INTRODUCTION TO THE MICRO- AND MINIMALLY INVASIVE DENTISTRY

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MINIMAL INTERVENTION DENTISTRY (MID)

- A GROWING TREND IN ALL FIELDS OF DENTISTRY
- THIS TERM HAS BEEN INTRODUCED 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 specialities 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 DIAGNOSTICS

- **Visual and Tactile Caries Diagnostics (Probing)**
- **X-RAY Diagnostics – Bite Wing Recordings**
- **Transillumination**
  - FOTI (Fiber-optic Transillumination), DIFOTI
  - Infrared: DiagnoCam®
- **Fluorescence Based Systems**
  - Infrared Laser Fluorescence: 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
  - Cariesinfiltration
  - Ozone Therapy
- Minimalinvasive Techniques
  - Enamel microabrasion
  - Air abrasion, Hydroabrasion
  - Oscillation-based Instruments: Ultrasonic abrasive, Sonoabrasive Preparation methods
  - Laser Preparation
- Rotary Instruments ➔ Special cavity designs and Preparation techniques (Micropreparation; box-preparation; Tunnel-preparation...)

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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**
Caries Infiltration
Cariesinfiltration – Steps

- 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)
- 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
- Use of a new celluloid matrix with the infiltrant syringe (Icon Infiltrant)
  1. Infiltration: 3 min
  2. Removal of the surplus material with dental floss and air syringe
- Light polymerisation for 40 s
  2. Infiltration: 1 min
  3. 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!
CARIES-INFILTRATION - STEPS

PREPARATIONS

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- Absolute isolation with dental dam
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Cariesinfiltration - Steps

Etching the Surface

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Caries Infiltration - Steps

Application of the Infiltrant

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CARIES INFILTRATION – IN THE ESTHETIC REGION
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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-Incisor-Hypomineralisation syndrome (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 ➔ bactericid, 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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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®**
AIR ABRASION

- Minimalinvasive cavity preparation technique – without drilling
- Mechanism of action: blowing of 27-50 micron aluminiumoxid-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 working 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 preparation and Caries removal - without Vibration and 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-YSGG
- 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!