

# INDICATIONS FOR EARLY ORTHODONTIC TREATMENT



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# 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.”<sup>1</sup>*

<sup>1</sup>Orthodontics: 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

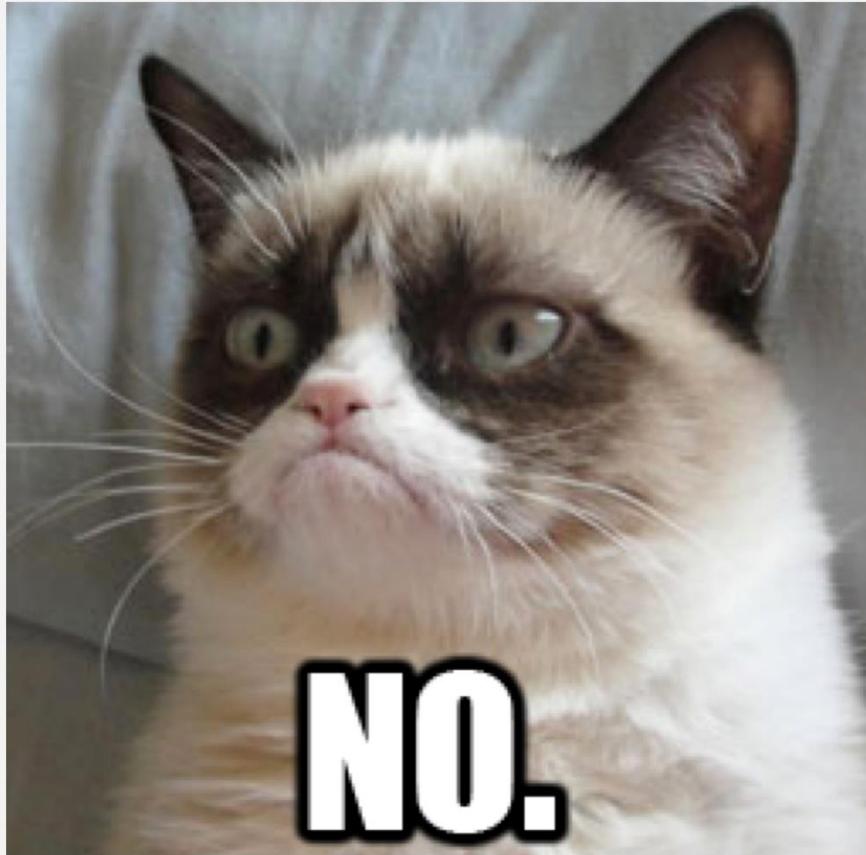
- ▣ The AAO recommends that children are first evaluated by an orthodontist at

