Retention and relapse

Dr. Kaán Miklós

Semmelweis University,
Department of Paediatric Dentistry and Orthodontics

SEMMELWEIS
UNIVERSITY 1769

Retention = we have to save the result of the orthodontic treatment

- *There is only one way to completely avoid relapse. At the end of treatment, remove the braces, polish the teeth, make study models and take photographs. And then take the patient out the back door of the office and shoot him. (Dr. Tom Graber DMD,* South African Dental Congress. August 1992.)

Basic Theories of Relapse and Retention: length of the retention

Corrected teeth tend to return to their original position

- Teeth should be held in corrected positions for an extended period of time to prevent relapse
- Due to musculature, apical bases, transseptal fibers, and bone morphology

Timing of Tissue Reorganization

- Once teeth are able to move individually from one another during mastication, reorganization of tissues can begin:
  - PDL: 3-4 months
  - Collagenous gingival fibers: 4-6 months
  - Elastic supracrestal fibers: 1 year
- In cases of severe initial rotations: supracrestal fibrotomies are recommended at or just before appliance removal to prevent relapse

The frequency of the relapse

- Difficult to determine because a lot of relapsed case are hidden
- In the lower fornt area less 20 % of the cases maintain proper

Marielle Blake, Kathryn Bibby

Retention and stability: A review of the literature
American Journal of Orthodontics & Dentofacial Orthopedics
September 1998

Reasons of relapse : Lower Incisors !!!

- Study conducted by *Little et al*
  - Patients with four 1st bicuspid extraction were evaluated for incisor crowding 10 years post-retention
  - Only 30% had ideal alignment
  - 20% had marked crowding
  - Post-treatment crowding was concluded to be unpredictable based on pretreatment findings

Extraction versus nonextraction

- If the treatment plane and leading of the treatment are proper, there is no difference related to the relapse

Erdinc A., E., Nanda R., S., Işıksal E.: Relapse of anterior crowding in patients treated with extraction and nonextraction of premolars American Journal of Orthodontics & Dentofacial Orthopedics June 2006

The length of the retention

- The length of the retention should be twice longer then the active treatment
- In the first 6-8 month the retainers should be worn 20-22 hours to avoid „jiggling”
- Later (12-14 hours) daily wearing is necessary
- The retainers have to be left by degress (every 2. day, twice a week etc.)
- The fixed retainers can be used for longer time (many years)

Retention and relapse

- Who is reponsible ?

Orthodontist

??

Patient

Objective reasons

Wisdom teeth ?

Why is retention needed?

The sentence that orthodontists hate: „Doctor, my teeth started to move back”…!

- Gingival and periodontal tissue require time post-treatment to reorganize
- Soft tissue pressures are likely to cause relapse if teeth are placed in an unstable position
- Growth post-treatment may cause relapse

Profitt, Contemp. Ortho, 2007

Basic Theories of Relapse and Retention: lower incisors crowding !!

Lower incisors are more likely to remain in good alignment if positioned upright over basal bone

- Perpendicular to mandibular plane
- In terms of stability, it is better to place too much lingual inclination rather than too much labial inclination

  - Labial inclination is more likely to collapse due to lip pressure

Basic Theories of Relapse and Retention:

Appliance therapy cannot permanently alter arch form (esp. in lower arch

- Should maintain the initial archform, as it will tend to return to its pretreatment shape

- *Strang* stated:

  "The width as measured across from one canine to another in the mandibular denture is an accurate index to the mandibular balance inherent to the individual and dictates the limits of the denture expansion in this area of treatment"

Strang, Textbook of Ortho, 1958

Basic Theories of Relapse and Retention:

Relapse is less likely if corrections are made during time of growth

- Influence of growth of the maxilla and mandible can only occur in growing patients
- Advantages of early treatment:
  - Interception prior to dental compensation
  - Possible correction of skeletal malocclusion while sutures are still open
  - Prevent irreversible soft tissue or bony changes

- **Post-treatment growth (esp. mandibular growth) will cause secondary crowding**

- *Litowitz* found that patients which exhibited the most growth during treatment demonstrated less relapse

Basic Theories of Relapse and Retention:

