Interceptive orthodontics Part 1

Department of Orthodontics

- Learning Objectives
- To learn the concept of interceptive orthodontics
- To differentiate between preventive and interceptive orthodontics
- To interfere a developing malocclusion and understand different options.

CONTENTS

- What is interceptive orthodontics
- Management of crossbite
- Management of lower anterior crowding
- Expansion

- The American Association of Orthodontists' Council of Orthodontic Education defines *interceptive orthodontics* as

"that phase of the science and art of orthodontics employed to recognize and eliminate potential irregularities and malpositions in the developing dentofacial complex."

Vahl. Orthodontics in 3 millennia. Chapter 12: Two controversie
occlusion. *Am J Orthod Dentofac Orthop December 20*

- The goals of early treatment are:

1. To establish ideal overjet and overbite,
2. Align the maxillary and mandibular incisors,
3. Set ideal torque and tip,
4. Establish adequate arch length, and
5. Obtain a Class I molar relationship.

- Eliminate the need for phase 2 full-banded orthodontics or significantly reduce the amount of treatment needed in the second phase. (**Baumrind, Early Treatment Symposium)**

Indications of Early Intervention

- Class II malocclusion
- Class III malocclusion with maxillary midface deficiency,
- Anterior and posterior crossbite (unilateral and bilateral),
- Midline discrepancies due to early loss of deciduous teeth with a midline shift,
- Severe anterior openbite,

- Severe deepbite with palatal impingement,
- Ectopic maxillary canines,
- Thumb- and finger-sucking habits,
- Crowding resulting in ectopic positioning of permanent teeth,
- Crowding resulting in periodontal compromises,
- Congenitally missing teeth,
- Supernumerary teeth.

Contra-indications of Early Intervention

- Unfavorable soft tissue/skeletal growth
- Patients factors: lack of motivation or parental supervision
- Low pain threshold
- Poor oral hygiene

Anterior Crossbites

- ***Graber (1988)*** has defined cross bites as a condition where one or more teeth may be abnormally malposed buccally or lingually or labially with reference to opposing tooth or teeth.

- ***Chow (1979):*** A malocclusion resulting from the lingual position of the maxillary anterior teeth in relationship with the mandibular anterior teeth.

Etiology

- ***Mc Donald and Avery (1983)*** reported:

1. A lingual path of eruption
2. Trauma to deciduous dentition: displacement of tooth buds
3. Delayed eruption of deciduous dentition
4. Congenitally abnormal eruption patterns
5. Supernumerary teeth
6. Indequate arch length
7. Odontomas

Classification

- Dental Crossbite
- Functional Crossbite
- Skeletal Crossbite

To differentiate dental from skeletal crossbite, one should attempt to guide the mandible in centric relation and evaluate molar and incisor relationship, as well as estimate the relative size of mandible compared with the maxilla.

If the molars are in a Class I relationship and the incisors at an end-to- end relationship, a dental correction can be unde

- According to ***Profitt***, correction of anterior dental crossbite requires first opening of enough space, then bringing the displaced tooth or teeth across the occlusion into proper position.

- The appliances suggested in the literature for correction of anterior crossbites in the deciduous dentition can be differentiated in three categories:

A. <u>Those that deliver heavy-intermittent forces and include:</u>

1. Fixed or removable mandibular acrylic inclined bite plane
2. Reversed stainless steel crowns
3. Tongue blade

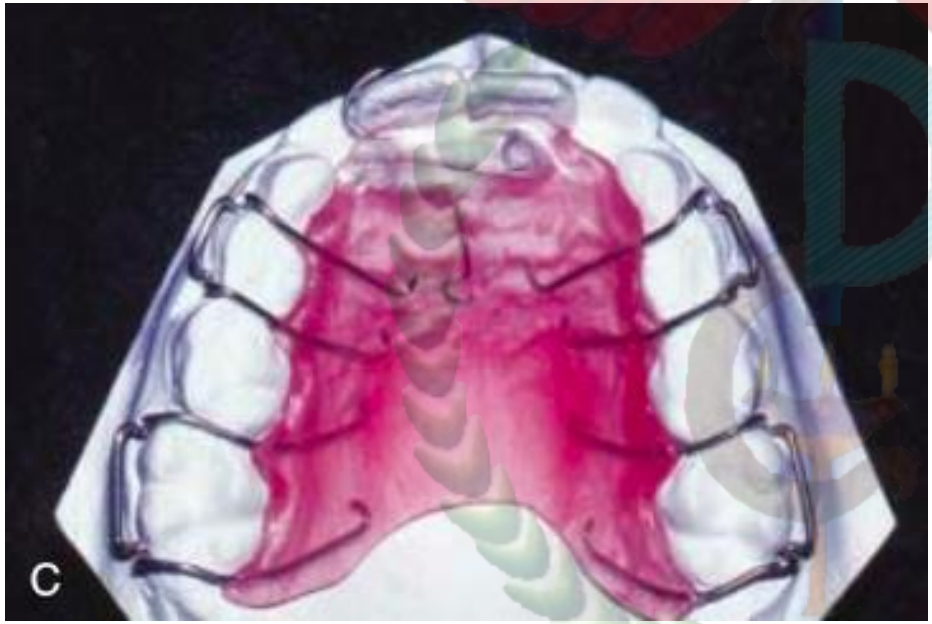
B. Those that deliver light-continuous force:

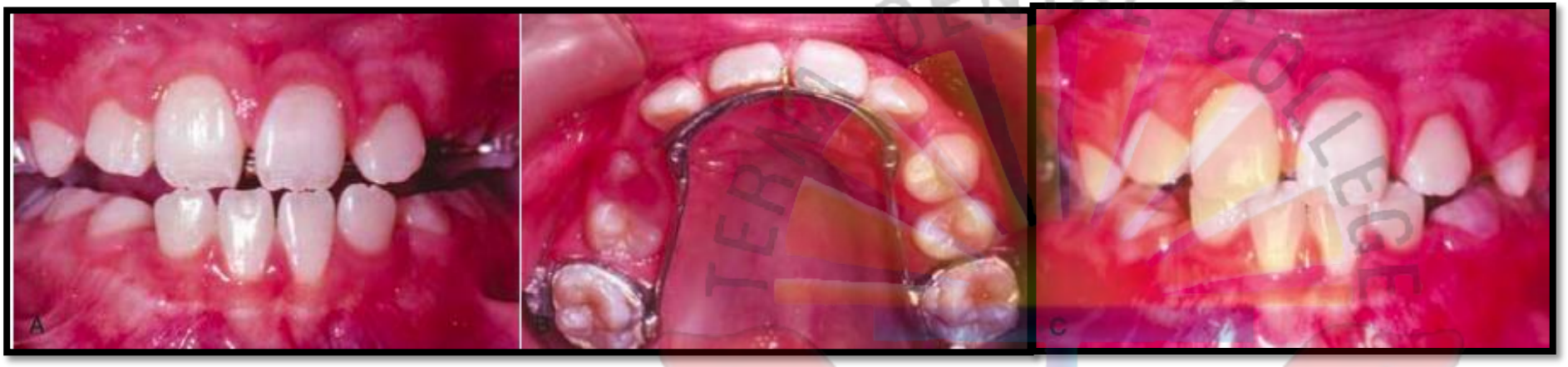
1. Removable appliance with auxiliary springs
2. Removable plate with screw
3. Maxillary lingual arch
4. Fixed light arch wire

