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Restorative dentistry

Posterior area

Faculty of medicine, Dpt of restorative dentistry, ass.prof. L. Roubalikova

Pit and fissure caries

Occlusal surfaces of premolars and molars
Foramina coeca

All pit and fissure restorations (fillings)

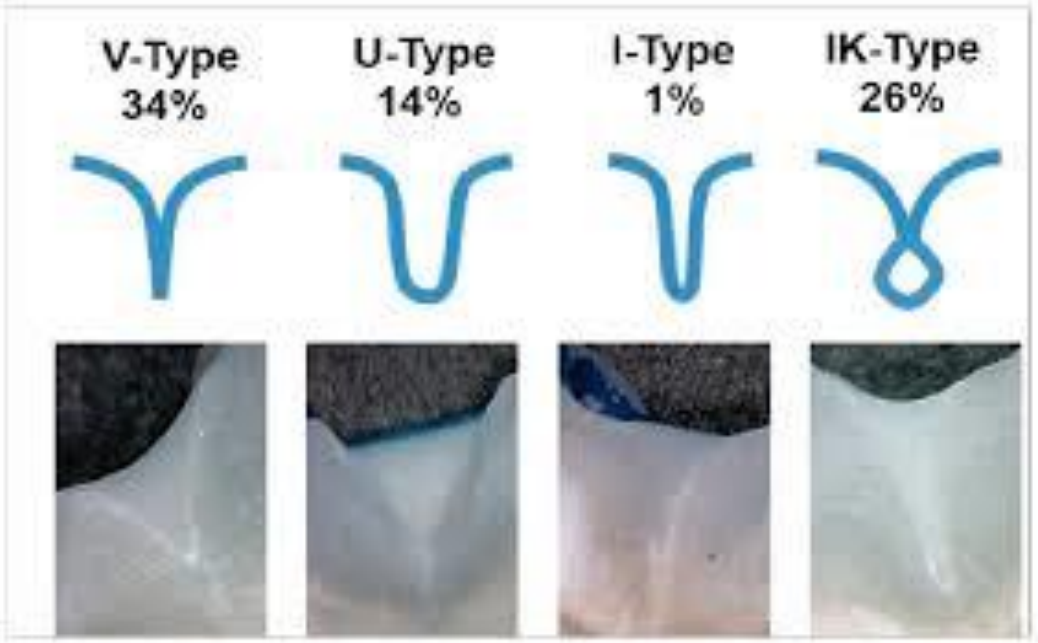
They are assigned in to three groups.
R. on occlusal surface of premolars and molars

R. in foramina coeca – usually on occlusal two thirds of the facial and lingual surfaces of molars.

R.on lingual surface of maxillary incisors.

Classification of fissures

- 1. Shallow and wide
  - V or U
  - 2. Deep and narrow
  - I or K



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Pits and fissures

- Caries danger areas – plaque accumulation due to morphology of fissures

- Structure of hydroxyapatit (carbonated HA) – enamel does not mature completely

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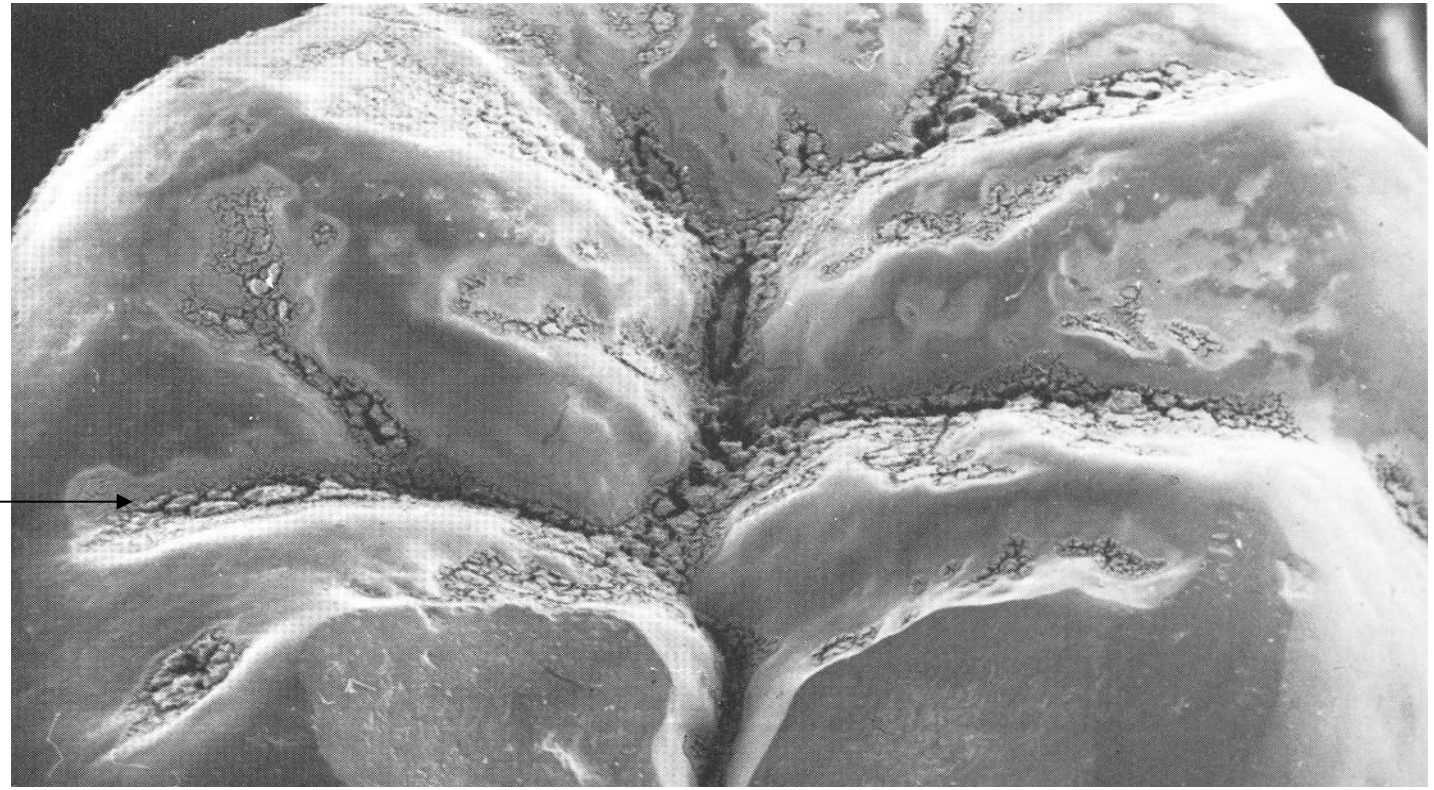
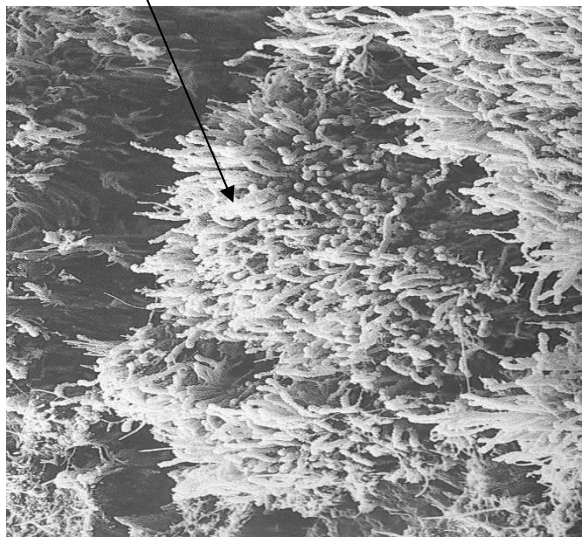
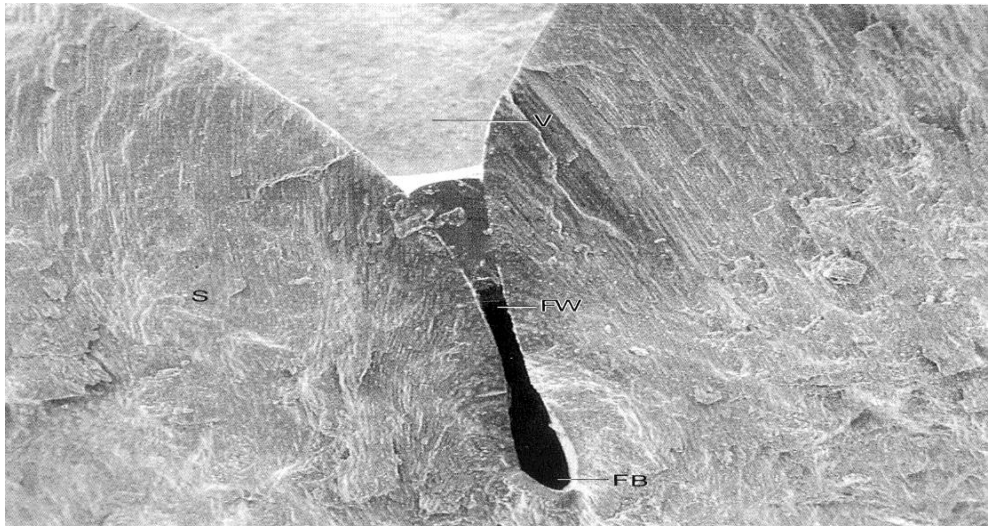
Morphology of fissures

Biofilm







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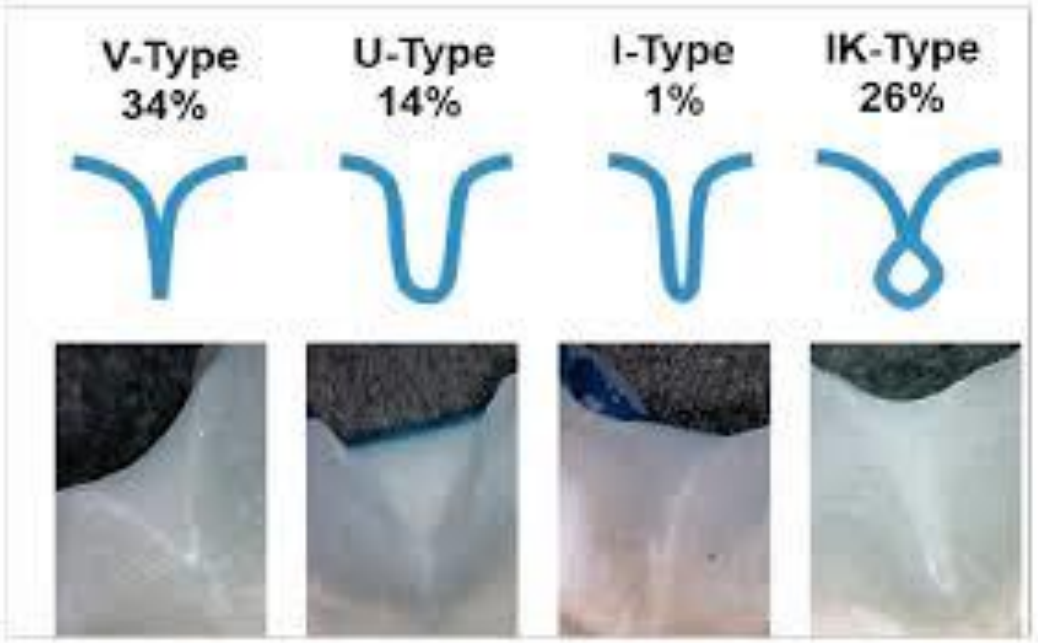

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Diagnosis

- Visual diagnosis – ICDAS, UNIWISS
- Infrared laser fluorescency (uncertain)
- Radiogram – if it spreads to dentin
- Diagnocam (uncertain)

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Pit and fissure caries

- Class I. acc. to Black

Caries danger area

Special morphology

Special sructure of enamel

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Diagnosis

- Visual criteria

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ICDAS–INTERNATIONAL CARIES DETECTION AND ASSESMENT SYSTEM

- **ICDAS**(2002)–6 code, later **ICDAS –II** –4code
- Caries lesionsin pit and fissures, smooth surfaces, roots and enext to fillings **–CARS** (Caries Associated with Restoration and Sealants

- Blunt probe

- Clean and dry surfaces, time of observation 5 s

- http://www.icdas.org/courses/english/index.html

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ICDAS – criteria

- 0 no changes observed


Code 0 before sectioning tooth


Code 0 after sectioning tooth

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ICDAS - criteria

- 1.- first visual changes observed on dry surface only (opaque, white, brown)


Code 1 before sectioning tooth


Code 1 after sectioning tooth

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ICDAS - criteria

– **2.** – first visual changes on wett surfaces


Code 2 before sectioning tooth


Code 2 after sectioning tooth

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ICDAS - criteria

- **3** – enamel is still present, zone of decalcification is out of fissure, dentin is affected

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ICDAS - criteria

- **4** – dark colour around the fissure (grey, blue, brown), enamel can be broken

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ICDAS - criteria

- 5 – cavitated lesion

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Clinical picture

- Dark colour

- White colour (undermined enamel) around cavitation

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Universal Visual Scoring System for pits and fissures (UniViSS occlusal)

Second step: Discoloration Assessment	**First step:** Lesion Detection & Severity Assessment					
	First visible signs of a caries lesion	Established caries lesion	Microcavity and/or localised enamel breakdown	Dentin exposure	Large cavity	Pulp exposure
	Score F	Score E	Score M	Score D	Score L	Score P
Sound surface (Score 0)	No cavitations or discolorations are detectable.					
White (Score 1)						
White-brown (Score 2)						
(Dark) Brown (Score 3)						
Greyish translucency (Score 4)						

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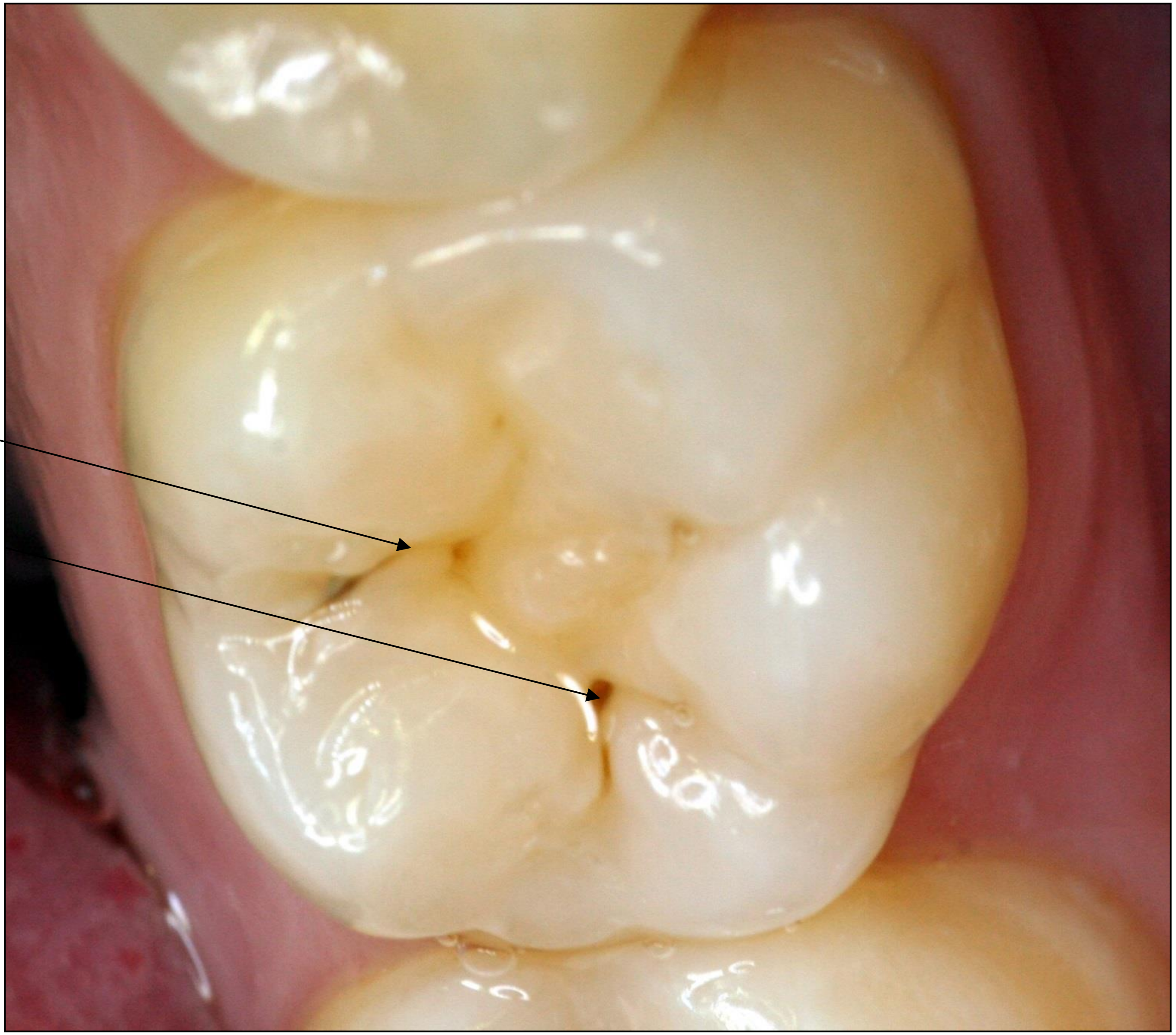
Caries



ICDAS 1

ICDAS 2

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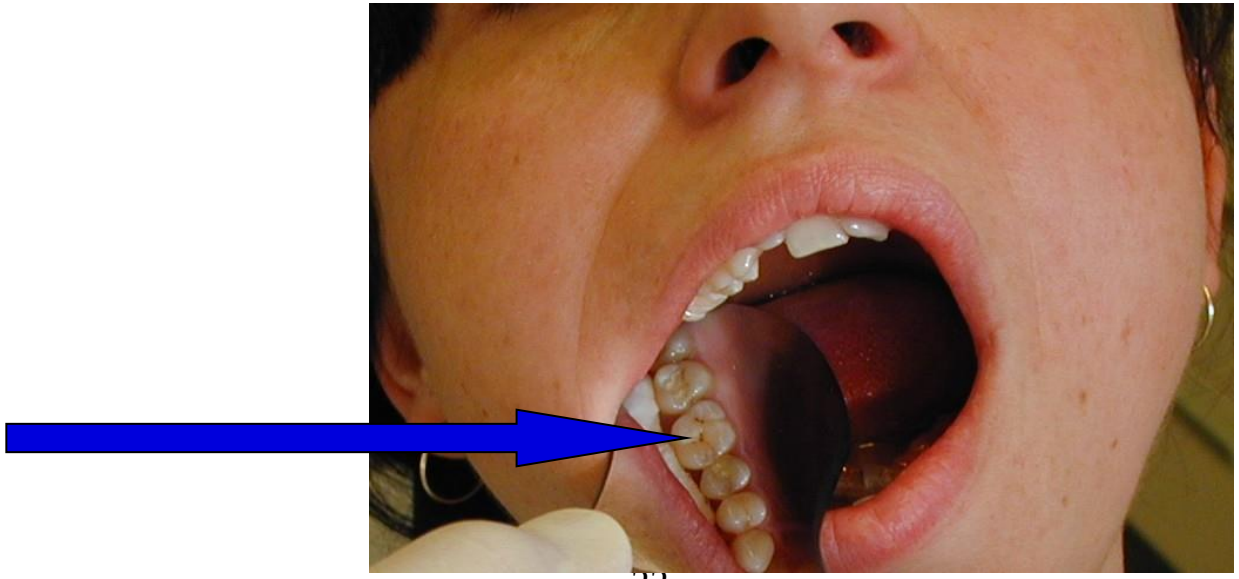
Pit and fissure caries



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Occlusal caries

- ICDAS 0 – 1 : observation
- ICDAS 2: observation or preventive filling
- ICDAS 3 – 4: filling therapy

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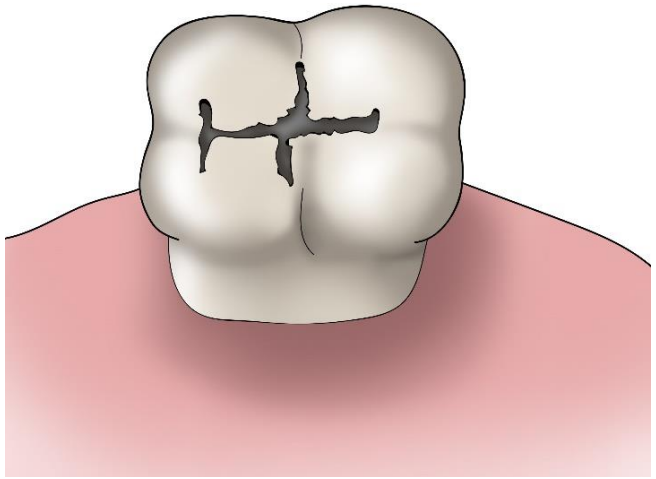
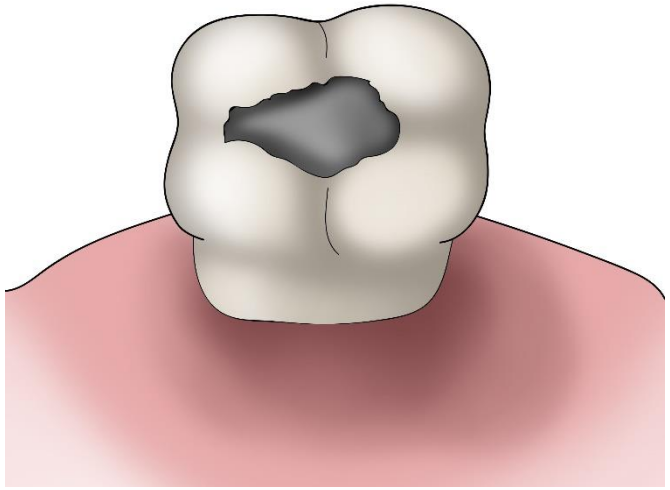
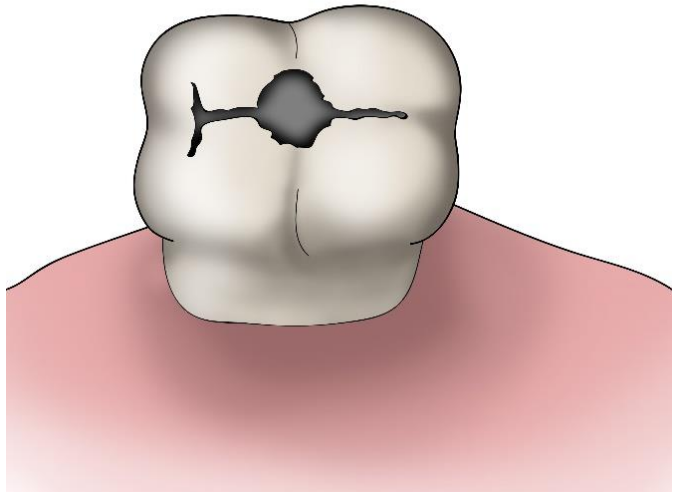






Indications of dental materials – occlusal caries

- Amalgam x
- Composite
- Glassionomer

Consideration

- Caries lesion: size and location
- Occlusal stress
- Level of oral hygiene
- Isolation of operating field
- Patient´s compliance

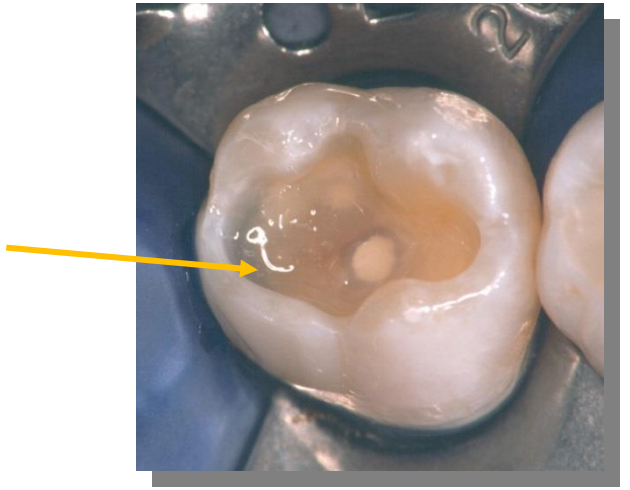
Amalgam ?