3. **Overcorrection** is recommended in malocclusions

- Class II → edge to edge
- Deep bite cases
- Rotated teeth
  - Less chance of relapse if there has never been a rotation; should create enough space initially for tooth to erupt into
  - Transseptal fibrotomy is also recommended in severe cases

Reitan, Angle Ortho, 1959

Edwards, AJO DO, 1968

Theories of Relapse and Retention:

Relapse is less likely to occur if the cause of the malocclusion is eliminated

- Thumb, finger or lip habit BAD HABITS !!
- Tongue posture
  - It has been stated that even after successfully completing tongue therapy/exercises correction is not guaranteed
- Nasopharyngeal obstruction →mouth breathing → open bite
- In a study by *Gavito et al.*, patients who initially started with an open bite where evaluated 10 years following retention → 35% had an open bite 3 mm or more

Nance, AJO DO, 1947

Gavito, AJO, 1985

Basic Theories of Relapse and Retention:

Obtaining proper occlusion is an important factor in maintaining corrected positions

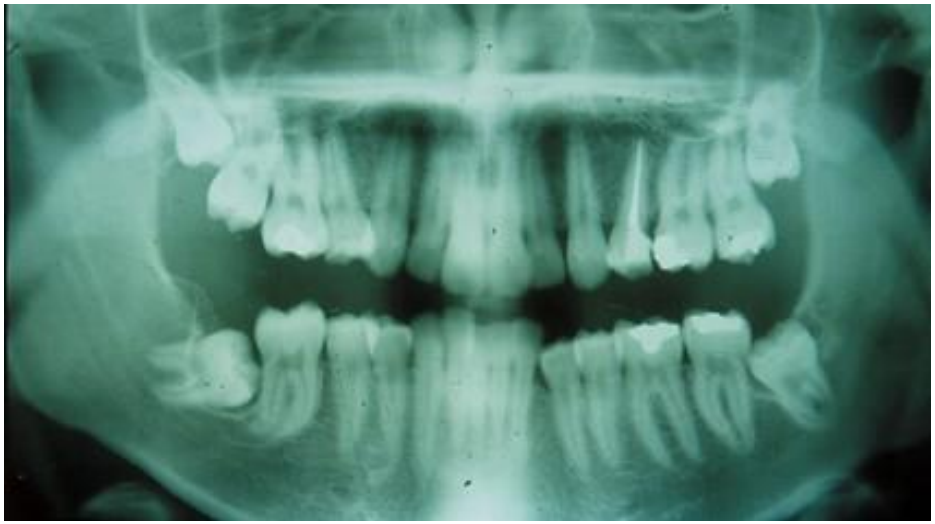
- No movement is seen from regular grinding
- Movement may occur if there is destruction of bone or a build up of fibrous tissue (difficult to maintain tooth position)

Parker, Angle Ortho, 1965

Goldstein, ADJ DO, 1965

9. Reasons of relapse

Wisdom teeth



Types of Retention

1. Removable Retention
2. Fixed Retention
3. Active Retention

Removable appliances

- Active plates
  - Pasive plates
- Functional, bimaxillary appliances

(To improve the relationship between the upper an lower jaw)
Frankel-appliance, Hansa-appliance, Bionator, Aktivator

