INTRODUCTION TO THE MICRO- AND MINIMALLY INVASIVE DENTISTRY

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MINIMAL INTERVENTION DENTISTRY (MID)

- A growing trend in all fields of dentistry
- The introduction of this term has been done by Davis and Makinson (1992)
- Instead of using the primary surgical and operative methods, this new concept is based on four modalities:
  - The early detection of caries and risk factors
  - Reduction of cariogenic microbes
  - Remineralisation of early lesions
  - Reparation and minimally invasive treatment of the evolved lesions
- The main principle: to keep all teeth and those functions through the life
MINIMAL INTERVENTION DENTISTRY (MID)

This principle involves more specialties in dentistry

- Preventive dentistry
- Conservative dentistry
- Prosthodontics
- Orthodontics and pedodontics
- Periodontology
MINIMAL INTERVENTION DENTISTRY (MID) – IN PREVENTIVE DENTISTRY

- **Early detection of caries and Caries Risk Assessment**
- **Caries prophylaxis** with the propagation of natural remineralisation of enamel with diethetic (change of food intake) and plaque control, salivation control, and adequate motivation of the patient
- **Remineralisation** of the beginned lesions
- **Biofilm-modulation**
- **Preventive closure of the caries predilection areas:** fissure sealing
Caries Diagnostik

- **Visual and Tactile** Caries Diagnostics (Probing)
- **X-Ray Diagnostics** – Bite Wing Recordings
- **Transillumination**
  - FOTI (Fiber-Optic Transillumination), DIFOTI
  - Infrared: DiagnoCam®
- **Fluorescence Based Systems**
  - Infrared Laserfluorescence: DiagnoDent, DiagnoDent Pen®
  - QLF (Quantitative Light-Induced Fluorescence) – Fluorescence Based Intraoral Camera: VistaCam, VistaProof, SoproLife®
- **Electric Impedance-Spectroscopy**: CarieScan Pro®
- **Photothermal Radiometry**: Canary System®

A laser beam directed onto the tooth will be rebounded with heat production and luminescence → this will be perceived
MODERN CARIES DIAGNOSTIC SYSTEMS

DiagnoDent

CanarySystem

SoproLIFE

CarieScan PRO
REMINERALISATION – LOCAL USE OF FLUORIDES

- Fluoride varnishes
- Fluorid iontoforesis
- Individual oral hygiene: toothpastes, mouthrinses
BIOFILM MODULATION

• GC TOOTH MOUSSE ®
• RECALDENT (ACP-CPP) ®
MINIMAL INTERVENTION DENTISTRY (MID) – IN THE CONSERVATIVE DENTISTRY – USE OF SPECIAL OPERATIVE TECHNIQUES

• Microinvasive Techniques
  • Enamel microabrasion
  • Cariesinfiltration
  • Ozone Therapy
• Minimalinvasive Techniques
  • Air abrasion, Hydroabrasion
  • Oscillation-based instruments: Ultrasonic abrasive, Sonoabrasive Preparation methods
  • Laser Preparation
• Rotary Intruments ➔ Special cavity designs and Preparation techniques (Micropreparation; box-preparation; Tunnel-preparation...
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ENAMEL MICROABRASION

• **Removal of the surface stains of the enamel layer (until 0.2 mm depth)**

• **Clinically usable in cases of enamel hypocalcification, hypoplasia, fluorosis or demineralisation**

• **Principle: decalcification of the enamel (with 6% hydrochloric acid), then removal of a 20-25 micrometer thick layer from the surface (with SIC Abrasive Paste)**

• **This treatment can also be completed by adhesive Filling therapy in the operative field**

• **Opalustre ®**
CariesInfiltration

- **Special microinvasive operative technique**, which stops the enamel caries lesions and also the early stages of dentine caries, **without irreversible removal of hard tissues**.

- **The principle is based on the penetration of a methacrylat-based, low viscosity material (infiltrant) into the body of a carious lesion. After light-curing, the infiltrant closes the micropores of the lesion, and forms a barrier which prevents bacteria and substrates to diffuse into the lesion → the carious process will be stopped.**

- **DMG Icon®**

- **In our Phantom Head- Practice this therapy method will be explained and introduced.**
CARISES INFILTRATION
Cariesinfiltration – Steps