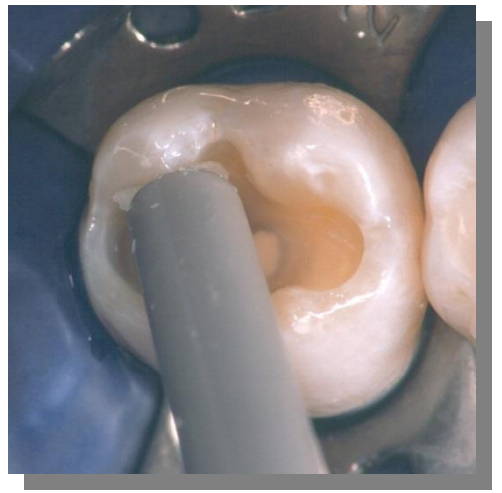
Pertinent material qualities and propeties
Strength
Longevity
Ease of use
Clinically proven sucess

BUT!

Amalgam - disadvantages

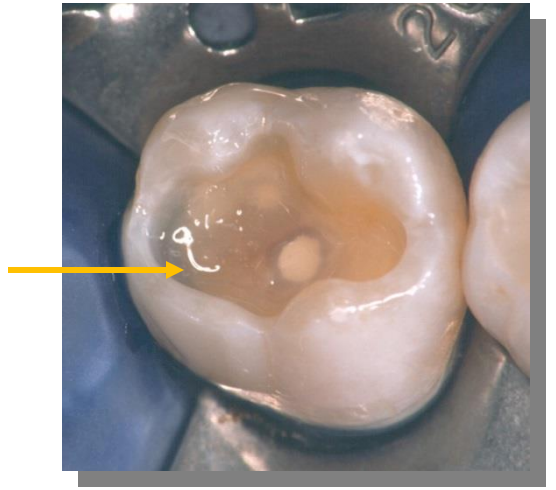
- Infractions of marginal ridge
- Corrosion
- Bad aesthetics

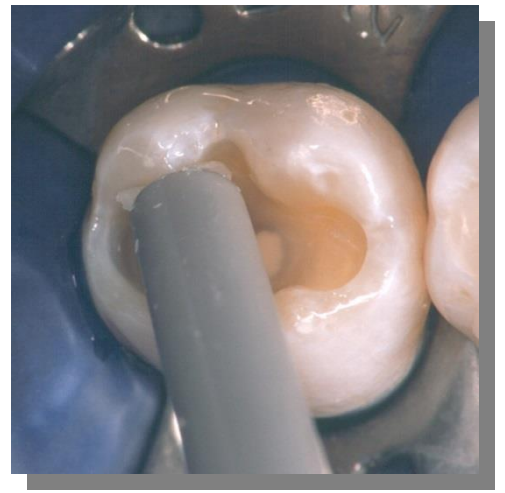




Amalgam - advantages

- Easy to place
- Good mechanical properties esp.
- Price





Indications

- Moderate to large restorations
- If there is heavy occlusal loading (alternative onlay)
- Oral hygiene is not optimal (alternative dense glassionomer as middle term temporary)
- When ihe proper isolation is not possible
- Price

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Contraindications

- Aesthetically prominent areas of posterior teeth
- Small - moderate classes I. that can be well isolated

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GIC only?

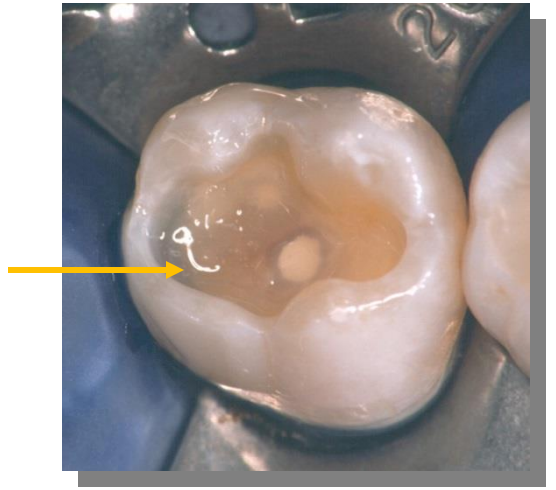
- Primary dentition
- Resin modifies GIC preferable

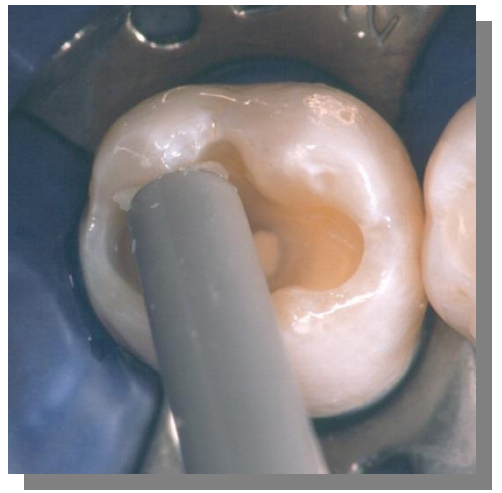
Composite - benefits

- Non metallic materiál
- Adhesion – no gap
- Less amount of hard dental tissues that is necessary to remove
- Good resistency of the treated tooth
- Aesthetics

Composite - disadvantages

- Good isolation is necessary
- Technique sensitive treatment
- Price





Indications

- Aesthetically prominent areas of posterior teeth
- Small - moderate classes I. that can be well isolated
- Larger cavities: consider not only the size and location of the caries lesion, but also occlusal loading, level of oral hygiene. Alternative: indirect restoration (onlay, crown).
- Good level of oral hygiene is necessary

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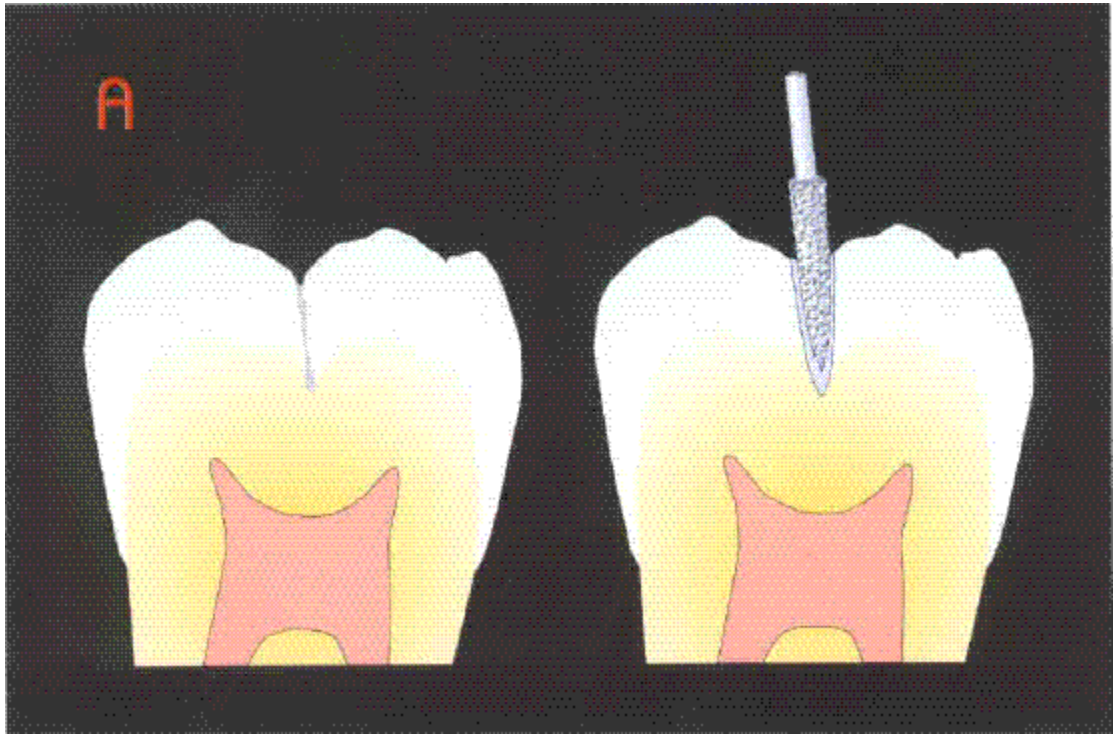
Pit and fissure sealing indications

- Teeth soon after eruption with deep fisures
- Disabled patients
- Adults - hyposalivation

Pit and fissure sealing - cointraindications

- Shallow fissures, good oral hygiene DMF = 0
- High caries risk (DMF high) – risk of proximal caries
- Proximal caries, occlusal caries (ICDS – 3 and more)

Adhesive preparation in a fissure – sealant filling



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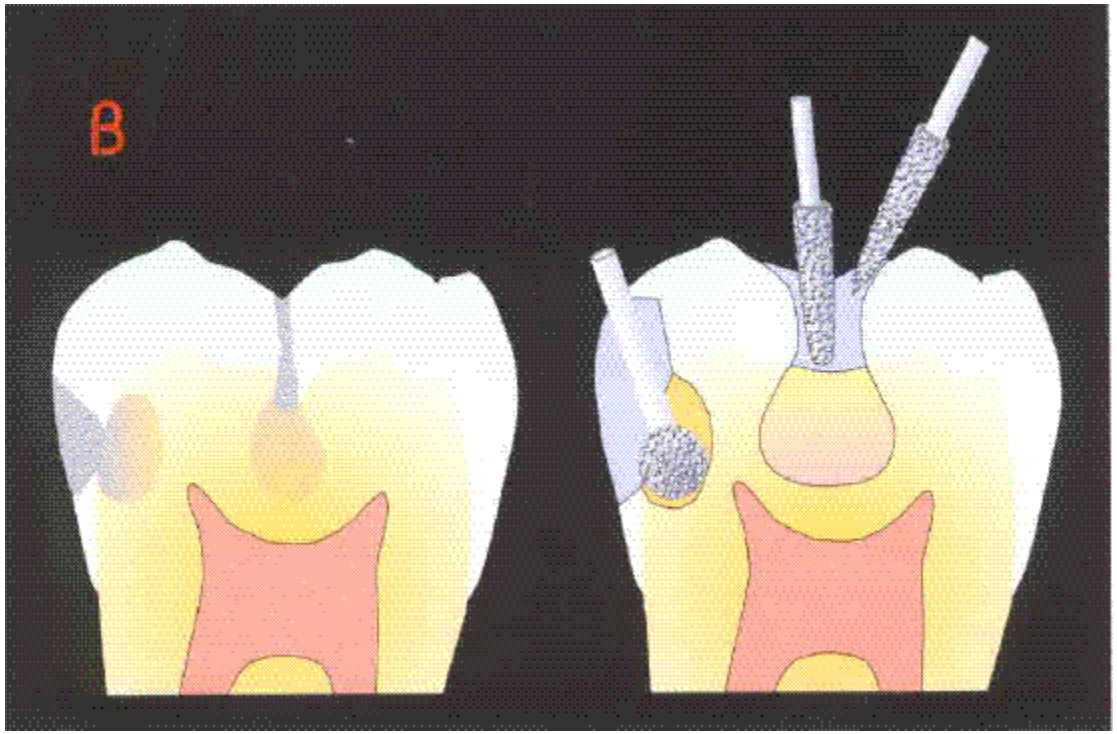
Adhesive preparation – caries lesion in dentin



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Preventive filling - indications

- Primary molars
- Premolars
- Permanent molars (ICDAS 3 and more)

Preventive filling - contraindications

- High caries risk, DMF > 5
- Large dental caries (more than 1/3 intercuspidal distance, underminig chronic caries
- Proximal surfaces must be intact or max D1
- Proximal cavitated lesions

Preventive composite filling

Preventive glassionomer filling

Sealant filling

Preventive filling – GIC + composite

Composit material

- Small cavities – preparation is limited on caries lesion only, small instruments no extention, fissure sealing around and sealant also covers the filling. This is preventive composite filling.
- Medium cavities – preparation is limited on caries lesion, GIC replaces lost entin, composite filling on the top.
- Larger cavities – preparation involved the fissures, box.

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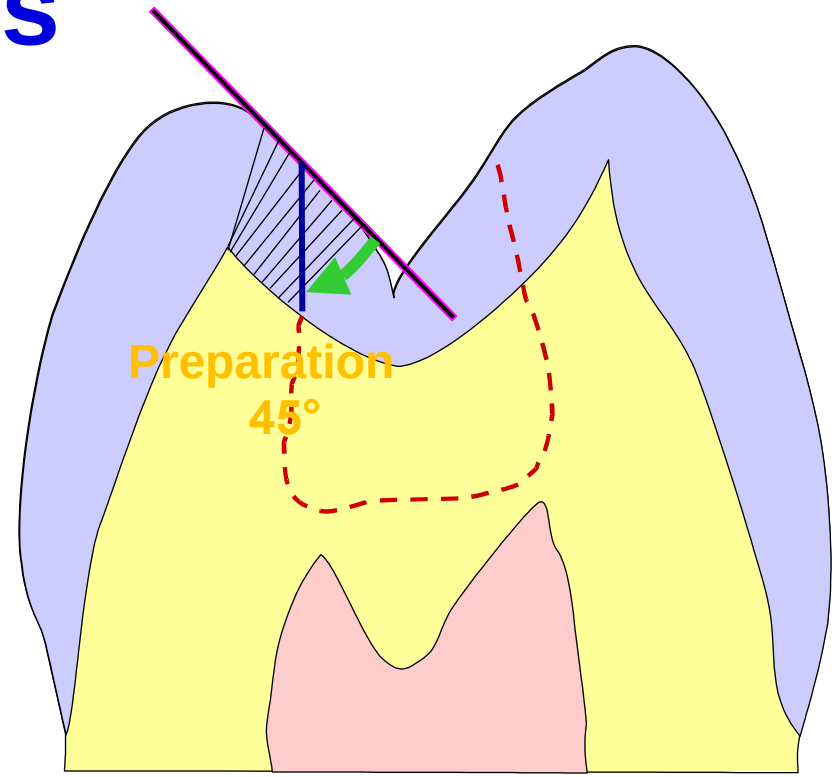
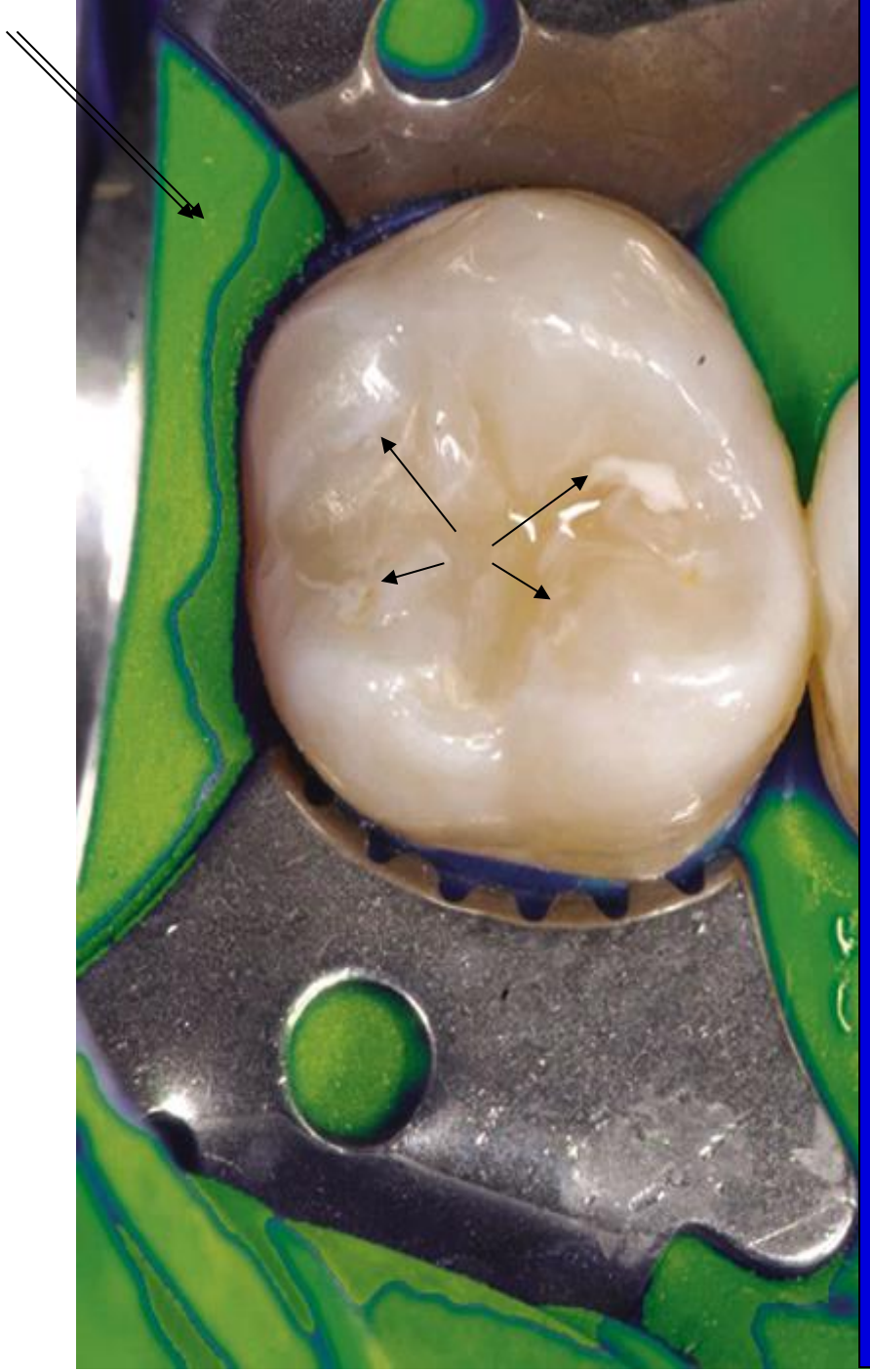
Box (remember rounded edges)

Preparation of enamel borders – no bevel

The beveling dependens on the orientation of enamel rods

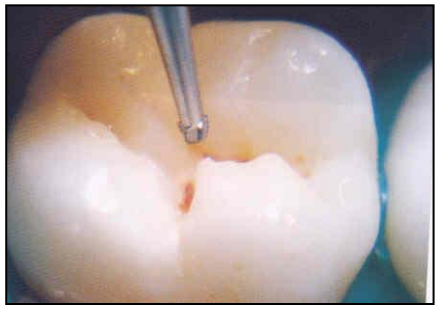




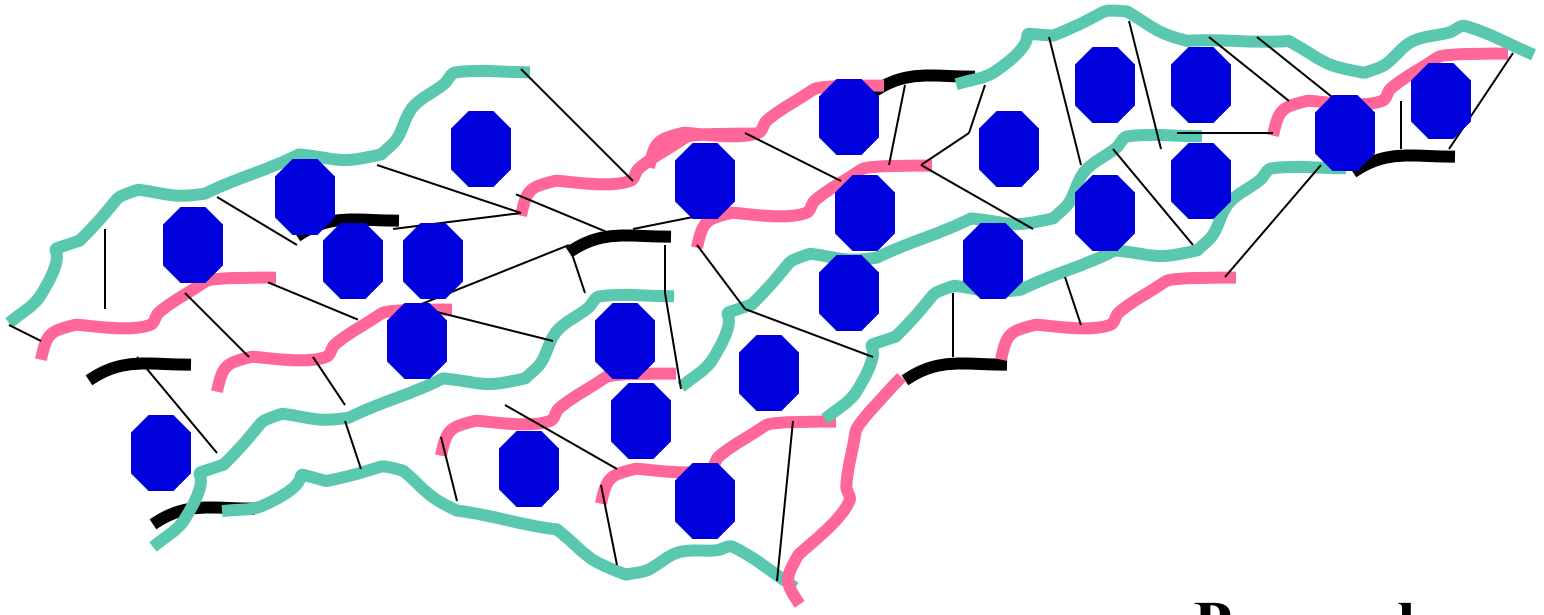
The composite material is built cusp by cusp

