

Special types of cavity preparation: tunnel, box only, ART.

Complex preparation for composites in case of a complex caries lesion.

Parapulpal pins.

4th year, 1st semester

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# Atraumatic restorative treatment (ART)

- Where routine treatment is not available or not possible
- In rural regions of underdeveloped countries
- Treatment is made by untrained dental personnel
- Aim: to halt or lessen the progression of frank caries lesion

# Atraumatic restorative treatment (ART)

- Lesion excavated by usage of simple plastic scoop
- Technique is based on a self-cured version of RMGIC – relatively high fluoride release
- Temporary restoration mixed by rubbing the materials together between the tips of the thumb and forefinger, then inserted into the „cavity”.
- Biting on it, patients create some gross anatomy and occlusal adjustment

# Preparation possibilities of the proximal lesions (posterior teeth)

- Class II conventional design
- Class II modified design
- Box only preparation
- Slot preparation
- Tunnel preparation



# Box only preparation

- Modified preparation design

Indication:

- only proximal surface is faulty
- no caries on the occlusal surface



# Box only preparation

- Round or inverted cone diamond bur
- Held parallel to the long axis of the crown
- Extended through the marginal ridge
- Gingival extension (axial depth) 0.2 mm inside the DEJ
- Extensions dictated by the lesion

# Box only preparation

- „Box” form:
- -boxlike with the inverted cone
- -scooped with the round diamond

# Box only preparation

- No bevelling
- No secondary retention features



# Amalgam box only preparation

- For some posterior teeth
- Proximal surface caries, but not faulty occlusal surface
- Proximal box preparation with specific retention form (mechanical retention, adequate thickness for the amalgam)
- No occlusal step
- Less tooth structure will be removed

# Slot preparation

- Modified preparation design
- Indication:
  - only proximal surface is faulty
  - no caries on the occlusal surface
  - access to the lesion from facial or lingual direction not through the marginal ridge

# Slot preparation

- Small round diamond bur
- Oriented at the correct occluso-gingival level
- As close to the adjacent tooth as possible
- Preservation of the facial and lingual surface as much as possible
- Extended the preparation depending on the lesion

# Slot preparation

- Axial depth 0.2 mm inside the DEJ
- Occlusal, facial and gingival cavosurface margins are 90 degrees or greater
- Preparation is similar to class III preparation (anterior teeth)



# Tunnel preparation

- Technique suggested by Jinks in 1963
- For treating primary second molars with placing silver alloy mixed with sodium silicofluoride in the distal aspect
- Provide fluoride reach area for the permanent first molars



# Tunnel preparation

- Technique modified by Hunt and Knight
- Utilizing as a conservative technique for restoring small interproximal caries

# Tunnel preparation - Advantages

- Possibility to preserve interproximal enamel
- Less potential for a restorative overhang (in traditional class II. overhangs can occur 25-76%)
- Preservation of the proximal ridge
- Only one-surface restoration is needed – reduce the tooth stiffness by 20%.
- Two surface restoration reduce the tooth stiffness by 46%.
- Less chance to destroy the adjacent tooth
- Decreased potential for microleakage
- It can easily be extended if necessary



# Tunnel preparation - Disadvantages

- Remains largely unused
- Highly technique sensitive
- Demands careful control by the operator
- Often passes within 1mm of the pulp
- Class II preparation tends to leave greater remaining dentin thickness than does tunnel
- Decreased visibility
- Caries removal is uncertain
- High rate of residual caries is left behind
- Concern about the marginal ridge strenght because undermining



# Tunnel preparation

## Indications, Contraindications

- Small, proximal lesion when esthetic demand is high
- Large caries lesion with difficult access
- Overlying marginal ridge is subjected to heavy occlusion, or demonstrate crack



# Tunnel preparation - Preparation

- Access through the occlusal surface with round bur
- Preparation should be started 2.00 mm from the marginal ridge
- Than directed toward the lesion
- Caries removal : slow speed, round bur
- Carioes-disclosing solution is needed
- Dentin stained is removed to assure complete removal of caries
- Magnifying loupes may be useful

# Tunnel preparation - Preparation

- Proximal enamel lesion is evaluated
- Intact - left alone:
  - early enamel lesion is more resistant to carious attack than sound enamel
  - be allowed to remineralize
- Weak, porous – punched or drilled through
- Marginal ridge has been undermined – preparation should be converted to class II preparation



# Tunnel preparation - Restoration

- GIC
- Cermet-GIC was originally used
  - radiopacity
  - fluoride release



- lower levels of Streptococci in plaque
- good seal

# Tunnel preparation - Restoration

- RMGIC current material of choice
- -radiopaque
- -fluoride release
- -prevent microleakage
- According to manufacturer's instruction

# Tunnel preparation - Restoration

- Firstly place the RMGI at the level of DEJ
- 1.5-2 mm occlusally be restored with resin composite
- (GIC are less wear resistant)
- Finishing, polishing