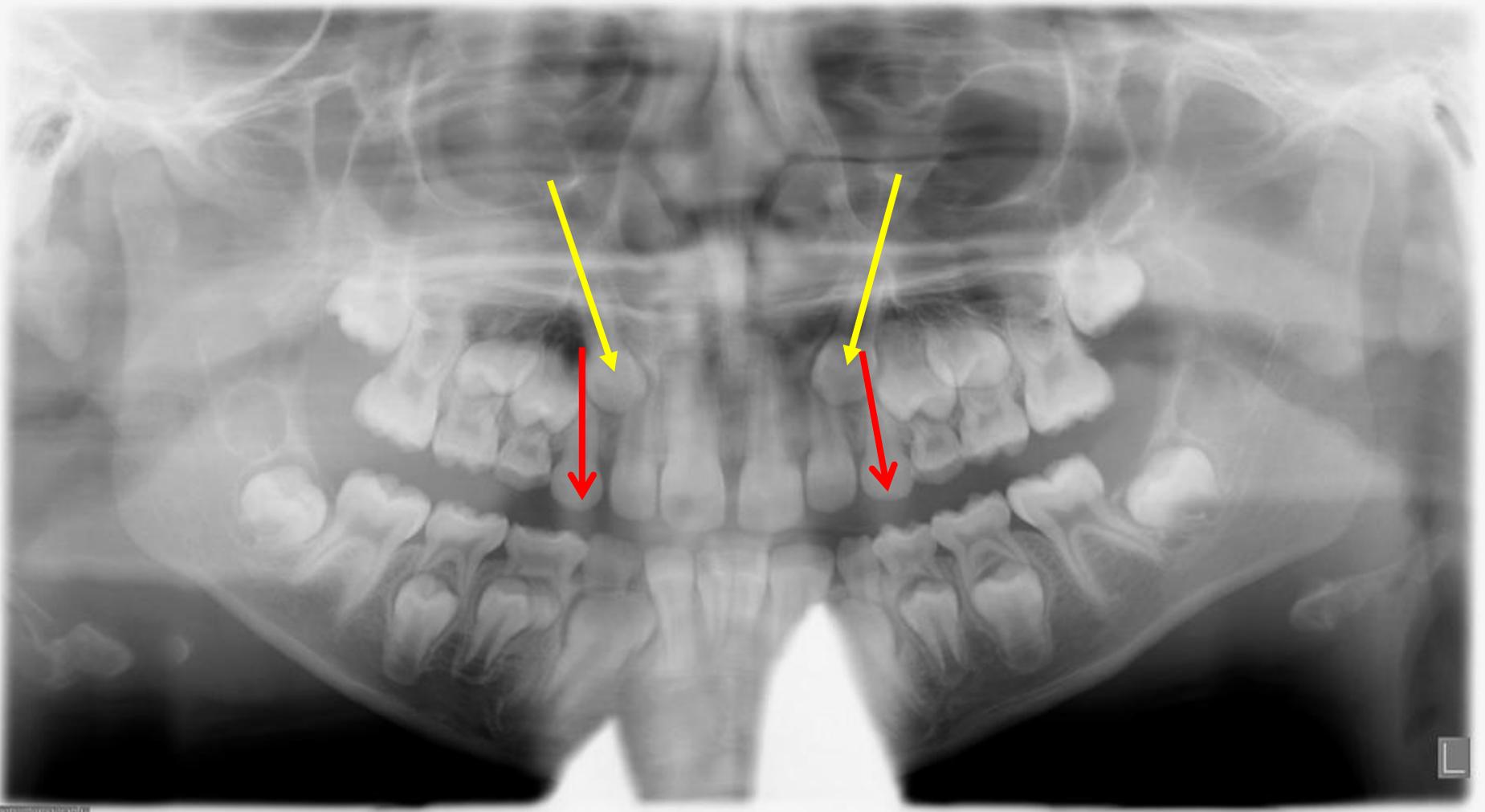
**Age 7**

to determine if they are in need of early orthodontic treatment.

# DOES EVERY CHILD NEED EARLY TREATMENT?

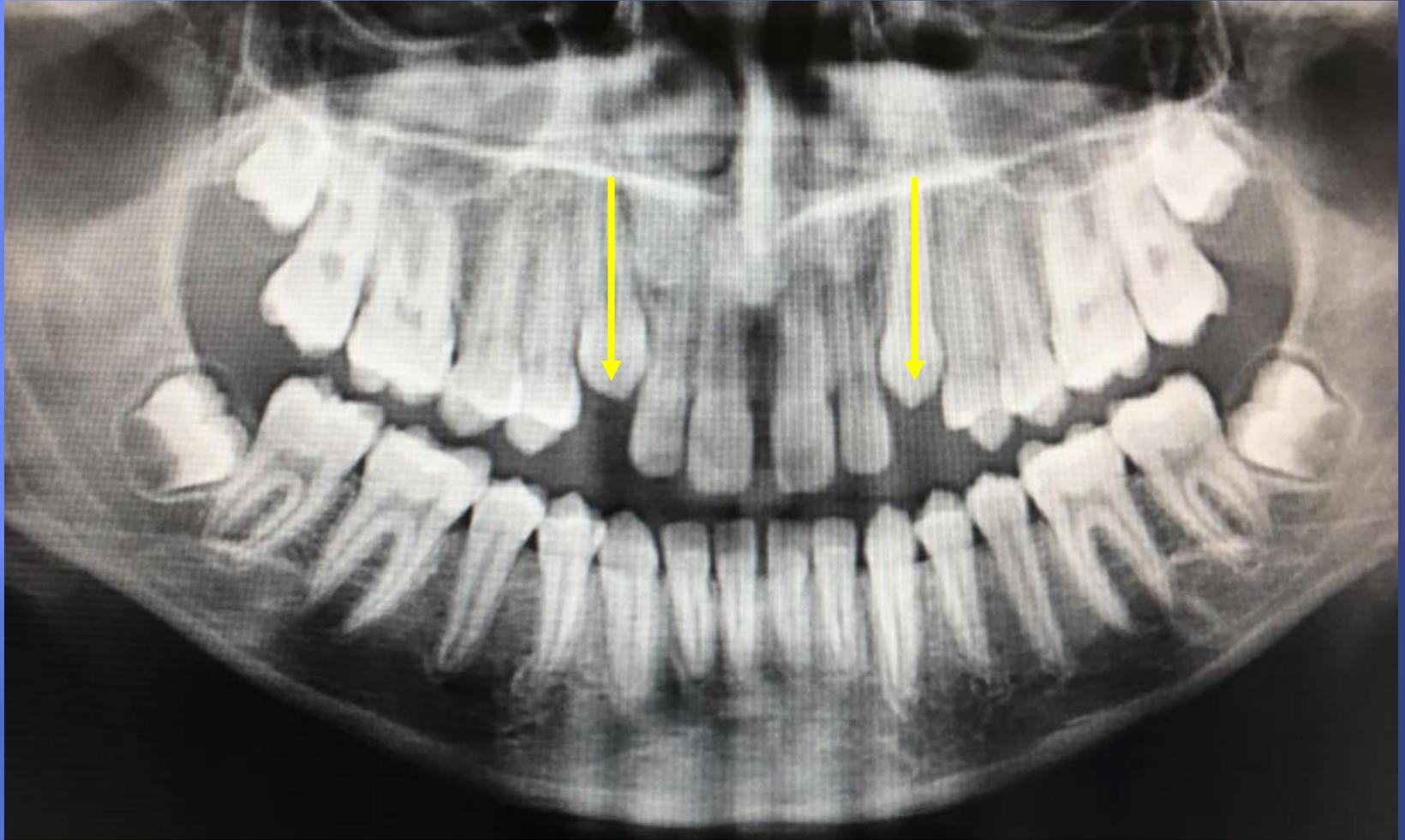






Orthopantomograph





# Gold Standard for Treatment Timing

- ▣ 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.”***

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# Principles of Treatment Timing

- ▣ 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

# Principles of Treatment Timing

- ▣ Proffit<sup>1</sup> 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

<sup>1</sup>Proffit. "The timing of early treatment: An Overview." AJO-DO. Vol 129(4): S47-S49, 2004.