Isolated cavities

Preparation of fissural complex



Polymerization shrinkage and polymerization stress



Pre –gel
Gel point
Post -gel

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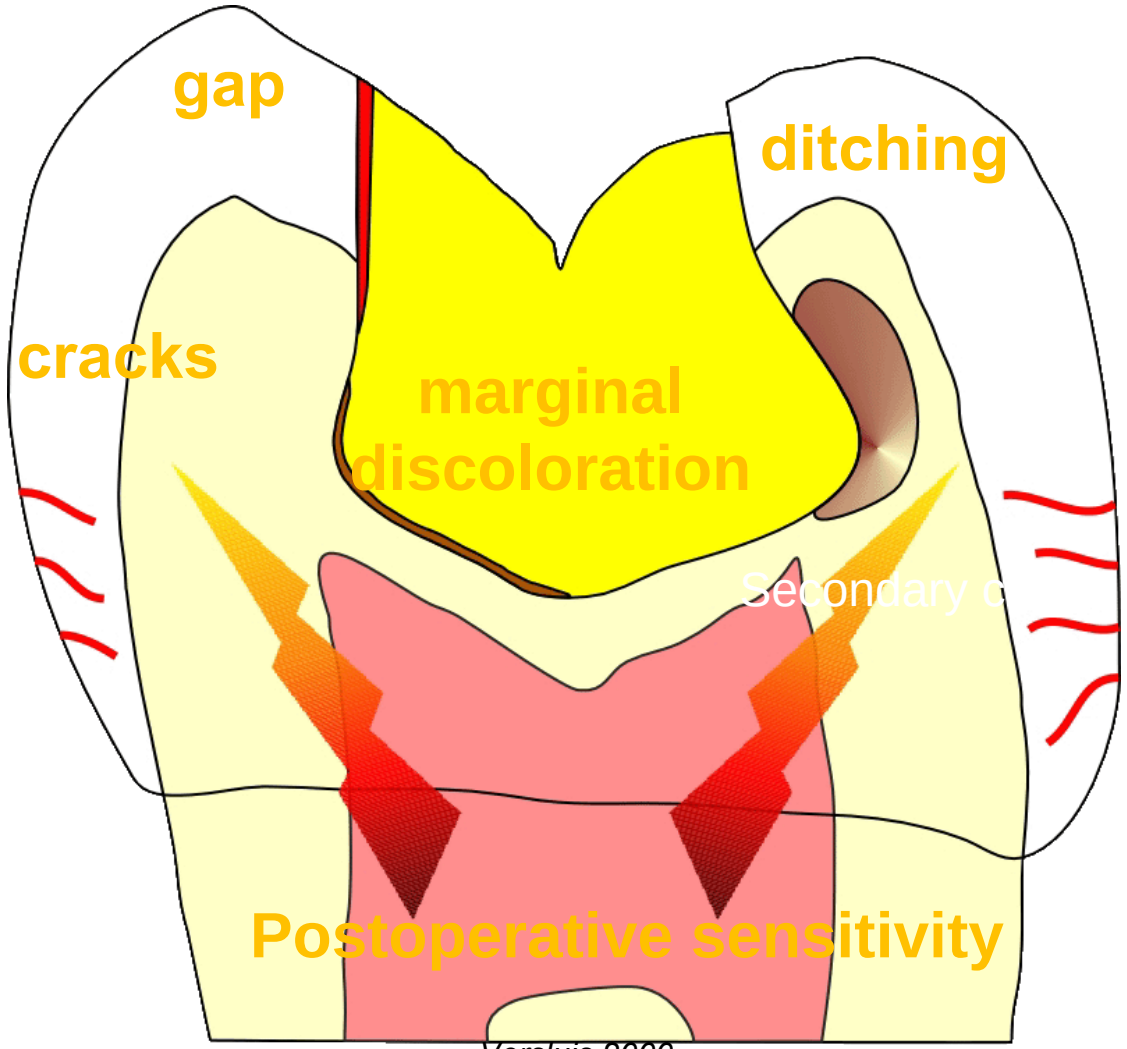
Risks – high C-factor



Versluis 2000

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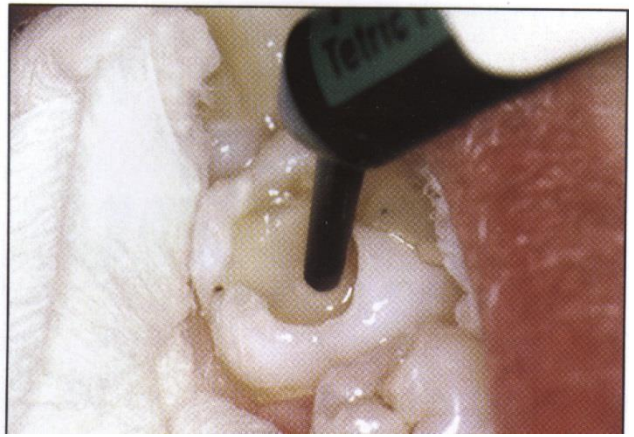
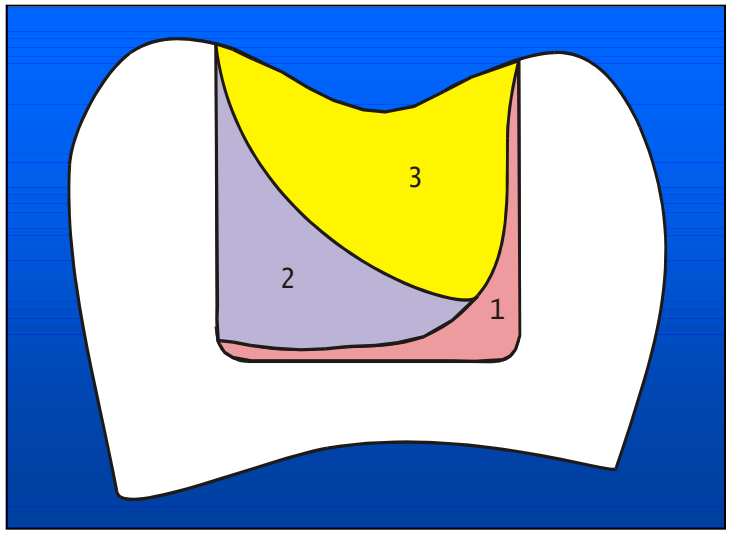
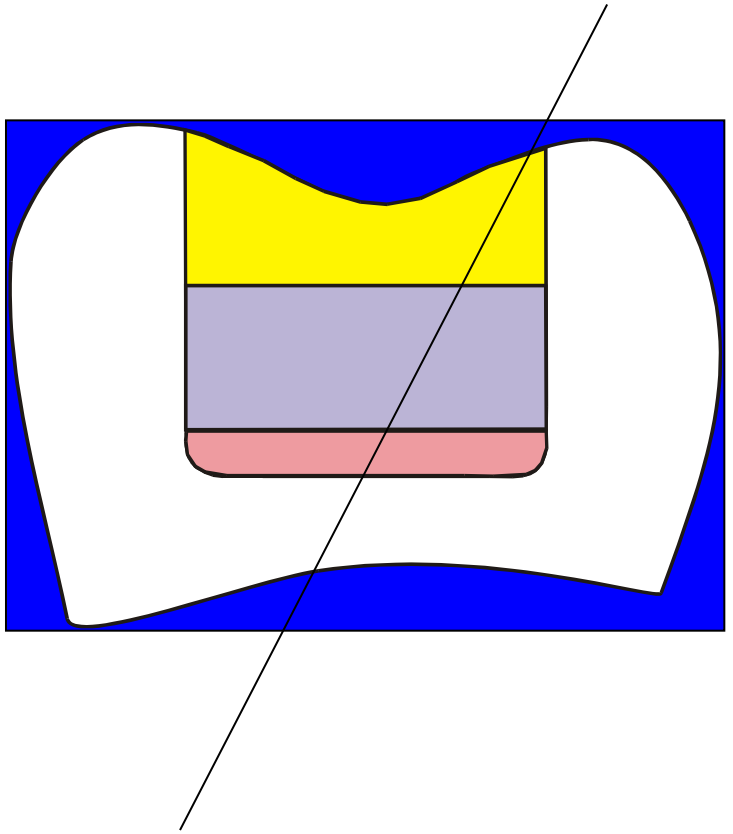
Flowables - importance

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



Placement of the materiál Incremental technique with respect to C-factor of each layer





Adhesives

- Acid etching technique

Etching

Washing

Priming Bonding

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Adhesives

- Selfetching adhesive systems

Priming

Bonding

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Adhesives

- Active and passive bonding

Active – rubbing with microbrush - selfetching

Passive – without any rubbing – acid etching

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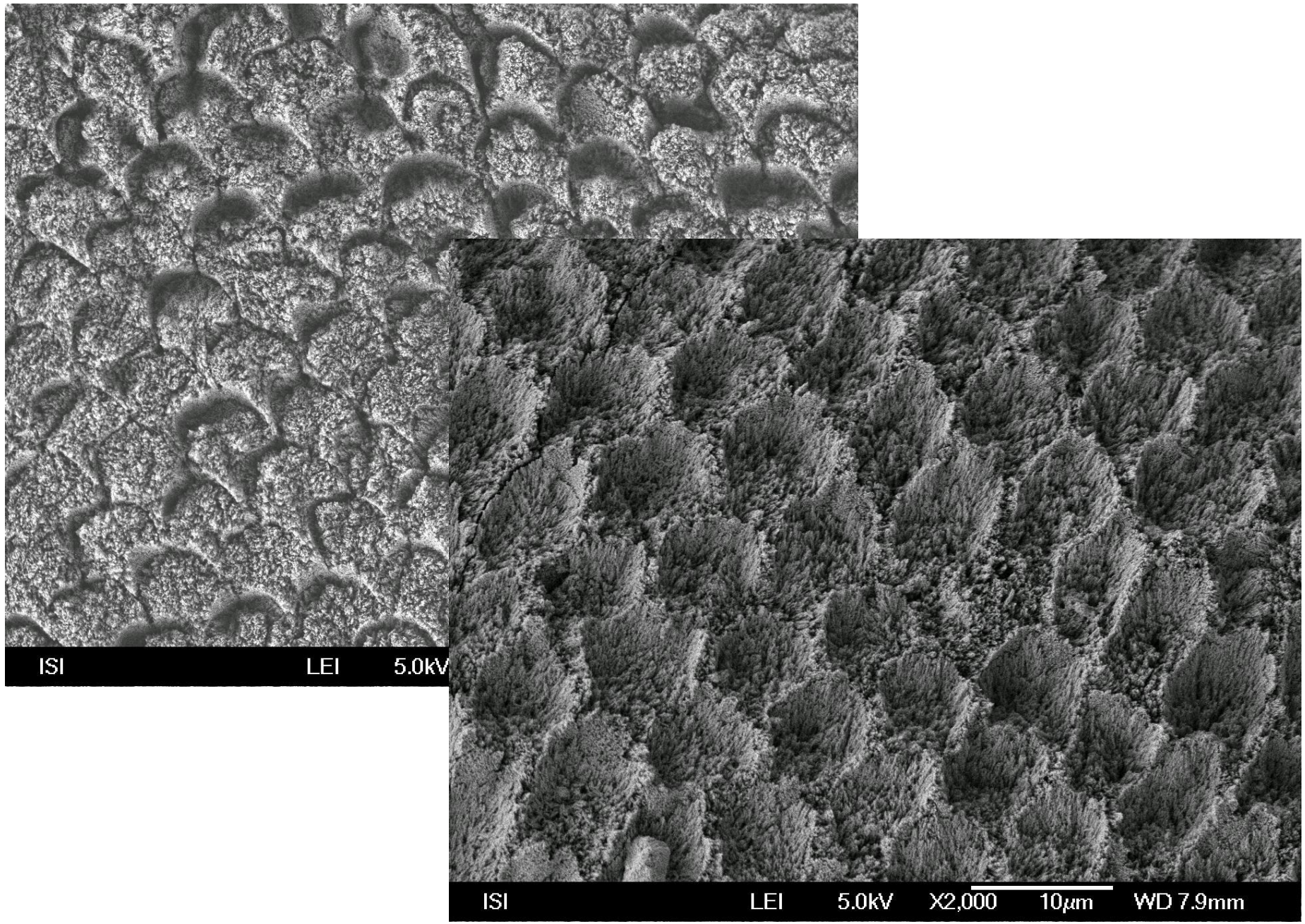
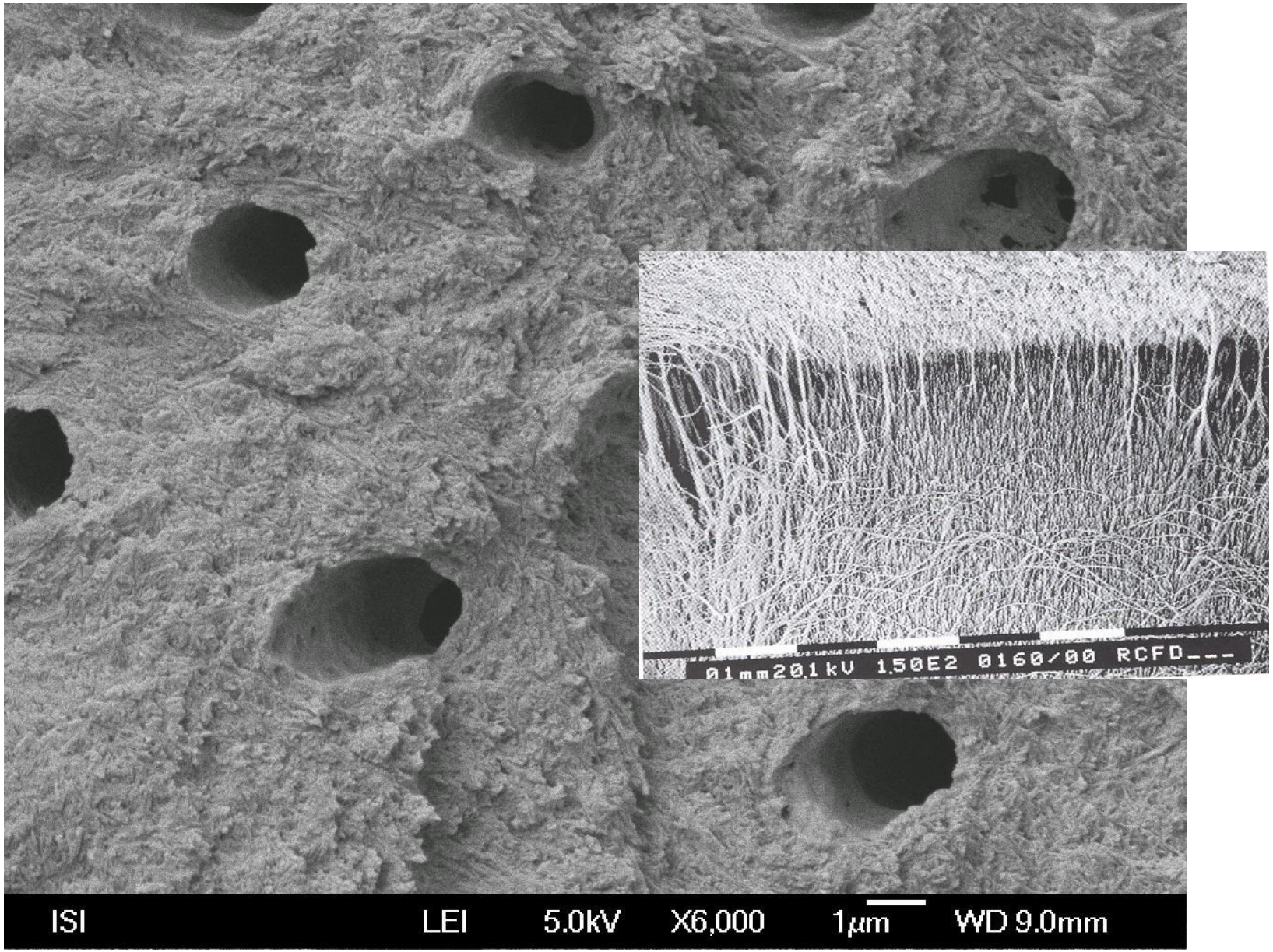
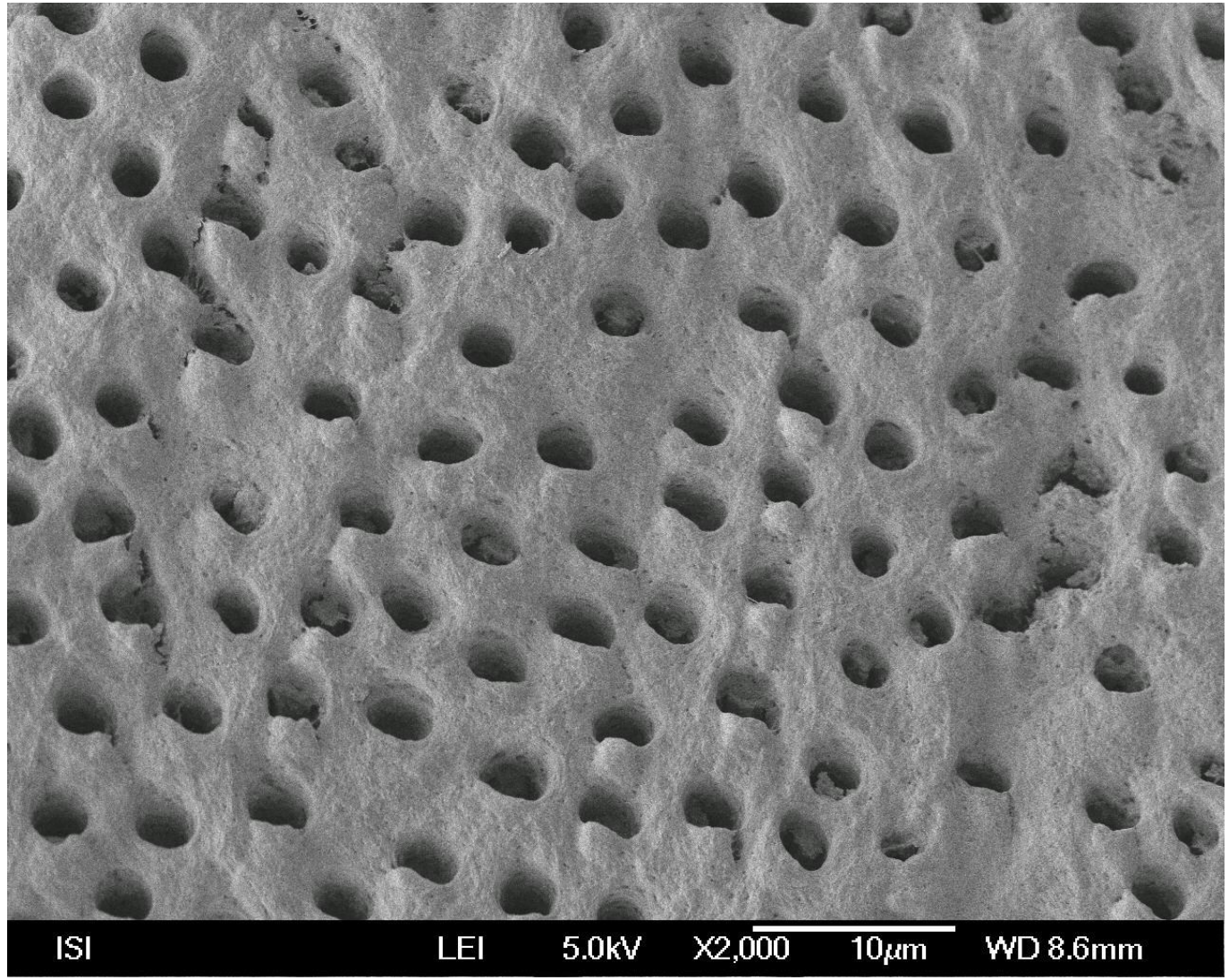

ISI LEI 5.0kV
ISI LEI 5.0kV X2,000 10µm WD 7.9mm


01mm20.1kV 1.50E2 0160/00 RCFD___
ISI LEI 5.0kV X6,000 1μm WD 9.0mm


ISI
LEI
5.0kV
X2,000
10μm
WD 8.6mm

Interdental space

- Interdental space is a caries danger area (below the contact point).

- Interdental space is infilled with interdental palilla, that moves apically during the time and the space is open.

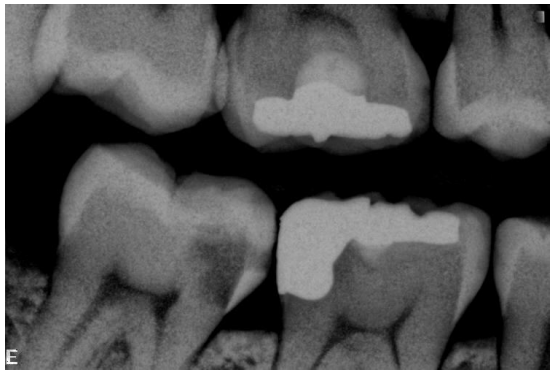
- Dental caries begins below the contact point.

Class II.