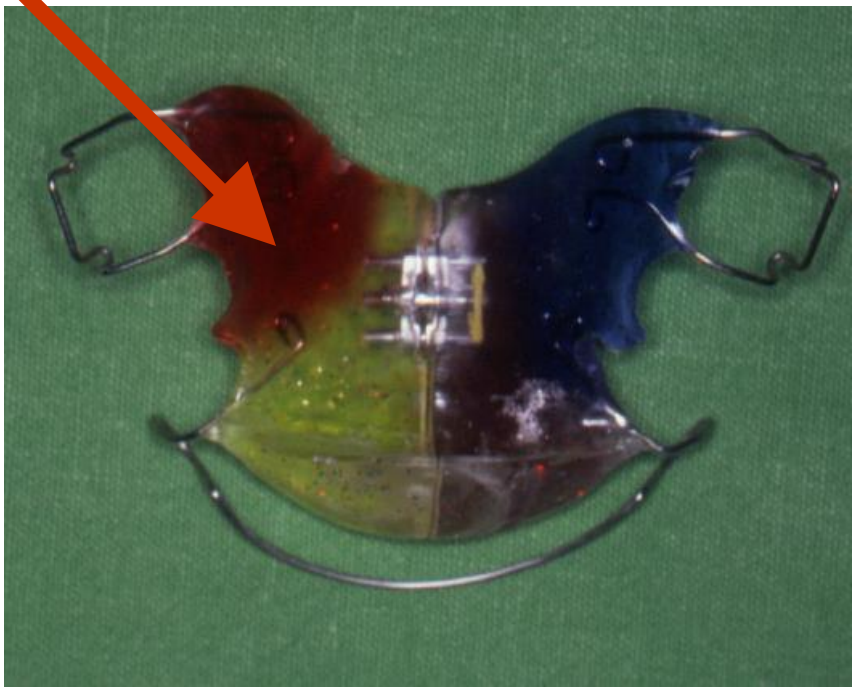
Grouping of plates

Passive

Upper passive (retention) plates

SCREW

Active



Upper active plate

Removable Retainers

- Advantages as a retainer:
  1. Reestablishes normal tissue when gingival hyperplasia is present
  2. Maintains occlusal relationship and intra-arch position
  3. Unlikely to break

1. Can be constructed to prevent relapse in skeletal Class II and open bite cases
   - Growth control is less effective than part-time functional appliance

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Removable Retainers

Disadvantages of removable retainers:

- Worn 10 hours during day and while sleeping ??
- Separates teeth by 2-3mm (clasps, springs)
- If appliance is made with incorrect hinge axis the patient's posterior teeth will not contact when incisors do

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Removable Retainers

- **Hawley Retainer:**
  - Most common removable retainer
  - Developed in 1920s
  - Clasps on molars, palatal coverage, and labial bow with adjustment loops
  - Can incorporate biteplate for deep bite patients

Profitt, Contemp. Ortho, 2007

Barrer-retainer

Removable Retainers

- **Wraparound Modification:**

  “3-3 Clip-on”

- Used mainly for lower anterior area
- Can realign incisors and/or maintain lower incisor space closure
- Used if posterior teeth were well aligned pre-treatment

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Removable Retainers

- **Essix:**
  - Developed in 1993
  - Plastic removable appliance
  - Advantages:
    - Esthetic
    - Patient is more likely to wear
    - Inexpensive
    - Quick fabrication
    - Minimal bulk
    - High strength
    - No adjustments
    - Usually does not interfere with speech or function
  - Studies have determined that Essix retainers are as efficient as Hawley-type or bonded wire retainers

Graber, Orthodontics, 2005

Retainers –
Essix retainer (only anterior)

Removable Retainers

- **Damon Splint:**
  - Basically, upper and lower Essix retainers connected
  - Retentive splint for Class II, Class III, and bilateral crossbite treatment
  - Assists in tongue training
  - Holds teeth and arches in corrected position

www.ormco.com

Removable Retainers

- **Positioner:**
  - Can be made as retainer or used for finishing and then maintained as retainer
  - <u>Disadvantages as a retainer</u>:
    1. Bulky and difficult to wear full-time
    2. Do not retain incisor position as well as a conventional retainer b/c patients usually wont wear full-time
    3. Overbite increases due to limited patient wear

Profitt, Contemp. Ortho, 2007

Active Retainers

- **Modified functional appliance:** manage relapse potential in Class II or Class III cases
  - Activator or Bionator:
    - Upper and lower retainers joined by inter-occlusal bite blocks
  - Maintain occlusal relationship
  - Bite registration is taken in CR, so appliance is “passive”
    - Example: If adolescent slips back 2-3 mm into Class II after early correction, this appliance can be used to recover proper occlusion
    - Goal: Hold maxillary posterior segment and allow for eruption of mandibular posterior segment anteriorly (Class II)