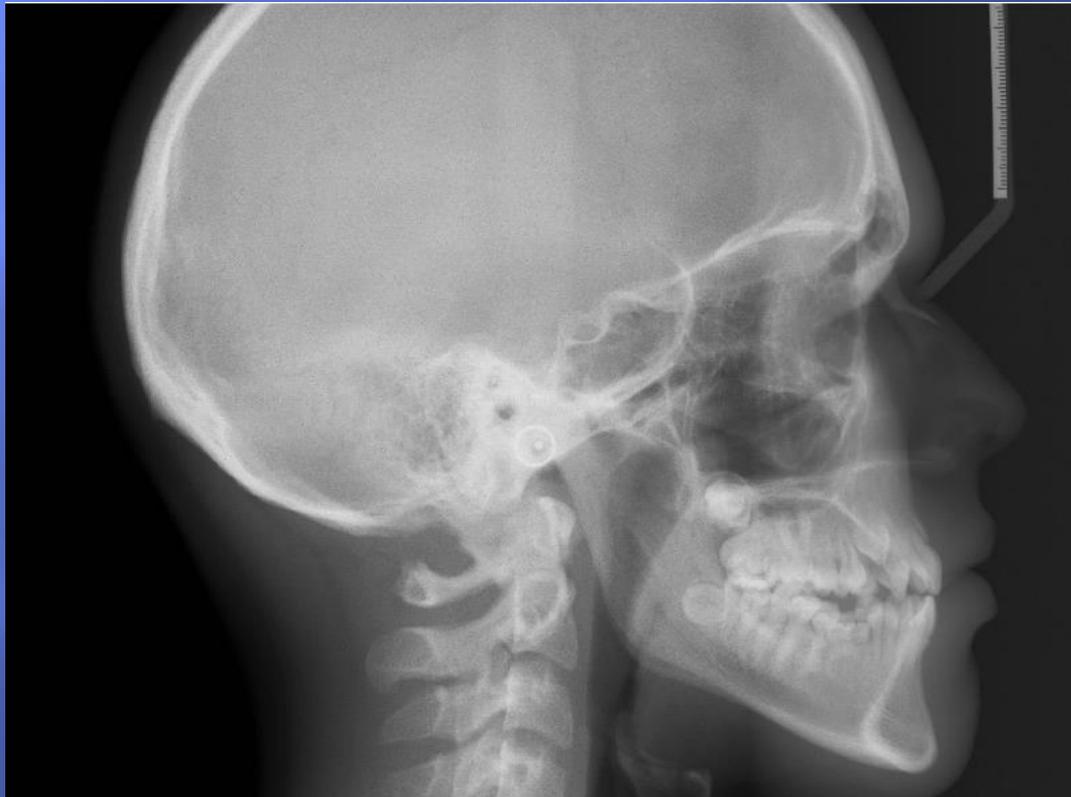
## ■ Growth Modification:

- 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)