Origin:

Proximal surface below the contact point

Propagation of dental caries from the occlusal surface



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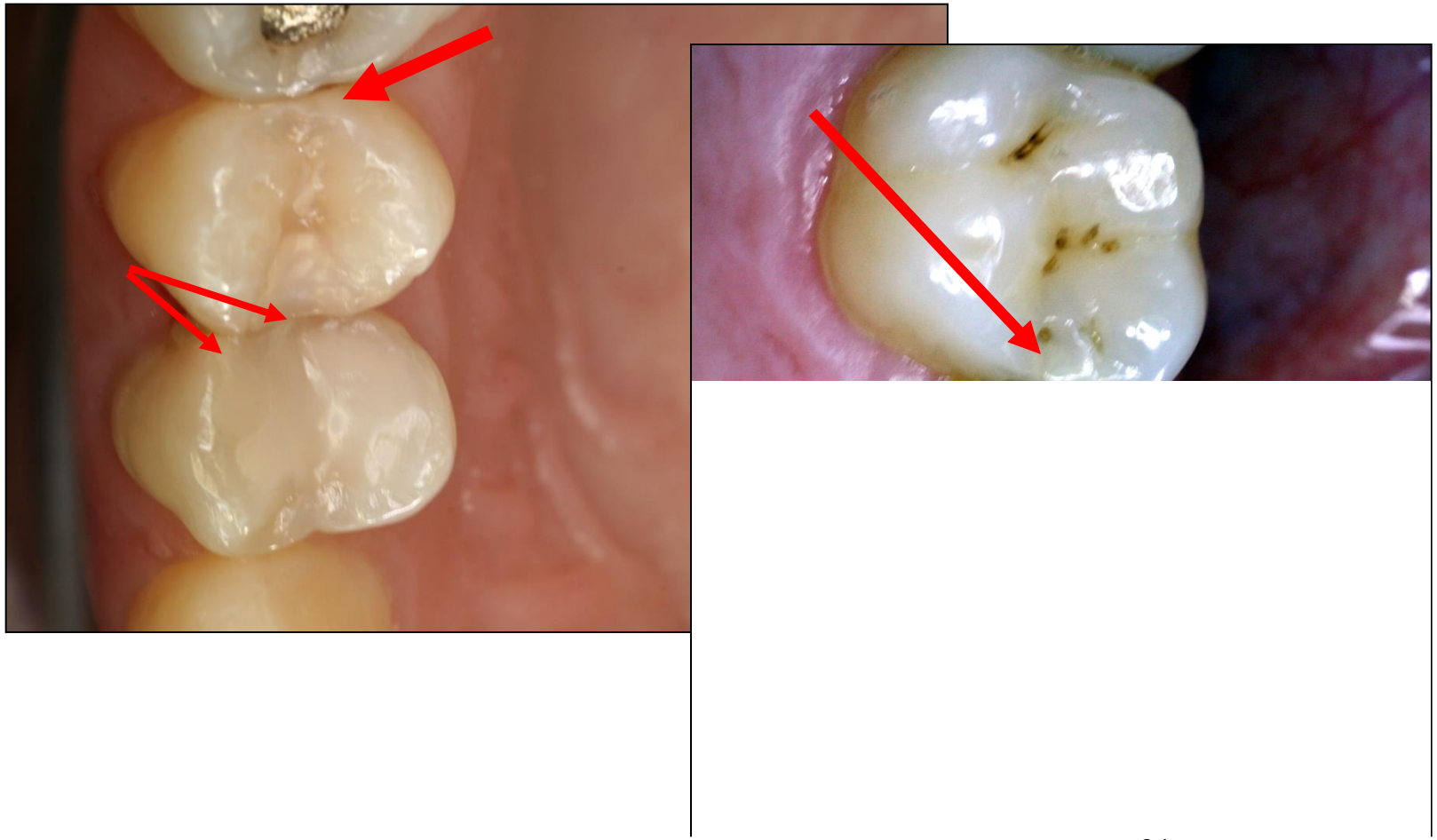
Symptoms

- No symptoms
- Increased sensitivity (cold, sweet)
- Retention of food
- Defect (carious lesion is open – the enamel is broken)
- Bite sensitivity (when carious lesion is open)

Diagnosis

- Visual changes of tooth structure (chalk white colour).
- Transillumination (white light, or Diagno Cam).
- Radiography



Bite wing

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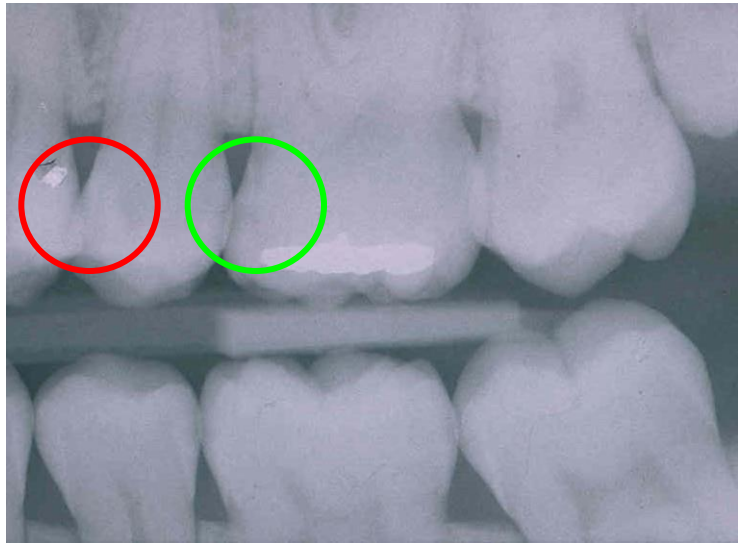
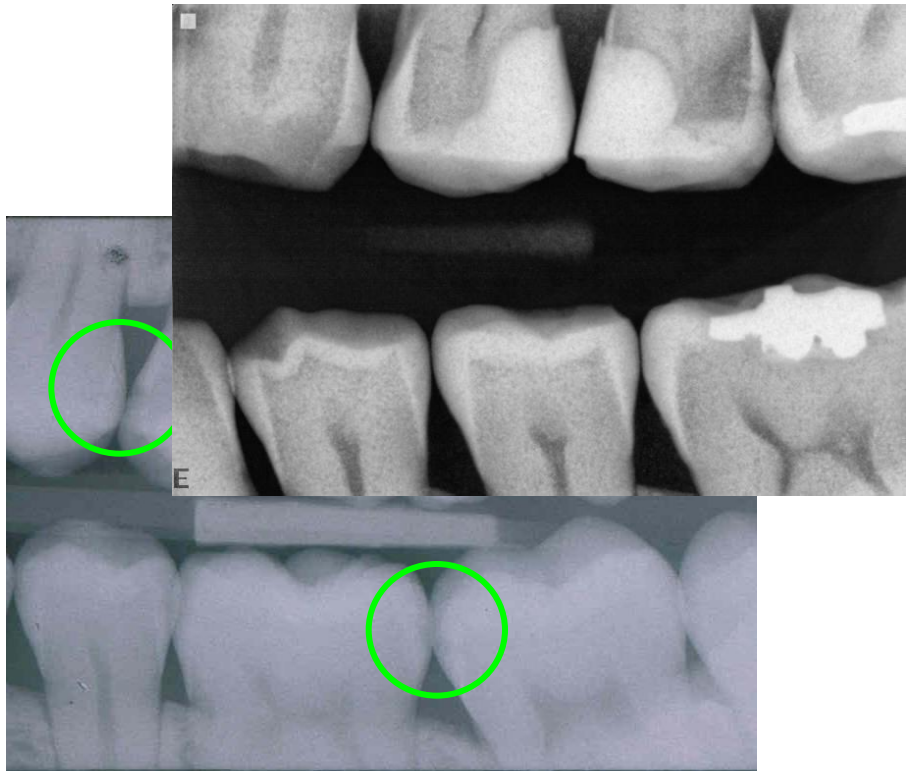
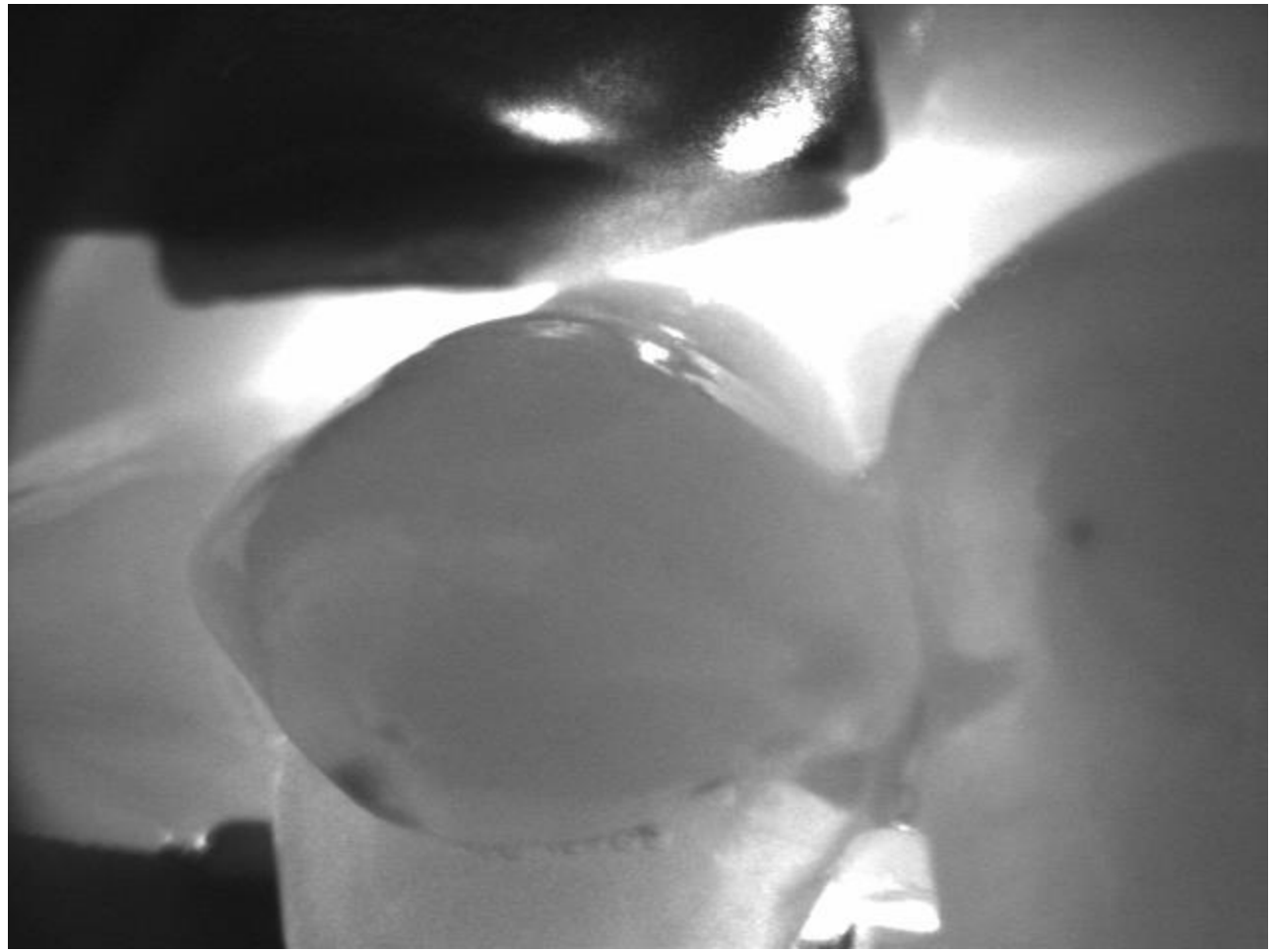
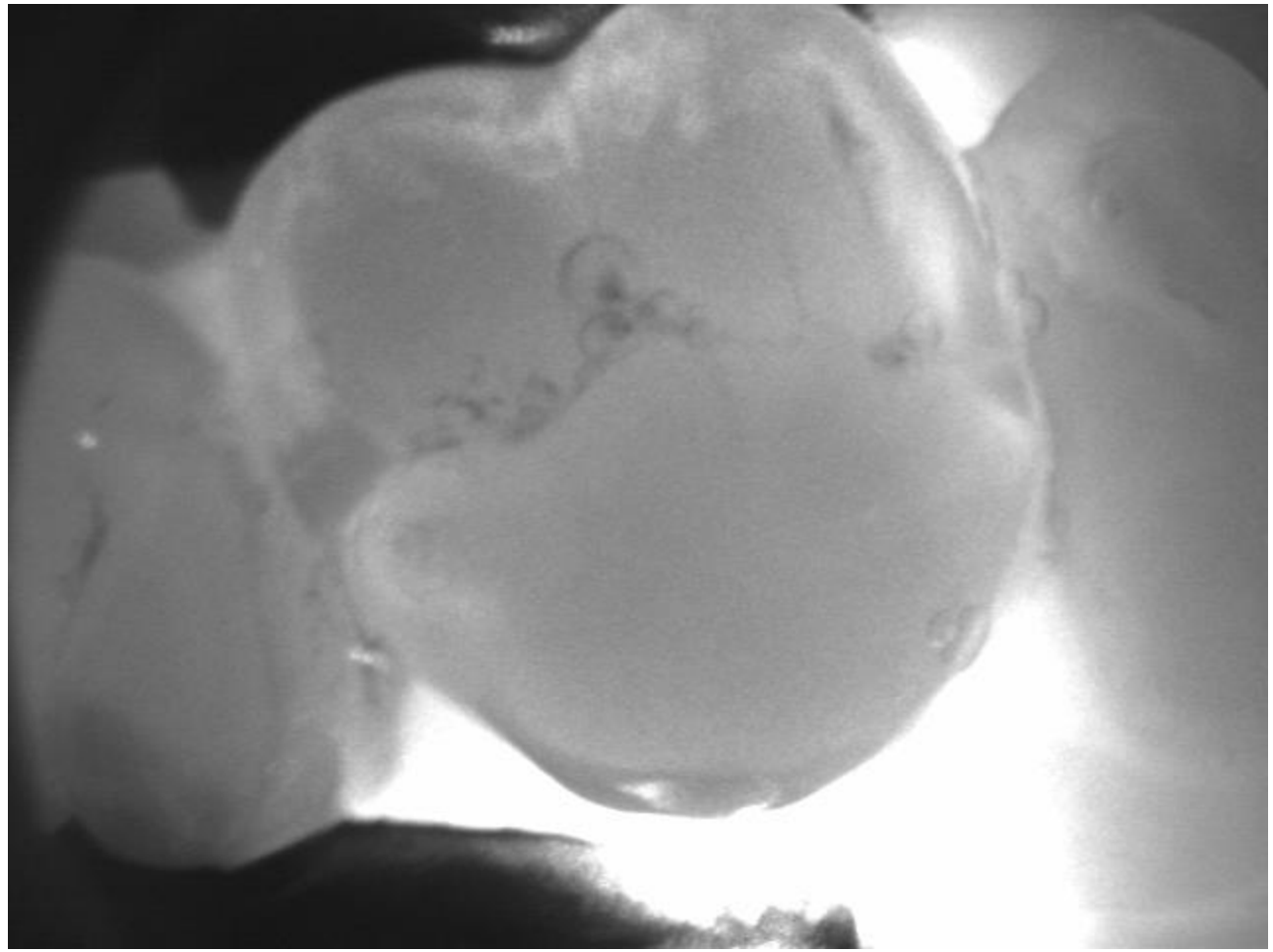
D1 – radiolucency till ½ the enamel
D2 – radiolucency till the border of enamel and dentin
D3 – radiolucency till ½ dentin
D4 - radiolicency more than ½ dentin





DIAGNOCam





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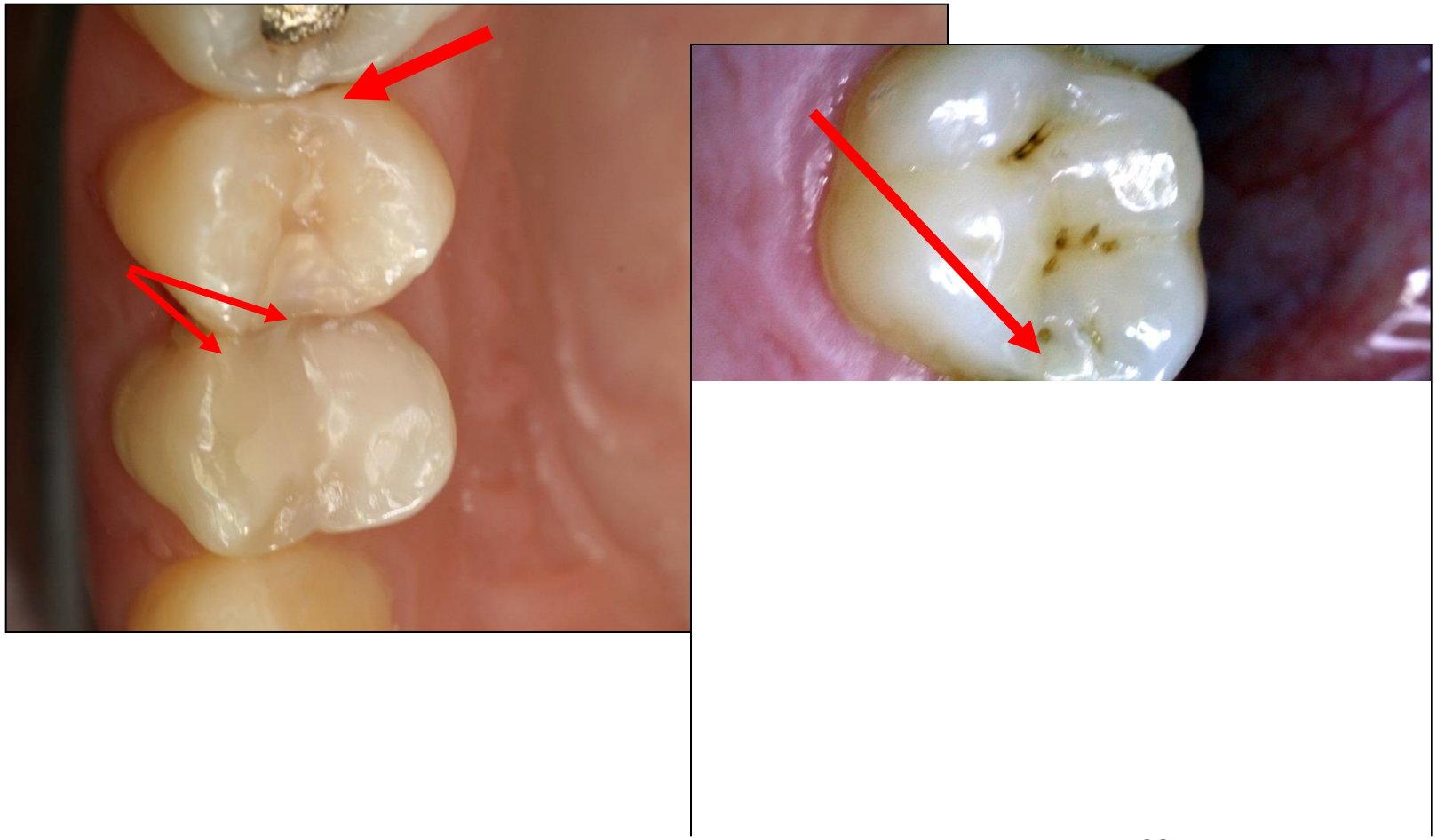

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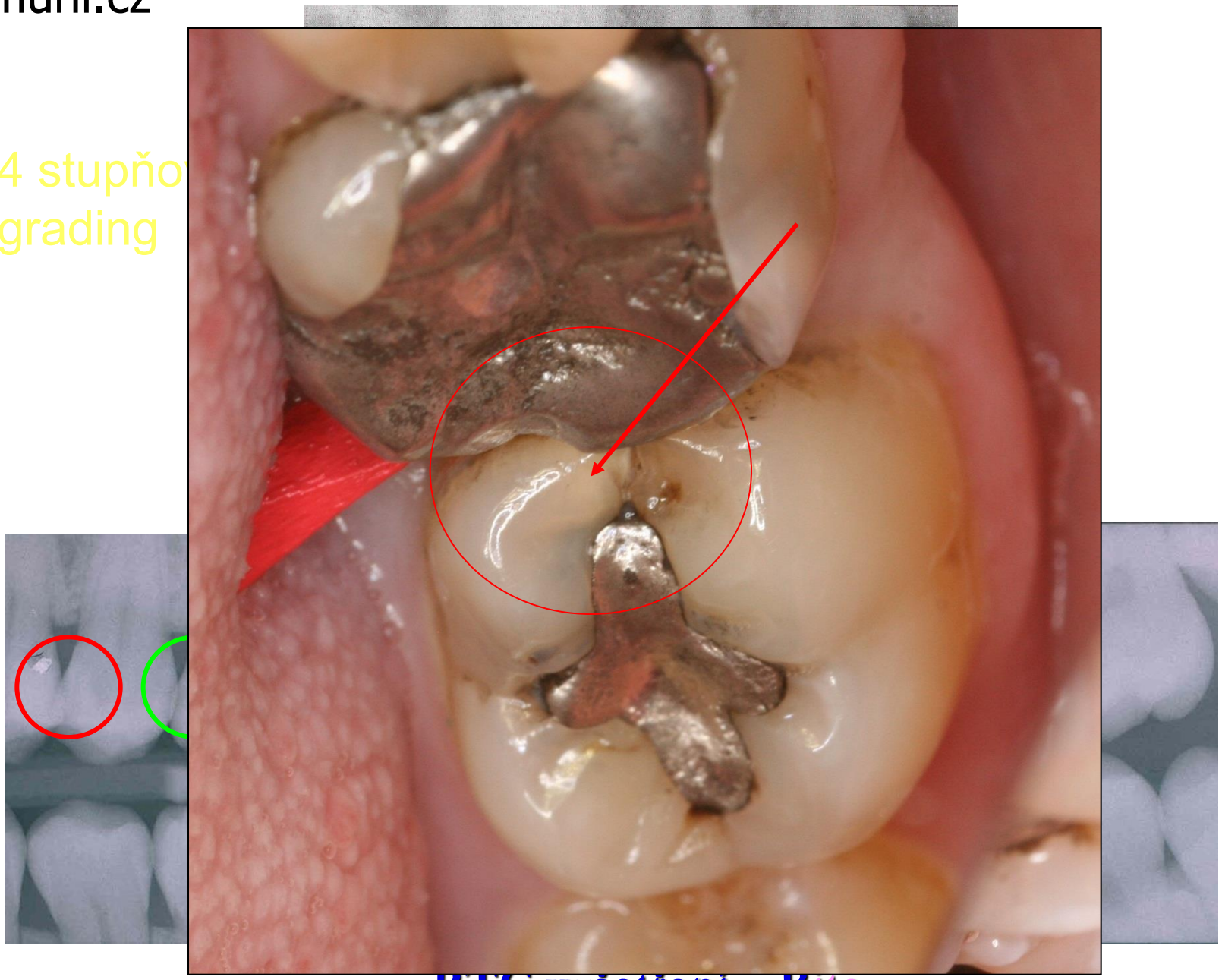
4 stupňo
grading