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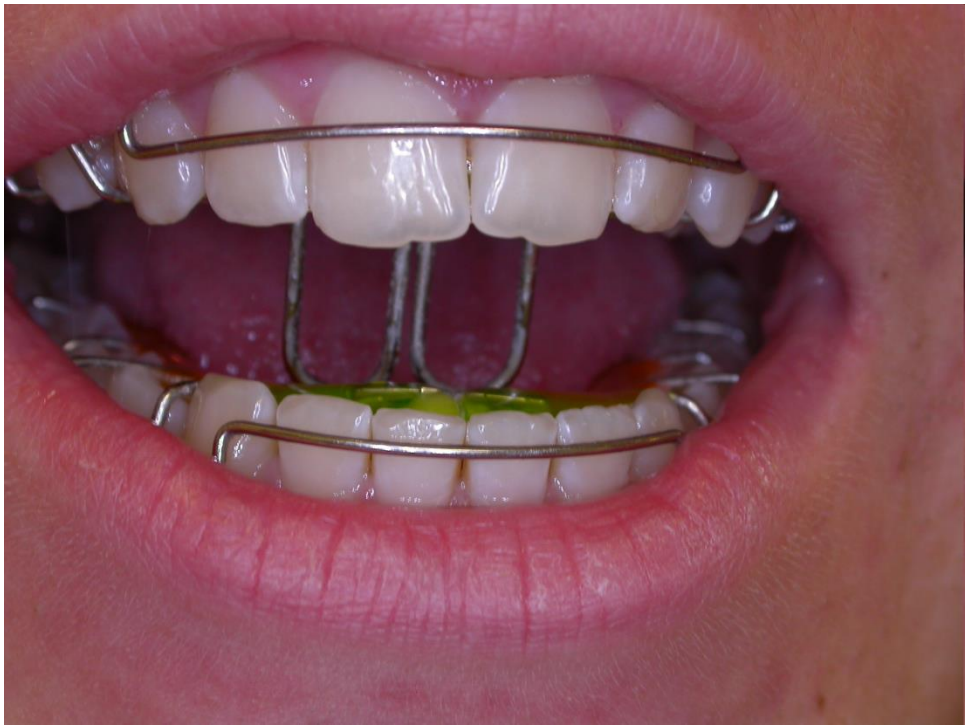
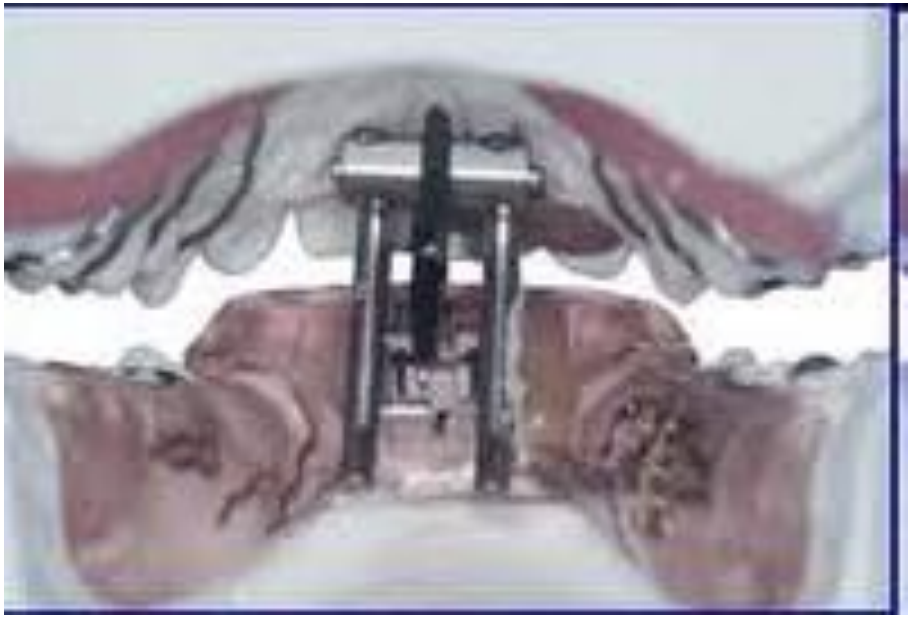
Double Plate





Retention: Class III

- Relapse occurs mainly from mandibular growth
- Chincups and functional appliances: rotate mandible downward causing more vertical growth
  - Not as effective as maintaining Class II
- If relapse occurs in normal or excessive face height patients: may need surgical correction after growth
- In less severe Class III cases: Utilize functional appliance or positioner
  - Will maintain occlusal relationship in these cases
  - May position jaws down and back to prevent relapse

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Fixed Retainers

- Utilized in cases where stability is questionable and prolonged retention is planned