C. Those that may correct skeletal problems in young patients (maxillary deficiency and/or mandibular prognathism):

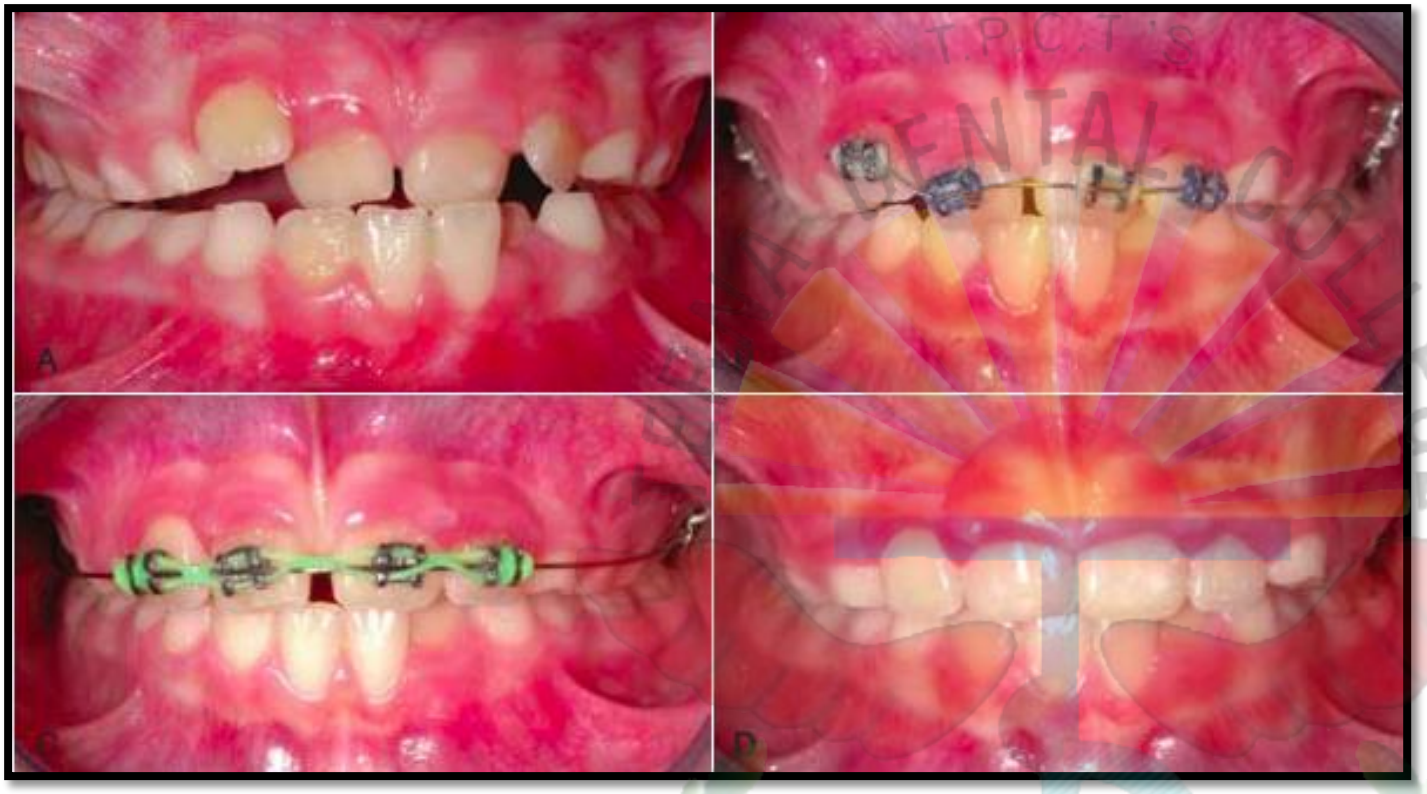
1. Maxillary protraction devices
2. Chincup therapy

- In a young child, the best method for tipping maxillary and mandibular anterior teeth out of crossbite is:
- A removable appliance using fingers springs for facial movement of maxillary incisors.
- (less frequently) An active labial bow for lingual movement of mandibular incisors





- For moderate anterior crossbite: maxillary lingual arch with finger springs (whip springs).
- Indicated when compliance problems are anticipated.
- Most effective when 15mm long.
- Activation: advancing the spring by 3mm at each monthly visit.

