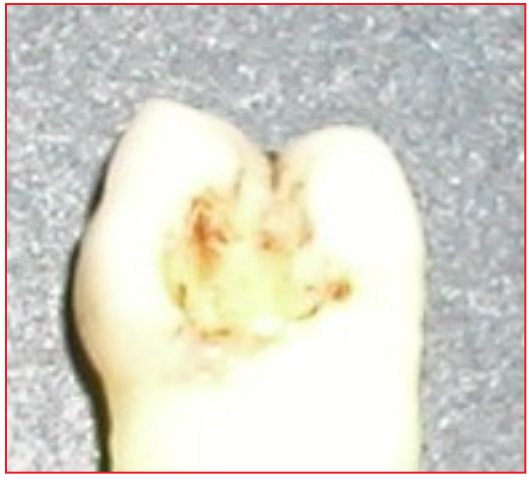


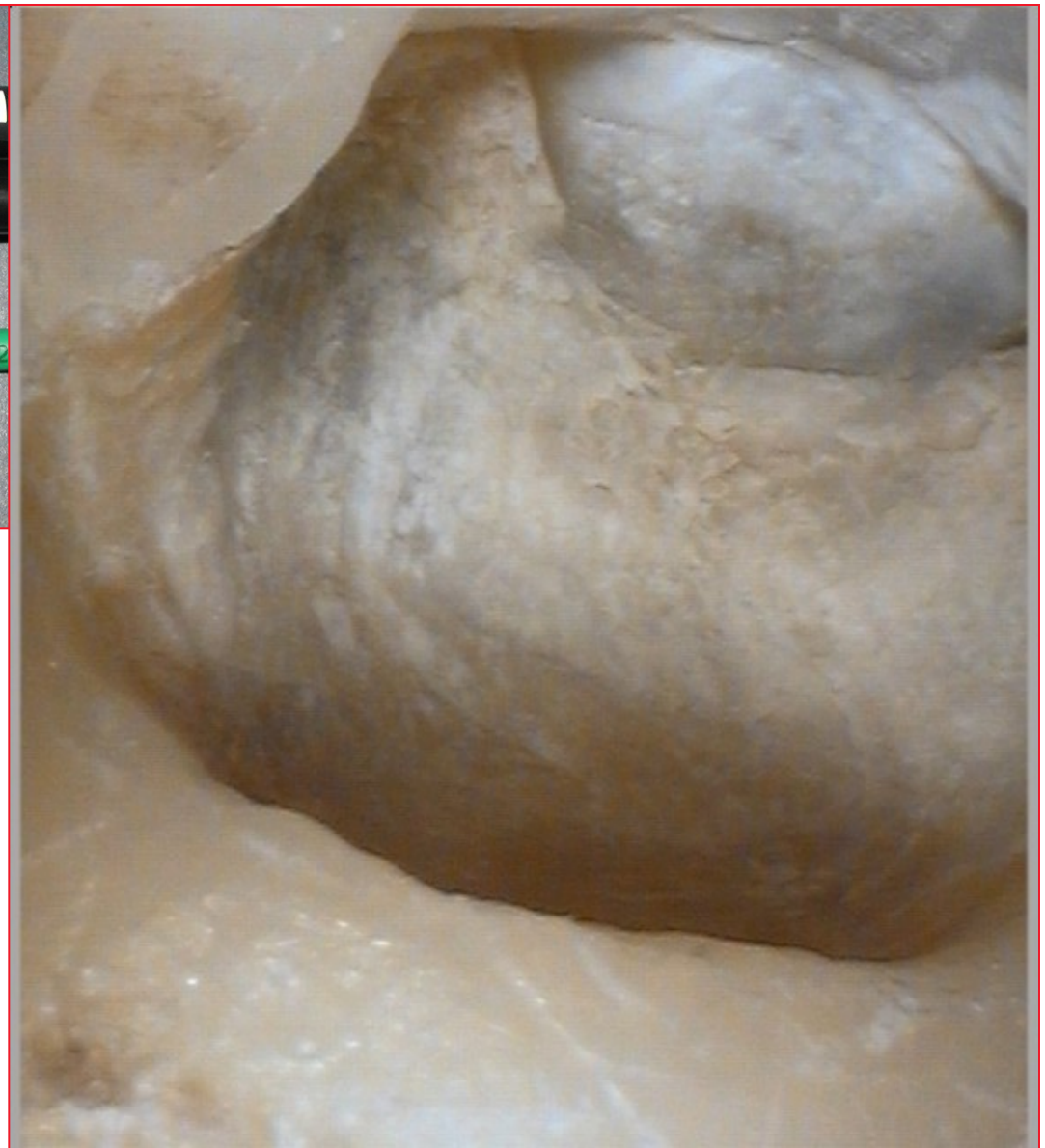


➢ Chemomechanical preparation



➢Chemo – mechanical preparation



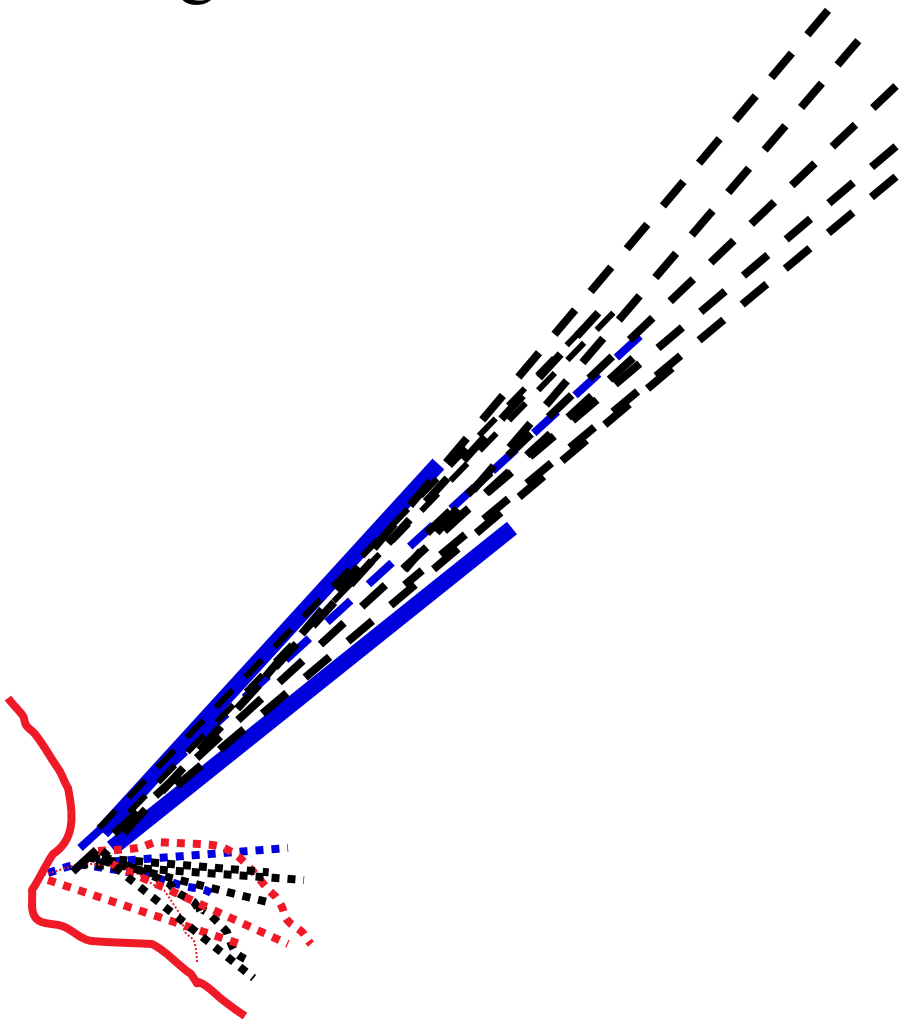


MUNI MED

- ✓ ***No anesthesia needed***
- ✓ ***Smell of chlor***
- ✓ ***No noise***
- ✓ ***For anxious and disabled patients***
- ✓ ***Time consuming***

Rafique S, Banerjee A, Fiske J.
Clinical trial of an air-abrasion/Carisolv gel regimen for restorative treatment for dentally anxious patients.
Caries Res 2002; 186 (Suppl.3)36:39.