RTG vyšetření – Bite Wing

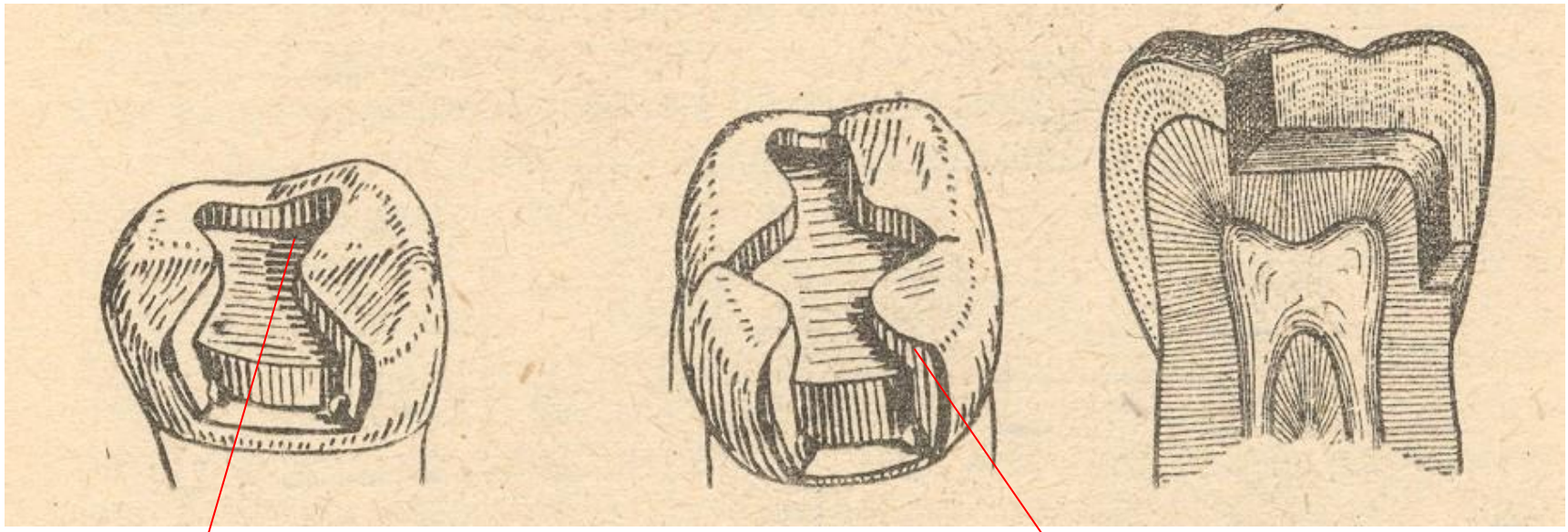
Choice of the material depends on

- Size of carious lesion
- Level of oral hygiene
- Occlusal loading
- Cooperation of the patient and other factors

Preparation - adhesive materials (composites, glass ionomers)

- Conventional preparation for composites
- Adhesive slot
- Tunnel preparation

Conventional preparation amalgam



Occlusal cavity

Proximal cavity - box

Access to the cavity

From the occlusal surface

Through the undermined enamel

Separation using wooden wedges is useful

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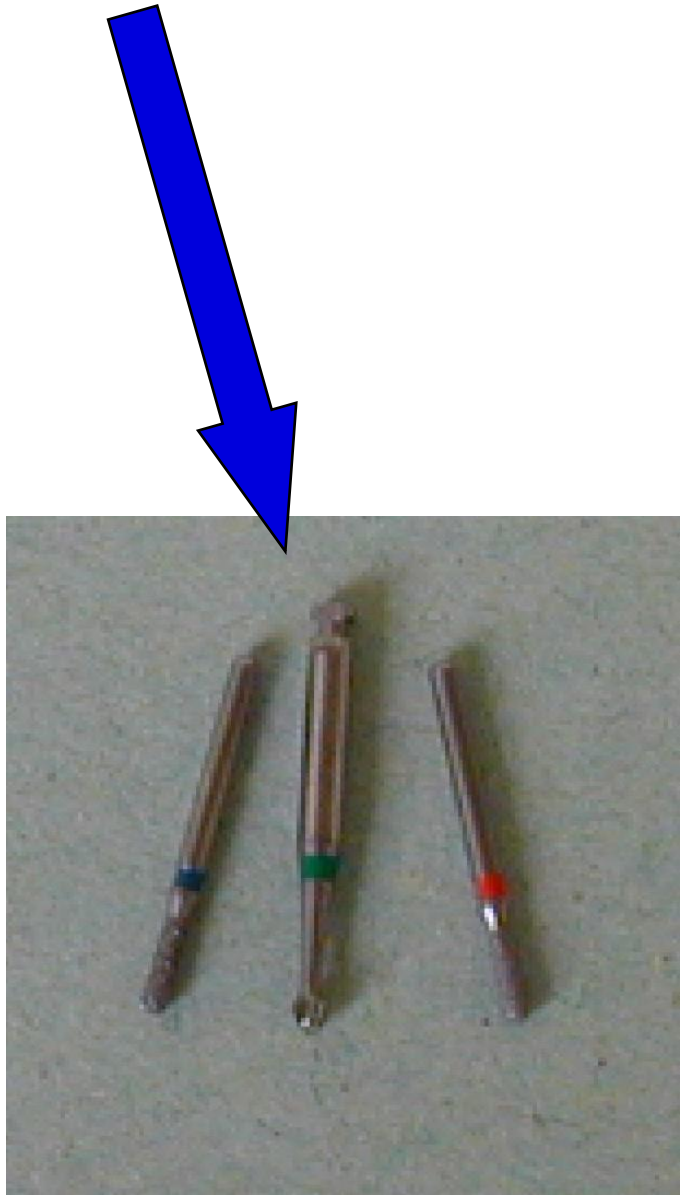
Pre op



Access to the cavity

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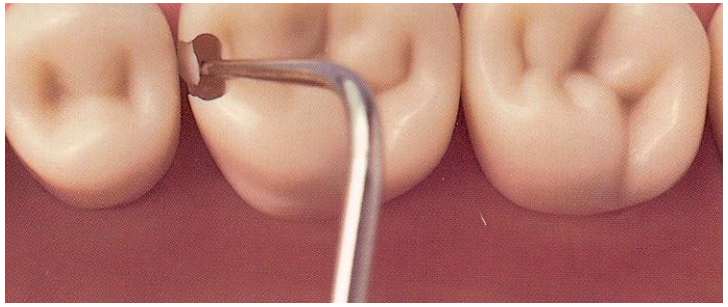
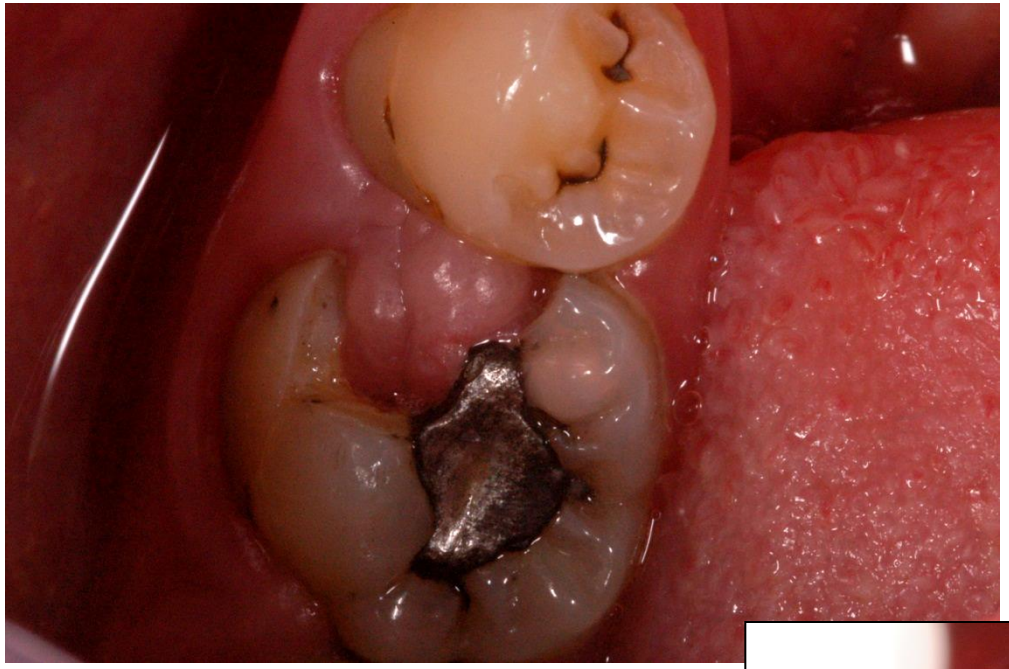
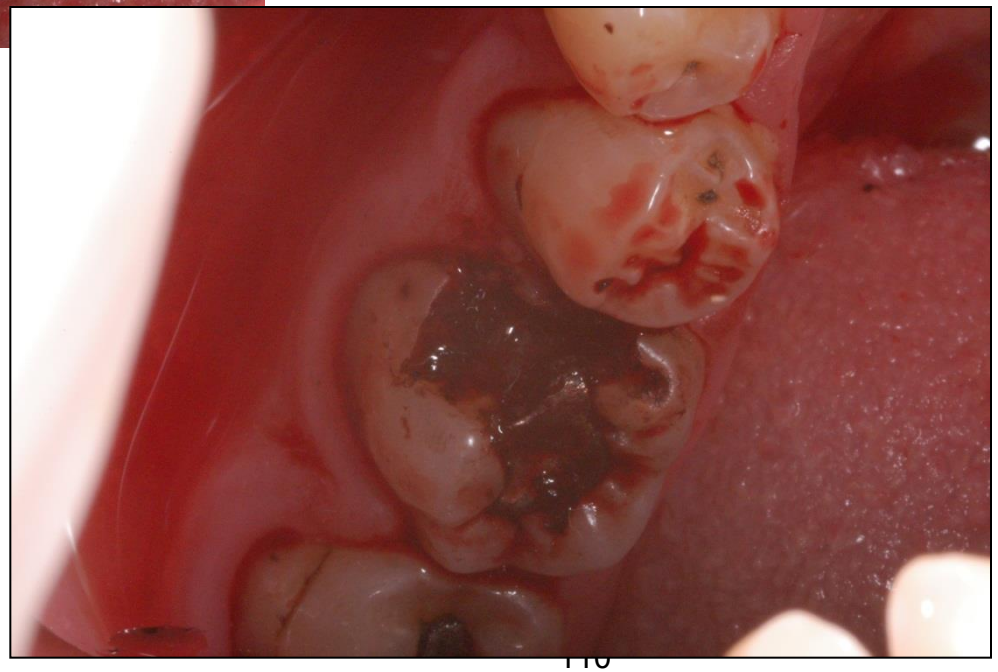
Wooden wedge



Breaking the thin enamel layer out of the cavit



➢ Remove of the gingiva that grows into the cavity



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Cavosurface margin and extention for prevention

Proximal box:

Vestibullary and orally – axial walls (the border between the oral/vestibular and proximal surface.

Supragingival

Occlusal

Class I.

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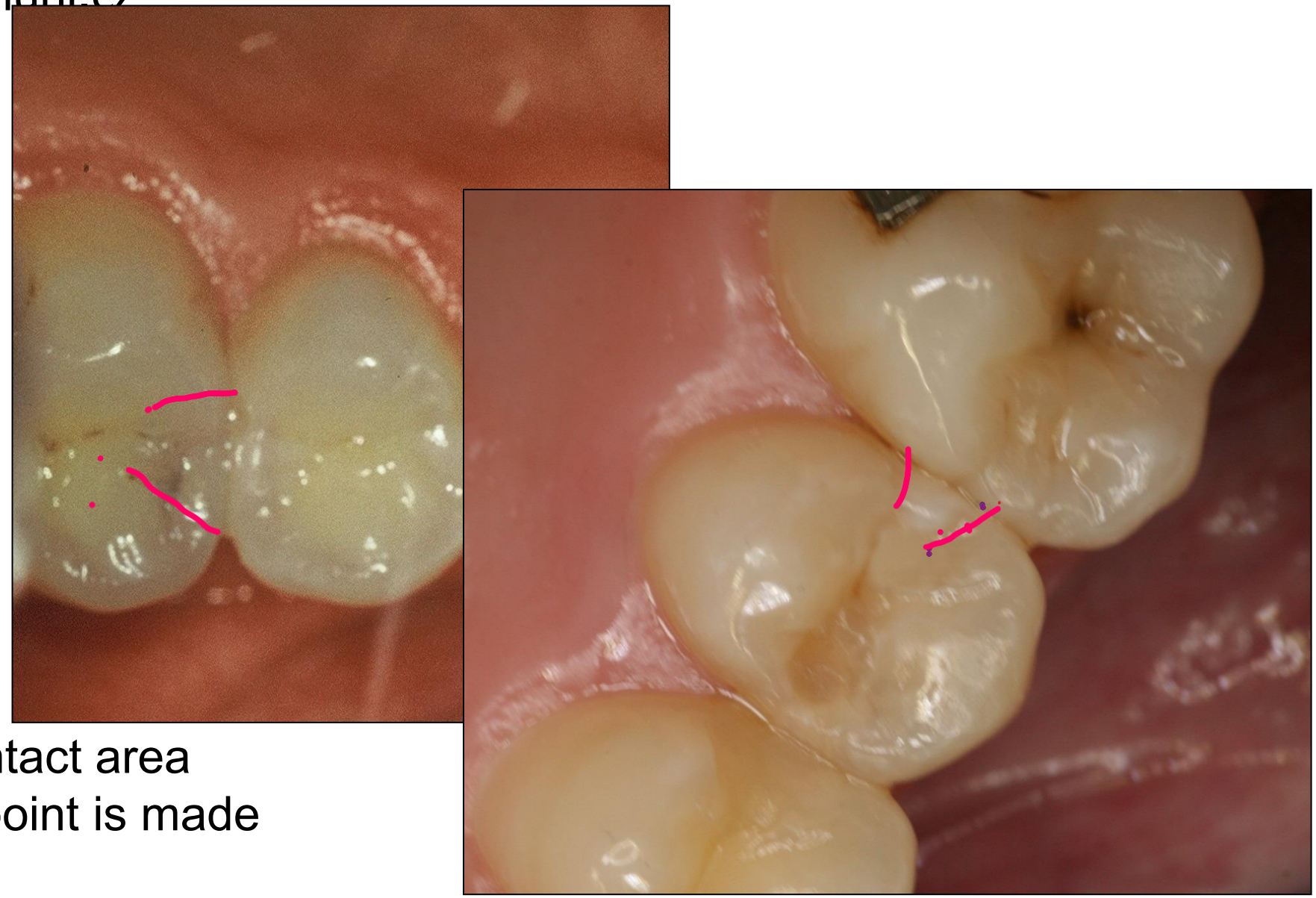


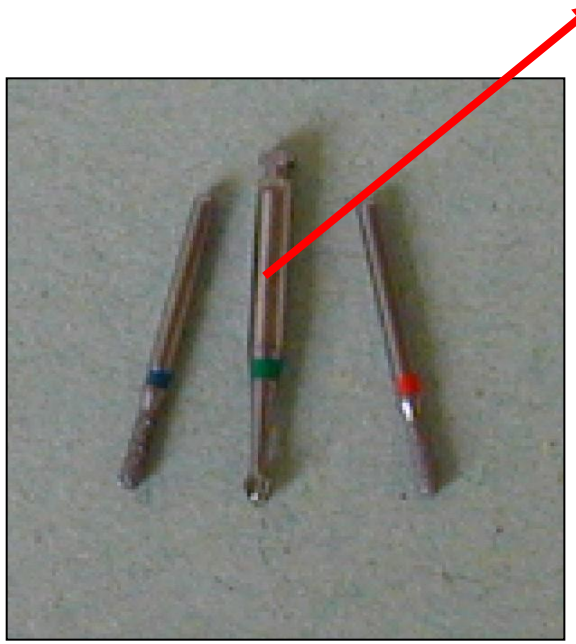
Study the contact area
The contact point is made
of the filling
The axial wall is 0,5 mm vestibulary resp.orally
from the contact point

Resistancy

- No undermined enamel
- No sharp edges
- Isthmus is 1/3 – 1/4 intercuspidal distancex
- Angle between axial and gingival wall: 90°, or 85°
- Width of gingival wall is 1 mm at least
- Thickness of the filling 2 – 4 mm (4mm if cusp replacing)

Excavation of carious dentin

Rounded bur



(Caries Detector, Kuraray, Japonsko; Caries Marker, VOCO,Německo)

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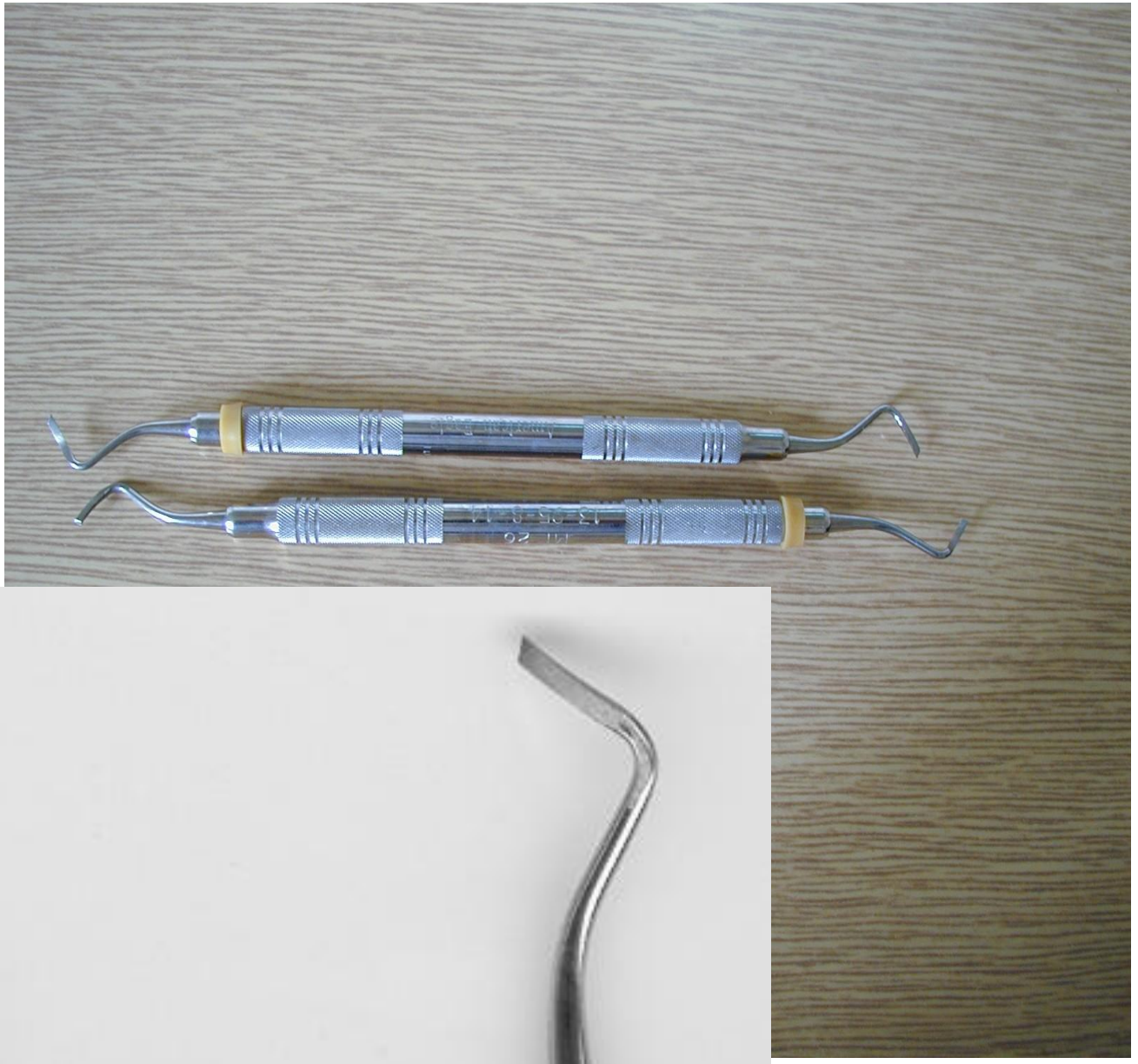
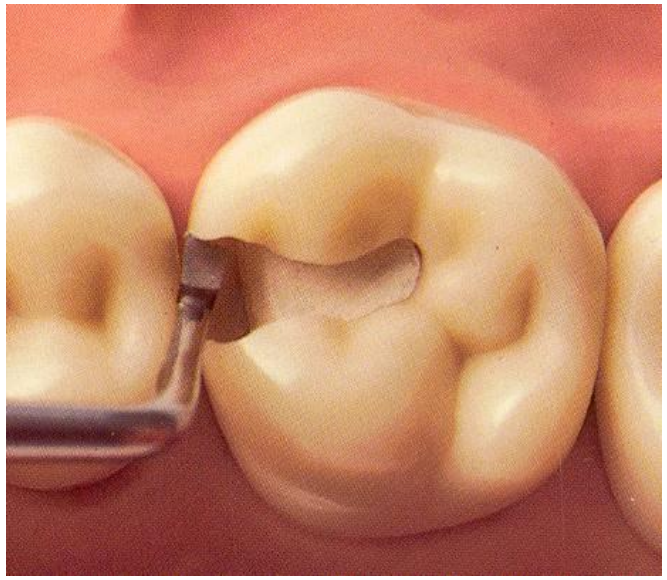
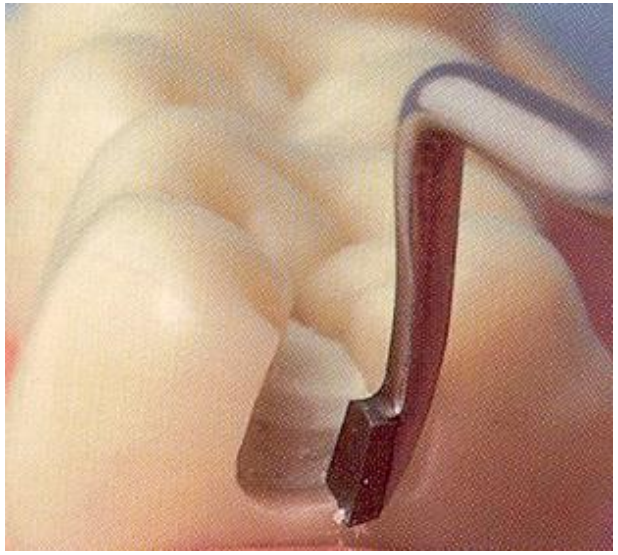
Finishing of the walls of the cavity

- Red coded diamond bur
- Chisel on the gingival wall (if in enamel)







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Final check

- Goog light, miror

Matrix placement

➢Matrix primarily is used when a proximal surface is to be restored

The objectives:

- Provide proper contact
- Provide proper contour
- Confine the restorative material
- Reduce the amount of excess material

Matrices

- Ivory I retainer Ivory 1
- Hawe Neos retainer Ivory 8
- Tofelmire matrix and retainer