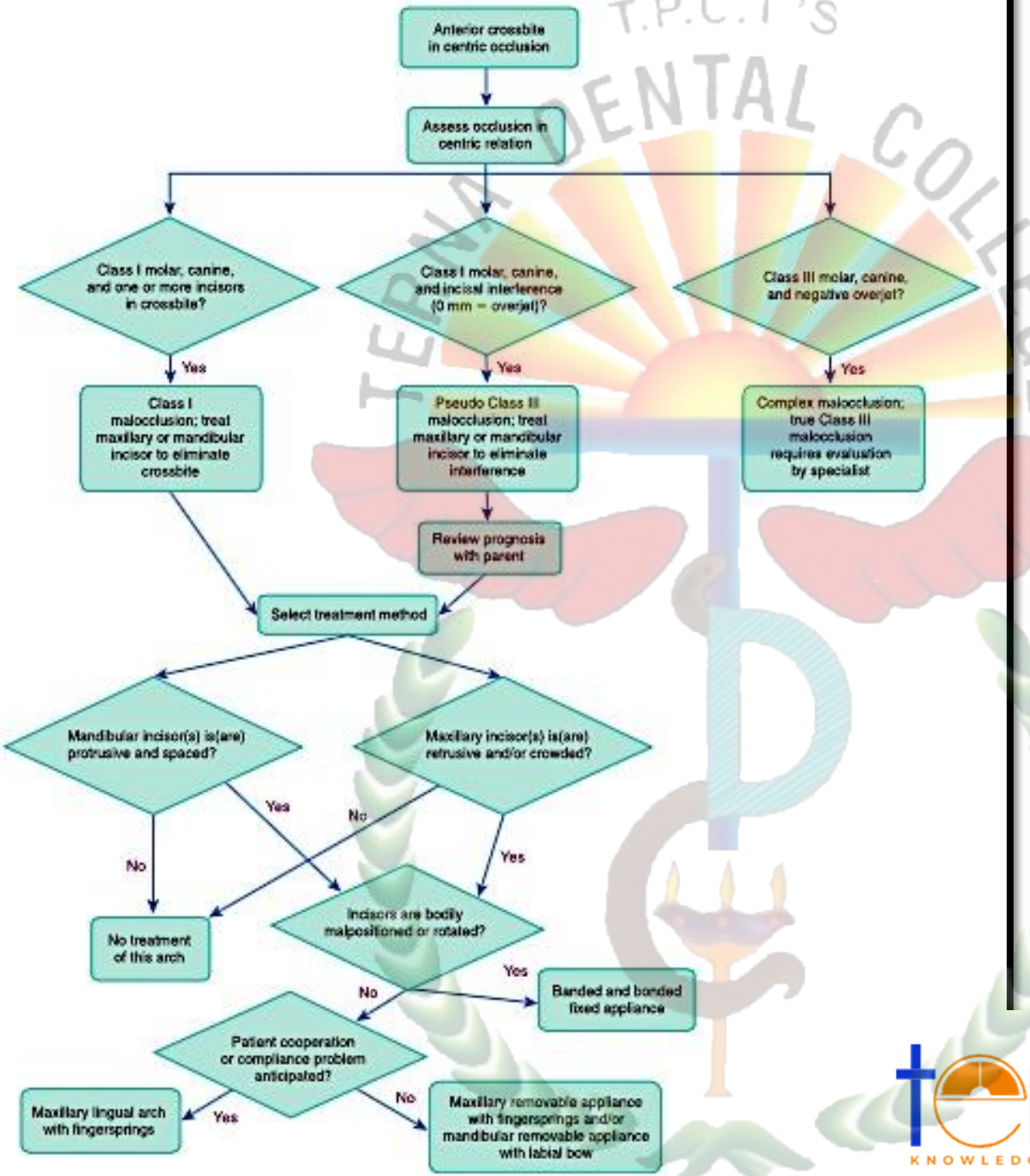


2 × 4 appliance: best choice, when no skeletal component, for a mixed dentition patient with crowding, rotations, need for bodily movement and more permanent teeth in crossbite.

When anterior teeth are bonded and moved prior to canine eruption, it is best to place lateral incisor brackets with increased mesial root tip so that its roots are not repositioned into canine eruption path.

- If torque or bodily movement needed, finishing with a rectangular wire is needed even in early mixed dentition (or else teeth will tip back in crossbite).

Anterior Crossbite—Pathways of Care



Posterior Crossbites

- ***Mc Donald and Avery suggested***: Crossbites, anterior or posterior, functional or skeletal should be treated as soon as it is practical to do so.

- Correction of dental crossbites in mixed dentition is recommended because it eliminates functional shifts and wear on the erupted permanent teeth, and possibly dentoalveolar asymmetry.

- This usually also increases arch circumference and provides more room for the permanent teeth.

- Skeletal crossbites, usually resulting from a narrow maxilla but occasionally from an excessively wide mandible, generally are treated by heavy forces to open the midpalatal suture and make the maxilla wider.

- Dental crossbites are treated by moving the teeth with lighter forces.

Etiology

Type	Cause
Developmental	Transverse discrepancy between the maxilla and mandible Anteroposterior skeletal discrepancy Cleft palate, and other malformations of the head and neck
Pathology	Unilateral condylar hypoplasia or hyperplasia Juvenile rheumatoid arthritis
Soft-tissue influence and habits	Neonatal intubation resulting in trauma to or prolonged pressure on the palate Early weaning and associated low-impact muscular activity from bottle feeding Non-nutritive sucking Functional shift to achieve maximal intercuspation Adaptive swallowing behaviour Open mouth posture/predominant mouth breathing Low tongue position Conditions associated with decreased tonic muscle activity Scarring as a result of post-traumatic injury (e.g. burns)

Basic approaches to managing posterior cross-bites in the primary dentition:

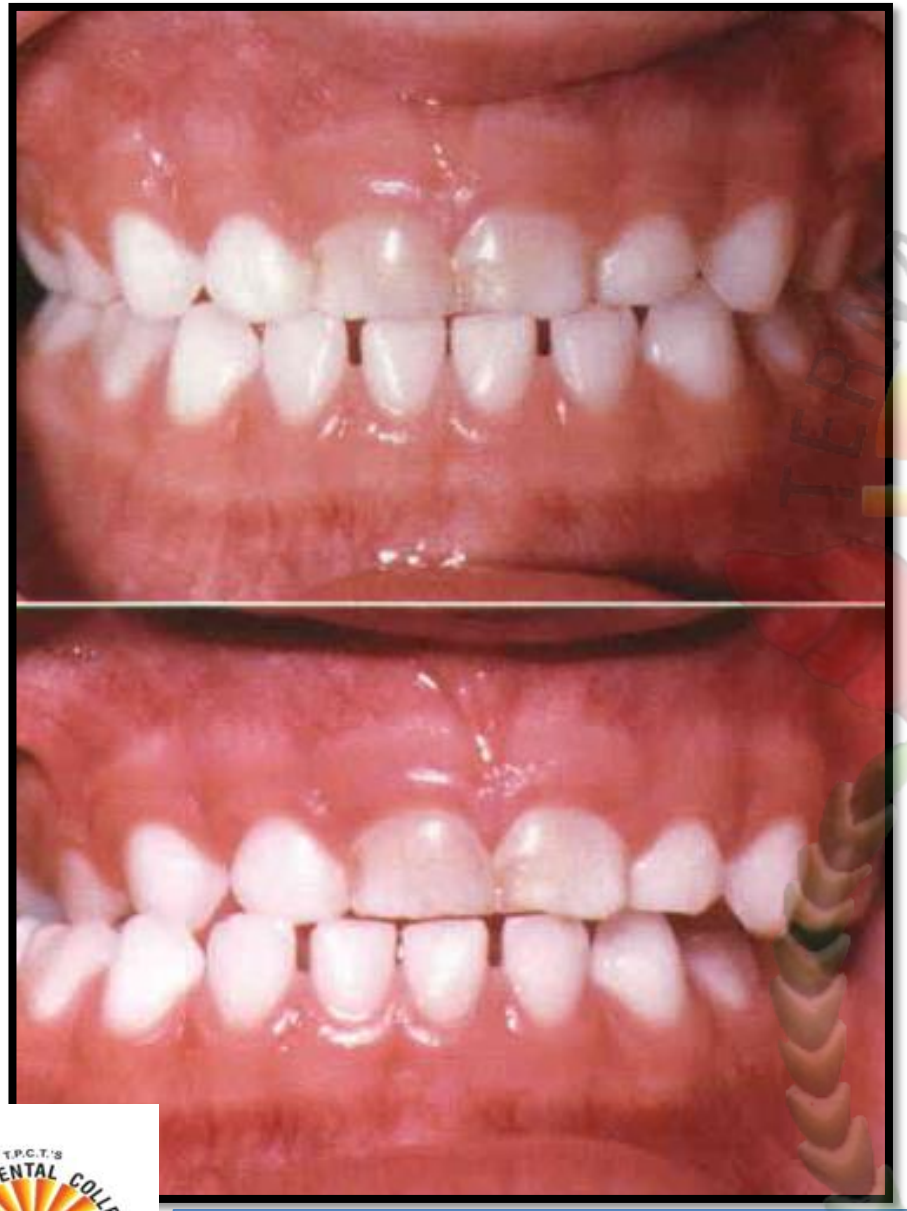
1. Correct any habit that has contributed to the etiology of the cross-bite or monitor for spontaneous correction.

