Treatment of cervical lesions. Sandwich technique.
INTRODUCTION

Cervical lesion
Cervical Sensitivity
Common painful disease

- Recent studies show: the prevalence of sensitivity may approach 50% of the population (higher than 50% in parodontopathy)
- The pain is short and sharp typically
- Dentin is sensitive to several types of stimuli (e.g. osmotic, thermal, chemical, tactile)
- Sensitivity is caused by open dentinal tubules
TOOTH CERVICAL SENSITIVITY

- The pain is amplified when the dentinal tubules are open to the oral cavity.
- The occlusion of the tubules seems to decrease the sensitivity (by sclerotic dentin or smear layer).
- More exposed dentinal-tubules cause stronger pain.
CAUSES OF DENTINAL SENSITIVITY

- Abrasion, attrition, erosion

- The cervical area of teeth is the most common site of hypersensitivity. It may be caused abrasion mainly.

- Causes of abrasion:
  - Improper tooth-brushing technique (most common)
  - Abrasive toothpastes
  - Habits such as holding a pipe stem by the teeth
  - Tobacco chewing
  - Vigorous use of toothpicks between adjacent teeth, etc.
CAUSES OF DENTINAL SENSITIVITY II.

Carious cervical lesion:

Usually seen in the region of plaque accumulation i.e. near the gingival or under proximal contacts.
RISK FACTORS OF CARIOUS CERVICAL LESIONS

- Poor oral hygiene
- High sugar diet
- Adolescents undergoing orthodontic treatment
- Xerostomia combined with gingival recession and exposed root surfaces
CAUSES OF DENTINAL SENSITIVITY III.

Erosion lesions:

It can be defined as a loss of tooth substance by chemical process that does not involve known bacterial action. The surfaces are smooth, hard and polished.
RISK FACTORS OF EROSION LESIONS

- Nutrition disorders (bulimia)
- Stress (reflux)
PATOMECHANISM

There are three theories to explain the sensitivity:

- **Hydrodynamic theory** is the most widely accepted explanation of dentinal sensitivity (changes in fluid movement within open dentinal tubules are perceived as pain by mechanoreceptors near the pulp)
- **Odontoblast-receptor theory**
- **Direct nerve-cell theory**
ANATOMY

- There are three types of hard tissue each tooth:
  - Enamel
  - Cementum
  - Dentin
- The gingiva connects to the enamel, normally.
- The cementum joins the enamel to form the cementoenamel junction, which is referred to as the cervical line. In about 10% of teeth, enamel and cementum don’t meet, and this can result in a sensitive area.
ENAMEL

- **Compound:**
  - Highly mineralized crystalline structure
  - 95-98% anorganic matter (hydroxyapatite-Ca$_{10}$(PO$_4$)$_6$(OH)$_2$)
  - 1-2% organic matter and 2% water

- **Structure:**
  - Enamel prisms (or rods)-the largest structural components
  - Inter-prismatic substance (with more organic matter)
DENTIN

- **Compound:**
  - Dentin is less mineralized than enamel but more mineralized than cementum or bone
  - 75% anorganic material (mainly hydroxyapatite)
  - 20% organic material
  - 5% water and other materials

- **Structure:**
  - Dentinal tubules (each tubule contains the cytoplasmic cell process-Tomes fiber-of an odontoblast)
  - The course of the dentinal tubules is a slight S-curve (from the pulp cavity to dentin-enamel or dentin-cementum junction)
  - Peritubular dentin
  - Intertubular dentin (less mineralized)
Cementum is the hard dental tissue covering the anatomic roots of teeth, and is formed by cells known as cementoblasts.

Two kinds of cementum are formed: cellular and acellular.

Consists of about 45-50% inorganic material (hydroxyapatite).

50-55% organic material and water.

The portions of the principal fibers embedded in the cementum and alveolar bone are called Sharpey’s fibers.
GINGIVAL RECESSION

- The cervical sensitivity is more frequent in periodontal diseases
- In these cases the prevalence is from 80% to almost 100%
- The cementum covering the root surface is extremely thin and provides little resistance to abrasion or erosion (it can denude easily and dentin is exposed)
- Improper toothbrush technique cases gingival recession and cervical hypersensitivity (V-shaped abrasion)
THERAPY

- We have to kill the pain firstly
- We have to determine and eliminate the causes
- There are more facilities to treat dentin-hypersensitivity
- In some cases toothpastes, including KNO3 or StCl, can help
PROFESSIONAL THERAPY

- Treatment or prevention of hypersensitivity is usually accomplished by use of some method to occlude the open tubules

- **Chemical materials:**
  - corticosteroids (decrease inflammation)
  - protein precipitators
    - AgNO3 (colors the tooth, hurts the gingiva and pulp)
    - ZnCl2, SrCl2,
  - others
    - Ca(OH)2, KNO3, fluorides, fluoride-electrophoresis
SEMI-INVASIVE, INVASIVE THERAPY

- When the conservative methods fail to provide relief, restorative treatment is indicated
- We have to prepare the tooth structures usually
- **Materials:**
  - composites
  - resins
  - liners
  - dentin adhesives
  - glass-ionomers
  - crowns (final possibility to avoid root-canal treatment)
DISEASE ON THE ENAMEL

- Adhesive technique:
  - local anaesthesia (if necessary)
  - cleaning the tooth
  - isolation of the operating site (cofferdam, cotton rolls)
  - removing the fault, defect tooth structure
  - preparation of the enamel
  - pulpal protection
**Etching:**

- 37% orthophosphoric acid (most common)
- In accordance with the conventional procedure:
  
  1 min. etching on the enamel, after which rinse the etchant for 1 min., and dry the cavity for 1 min.