➢Kinetic preparation – sandblasting – air abrasion

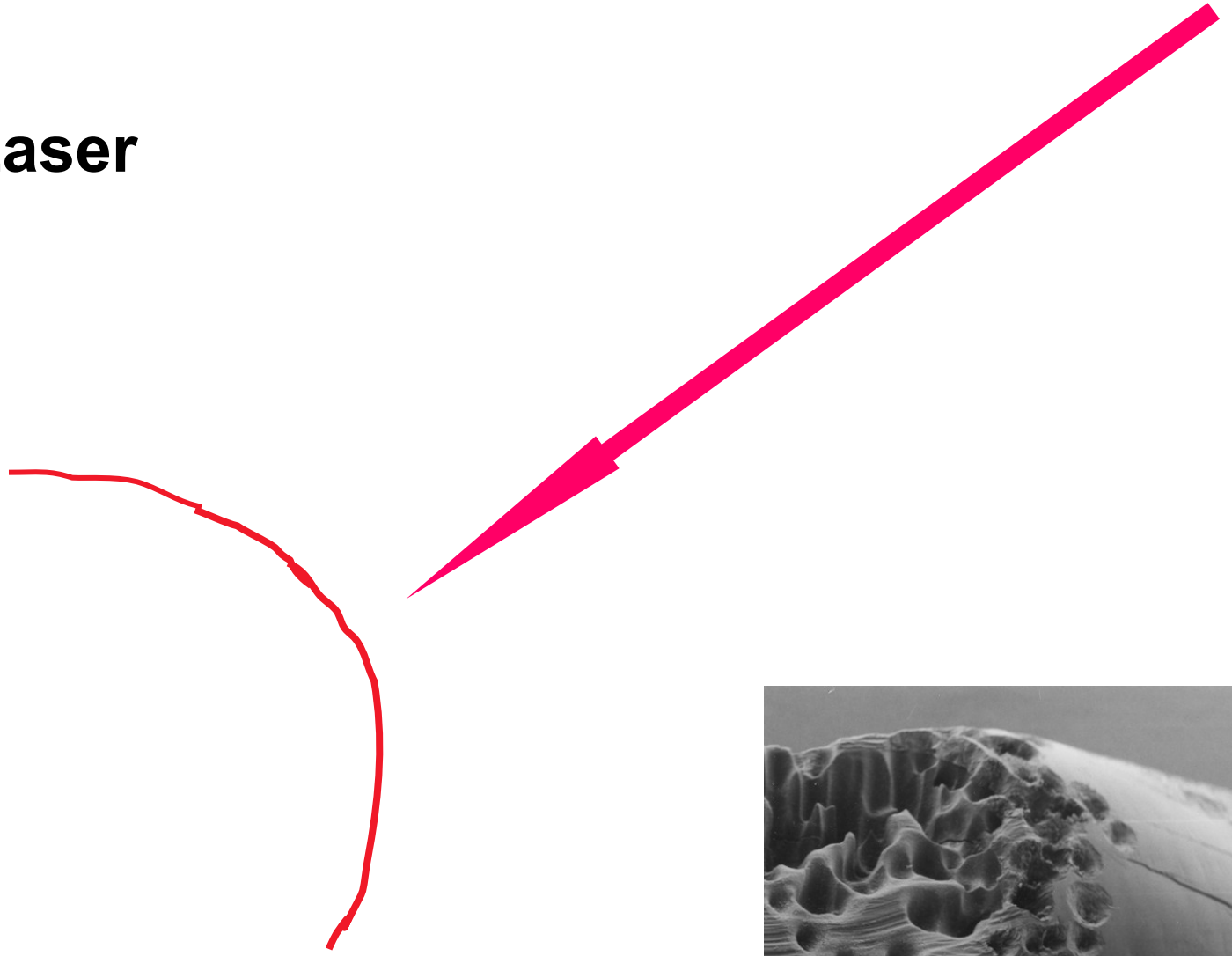


- ✓ ***Good accepted by patients***
- ✓ ***Time consuming***
- ✓ ***Excavation of dentine is not sufficient***
- ✓ ***Rough borders***
- ✓ ***Dust***