2. Remove tooth interferences or generate cuspal guidance that prevents the patient from biting into functional cross-bite. (unilateral cross-bite associated with a canine-guided functional shift)

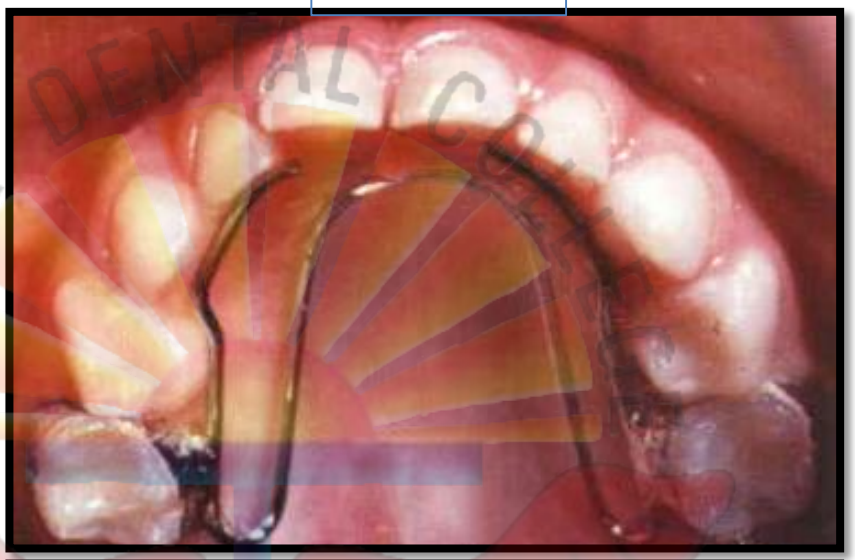
3. Actively expand a constricted maxillary arch using one of several removable or fixed appliances.

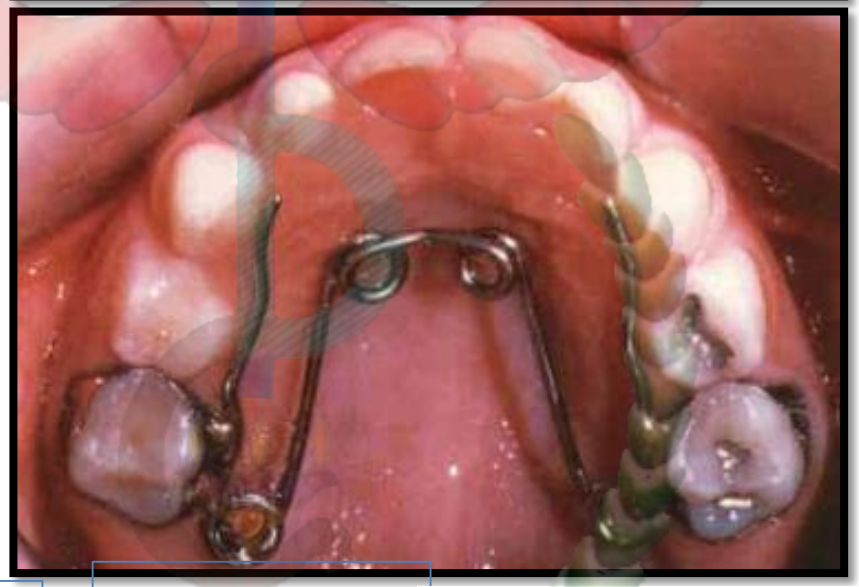
4. For dental and most forms of skeletal posterior crossbites with an **intermolar arch width differential of greater than 1mm**, these cannot be predictably corrected by removal of tooth interferences alone, and so **arch expansion is required**.

5. Some of the expansion appliances may serve an additional function by helping to eliminate certain contributory habits such as digit sucking.