- Reinigung der Zähne mit Zahnpaste und Polierpaste
- Trockeneinlegen mit Kofferdam
- Inspektion der Läsion: Kavitation vorhanden?
- Separation der Zähne mit einem speziellen Keil (Icon; DMG, Hamburg)
- Gleichzeitiges Einführen eines Folienapplikators mit der Ätzgel-Spritze (Icon Etch)
- Applikation der Salzsäure (Icon Etch) für 2 min, Kontrolle der vollständigen Benetzung
- Absprühen der Säure und ausgiebiges Trocknen
- Applikation von Ethanol (Icon Dry)
- ausgiebiges Trocknen
- Einführen eines neuen Folienapplikators mit der Infiltratentspritze (Icon Infiltrant)
  1. Infiltration: Einwirkzeit 3 min. Auf ausreichenden Materialauftrag achten, ggf. während der Einwirkzeit weiteren Infiltranten ca. alle 30 s applizieren.
- Entfernen von Überschüssen mit Luftpuster und Zahnpaste
- Lichthärtung für 40 s
  2. Infiltration: Einwirkzeit 1 min. Auf ausreichenden Materialauftrag achten
- Entfernen von Überschüssen mit Luftpuster und Zahnpaste
- Lichthärtung für 40 s
- Entfernung von eventuellen Überschüssen mit dem Scaler, Politur mit Finierstreifen
- Eintrag in das Behandlungsblatt
Caries Infiltration - Steps

Preparations

- Tooth cleaning with dental floss and polishing paste
- Absolute isolation with dental dam
- Inspection of the lesion: is there a cavitation?
- Separation of the teeth with a special wedge (Icon; DMG, Hamburg)
CARIES INFILTRATION - STEPS

ETCHING THE SURFACE

- Use of a special celluloid matrix with the etchant syringe (Icon Etch)
- Application of the 10% hydrochloric acid (Icon Etch) for 2 minutes
- Rinsing off the acid with air-water syringe, then drying the surface
- Application of Ethanol (Icon Dry)
- Thorough drying
CARIES INFILTRATION - STEPS

APPLICATION OF THE INFILTRANT

- Use of a new celluloid matrix with the infiltrant syringe (Icon Infiltrant)

  1. Infiltration: 3min

- Removal of the surplus material with dental floss and air syringe

- Light polymerisation for 40 s

  2. Infiltration: 1min.

- Removal of the surplus material with dental floss and air syringe

- Light polymerisation for 40 s

- Removal of the surplus material with scaler and finishing strips

- Documentation!
CariesInfiltration – IN THE ESTHETIC REGION
Caries Infiltration

Contraindications
- Deep caries (ICDAS 4, 5 und 6 and/or radiological > D1)
- Inactive carious lesions
- Root caries (Dentin)
- Erosions

Restrictions
- Carious lesions in pits and fissures
- Molar-Incisive-Hypomineralisation (MIH), Amelogenesis imperfecta
- Fluorosis
- Enamel development defects, traumatic enamel lesions
OZONE THERAPY

- Non- or Microinvasive possibility to treat early fissure caries, without drilling and pain
- Endodontic use is also possible
- Mechanism of action: the tooth is treated with ozone gas for 20-60 seconds → baktericid, virucid, fungicid effect; the carious process will be stopped
- After treatment the treated tooth should be remineralized (fluoride varnish)
- The device is very expensive; therefore this treatment modality gained little popularity
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AIR ABRASION

• **Minimalinvasive cavity preparation technique – without drilling**

• **Mechanism of action:** blowing of 27-50 micron aluminium oxide particles with air pressure onto the tooth surface

• **Use:** preparation for fissure sealing; minimalinvasive treatment of fissure caries; surface roughening for adhesive procedures

• **PrepMaster®, EtchMaster®, Kavo Rondoflex® (Hidro-abrasion)**
ULTRASONIC / SONOABRASIVE PREPARATION

- ULTRASONIC OR SONIC (25 kHz/6.5 kHz), PNEUMATIC PREPARATION INSTRUMENTS
- VARIOUS HEADS FOR EACH CAVITY DESIGN
  - ENDODONTICS, INLAY-PREPARATION, APPROXIMAL CAVITIES
- CONTROLLED TOOTH STRUCTURE REMOVAL, WITH MAXIMUM PROTECTION OF THE NEIGHBOURING TEETH
- KAVO SONICFLEX ®
LASER PREPARATION

- **Possibility of selective Tooth prepeparation and Caries removal - without Vibration und Sensibility**
- **After preparation the surface will be rough, with opened dentinal tubules \( \Rightarrow \) good for adhesive techniques**
- **Mechanism of action: The carious tissues with high water content will be removed with ablation**
- **Erbium Laser (with Infrared Wave length) is the best for cavity preparation and caries removal: Er-YAG; Er-YSFG**
- **Waterlase ®**
USE OF ROTARY INSTRUMENTS IN A NEW WAY
- "MICRO-DENTISTRY"

• The original rotary instruments can also be used with the principles of minimally invasive dentistry

• Use of special burs, which guarantee a controlled and minimally invasive reduction of tooth structure: MicroPrep Kit (KOMET®)

• Use of the Operative microscope and various loupes in the modern dentistry:
  • Cavity preparation
  • Endodontics
  • Minimally invasive Prosthodontics: Preparation and cementing
SPECIAL CAVITY DESIGNS

- APPROXIMAL BOX PREPARATION
- TUNNEL PREPARATION
THANK YOU FOR THE ATTENDANCE!