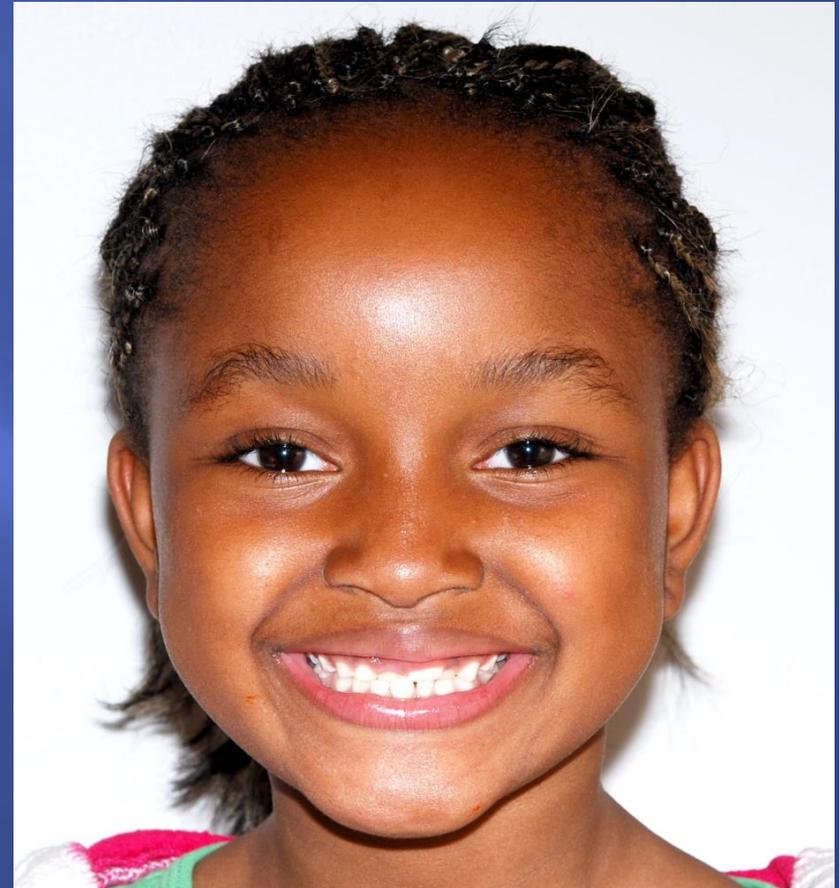


# Outline

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# Indications for Early Treatment

- 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

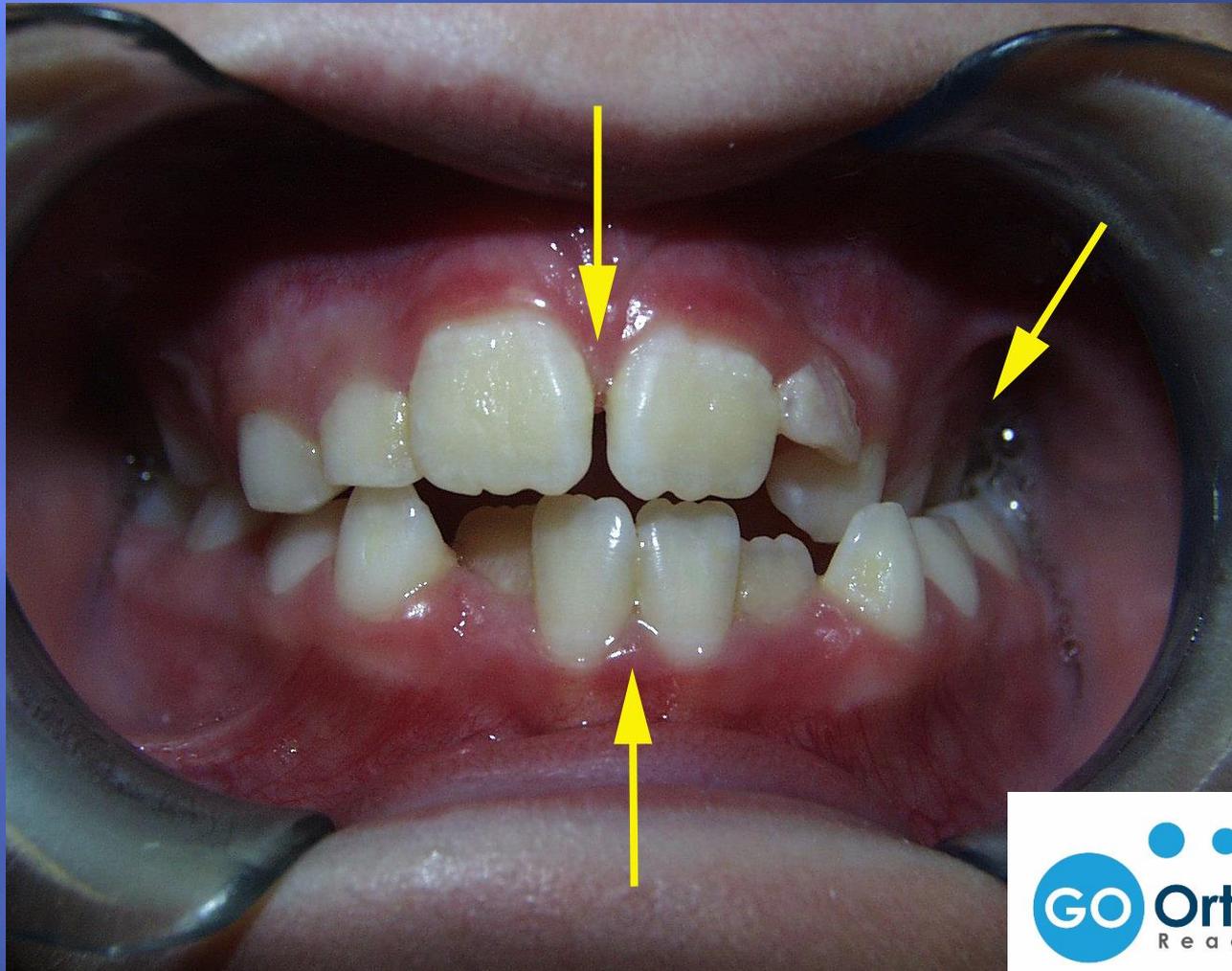
# 1. Severe Dental Problems

- ▣ **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.<sup>1</sup>
- ❑ Crossbite correction will also increase arch circumference and provide more room for permanent successors.

Langberg, et al. Transverse skeletal and dental asymmetry in adults with unilateral lingual posterior crossbite. Am J Ortho 127:6-15, 2005.