- Four main indications:
  1. Maintaining lower incisor position
  2. Holding diastema closed
  3. Implant or pontic space maintenance
  4. Retaining closed extraction spaces

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Fixed Retainers

1. **Maintaining lower incisor position during late mandibular growth:**

- Even mild mandibular growth between the ages of 16-20 can cause lower incisor relapse
- A fixed lingual bar bonded only to canines can prevent distal tipping of lower incisors
- A heavy wire, 28 or 30 mil, should be used due to long span
- Studies indicate that placing retention loops on canines will decrease breakage

Twist-flex wire, thin stainless steel wire, ready-made soft metal wire

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Fixed Retainers

- If teeth were severely rotated or spaced, all teeth (3-3) can be bonded together using a 17.5 mil braided steel wire – as it is not desirable to use too rigid of a wire (must allow physiologic tooth movement)
- Patients who were evaluated after 20 years of having a lower fixed retainer showed NO signs of periodontal problems
- If proper flossing is maintained, fixed retainers can remain indefinately

Booth, Angle Orthodontics


8

Üvegszálas retainerek

Fixed Retainers

2. Holding diastema closed:

- Utilize lighter wire
  (17.5 or 19.5 mil twist)
- Bond above cingulum –
  out of occlusion
- Can prevent bite deepening if lower incisors erupt

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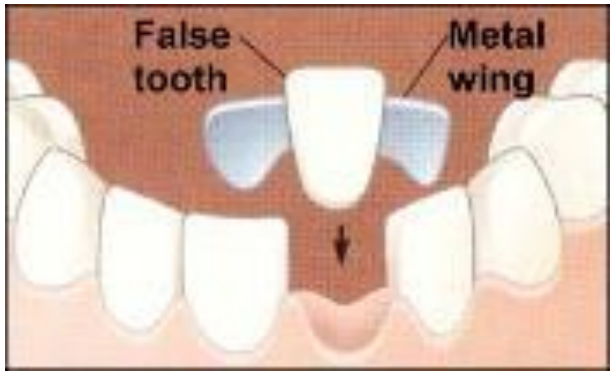
Fixed Retainers



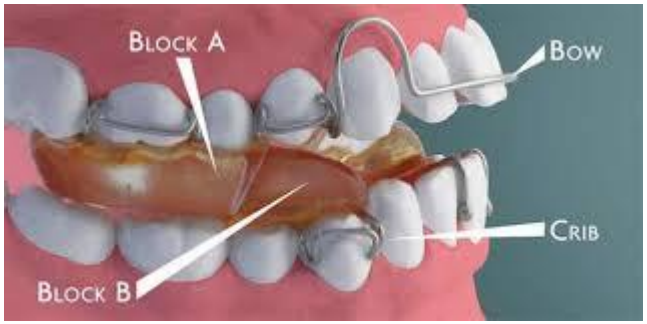
3. Implant or pontic space maintance:

- Reduces mobility of teeth making it easier to place bridge
- Holds space if prolonged periodontal treatment is required post-ortho, prior to placement of restoration
- Implants should be placed as soon as ortho is completed so it can be included in initial stages of retention

Retention: Deep Bite

- Must control overbite during retention period
- Construct upper removable retainer with a baseplate to prevent lower incisors from over-erupting; posterior occlusion is maintained
- After stability is achieved, worn at night only

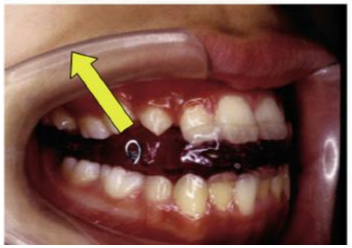
Retention: Anterior Open Bite



- Patients with habit (thumb or tongue):
  - Relapse occurs by a combination of molar elongation and incisor intrusion

- Patients without habit:
  - Relapse is due to elongation of posterior teeth, mainly upper molars; not incisor related

Retention: Anterior Open Bite



- High-pull headgear with use of conventional removable retainers
- Appliance with posterior bite blocks (open bite activator or bionator) at night and conventional retainers during the day
  - Preferred because:
    - Prevents eruption of upper an lower molars
    - Better patient acceptance

Thank you for your attention !