- The connection is stronger if etching the dentin also
  
  (30 sec. Etching the enamel, and 15 sec. The dentin)

- The new-type systems are self-etching, so the etching and bonding is happen in one step.

**ADHESIVE TECHNIQUE**
**Bonding:**
- bonding systems involve an unfilled or light-filled, liquid acrylic monomer mixture
- the adhesive is a low viscous monomer, can penetrating into the etched enamel easily

**Steps:**
- the enamel bonding agent is applied to the prepared enamel surface with microbrush or other suitable applicator tip
- lighting time is 20 sec.
- dentin bonds are available (its can increase the connection for the tooth structure)

**ADHESIVE TECHNIQUE**
Inserting and curing the self-cured composite:

- polymerization is chemically
- paste-paste system
- equal amounts of the two paste mixed with plastic spatula for 30 sec. to obtain homogenous mixture
- placing composite filling into the cavity with hand instrument (plastic cervical matrice for providing contour)
- working time is 1-2 min. usually, after contouring and polishing

ADHESIVE TECHNIQUE
Inserting and curing the light-cured composite:

- polymerization with curing light (480nm)
- add and cure the composite in several increments to reduce the polymerization shrinkage (max. thickness we can transilluminate is 2mm)
- lighting time: 40 sec. (opac) or 20 sec.
- cure the filling through the tooth structure to reduce polymerization shrinkage
- don’t touch the filling material surface before polymerization
- contouring and polishing the composite

ADHESIVE TECHNIQUE
DISEASE ON THE CEMENTUM AND ON THE ENAMEL

Problems:

- there’s no etchable enamel on the root surface
- it’s difficult to keep dry the cavity because of gingiva

We can use dentin-bonds and glass-ionomer cements on the dentin surface to connect to the tooth structure.
GLASS-IONOMER CEMENTS (GIC)

- Current GIC don’t hurt the pulp
- most conventional glass-ionomer systems are quite technical sensitive
- chemical adhesion to hard tissues of tooth
- polymerizing shrinkage is low
- cariostatic propertie (because of fluoride release)
- etchable surface
- cervical defects and root-surface caries are well suited for restoration with glass-ionomers
“SANDWICH” TECHNIQUE

**Indication:**
- the disease is on the enamel and the cementum too

**Technique:**
- cleaning the operating site
- placing GIC filling into the cavity
- etching on the prepared enamel (30 sec.), after than the GIC surface too (30 sec.)
- rinsing the etchant, and drying the hall cavity (1-1 min.)
- placing composite filling into the cavity (good esthetic propertie)
- GIC is cariostatic matter at the critical area
- contouring and polishing
The GIC would be placed to cover the dentin and become the external material at the dentin margin, and the composite is layered on the top of it.

Open SANDVICH Technique

Composite resin

Glass-ionomer

(No enamel at gingival margin)
**CLOSED SANDWICH TECHNIQUE**

- The GIC would be placed at the base of the proximal box, so as it falls just short of the external cavo surface, and covered with composite

  Closed SANDVICH Technique

  Composite resin

  Glass-ionomer

  (Enamel remaining at gingival margin)
Color Selection

- Should be accomplished before the restorative procedure is started.
- Be careful with shade selection, because the color is usually darker at the cervical third.
- The shade can be confirmed with a small amount of resin composite applied as a test shade, placed directly on or adjacent to the tooth and cured. This procedure should only be performed on unetched surfaces to facilitate removal after shade verification.
Cavity preparation

1. Microretentive cavity preparation (where the tooth is covered by enamel)
2. Beveling the enamel margins
The placement of GIC to the gingival wall and become the external material at the dentin margin this is opened technique.

The placement of GIC at the base of the proximal box closed technique
Etching, and Placing Adhesive

- Etching: 37% orthophosphoric acid gel, rinse off, drying
- Bonding: application of bonding agent, drying, polimerization
INSERTING AND CURING THE COMPOSITE

The internal stresses can be reduced by using:

- Horizontal layering technique
- Oblique layering technique
- Soft-start polymerization
The thickness of each increment of composite is not more than 2mm.

Each increment shall be fully polymerized before the next one is inserted into the cavity.
Oblique incremental Technique

- First increment contacting the gingival, axial, and distal wall.
- Second oblique increment placed contact the occlusal, axial, and mesial walls, after the first increment has cured.
- Third increment covering the other increments and sealing the cavosurface margin.
**Slow or “Soft-start” Polymerization**

- With this mode the light intensity is low at the beginning of the curing cycle.
- Then it will either exponentially rise to full during the first half of the curing cycle or stay low for the first half and then be shifted to high for the rest of each curing cycle.
CONTOURING AND POLISHING THE COMPOSITE

- Flame-shaped carbide bur
- Abrasive discs
DISEASE ON THE CEMENTUM

Difficulty:
- There’s no etchable enamel surface
- Using dentin-bonds is a successful possibility to treat the sensitive dentin surface

Therapy:
- Dentin-bonding agents provide the best rate of success
- Using GIC-s is success too
- Resin-modified glass-ionomers have better mechanical and esthetical properties than conventional GIC-s
EXTREM CASES

- In the case of extrem abrasion or erosion we can make crowns to avoid the root treatment (ceramic crowns are very esthetics)

- In other cases there is extremly gingival recession and parodontal operating can help only (replacing the gingiva to the enamel, and covering the exposed dentin by gingiva)