# 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**

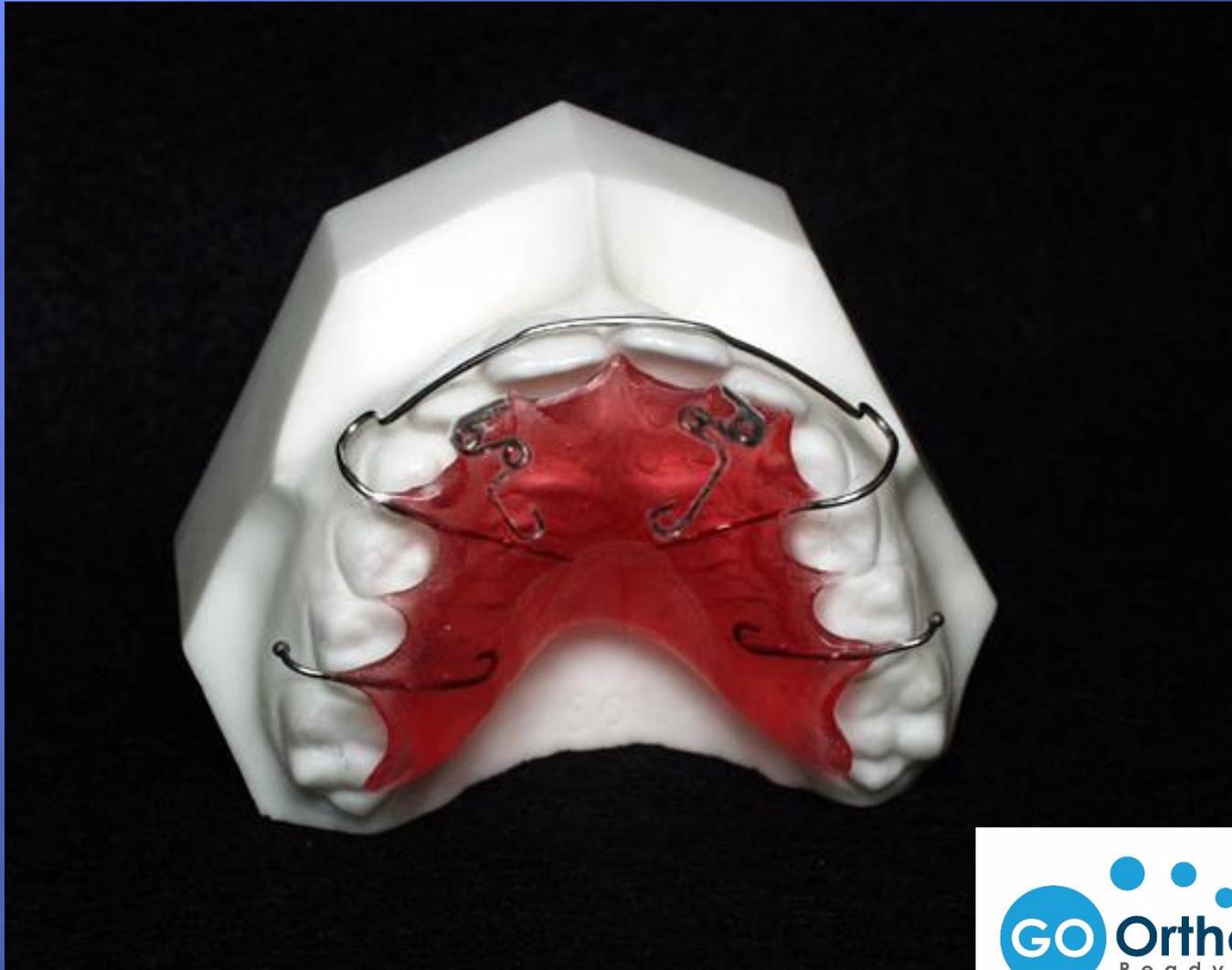
- Mandibular stabilizing LHA with cross-elastics to maxillary teeth in crossbite

# Anterior Dental 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.<sup>1</sup>
- Early Treatment Considerations?
  - Extraction/Non-Extraction
  - Maxilla vs. Mandible



<sup>1</sup>Arvystas. The rationale for early orthodontic treatment. AJO-DO. Vol 113(1); 15-18, January 1998.



# TSALD

## ▣ 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.<sup>1</sup>

<sup>1</sup>Arvystas. The rationale for early orthodontic treatment. AJO-DO. Vol 113(1); 15-18, January 1998.