Pietrini DR. Air abrasion for 21st century. Dent Today 2000;19:106-108

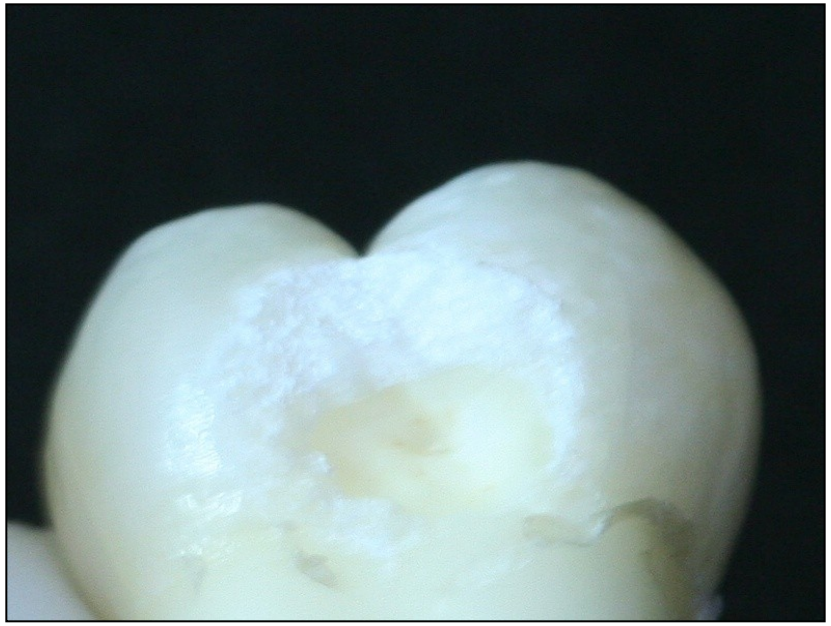
MUNI MED

- **Laser**

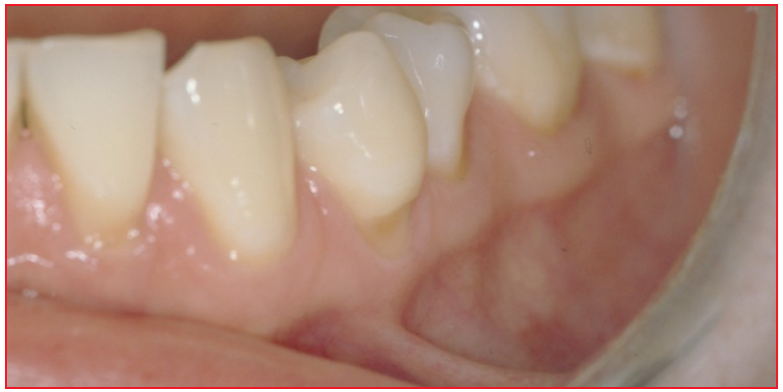


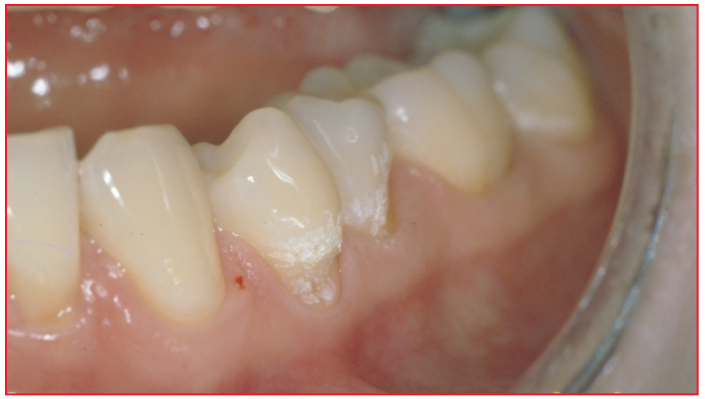
Er,Cr:YSGG Laser
Er: YAG

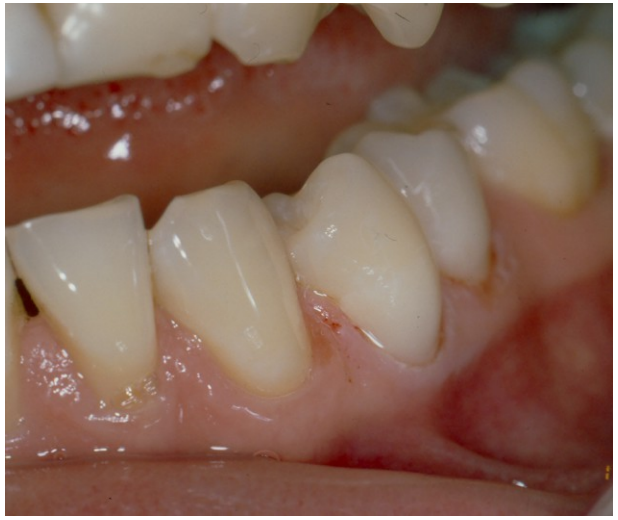