W- Arch

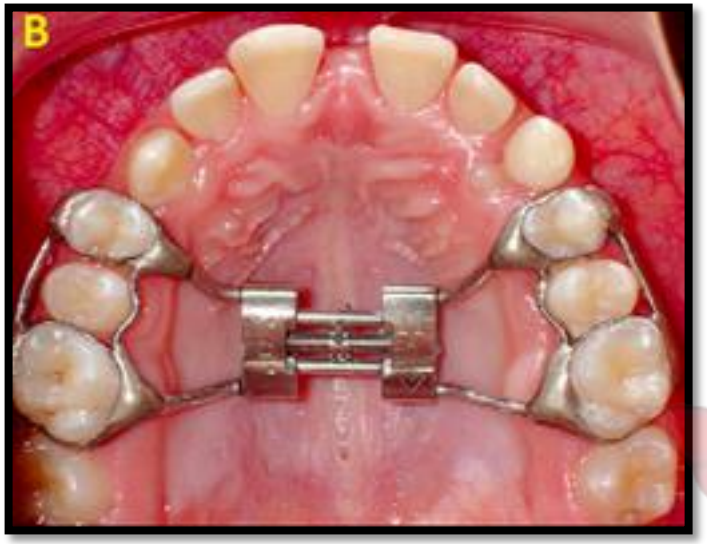




Quad Helix

Minor canine interferences leading to mandibular shift

HYRAX EXPANDER



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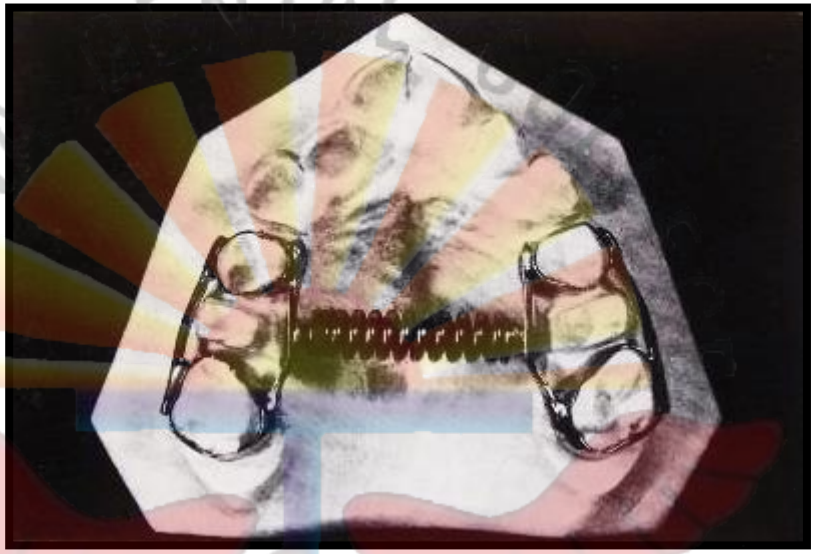

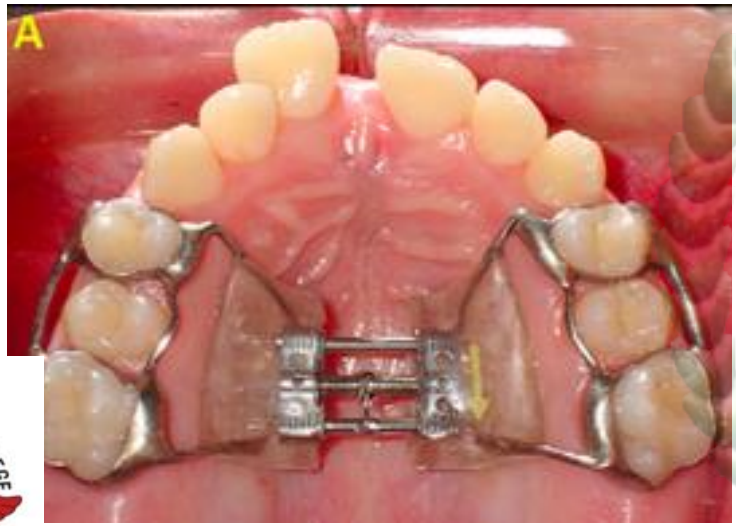

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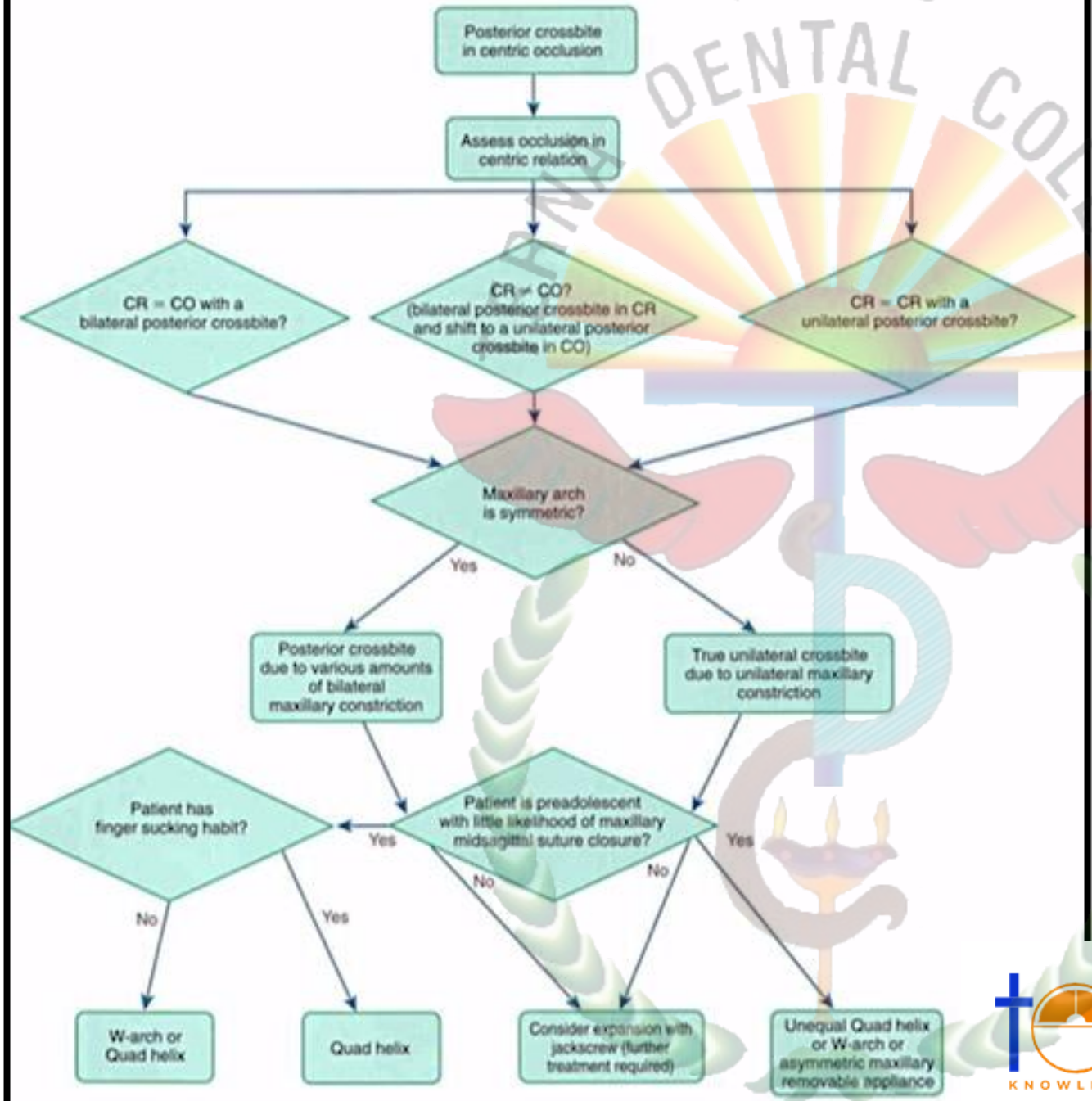
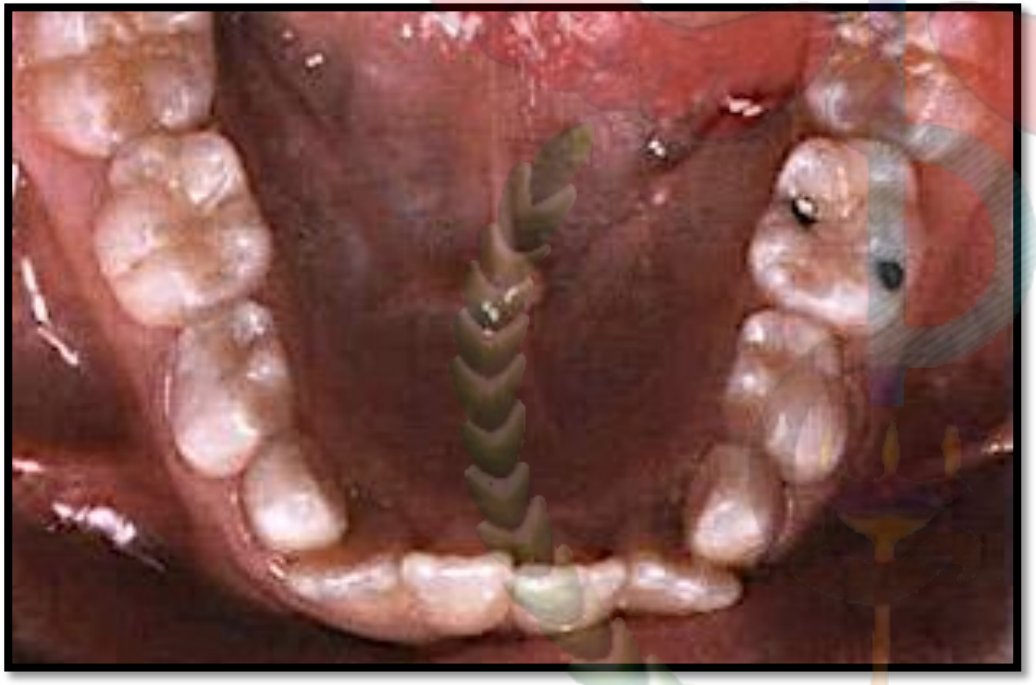
BONDED RME