# TSALD

## ▣ Maxillary TSALD non-ext

### ■ Treatment Options:

- ▣ 2x4
- ▣ Removable Schwartz Plate (expansion)
- ▣ Fixed Expander (Quad Helix, RPE)

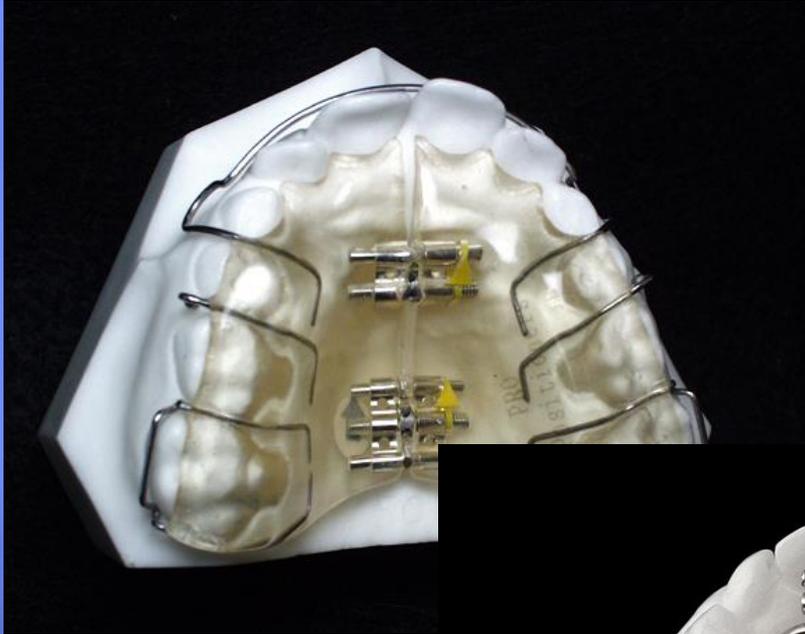
## ▣ Mandibular TSALD non-ext

### ■ 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



 **EXCEL**  
ORTHODONTICS INC.



 **GO Orthodontics**  
Ready. Set. Smile!

# 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.

# Space Maintenance

## ▣ 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.<sup>1</sup>

# 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



# Skeletal CLIII

## AP and Vertical Maxillary Deficiency

- ▣ 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.<sup>1</sup>
- ▣ **Treatment Options:**
  - ▣ **Reverse-pull/Protraction Headgear\*** (Facemask)
    - ▣ With or without maxillary expansion

<sup>1</sup>Westwood, McNamara, Franchi, Baccetti. Long-term effects of CLIII treatment with rapid maxillary expansion and facemask therapy followed by fixed appliances. Am J Orthod 2003; 123:306-20.

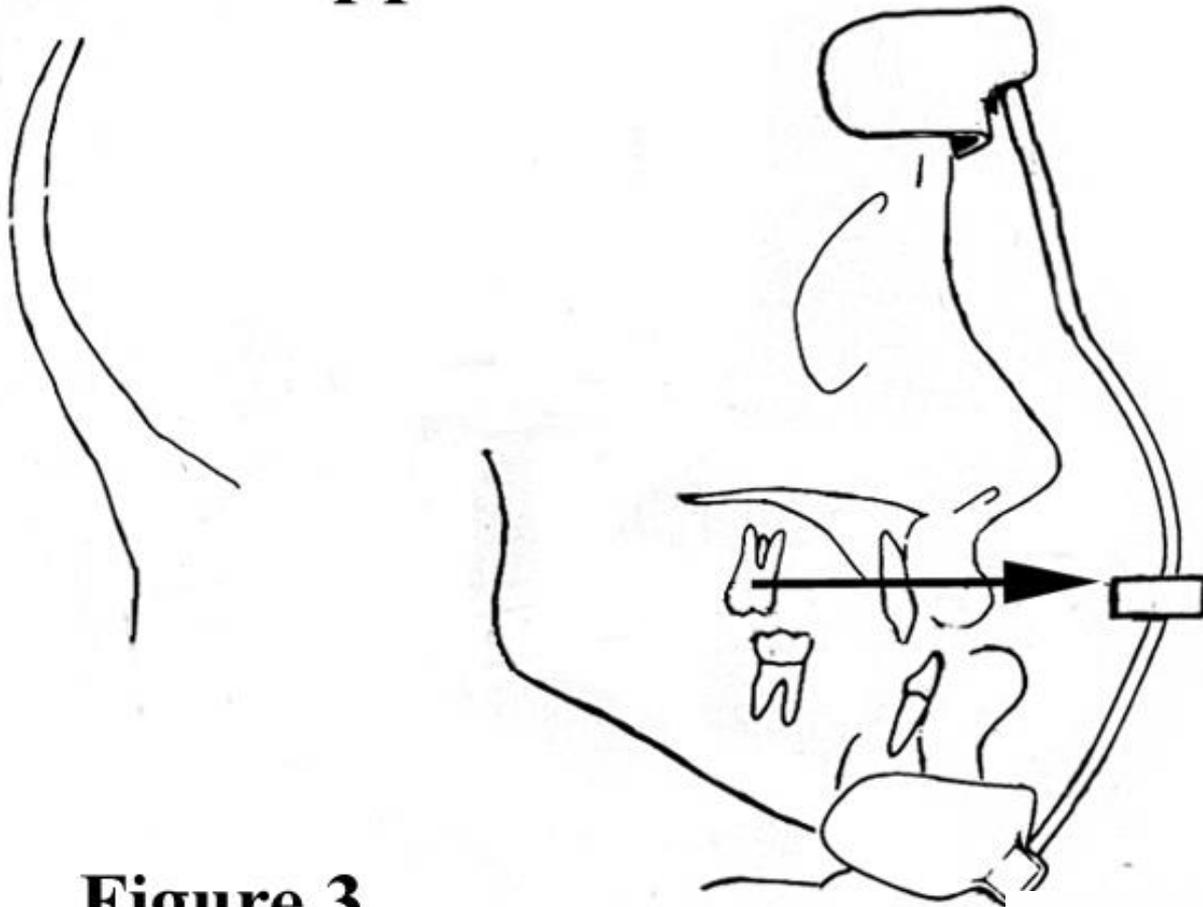
# Protraction Facemask



# 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<sup>1</sup>**
- ▣ 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**

