Outline

- Definition
- Principles of Treatment Timing
- Indications for Early Treatment:
  - Severe Dental Problems
  - Severe Skeletal Problems
  - Myofunctional/Habit Problems
Definition

AAO Council of Orthodontic Education:

**Interceptive Orthodontics** -

“The science and art of orthodontics employed to **recognize and eliminate potential irregularities and malpositions in the developing dentofacial complex.**”

1Orthodontics: Council on Orthodontic Education. St Louis; AAO1971.
Orthodontic treatment in the early mixed-dentition stage may be referred to as:

- Phase I Treatment
- Early Treatment
- Interceptive Treatment

For a child with a complex problem, it is highly likely that a second stage of treatment will be needed.
AAO Recommendation

- The AAO recommends that children are first evaluated by an orthodontist at Age 7 to determine if they are in need of early orthodontic treatment.
DOES EVERY CHILD NEED EARLY TREATMENT?
NO.
Although orthodontic screenings are recommended at age 7, the “Gold Standard” for orthodontic treatment timing is:

“During the adolescent growth spurt, starting in the late mixed or early permanent dentition.”
Definition

Principles of Treatment Timing

Indications for Early Treatment:
- 1) Severe Dental Problems
- 2) Severe Skeletal Problems
- 3) Myofunctional/Habit Problems
In determining “optimal timing” for orthodontic treatment, two considerations are important:

- **Effectiveness**... how well does the treatment work?
- **Efficiency**... what is the cost-benefit ratio?
  - Cost=Burden of Treatment
Proffit\textsuperscript{1} considers 4 key principles in Early Tx:

- Growth modification
- Facial growth in the three planes of space
- Tooth eruption vs. Skeletal growth
- Permanent teeth eruption location

Growth Modification:

- Is most successful when it accompanies the adolescent growth spurt and ends near the time rapid growth subsides.

- If you start growth modification too late it does not work, but if you start too early, it can take a long time and the patient becomes “burned out.”
Facial Growth in 3 Planes:

- Facial growth in the three planes of space (horizontal, sagittal and vertical) is completed at different times.

- Important to time growth modification procedures differently for different problems.
  - Ex: Crossbite vs. CLII correction vs. Skeletal open bite
Tooth Eruption vs. Skeletal Growth

- Tooth eruption does correlate, but not very well, with skeletal growth.
- Timing of treatment may have to be adjusted because skeletal and dental development are not in synchrony.
Permanent teeth eruption location

- Permanent teeth often do not erupt where their deciduous predecessors were.
- This means that a second stage of treatment in the early permanent dentition is usually necessary when initial treatment is done in the mixed dentition.
Goal-Setting in Early Treatment

- There is a limit to the time and cooperation that patients and parents are willing to devote to treatment.

- It is easy for mixed dentition treatment to extend over several years and result in one long period of treatment.

- If mixed dentition treatment takes too long, there are 2 problems:
  - 1) Patients become “burned out”
  - 2) Chance of damage to teeth increases as treatment time increases
Early/interceptive orthodontic treatment should be limited to **ONE YEAR** (max 18 months)
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  - Myofunctional/Habit Problems
When is early treatment indicated?

- When it will produce a long-term result that can justify the extra cost (psycho-social reasons), or will eliminate the need for a later treatment stage (not guaranteed).
Early Treatment

3 Main Categories:

1. Severe Dental Problems
2. Severe Skeletal Problems
3. Myofunctional/Habit Problems
1. Severe Dental Problems

- Crossbites of Dental Origin (Posterior/Anterior)
- Severe Crowding (Tooth Size Arch Length Discrepancy - TSALD)
- Premature Tooth Loss: Space Maintenance
- Eruption Problems
Crossbites of Dental Origin

- Due solely to displacement of teeth
- Important to distinguish between skeletal and dental etiology.
  - When evaluating a crossbite in the primary or mixed dentition, check dental midlines.
- Full Cusp Bilateral Posterior Crossbite
  - Usually skeletal constriction
- Unilateral Posterior Crossbite
  - Usually due to an occlusal interference
  - May be due to a skeletal asymmetry
- Anterior Crossbite
  - May result from lack of space for permanent incisors
  - Usually due to a jaw discrepancy
Posterior Crossbite with Functional Shift of Mandible
Benefits of Treating Dental Crossbites Early:

- Eliminates functional shifts and wear on permanent teeth, and possibly future dentoalveolar asymmetry.¹

- Crossbite correction will also increase arch circumference and provide more room for permanent successors.

Posterior Dental Crossbite

- **Treatment Options:**
  - Equilibration to eliminate mandibular shift
    - Check primary canines
  - Expansion of a constricted maxillary arch
    - Removable Schwartz Plate
    - W-arch (fixed)
    - Quad Helix (fixed)
  - Repositioning of individual teeth to deal with intra-arch asymmetries
    - Mandibular stabilizing LHA with cross-elastics to maxillary teeth in crossbite
Treatment Options:
- Confirm non-skeletal etiology
- Due to lack of space?... focus on total space management, not just crossbite.