Posterior Crossbite—Pathways of Care



Lower Anterior Crowding

- ***Radznic (1988)*** defined dental crowding as difference between space needed and space available in the dental arch.

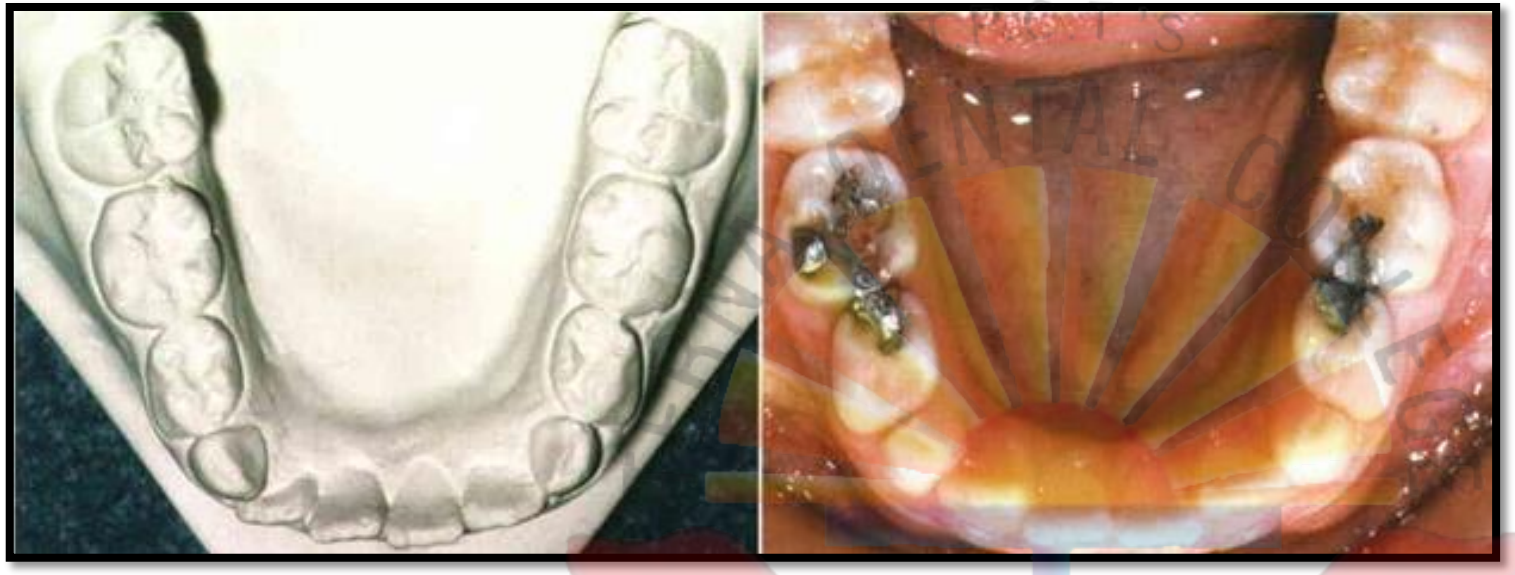


Mild to Moderate Crowding of Incisors With Adequate Space

Irregular Incisors, Minimal Space Discrepancy

- When children with normal occlusion go through transition from primary to mixed dentition, up to 2mm of incisor crowding may resolve spontaneously without treatment.

- If exaggerated parental concern is a problem, one could consider disking the interproximal enamel surfaces of remaining primary incisors or canine.



- It is possible to gain as much as 3 to 4mm of anterior space through this procedure.