# Tunnel preparation - success

- Variable results about failures:
  - no failures or 48% at 2 years
- Causes:
  - occlusal surface failures
  - marginal ridge failures 0-5% because of undermining
- Important : discriminating case selection

# Amalgam tunnel tooth preparation

- Not supported technique
- Preparation joins an occlusal lesion with a proximal lesion under the marginal ridge.
- Lack of access and visibility
- Strong state of the marginal ridge is controversial





# Complex preparation for composite restoration

- Large amount of tooth structure are missing
- Alternative procedure of an indirect (inlay, onlay) restorations
- Temporary therapy until the final phase of the treatment (periodontal, orthodontic treatment)



# Complex preparation for composite restoration Advantages

- One session treatment
- Conserves tooth structure
- Less use of pins
- Esthetics



# Complex preparation for composite restoration

## Disadvantages

- Technique sensitive
- Less wear resistance
- Insufficient enamel presence reduce the success rate
- Perfect isolation is needed
- Whole occlusal surface coverage is not ideal



# Complex preparation for composite restoration

- Basic rules should be followed:
    - remove the fault defect, old material or friable tooth structure
    - creating prepared enamel margins 90 degrees or greater
    - butt joint or 90 degreee cavosurface margins on root surfaces
    - roughening the prepared tooth structure with diamond
- The most conservative manner should be applied.

# Usage of pins

- Less need for pins because of micromechanical bonding
- Plan the type, number, size and location of pins that needed

# Types of pins

- Self-threading pins – most frequently used
- Friction locked pins – rarely used, intermediate retention
- Cemented pins – rarely used, least retentive

Surface characteristics influence the retention (number and depth of the elevations)

# Self-threading pins

- Originally described by Going in 1966.
- The most retentive pin type
- Vertical and horizontal stresses can be generated in the dentin
- Pulpal stress is maximal if the orientation is perpendicular to the pulp
- The diameter of the prepared pinhole is smaller than the pin
- The elasticity of the dentin permits the insertion
- The depth of the pinhole from 1.3 mm to 2 mm.



# Pin sizes

- Four sizes are available with corresponding color-coded drill
  - 0.015 inch 0.38 mm – too small to provide adequate retention in posterior teeth
  - 0.019 inch 0.48 mm
  - 0.024 inch 0.61 mm
  - 0.031 inch 0.78 mm: rarely used, highest incidence of crazing, cracking which communicated with the pulp chamber



# Main principles

- Placing pins in nonparallel manner increase the retention
- Bending may weaken the pin
- General guideline for pinhole depth is 2 mm
- The fewest pins possible should be used to achieve the desired retention
- Pinholes no closer than 0.5 to 1mm to the DEJ or no closer than 1 to 1.5 mm to the external tooth surface
- Pinhole should be parallel to the adjacent external surface
- Minimal interpin distance is 3 mm or 5 mm
- Flute or furcal areas should be avoided

# Pinhole preparation

- Placed in a conventional latch type contra-angle handpiece
- Optimal depth 2 mm – depth-limiting drill should be used
- Check the angulation (pulpal exposure, external perforation)
- 300-500 rpm, apply pressure
- Prepare the hole in one or two movements (tilting the handpiece result in too large pinhole)



# Pinhole preparation

- The drill should never stop rotating (prevent breaking)
- Steady stream of air may be applied – to dissipate heat
- Dull drills cause increased frictional heat and cracks in the dentin
- Worn or rounded self-limiting shoulder result in too deep hole



# Pin design

- Standard
- Self-shearing
- Two-in-one
- Link Series
- Link Plus

# Standard

- 7 mm long
- Flattened head to engage hand wrench or handpiece chuck
- Reach the bottom judged by tactile sense
- Can be reversed minimally following insertion to reduce stress



# Self-shearing

- Length varies according to the diameter
- Flattened head to engage the hand wrench or handpiece chuck
- Reaching the bottom the head of the pin shears off

# Two-in-one

- 9.5 mm in length
- Flattened head to aid in its insertion
- Reaches the bottom of the pinhole it shears in half. Other half remaining in the hand wrench or in the handpiece chunk
- Second pin may be positioned in another pinhole



# Link Series

- color coded plastic sleeve –latch type
- pin align itself as it threaded
- pins reach the bottom of the hole, top portion shears-off
- plastic hand wrench





# Link Plus

- self-shearing
- single or two-in-one pin
- sharper thread, tapered tip
- color coded plastic sleeve –latch type
- 2.7 mm extend out of the dentin



# Available material

- Stainless steel
- Titanium
- Plated with gold

# Pin insertion

- 10:1 reduction gear contraangle handpiece is available
- conventional latch type contra-angle handpiece
- After shear off plastic sleeve be removed and discarded
- Low gear: increases torque and tactile sense
- Prevent swallowing or aspirating hand wrench
- Any length of pin longer than 2 mm should be removed – with sharp bur, high speed, oriented perpendicular to the pin

# Pin insertion

Pin should be:

- tight,
- immobile,
- not easily with drawn

# Thank you for your attention!

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