Removable appliances

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Classification of the orthodontic anomalies

1. Basal (skeletal)
2. Dentoalveolar (teeth, proc. alveolaris)
3. Basal and dentoalveolar
The character of the orthodontic anomalies

Normal, but disadvantageous face:
- most of the treated patients

Orthodontic anomalies:
- developmental
- other pathological process
- consequence of trauma
The reasons and character of the orthodontic anomalies

The reasons of the big variety:
- The face has several components
- Each of them has an own growth program
- The different tissues show different response after the forces
Aims of the modern orthodontic therapy

Balanced occlusion

Harmonic face profile
Appliances for treatment

• Removable

• Fixed
Removable appliances

**Advantages**

- Can be removed for toothbrushing
- Palatal coverage increases anchorage
- Easy to adjust
- Less risk of iatrogenic damage than with fixed appliances
- Acrilyc can be thickened to form flat anterior *bite - plane* or buccal *capping* can be performed
- Useful as passive retainer or space maintainer
- Can be used to transmit forces to blocks of teeth
Removable appliances

Disadvantages

Appliance can be left out
Only tilting movements possible
Good technician required
Affects speech
Intermaxillary traction not practicable
Lower removable appliances are difficult to tolerate
Inefficient for multiple individual tooth movements
Steps in designing a removable appliance

Four components need to be considered

- Active components
- Retaining the appliance
- Anchorage
- Baseplate
Active components

• Springs
  adaptation; basic criteria: it should be as effective as possible with the minimum adjustment on fitting

• Screws

  The direction of the movement is determined by the position of the screw.
Retaining the appliance

- Adams Clasp
- Other method of retention
- Suothend clasp
- Ball-ended clasp
- Plint clasp
- Labial bows
Baseplate

- Self-cure or heat-cure acrylic
- Anterior bite-plane (increasing the thickness of acrylic behind the upper incisors)
- Buccal capping
Commonly used removable appliances
To correct anterior crossbite in mixed dentition

- Movement labially of upper incisor(s)
  - using a spring (different types) or screw
Screw appliance to expand upper arch

- For moving blocks of teeth

Activation: a one quarter turn of the screw – (opens the two sections of the appliance by 0.25 mm)
Hawley retainer

• Passive appliance
Used for retention after active orthodontic treatment
Functional therapy
Functional jaw orthopedics
Bad habits frequently cause malocclusion

Bad habits:
- Finger-sucking
- Thumb-sucking
- Mouth breathing
- Swallowing problems
- Tongue-thrusting
- Speech defects
Functional analysis

1. Profil
2. Lips
   (form, position)
3. Tongue
4. Airways
5. TMJ
6. Parafuction
   and bad habits
Evaluation of the lateral cephalometric X-ray

1. Profile
Soft tissue analysis
Line of harmony
2. Lips
3. Tongue
The forms of tongue thrusting

Anterior
Posterior
Both
4. Airways

Evaluation of the adenoids
(Mouth breathing?)
5. TMJ

Bilateral examination of TMJ
The aims of functional therapy

Neuromuscular stimulation
Normalisation of the sagittal /vertical relations
Expansion of the arches
Myofunctional therapy

*Early period:* oral screening
myofunctional appliance
(ensures the normal function,
helps the corrections of the functional
problems and the dental anomaly)
Functional appliances

**Definition:**
Appliance that **effects on the posture of mandible causing stretching the facial soft tissues, to produce a combination of dental and skeletal changes.**

**Classification of appliances:**

Tooth-borne or mucosa-borne

- **Passive** - e.g. bionator
- **Active** - if they carry active components like expansion screw
History

Roux 1883. – functional stimulation
Wolf 1895.
Robin 1902.
Andresen-Häupl 1938.
Schwartz 1942.
Balters 1956.
Fränkel 1958.
The way of the functional therapy

Functional stimulation of the tissues, jaws, condyle and the teeth
Functional appliance