# Protraction Facemask

- ▣ 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.**<sup>1</sup>

<sup>1</sup>Baccetti, Franchi, McNamara. Cephalometric variables predicting the long-term success or failure of combined rapid maxillary expansion and facial mask therapy. AJO-DO 126(1): 16-22, 2004.

# Skeletal CLII Mandibular Deficiency & Maxillary Excess

- 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.<sup>1</sup>
- “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 2006<sup>2</sup>

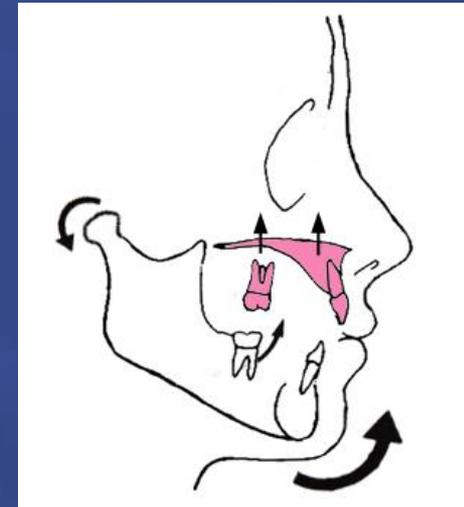
<sup>1</sup>Tulloch, Proffit. Outcomes in a 2-Phase randomized clinical trial of early CLII treatment. Am J Orthod 2004; 125:657-67.

<sup>2</sup>Proffit. The timing of early treatment: An Overview.”AJO-DO. Vol 129(4): S47-S49, 2004.

- 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

# Headgear

- ▣ 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.



# Functional Appliances

- Preferred for treatment of mandibular deficiency in the mixed dentition

- **Removable Functionals:**

- Bionator/Activator
- FR-2
- Twin Block

- **Fixed Functionals:**

- Herbst\*
- Bonded Twin Block



# Fixed Functional Appliances

- 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.