- ***Remember: in transitional dentition no disking or interproximal stripping should be attempted on permanent teeth. This could create a tooth sized discrepancy.***

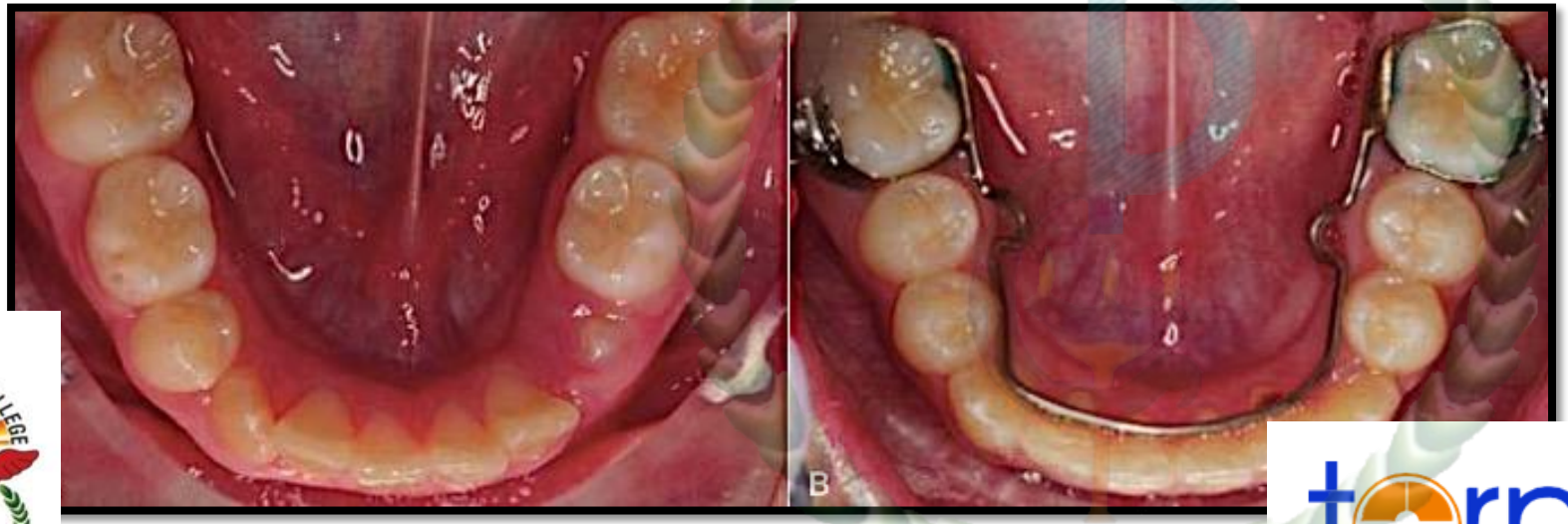
Space Deficiency Largely Due to Allowance of Molar Shift:

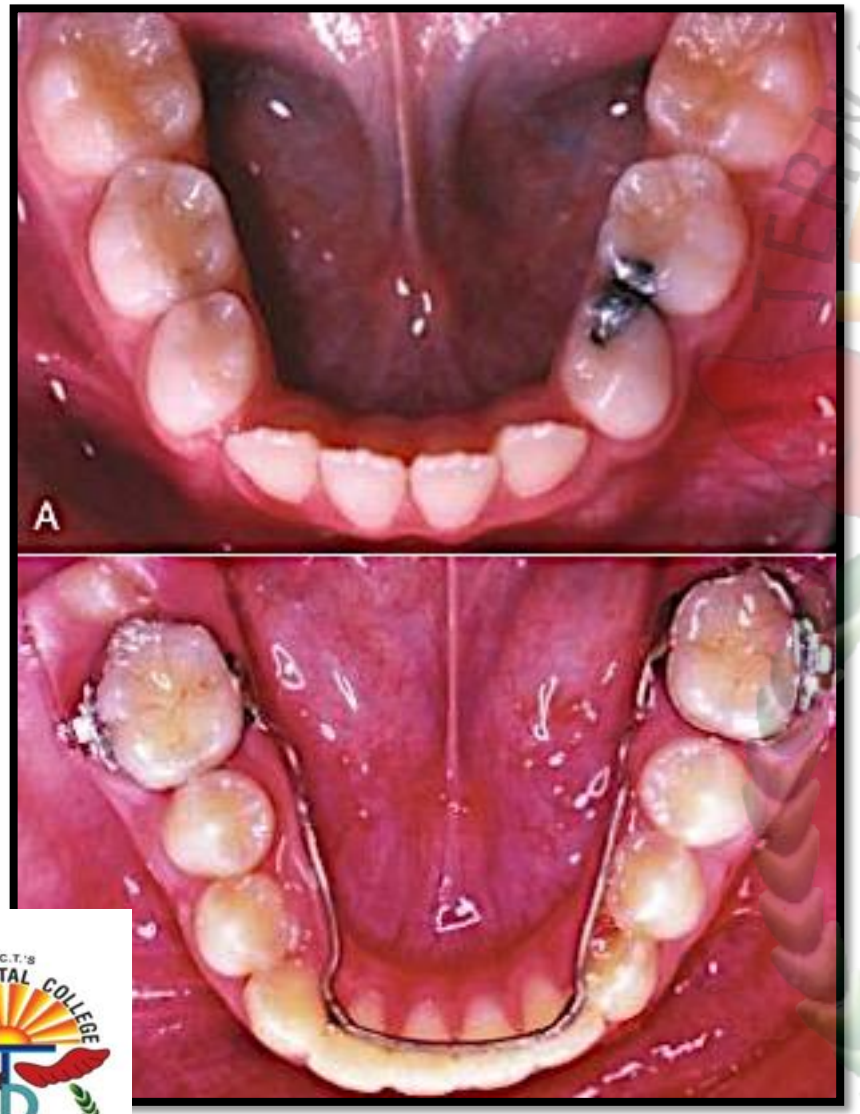
- In some children, more severe transitional crowding occurs when the incisors erupt.

- Space analysis often shows that **a major component of the projected space deficiency is the allowance for mesial movement of the permanent first molars when the second primary molars are lost.**