MUNI
MED



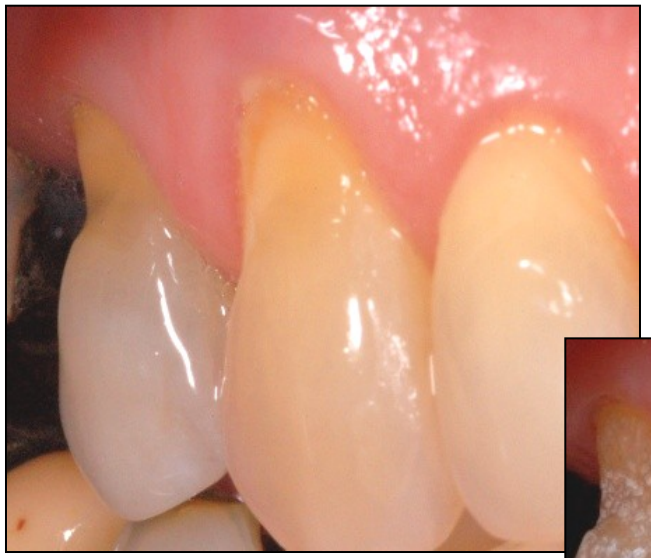
MUNI
MED

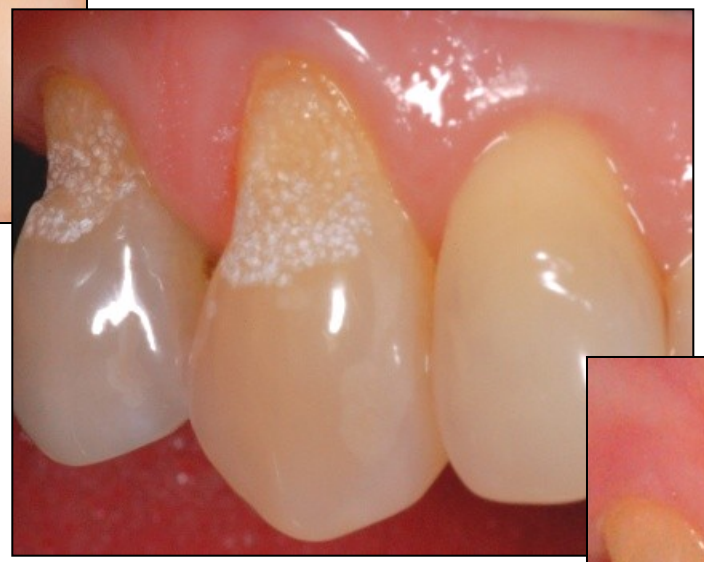


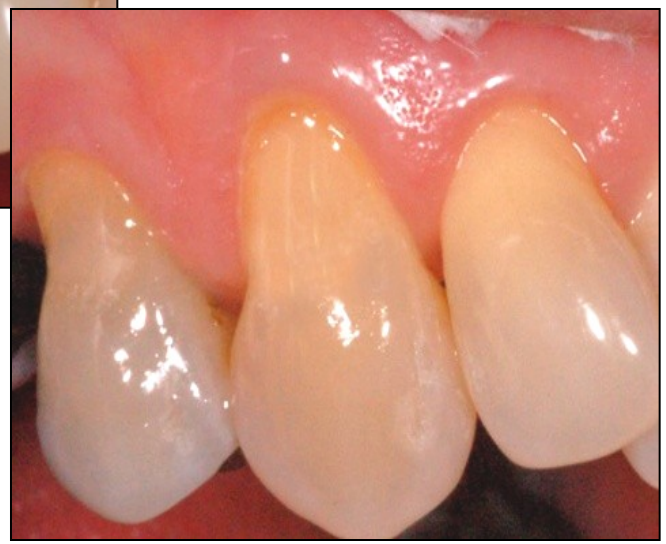




Roubalíková L, Wilhelm Z, Bilder J. : Use of Er:YAG laser in non carious cervical lesions. Clin Oral Invest, v tisku, 2004.