Before OB established:
- Extract adjacent primary teeth

After OB established:
- Appliance therapy
  - Maxillary removable appliance with fingersprings (+/- biteplate)
  - Maxillary lingual arch fixed appliance with fingersprings
  - Maxillary 2x4 advancing arch
  - **Overcorrect and retain!**
Hawley with Fingersprings
Severe Crowding / TSALD

- Early intervention in arch length discrepancies can eliminate the need for future premolar extractions.\(^1\)

- Early Treatment Considerations?
  - Extraction/Non-Extraction
  - Maxilla vs. Mandible

\(^1\)Arvystas. The rationale for early orthodontic treatment. AJO-DO. Vol 113(1); 15-18, January 1998.
Serial Extraction

- Extraction pattern for severe crowding in mixed dentition (C,D,4)

- Not as popular today because it is difficult to determine if crowding in the early mixed dentition is severe enough to make the extraction decision at that time.

- In cases of extremely severe crowding, data show that serial extraction can reduce the length of later comprehensive treatment.\(^1\)

\(^1\) Arvystas. The rationale for early orthodontic treatment. AJO-DO. Vol 113(1); 15-18, January 1998.
Maxillary TSALD non-ext

- Treatment Options:
  - 2x4
  - Removable Schwartz Plate (expansion)
  - Fixed Expander (Quad Helix, RPE)

Mandibular TSALD non-ext

- Treatment Options:
  - 2x4
  - Removable Schwartz Plate / FLEA
  - Lip Bumper
    - To alter force distribution of the perioral musculature and mucoperiosteum to allow uprighting of the mandibular canines and premolars.
Appliances
Lip Bumper
Premature Tooth Loss: Space Maintenance

- Early tooth loss may allow for drifting of permanent/primary teeth and cause alignment problems.
- Space maintenance is appropriate only when adequate space is available and all unerupted teeth are present and at the proper stage of development.
Treatment Options:

- **Band and Loop**
  - Unilateral fixed appliance for holding space for one tooth in a posterior segment

- **Partial denture space maintainers**
  - For bilateral posterior space maintenance when more than one tooth has been lost per segment and permanent incisors have not erupted

- **Distal Shoe**
  - To replace a primary second molar prior to eruption of the first permanent molar.

- **Lingual Arch/Nance/TPA**
  - When multiple primary posterior teeth are missing and permanent incisors have erupted.
Space Maintainers

- Band and Loop
- Distal Shoe
- Nance
Eruption Problems

- **Over-retained primary teeth**
  - Extract to prevent irregularity, crowding, crossbite.

- **Supernumary teeth**
  - Extract to minimize effect of permanent teeth being displaced.

- **Delayed incisor eruption**
  - Expose tooth, obtain proper anchorage from the rest of the arch (bond as many permanent teeth as possible) and use NiTi wires/elastics/springs to erupt the tooth.

- **Ankylosed primary teeth**
  - With permanent successor, maintain until adjacent teeth start tipping...then extract and lingual arch.
  - No permanent successor, extract before a large vertical occlusal discrepancy develops.¹

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Ankylosed E’s
Too early?
Early Treatment

3 Main Categories:

1. Severe Dental Problems
2. Severe Skeletal Problems
3. Myofunctional/Habit Problems
2. Severe Skeletal Problems

- Treatment goal is to modify child’s facial growth.
  - **TIMING IS KEY**—must be done before adolescent growth spurt ends!!

- What can we correct skeletally in early orthodontic treatment?
  - **Transverse Skeletal Problems**
    - Skeletal Crossbite
  - **Sagittal Skeletal Problems**
    - CLII (maxillary excess/mandibular deficiency)
    - CLIII (maxillary deficiency)
Transverse Maxillary Constriction

- Correction via opening the mid-palatal suture, which widens the roof of the mouth and floor of the nose.
- Less force is needed to open the suture in younger children and it is easy to accomplish palatal expansion.

**Treatment Options:**
- **Schwartz plate** with jackscrew/spring
- **Lingual arch** (W-arch or Quad Helix)*
- **Fixed palatal expander** with jackscrew

**NOTE:** RPE is NOT indicated on young children because can distort facial structures (widen alar base).
W-Arch and Quad Helix
The outcome of orthopedic treatment of CLIII malocclusion is favorable when it is started before the pubertal growth spurt.

CLIII patients orthopedically overcorrected to positive overjet of 4-5 mm or greater generally can sustain long-term outcomes.¹

Treatment Options:
- **Reverse-pull/Protraction Headgear** (Facemask)
  - With or without maxillary expansion

Protraction Facemask

[Images of a child wearing a protraction facemask, showing the device on the face and side profile.]