# Early Treatment

## 3 Main Categories:

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

# 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.

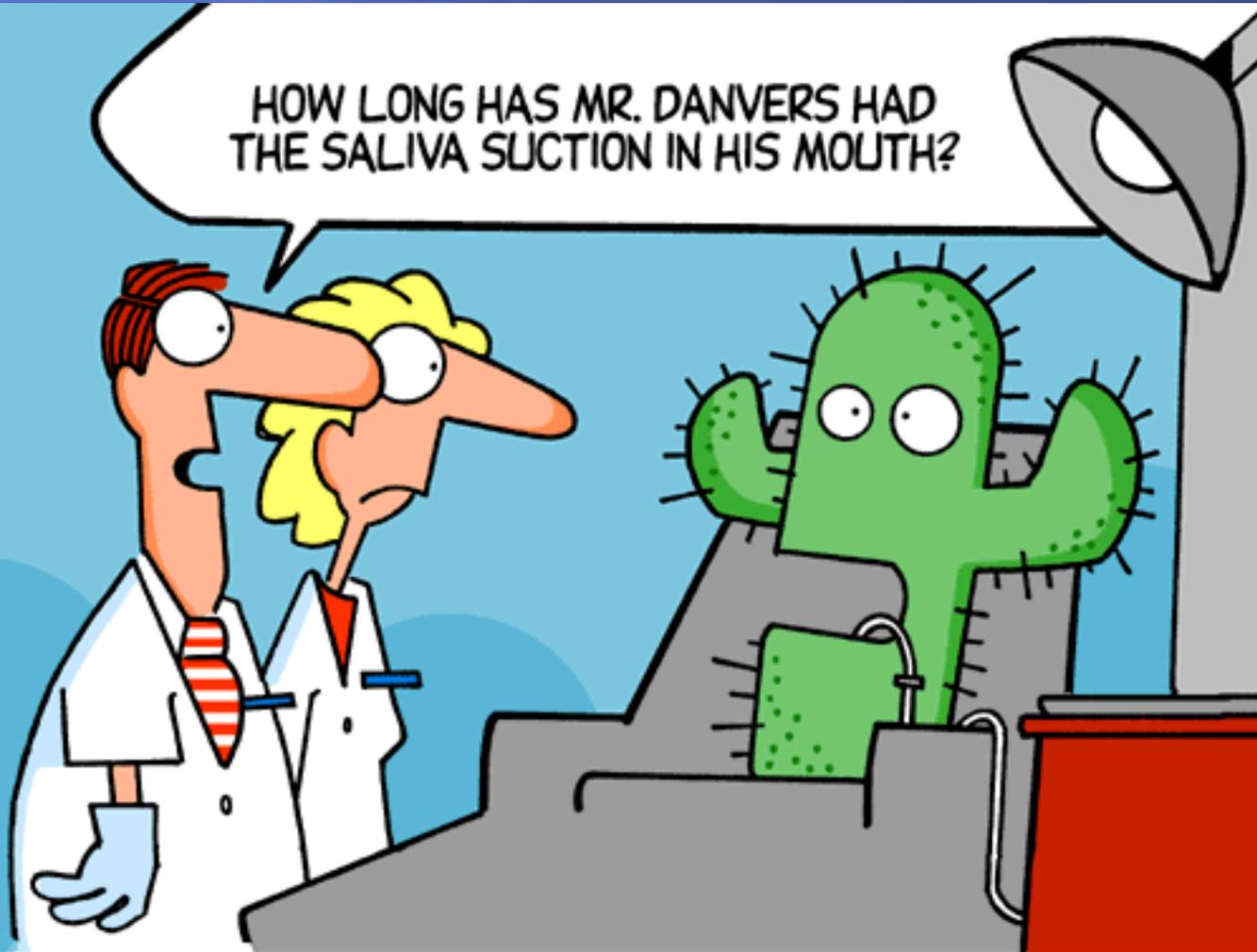
# Tongue Crib Appliance



# “Tongue Tamers”



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# 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:

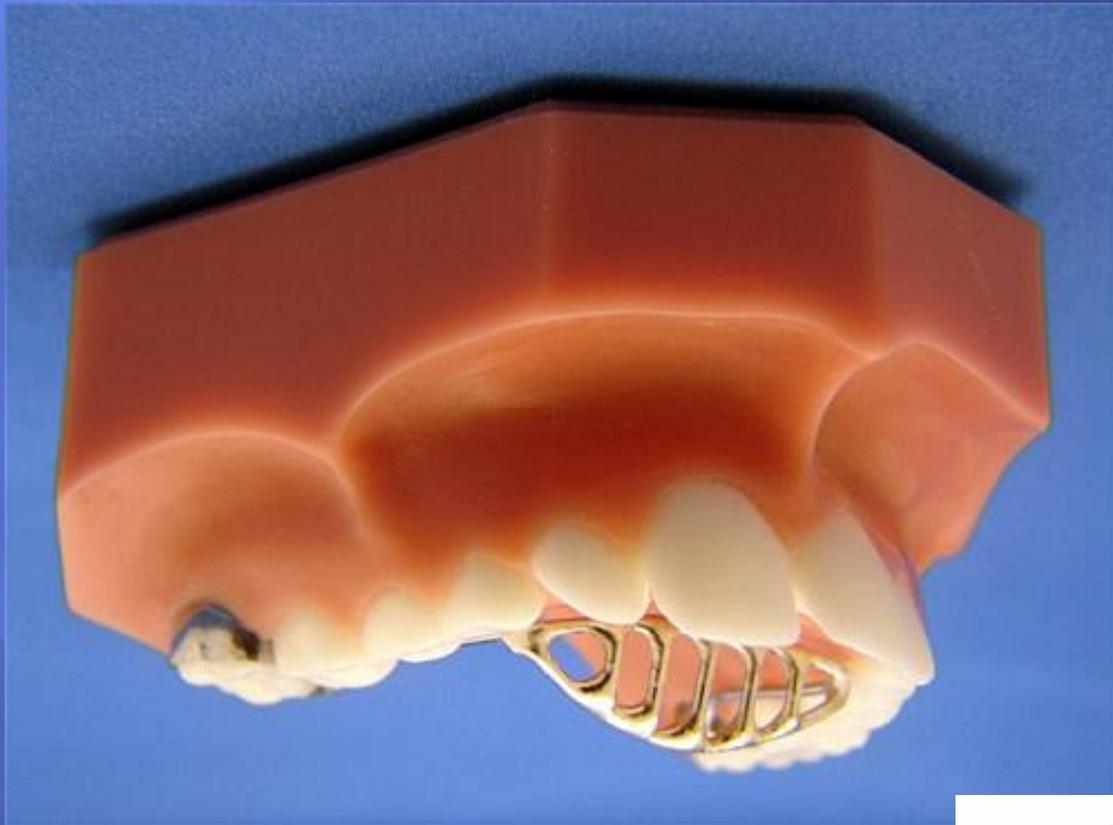
- **Fixed Thumb Habit Crib**

\*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.<sup>1</sup>
- ▣ Early intervention may help develop a normal occlusion and facial harmony.<sup>2</sup>
- ▣ **Ultimately, early treatment as a standard of care can be justified ONLY if it will provide additional benefits to the patients.<sup>3</sup>**

<sup>1</sup>Freeman, JD. Preventive and interceptive orthodontics: a critical review and the results of a clinical study. J Prev Dent 1977; 4:7-23.

<sup>2</sup>Ricketts, RM. Dr. Robert M Ricketts on early treatment (part 1) interview. J Clin Orthod 1979;1:23-28.

<sup>3</sup>Tulloch, Proffit. Outcomes in a 2-Phase randomized clinical trial of early CLII treatment. Am J Orthod 2004; 125:657-67.

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*Thank you for your attention!*

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