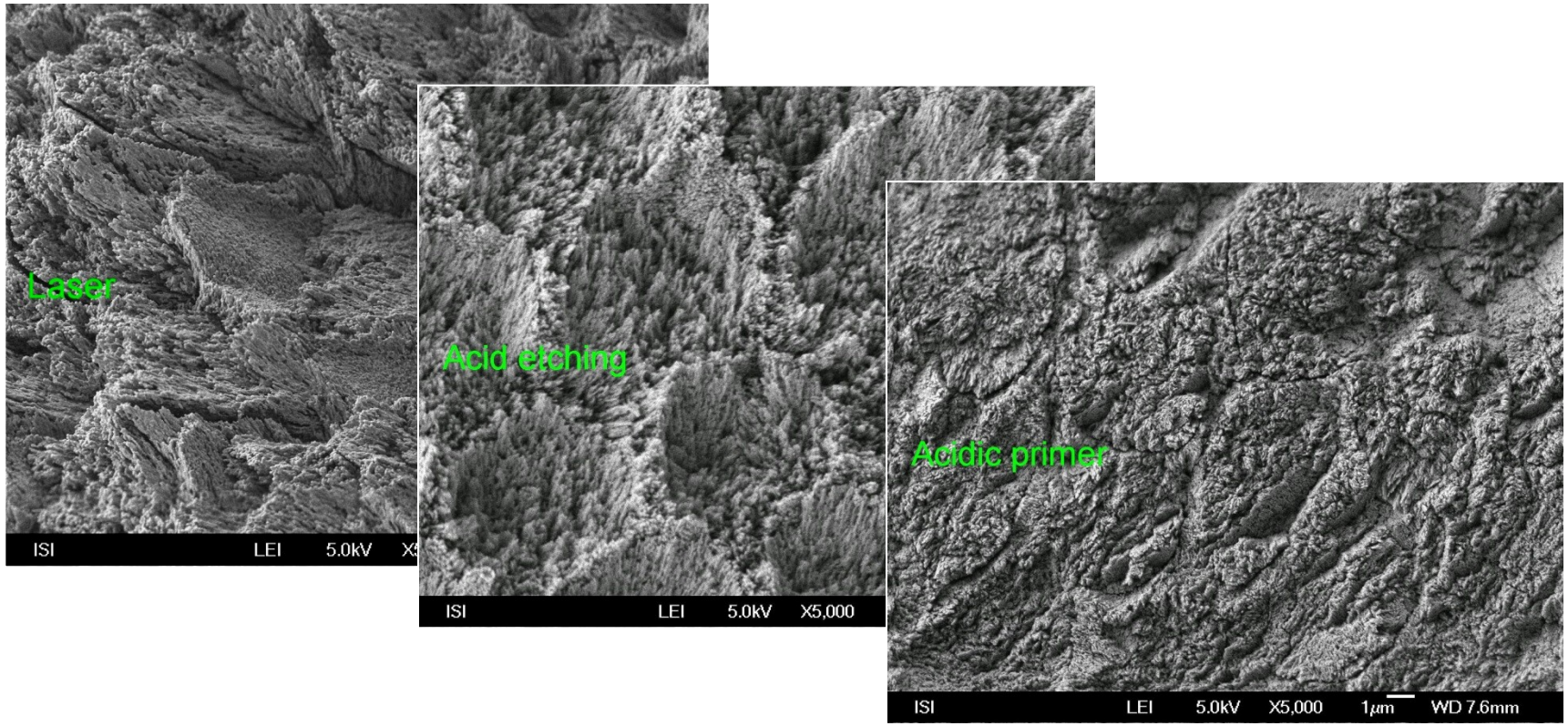






Adhesive preparation

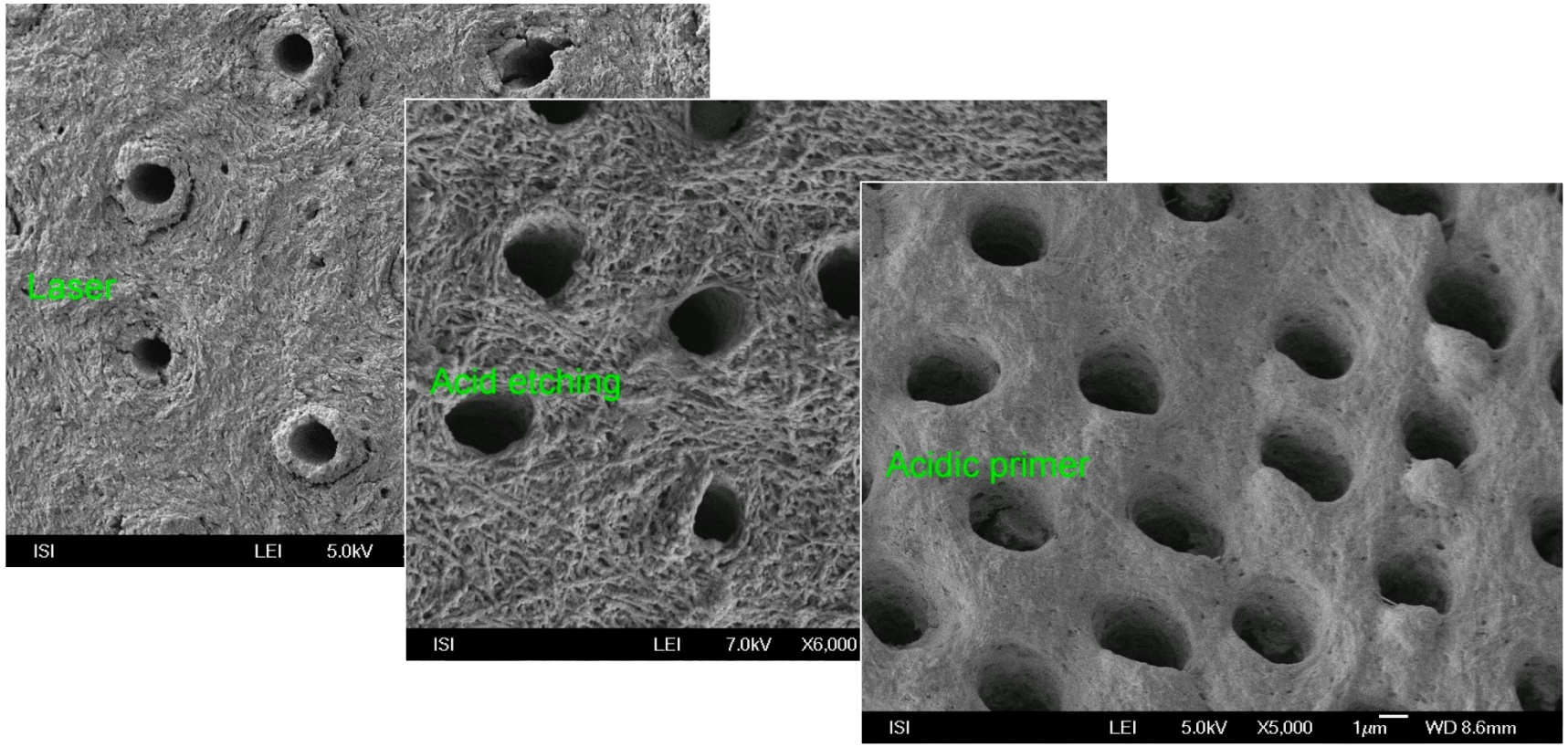
Sklovina



MUNI MED

Adhesive preparation

Dentin



MUNI MED

- ✓ ***Good accepted***
- ✓ ***Time consuming***
- ✓ ***Antimicrobial effect***
- ✓ ***Risk of perforation of pulp chambre***
- ✓ ***Price***

MUNI MED

Thank you !