[Logo for Go Orthodontics: Ready. Set. Smile!]

[Contact information and additional details may be present in the document, not shown here.]
Protraction Facemask

- Moves maxilla anteriorly and inferiorly
  - Increases size of maxilla by causing apposition of bone to posterior and superior sutures

- Most effective when used prior to age 10

- Defer until eruption of first molars (↑ anchorage)

- Research shows that palatal expansion immediately prior to facemask therapy makes A-P skeletal change more likely.
  - Recommendation: 4.0 mm of palatal expansion to “loosen” the maxilla prior to protraction.
Forward Movement of Upper Jaw

Figure 3
As children come closer to adolescence, mandibular rotation and displacement of maxillary teeth—not forward movement of the maxilla—contribute to the treatment result.

Most facemask patients improve in the short term, but current data suggest 25% will require future orthognathic surgery.¹

Early treatment of CLII (deficient lower jaw) growth patterns are a current topic of debate.

UNC studies have shown that both headgear and functional appliances are effective in modifying growth during a stage of early treatment. At the end of Phase I treatment there is a statistically significant difference between the treated and non-treated children.

However, at the end of comprehensive fixed appliance therapy, University of North Carolina data has shown that there is no difference among the previously treated and untreated CLII groups.
UNC Growth Studies

- Early treatment produces no reduction in the average time a child is in fixed appliances during a second stage of treatment, and it does not decrease the proportion of complex treatment involving extractions or orthognathic surgery.¹

- “It has now been established that early treatment for most CLII children is no more effective, and considerably less efficient, than later 1-stage treatment during adolescence.” –Proffit 2006²

However, there are indications for early CLII treatment:

- **Psycho-social Issues**
- **Trauma**

**Treatment Options:**

- **Headgear**
  - Cervical Pull
  - High Pull
- **Functional Appliances**
  - Bionator/Activator
  - Frankel II “FR-2”
  - Herbst
  - Twin Block
Good choice for treatment in a CLII patient with maxillary excess.
- Restrains maxillary forward growth
- Allows for normal growth of the mandible
- **Cervical Pull Headgear:**
  - Can be used on patients with a low MPA
- **High Pull Headgear:**
  - Used on vertically sensitive patients.
  - Orthopedic maxillary impaction with mandibular autorotation forward.
Preferred for treatment of mandibular deficiency in the mixed dentition

- **Removable Functionals:**
  - Bionator/Activator
  - FR-2
  - Twin Block

- **Fixed Functionals:**
  - Herbst*
  - Bonded Twin Block
Although some clinicians recommend CLII tx with fixed functional appliances, there is little evidence to support early treatment with these appliances.

Long-term Herbst studies by Pancherez show substantial rebound in the immediate post-treatment period.
- Now recommended for early permanent dentition.

Limited skeletal effects are seen with Herbst treatment.
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3. Myofunctional/Habit Problems

2 Main Problems to Consider for Early Tx:

- **Tongue Thrust** Swallowing Pattern Contributing to an Open Bite / **Tongue Resting Position**

- **Thumb Sucking** Contributing to an Open Bite
Tongue Thrust Swallowing Pattern Contributing to an Open Bite

- May not actually be the “thrust” contributing to the open bite, but the tongue size and resting position.

- Treatment options:
  - **Myofunctional Therapy** -- controversial
  - **Tongue Appliances** — Cribs, Tamers, etc.
“Tongue Tamers”
HOW LONG HAS MR. DANVERS HAD THE SALIVA SUCTION IN HIS MOUTH?
Thumb Sucking Contributing to an Open Bite

- With frequency and prolonged sucking:
  - maxillary incisors are proclined
  - mandibular incisors are tipped lingually
  - eruption of permanent incisors is impeded
  - OJ increases
  - OB decreases—development of anterior openbite

- Early Treatment Options:
  - Non-dental Intervention
  - Appliance Therapy
Non-Dental Intervention:
- Straightforward “Adult” discussion with patient about terminating behavior
- Reminder Therapy – Bandaid, Mavala Stop
- Reward system
- Elastic Bandage around elbow
- Thumb guard

Appliance Therapy:
- Fixed Thumb Habit Crib
*Appliance should be kept in place for 6 months after sucking apparently ceases to ensure the habit has truly stopped.
Thumb Guard
Thumb/Tongue Crib
Long-term Impact of Early Treatment

- As facial and dental development continues throughout childhood and adolescence, the long-term impact of early treatment may not be predicted.\(^1\)

- Early intervention may help develop a normal occlusion and facial harmony.\(^2\)

- Ultimately, early treatment as a standard of care can be justified ONLY if it will provide additional benefits to the patients.\(^3\)


References

- Arvystas. The rationale for early orthodontic treatment. AJO-DO. Vol 113(1); 15-18, January 1998.
Thank you for your attention!

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