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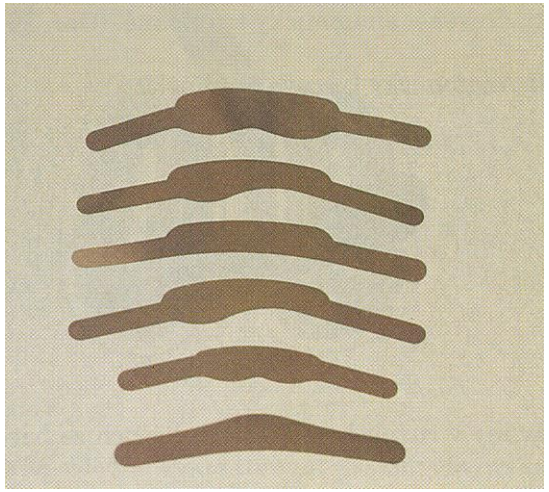
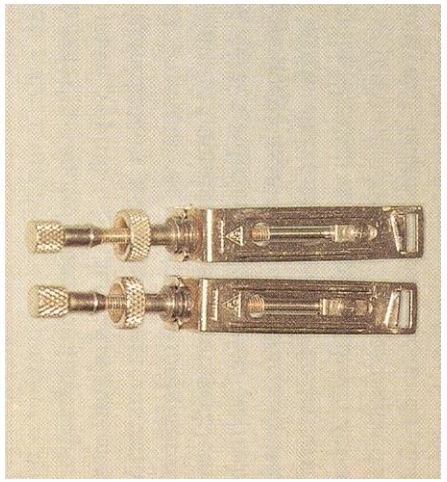
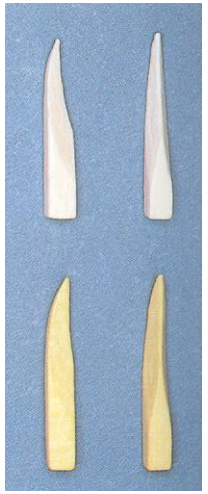
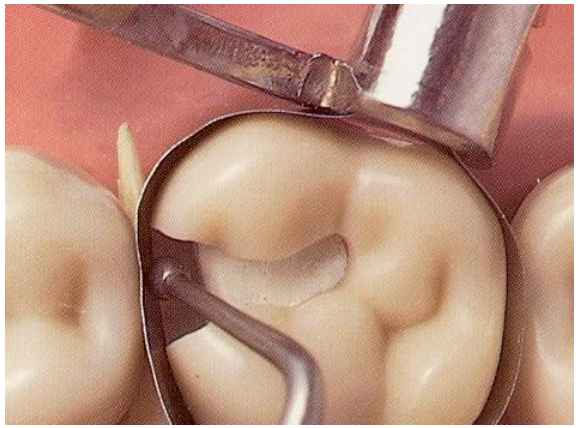
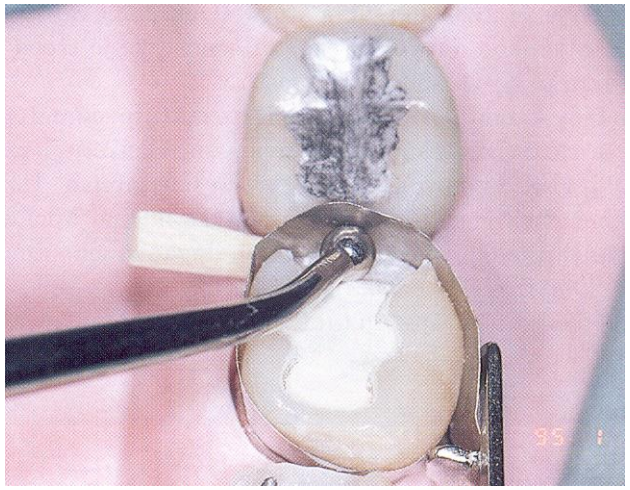
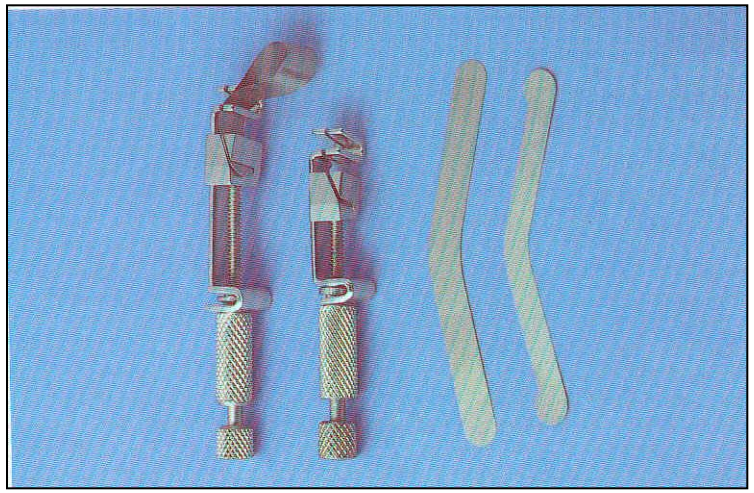


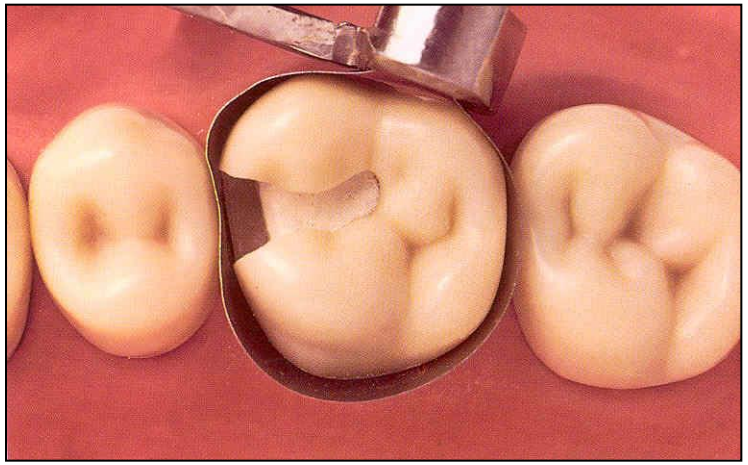


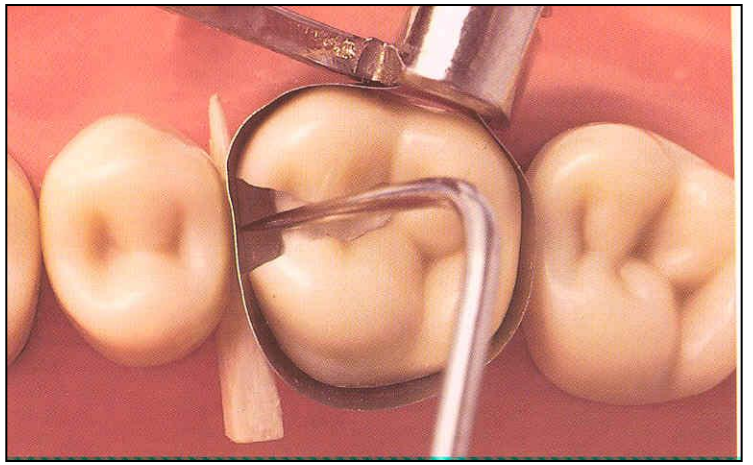








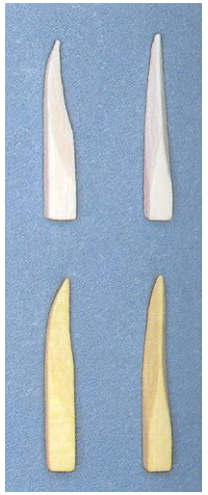




Wedges

- Wooden wedges

  - tighten the matrix band
  - compress the gingiva
  - separate the teeth



Wedging

- Slip the matrix band over the tooth)apical to the gingiva margin – 0,5, - 1 mm)
- Tighten the matrix, check it with probe
- Place a wedge
- Turn the retainer ¼ counterclockwise
- Contour the band

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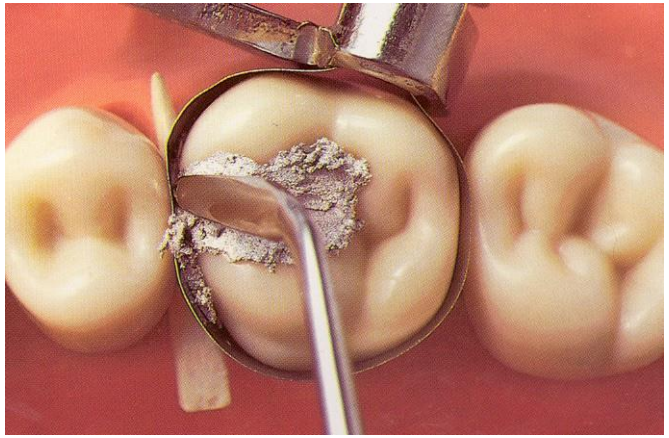
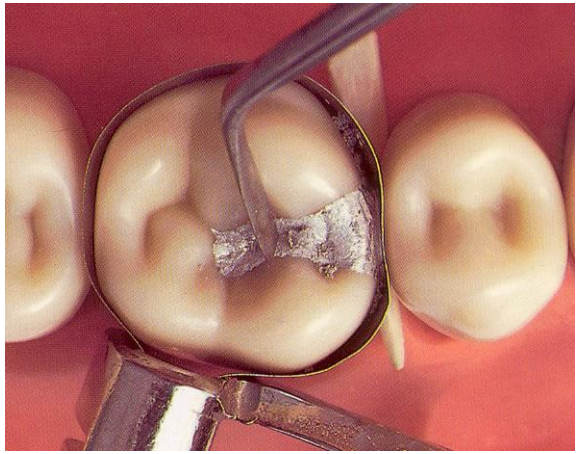
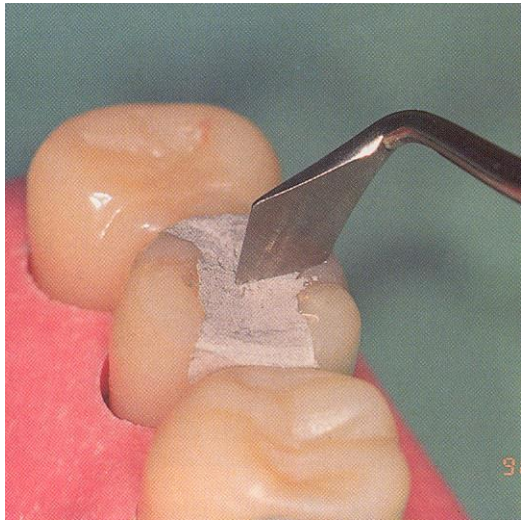
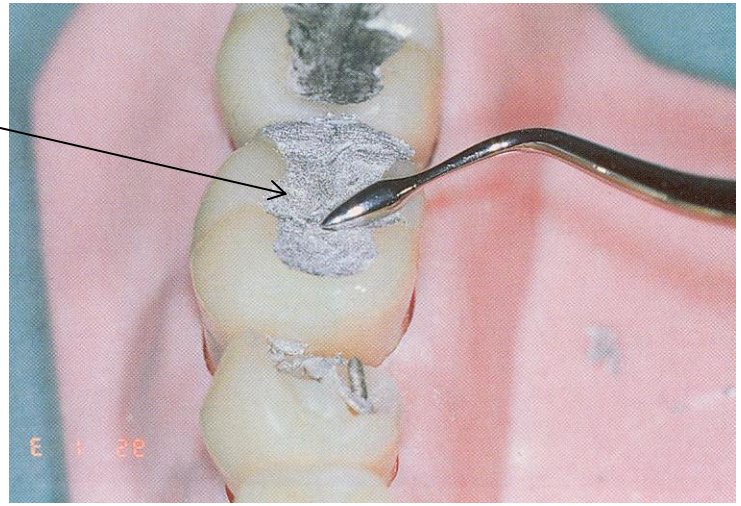






Carving

Burnishing



Indications: Composite

- Aesthetically prominent areas of posterior teeth
- Small - moderate classes I. that can be well isolated
- Good level of oral hygiene is necessary

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Contraindications: Composite

- Moderate to large restorations
- Restorations that have heavy occlusal contacts
- Restorations that cannot be well isolated
- Restorations that extend onto the root surface (subgingival – margin relocation or lenghtening of the crown is necessary)
- Abutment teeth for removable partial dentures

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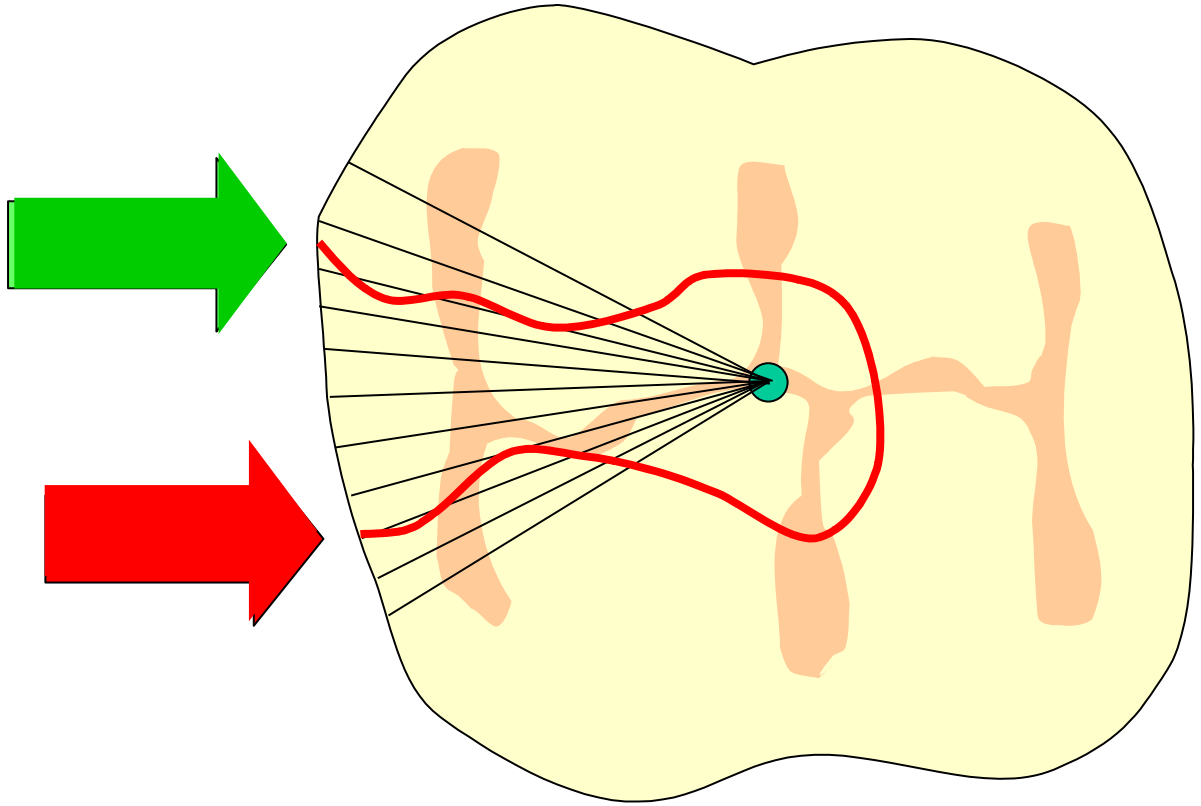
Composite - possibilities

- Conventional cavity (oclusal and proximal cavity)
- Adhesive slot
- Tunnel preparation
- Cusp replacement – direct, indirect.

Interproximal borders

Composite

Amalgam



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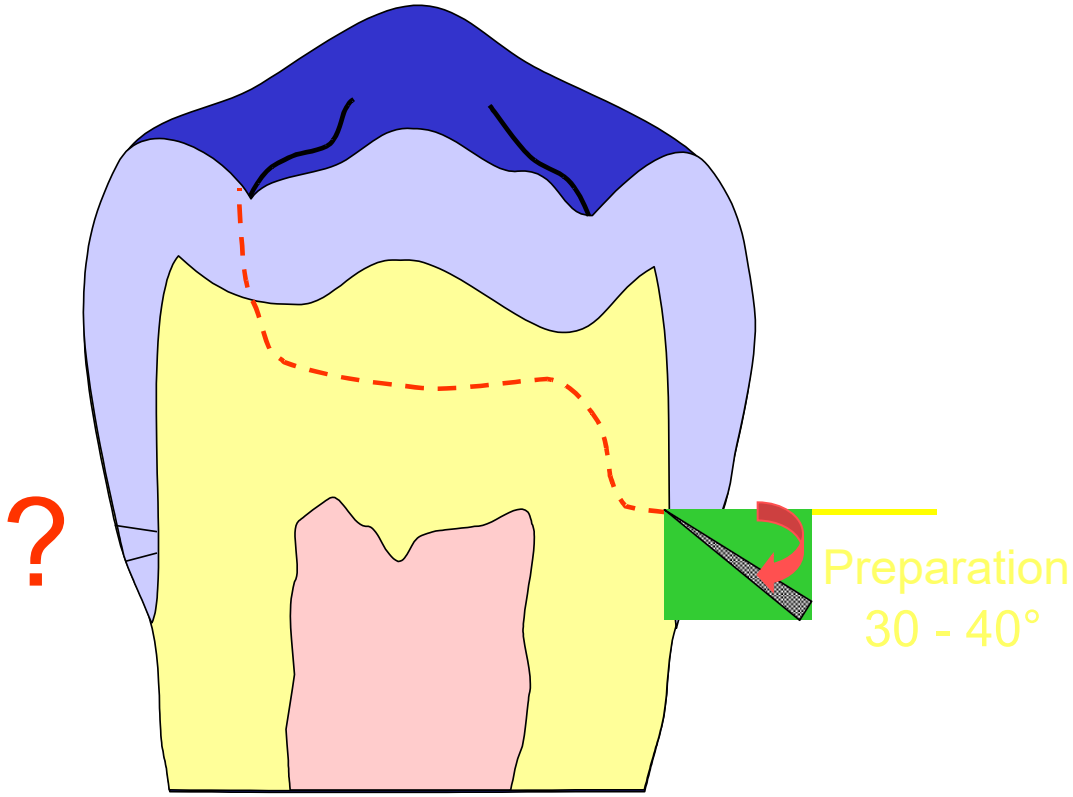
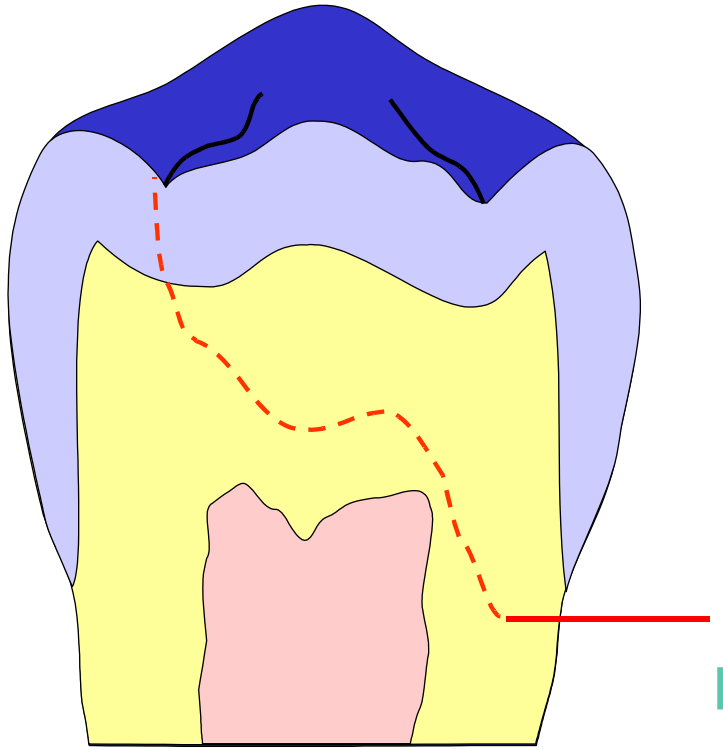
Cervical borders

In enamel



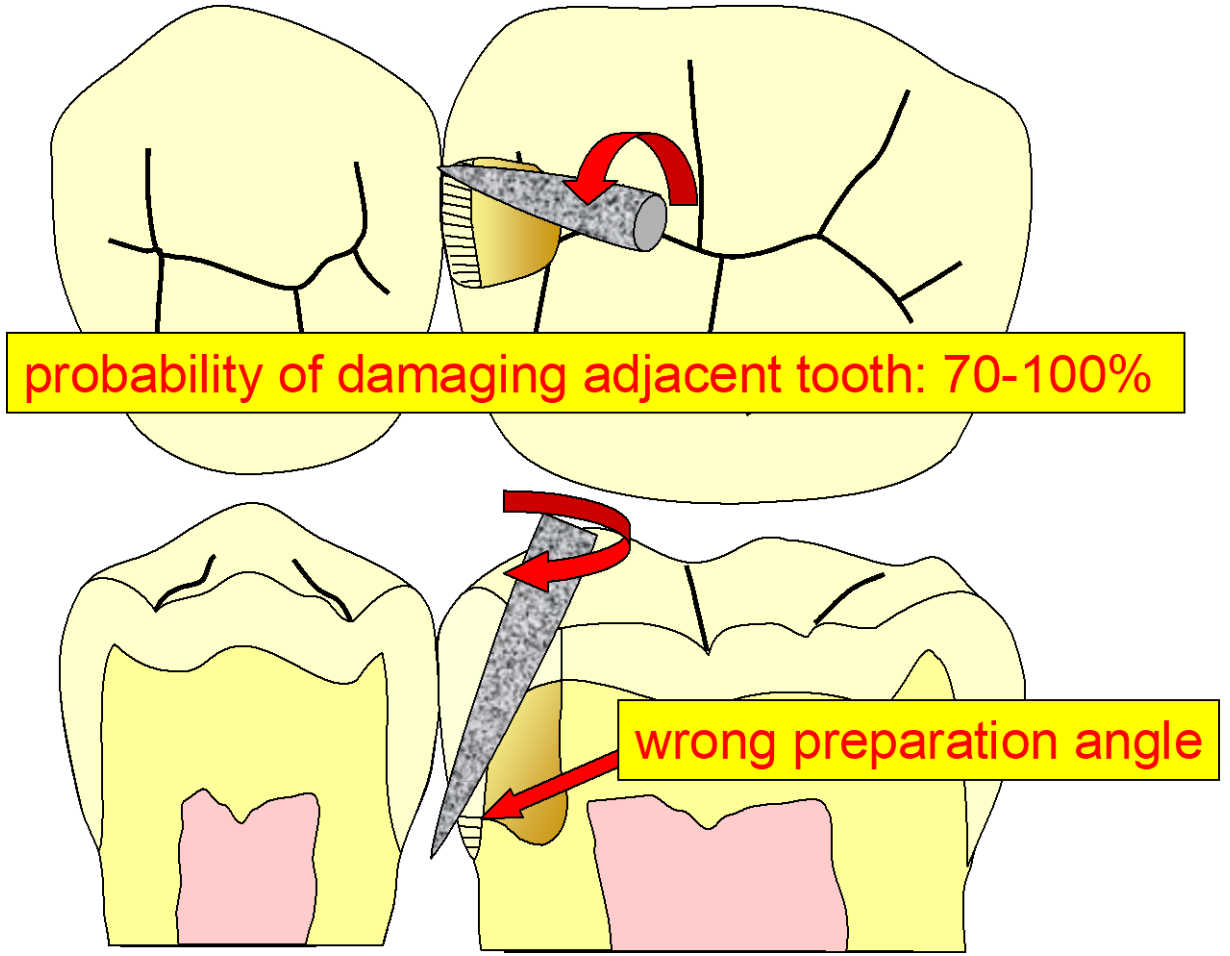
Cervical borders

In dentin



No bevel

Preparation technique



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Oscillating instruments

Class II. and contact point

- Matrix band + matrix retainer
  - Metal band (in primary teeth)