Basis of its work:
The grows of the mandible is guided (particularly in the anterior and vertical directions) but the grows of the maxilla is also affected
Functional appliance

Mode of action

- Works by posturing the mandible forwards, which causes soft tissue stretching. This generates a Class II intermaxillary traction forces.
Use of functional appliances

Midline aligning

Arrangement of the horizontal relation and the vertical relation
Functional appliances

**Main effects of use:**

– Correction of malocclusions in young patients by influencing on grows

– Elimination of functional disturbances

– Correction of tooth positions (retrusion or protrusion of lower or upper incisors)

Can’t solve the torque of teeth and very limited in improving rotations!
Functional appliances

Correction in overjet (as a result) produced by combination of tooth movement (70%) and skeletal movement (30%)

Effects of functional appliances:

Dentoalveolar changes - retroclination of maxillary incisors, proclination of lower incisors

Increased mandibular length – due to downward and forward translation of the condyle which may encourage backward compensatory growth

2-4 mm; great individual variation
Effects of functional appliances (cont.)

- **An increase in lower anterior face height (LAFH)** – due to a combination of molar eruption and downwards mandibular grows (useful where there is a deep overbite)
- **Forward remodeling of glenoid fossa**
- **Restraint of maxillary grows** – due to the Class II traction forces acting on maxilla. Incorporation of *headgear* into functional appliance treatment *increases* this effect.
Functional appliances

Patient selection

Criteria and indications:

- Class II malocclusion (Class III malocclusion)
- Significant Class II skeletal discrepancy with mandibular retrognathia
- Growing patient (during the pubertal growth spurt) for maximum response (males: 14-16 year olds; females: 11-13 year olds)
- Compliant patient – difficult tolerancy; patient must attend for regular appointment

Motivation & cooperation!
Functional appliances

When to start the treatment?

Optimally, *prior* to the loss of the primary second molars

(the difference in mesiodistal crown dimensions between the primary molars and correspondent teeth can be utilized for the correction of the distoocclusion)
In which age should we use the functional appliances?

Ideal: 10-12 yrs of age

During growing

Wearing time?

12-15 hrs daily
Contraindication: disturbed nasal passages, limited intraoral space – when the patients are not able to keep the appliances in the mouth!
Types of functional appliances

1924 - Viggo Andresen (Norway) – activator - many modifications

Andresen-Häupl

The twin block appliance

For Class II cases with a reduced or normal vertical dimension

*mandibular and maxillary appliance:*

acrylic baseplate with midline expansion screw;
Adam clasps (placed onto the first permanent molars - and first premolars)
The bite blocks cover the occlusal surface of the premolars and molars (labial bow for the retention and to aid the retraction of upper incisors)

**Two-piece appliance**
– it allows lateral mandibular excursions - may increase comfort and improve compliance
Twin block in the practice
Twin block in the practice II
Functional appliances

Balters

Klammt
Functional appliances

Fränkel     Hansa
Hansa appliance
Bertoni screw – expansion into 3 directions
Modified functional appliances
Functional appliances

How to start?
What we need?

Recent set of dental cast
Construction bite/bitewax
Construction bitewax

Edge-to-edge
Two thirds of a red wax sheet is warmed by a flame/in hot water.

The soft wax is rolled and fitted on the recently obtained mandibular dental cast.
The patient occludes in the wax roll, positioned at the mandibular teeth – anterior position! (under guidance)
Construction bite
Summing up (aims and results of...)

- Profiting the growth period
- Neuromuscular stimulation
- Cancelling the dysfunction
- Rebuilding the TMJ
- Pretreatment before MB appliance
Effects…

Before treatment…

After treatment…
(9 months later)
Literature

  ISBN 9781405127882
- FPGM van der Linden: Orthodontic concepts and strategies. Quintessence, 2004
  ISBN 1-85097-094-7
  ISBN:0-7216-8289-8
Thank you for your attention!