Without matrix retainer

Plastic band (polyester – e.g. Lucifix matrix)

Sectional matrices with separator

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Matrix band and matrix retainer

Contact point
Contact area

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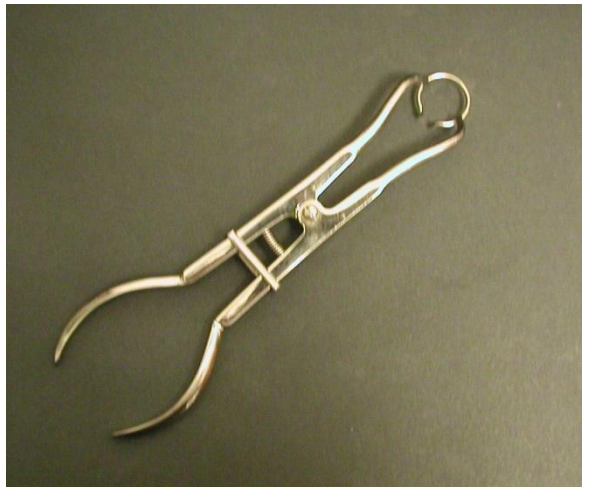


Composite filling class II.
Contact point

Sectional matrices

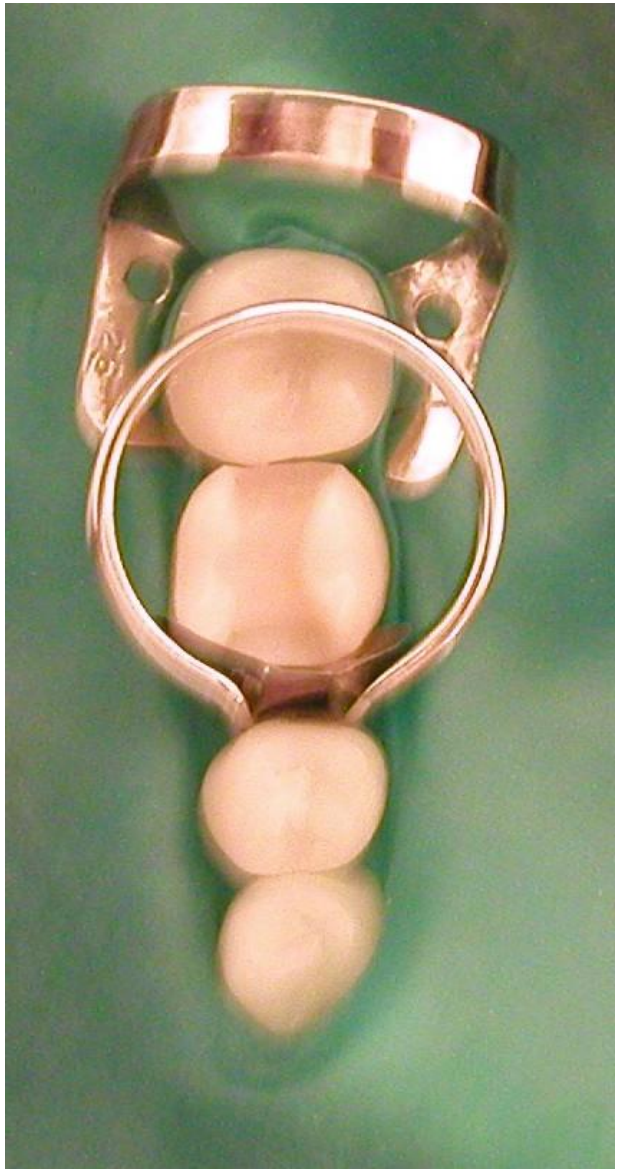
- Sectional matrices

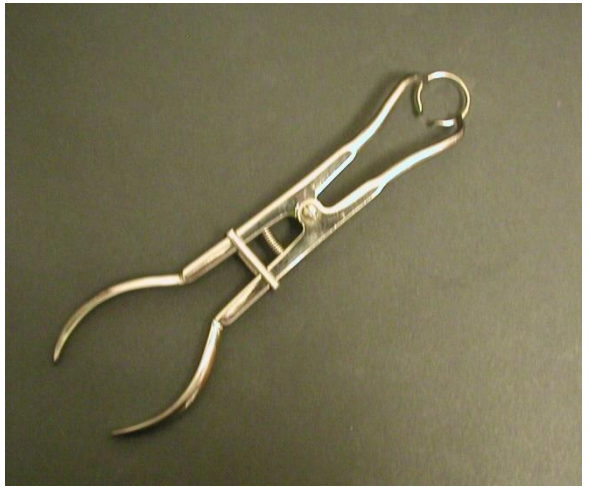
with separator

Good adaptation

Separation using wedge

and separator





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Sectional pre-contoured metal matrix system provided the highest contact tightness with the highest length of contact arc. Restorations with circumferential pre-contoured metal matrix system provided higher LCA than those with circumferential straight metal matrix with Tofflemire retainer and circumferential pre-contoured transparent matrix system“

Kampouropoulos D, Paximada C, Loukidis M, Kakaboura A. The influence of matrix type on the proximal contact in class II resin composite restorations. Oper Dent 2010; 35; 454-462

Use of the sectional matrix system in two-surface Class II cavities resulted in statistically significantly tighter proximal contacts than the use of the circumferential matrix system.
For the three-surface no statistically significant differences in contact tightness were found between the different matrix systems.“

Wirsching E, LoomansB A, Klaiber B, Dörfer C E. Influence of matrix systems on proximal contact tightness of 2-and 3-surface posterior composite restorations in vivo. J Dent 2011; 39: 386–390

Step 1: Pre - wedging

The wedge is inserted before preparation:

Compression of gingiva

Separation of teeth

Together with the matrix protection of damage of neighbouring tooth

Matrix for the filling can be inserted easier.

Step 2: preparation

- Preparation with the protection of neighbouring tooth using the metal strip or matrix.

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Step 3: adaptation of wedge, matrix and separator

- The wedge can be new or the same as previous, inserted from oral or vestibular side
- The matrix is 0,5 mm below the gingival wall
- Separator separates teeth

Step 4 Making filling

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Class II.

Class II.

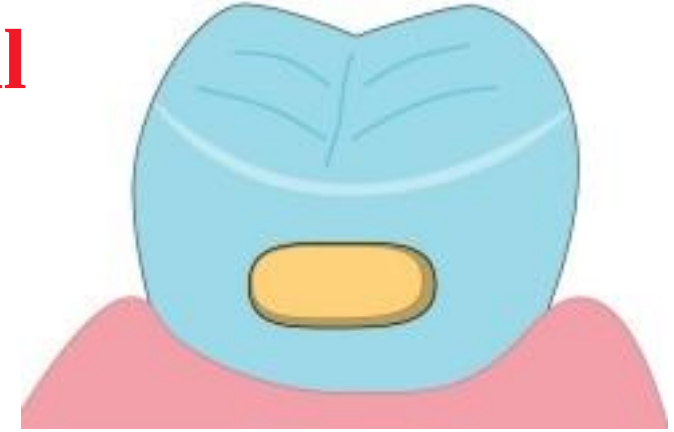
Class II.

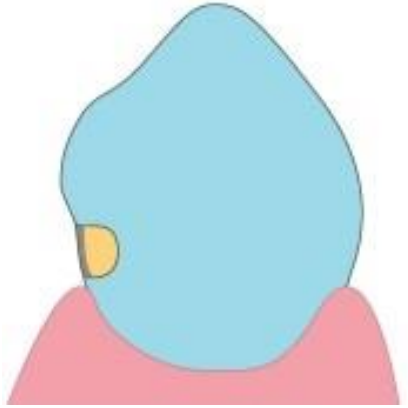
Miniinvasive class II. cavities

Adhesive slot

Vertical

Horizontal





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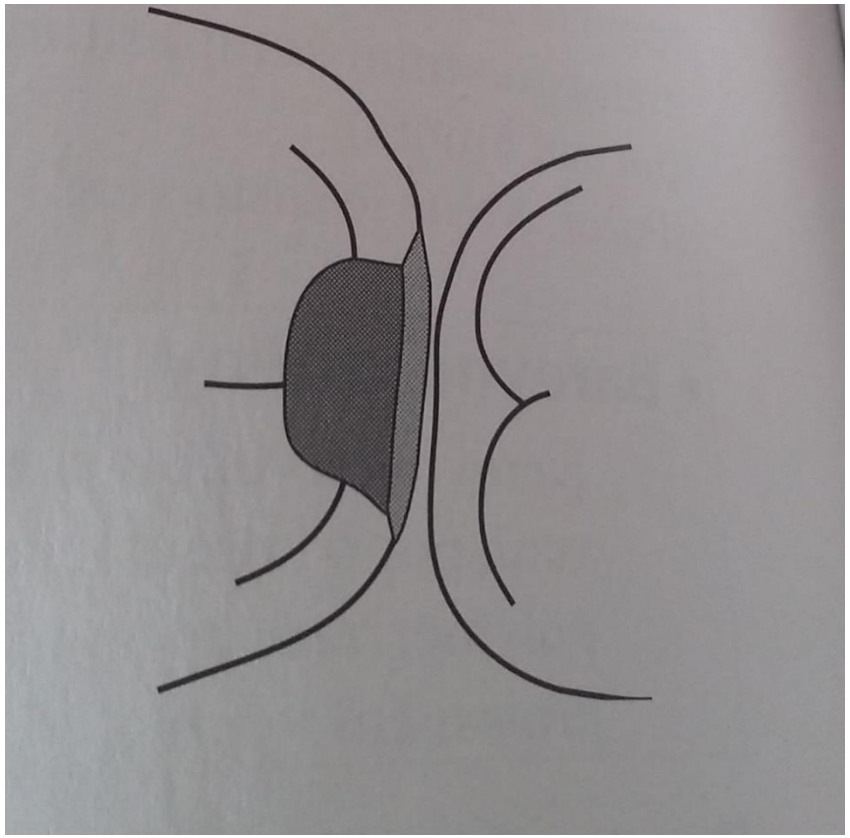
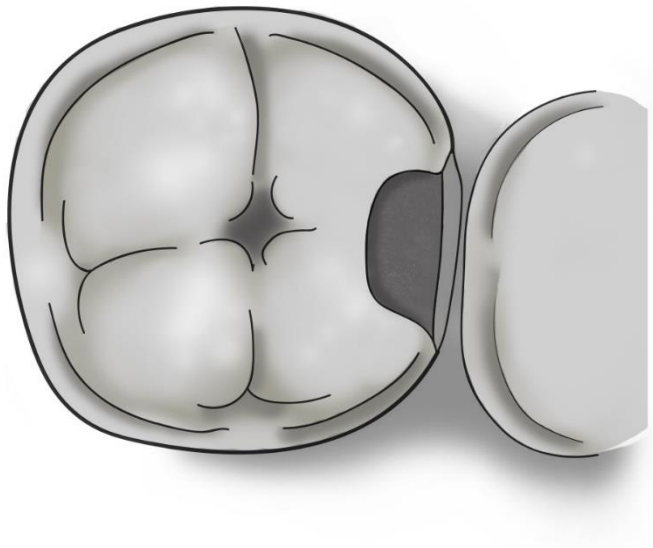
Adhesive slot





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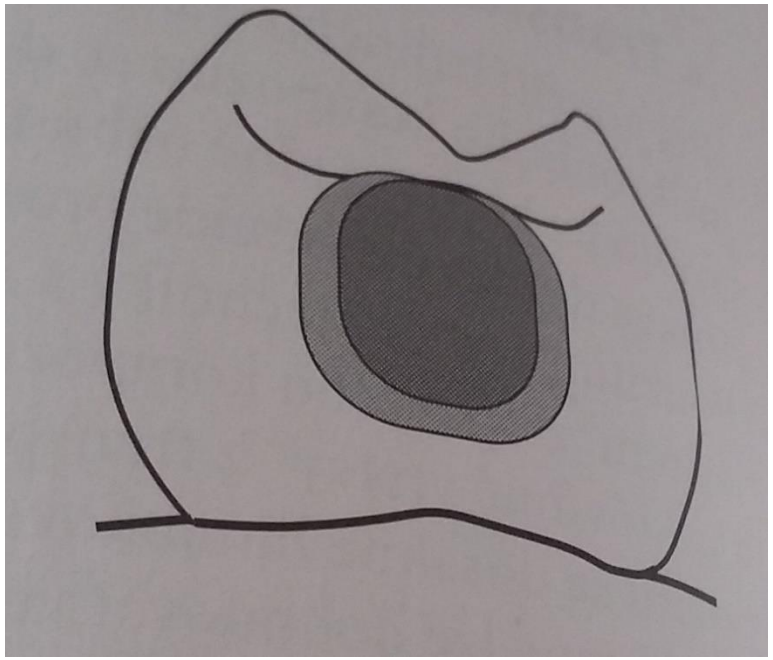
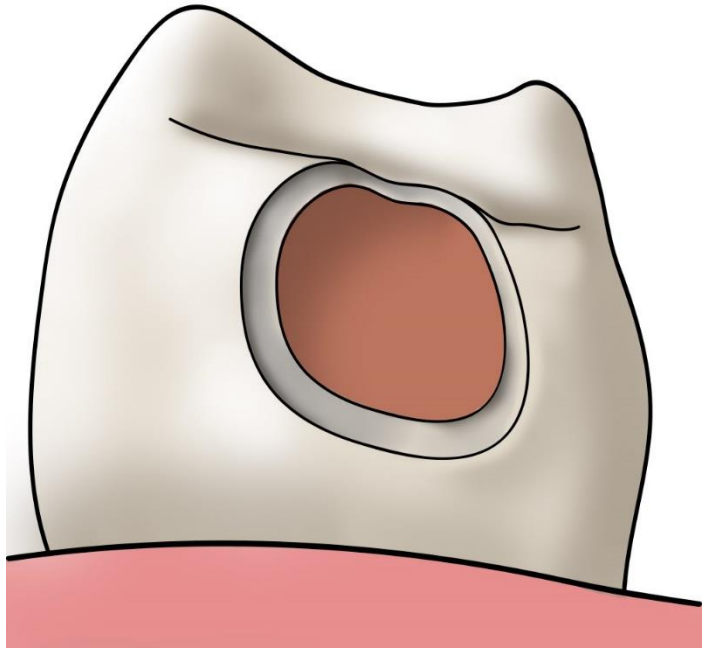
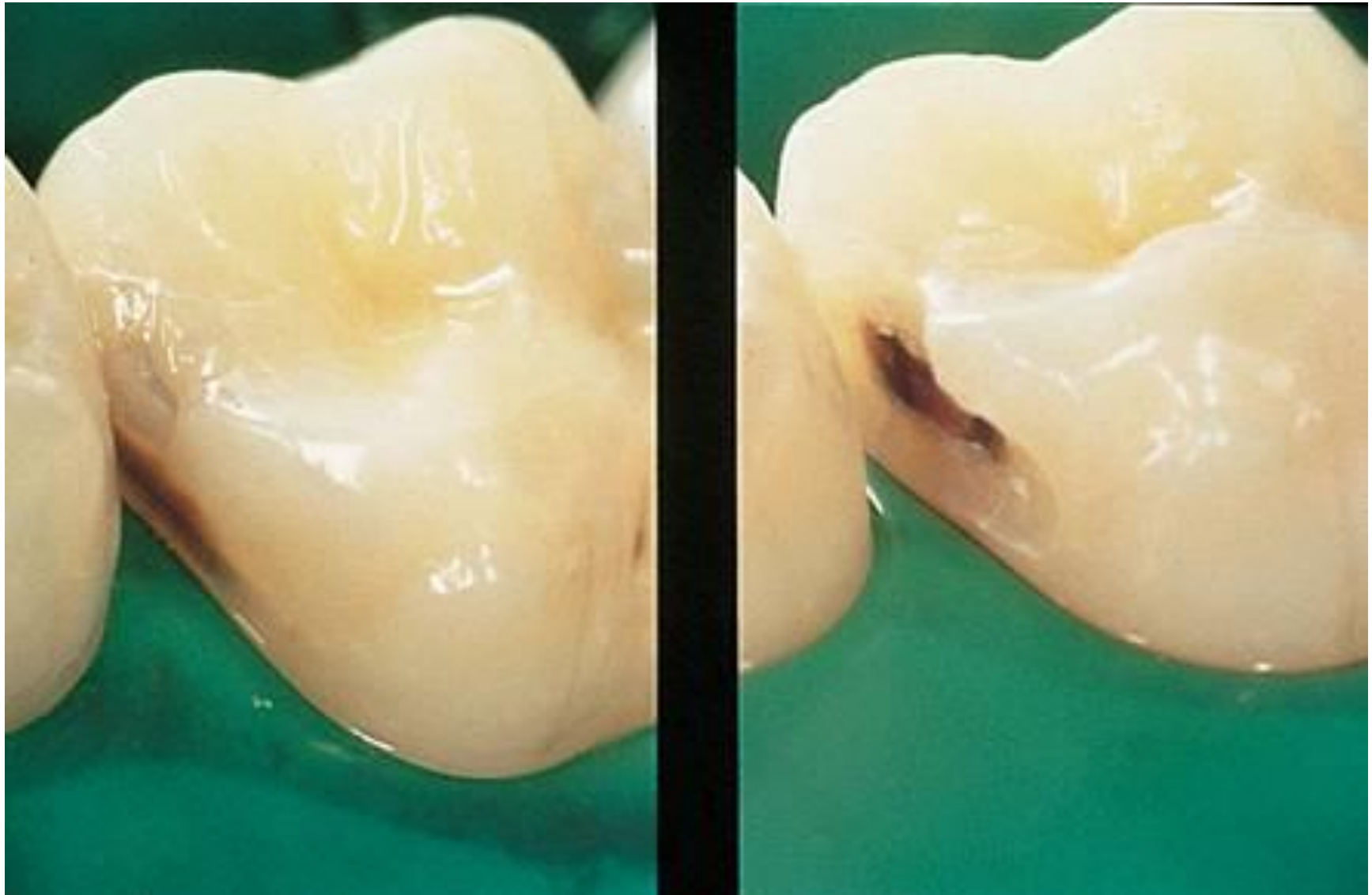
Adhesive slot

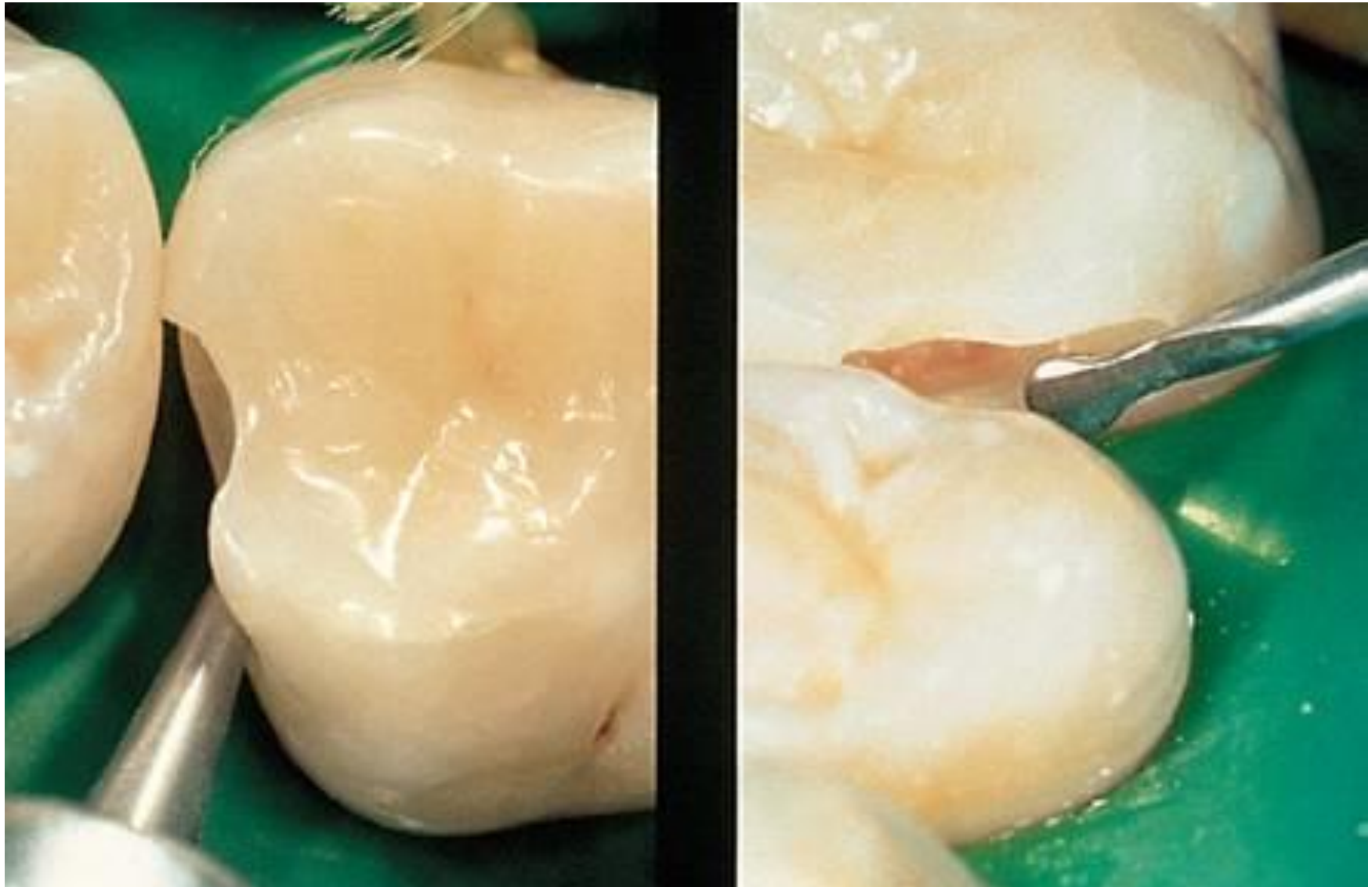


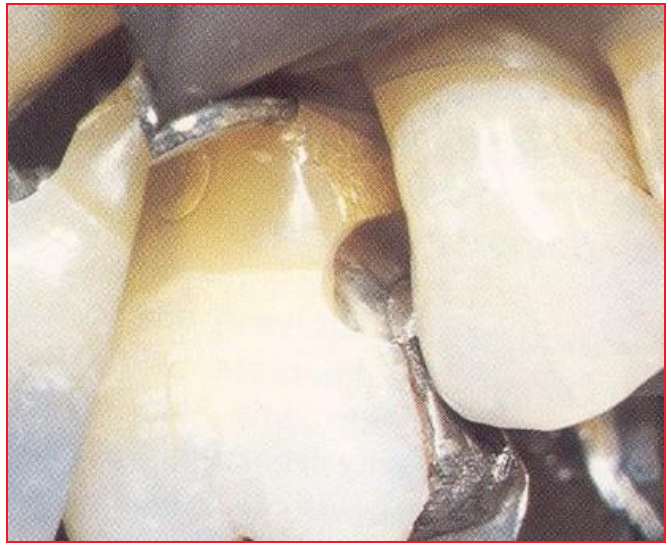


Approximal Caries



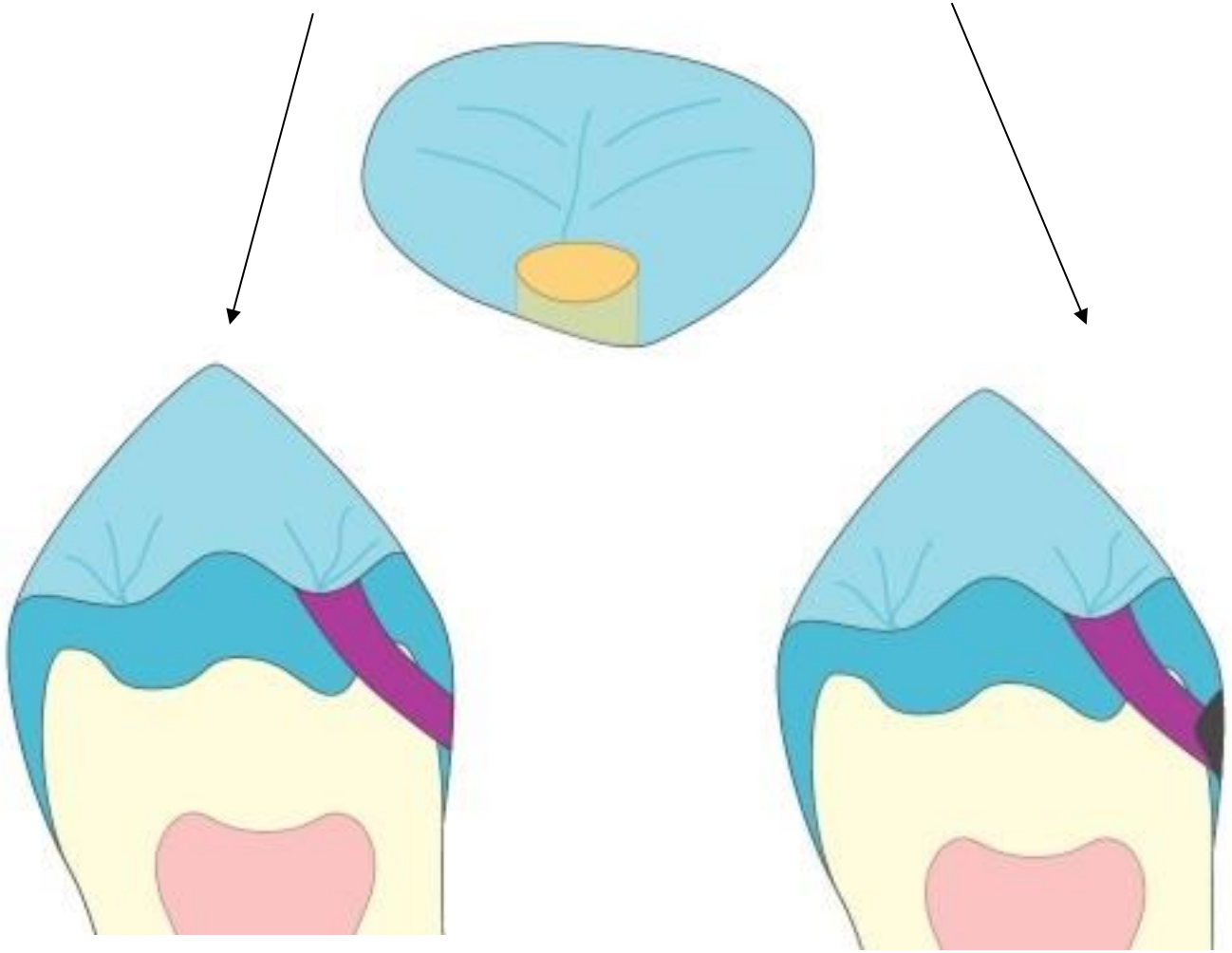
Approximal Caries

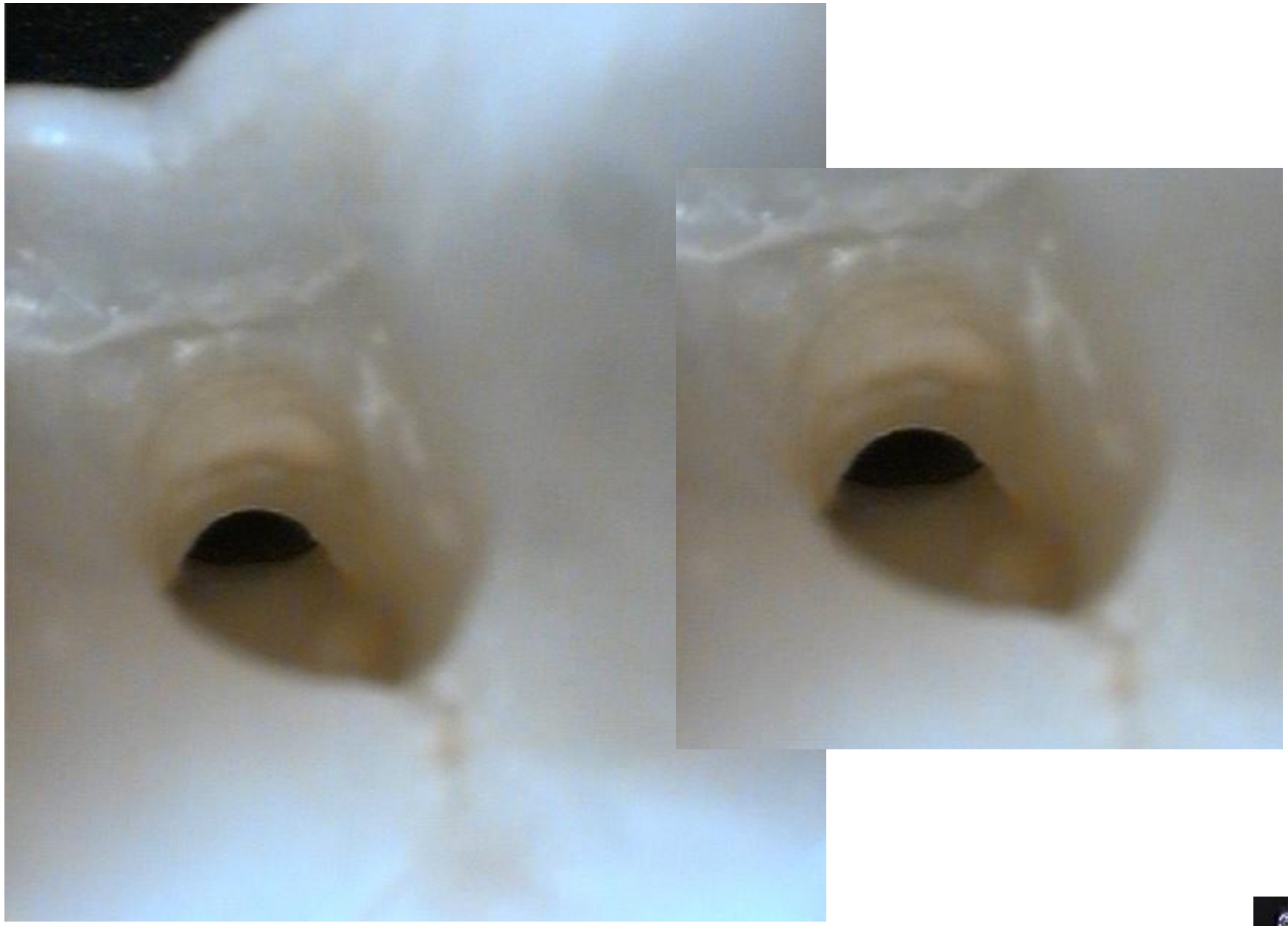


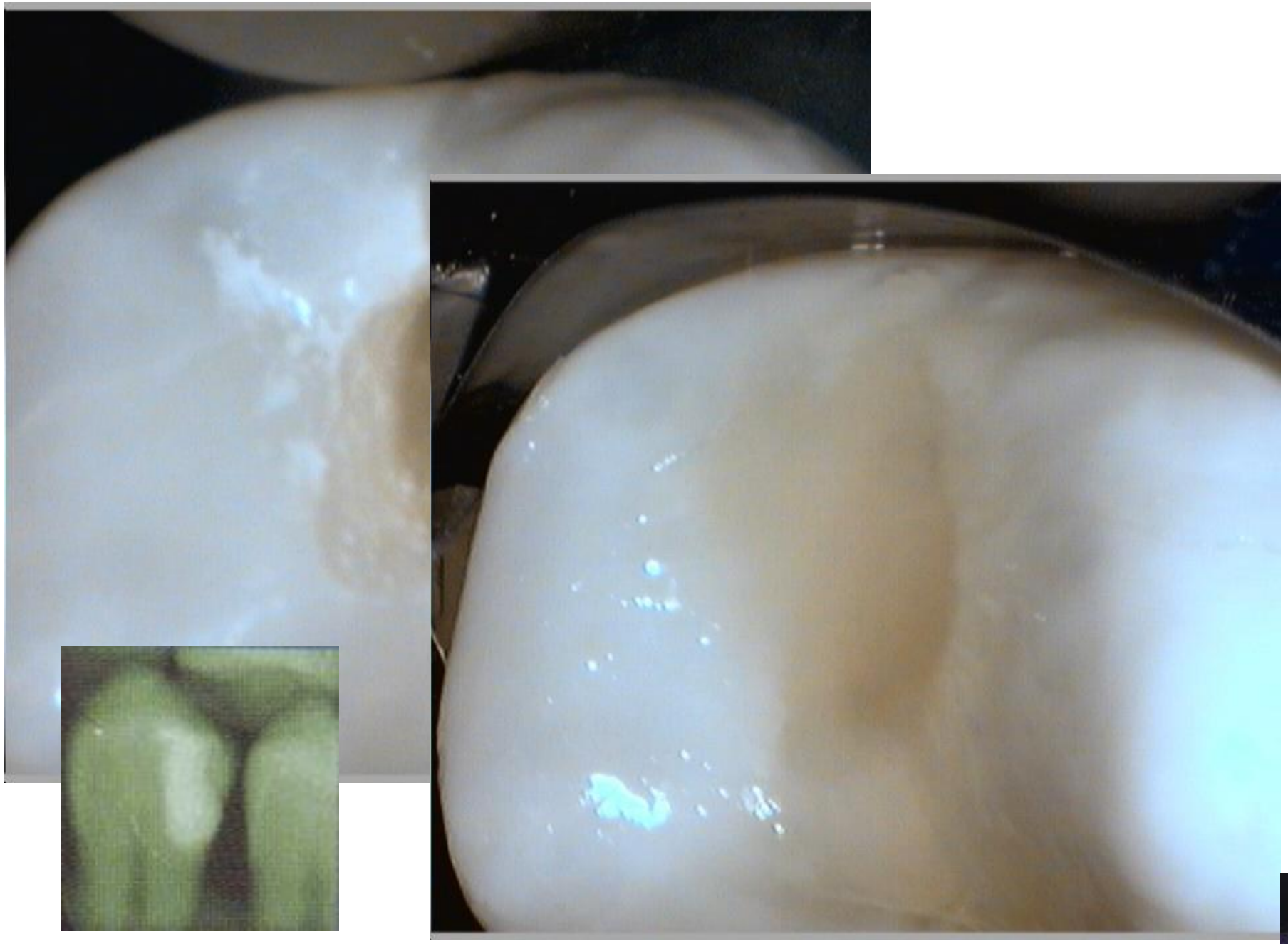


Tunnel preparation

Open Closed







Success?

Low caries risk
Special smal instruments
Magnification
BW post op
Composite or GIC

Bulk fill - materials that can be cured in the thicker layer

j1.

1. Higher translucency
2. More fotoinitiators
3. Some of the are dual cured
4. Some of them have short fiber filler

Bulk fill - materials that can be cured in the thicker layer

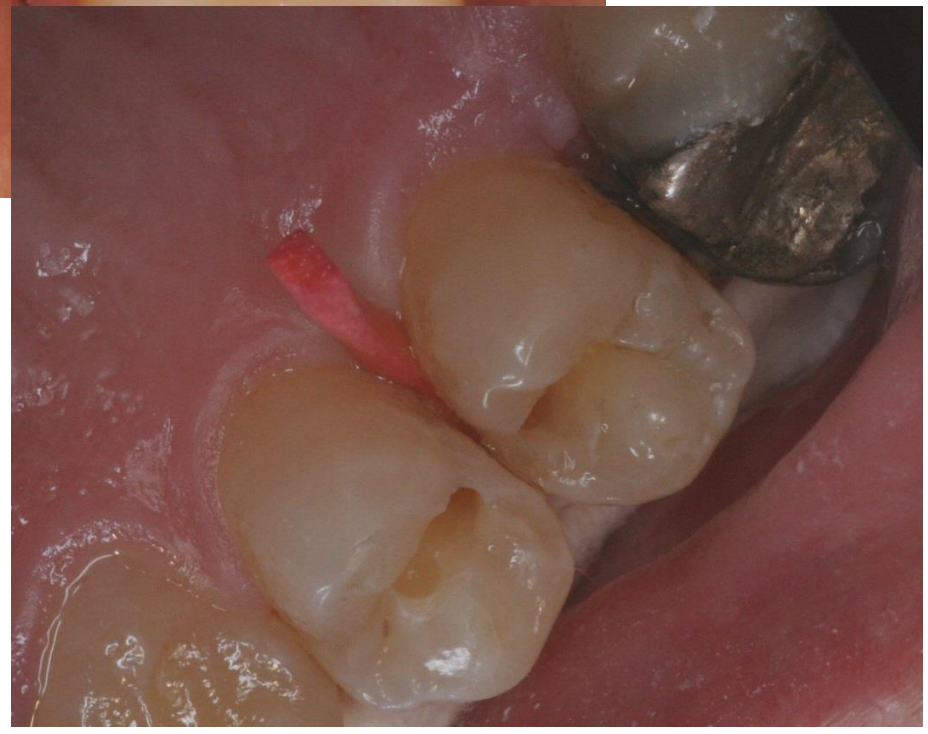
je

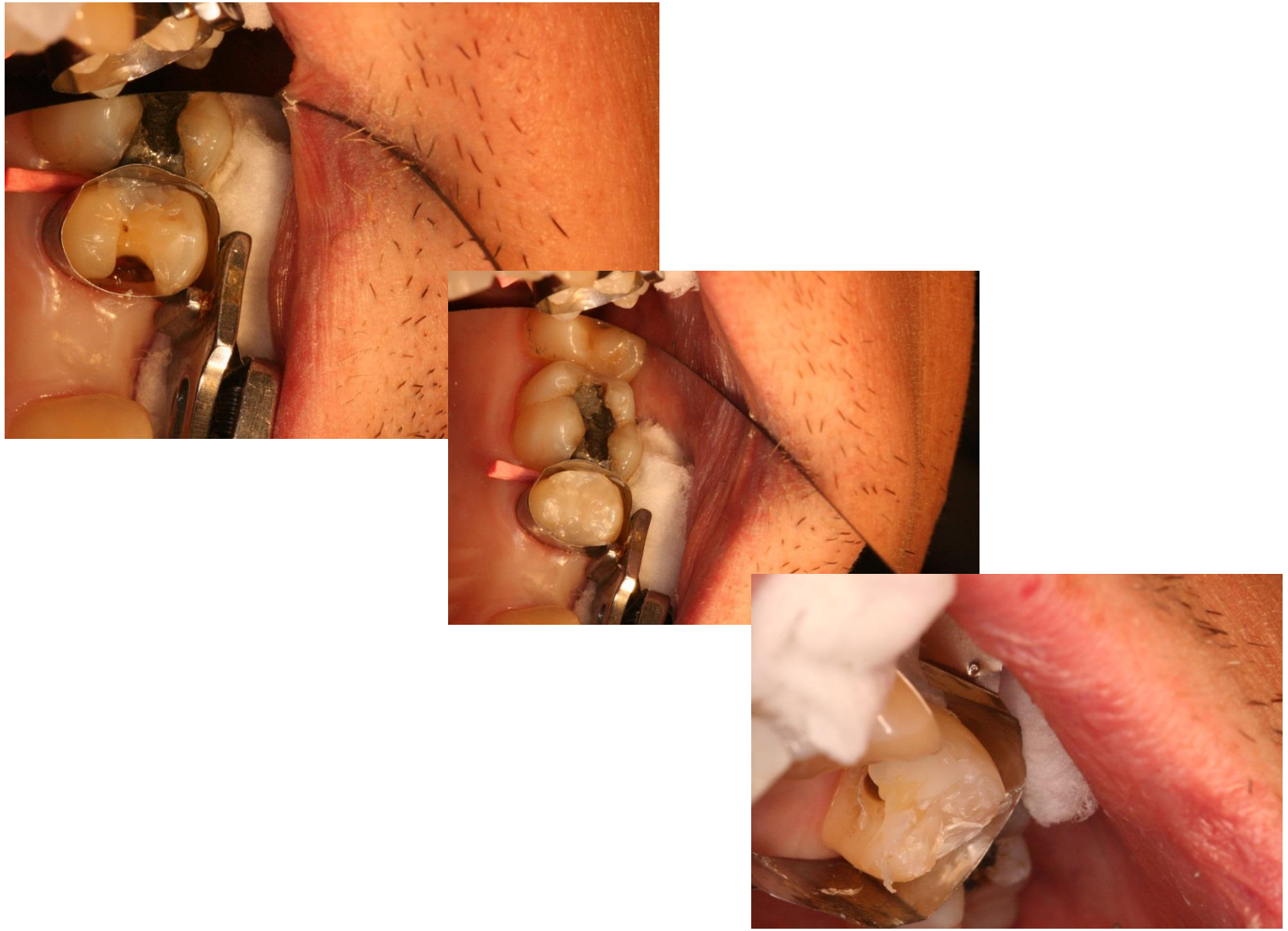
1. Flowable materials –
Good marginal adaptation, usually necessary to use the conventional composite material on the top

2. Condensable composit materials – in combination with flowable

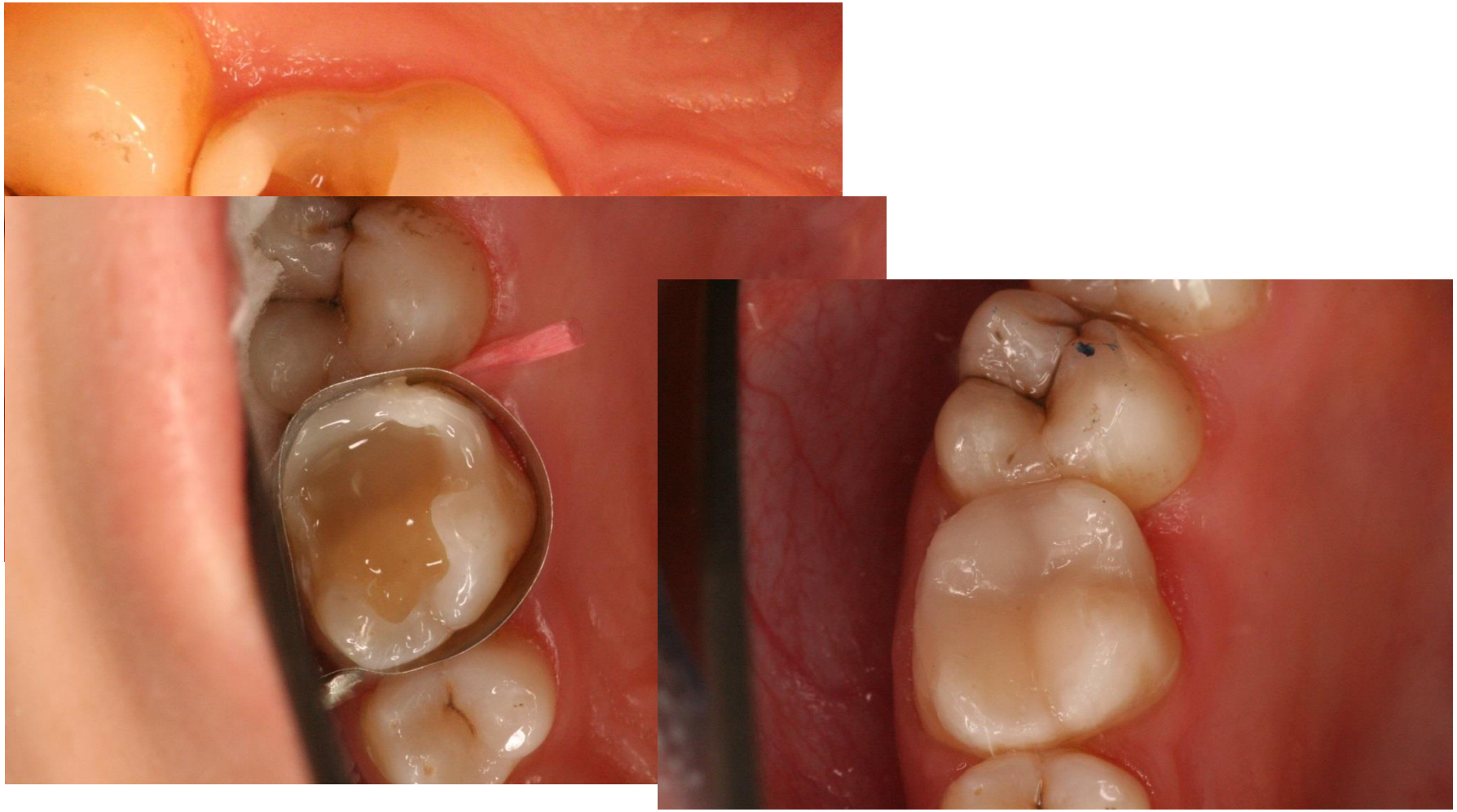
3. Sonic materials (Sonic Fill) – thixotropy, the viscosity is decreased by vibrations.

Sonic Fill






3M ESPE
Filtek™ Bulk Fill
Flowable Restorative
A1
Bulk Fill Flow



Problems of bulk fill materials

Lower aesthetics

Polymerization stress

Adhesion procedure must be kept

The depth of the cavity must be measured