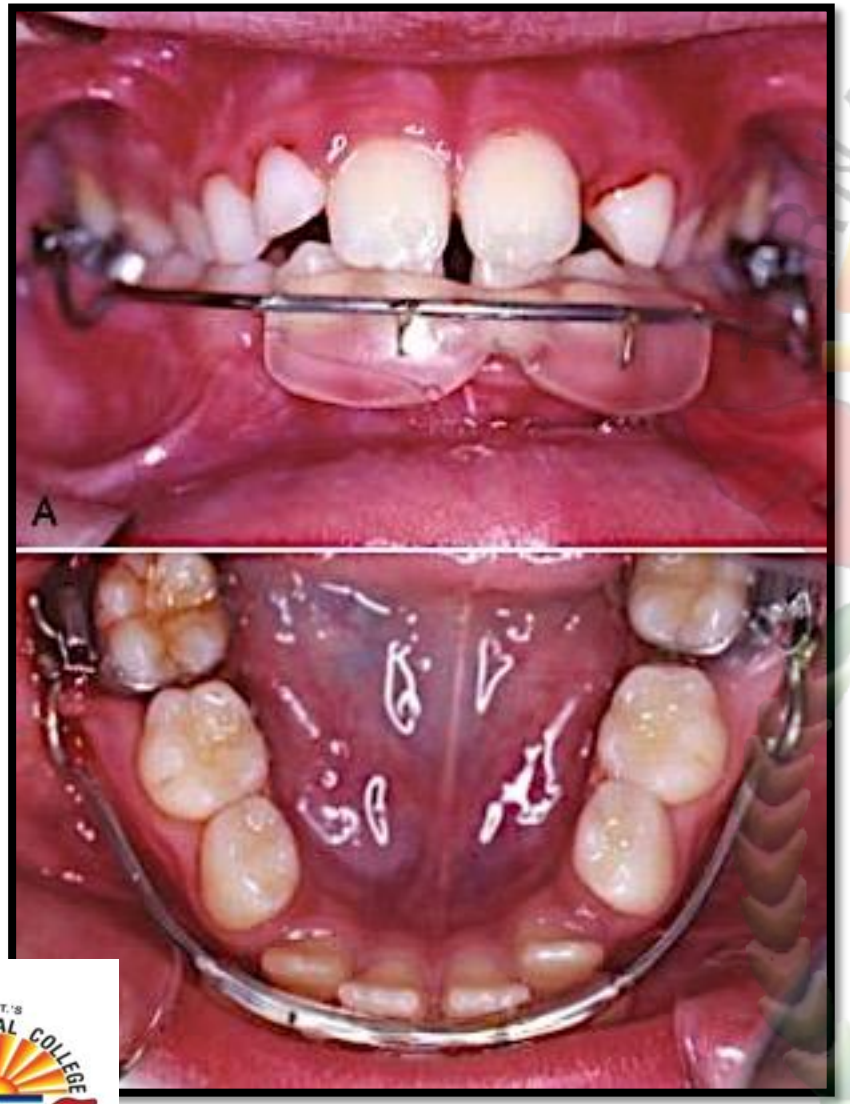
- Current recommendation for patients with moderate crowding is intervention with lingual arch in the late mixed dentition, just before the second primary molars exfoliate.

- A lingual arch in conjunction with primary teeth extraction or exfoliation can be effective way to take advantage of leeway space and reduce crowding.





- Lingual arch can be activated slightly to tip molars distally and incisors facially to obtain a modest increase in arch length



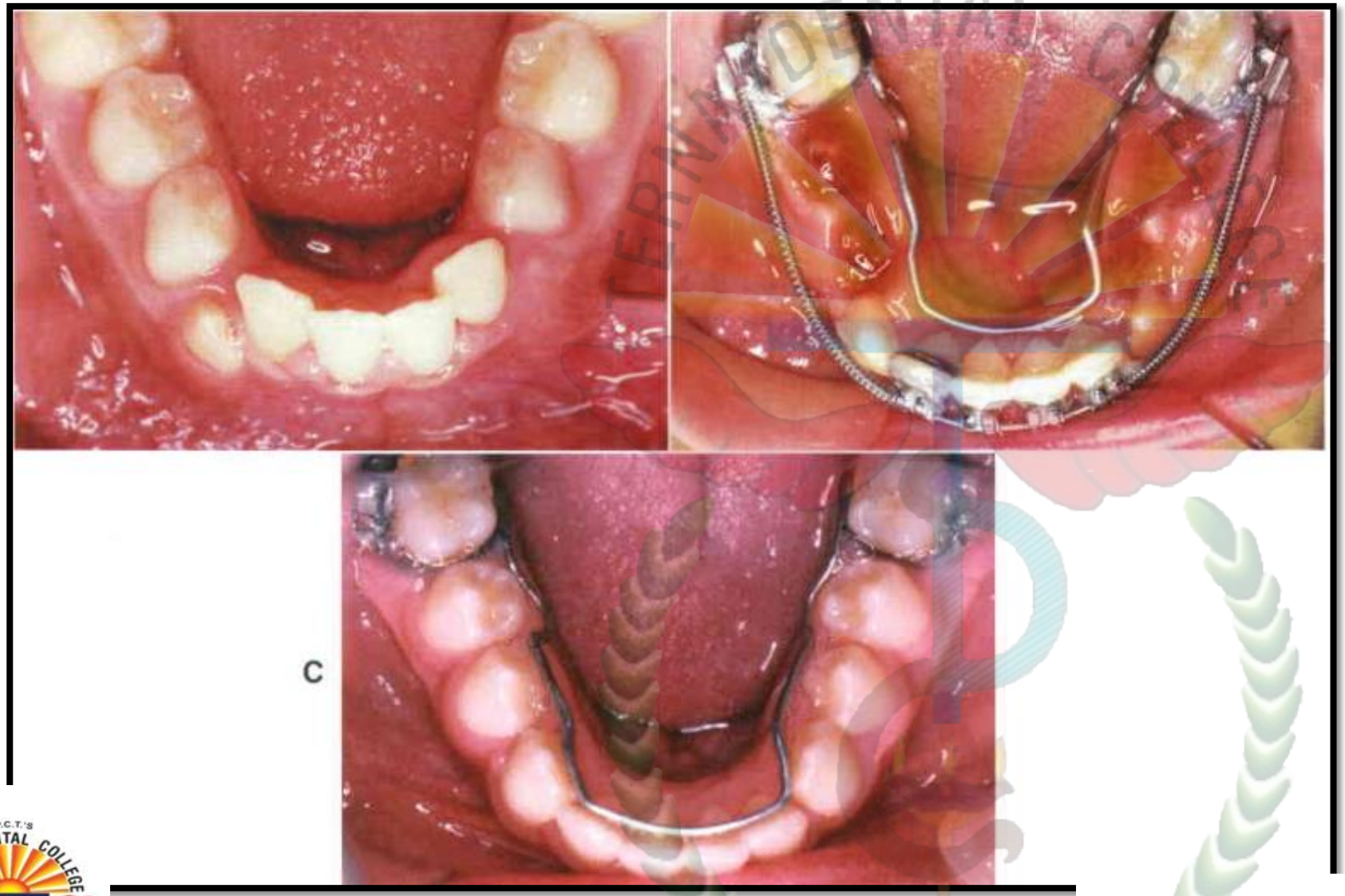
- A lip bumper also can be used in the lower arch to maintain the position of the molars or perhaps tip them slightly distally while removing lip pressure and allowing the incisors to move facially.

Expansion for Treatment of Crowding in Early Mixed Dentition

- Lower incisor teeth usually can be tipped 1 to 2mm facially without much difficulty, which creates up to 4mm of additional arch length.

- Two methods should be considered:

1. Use an active lingual arch
2. Band permanent molars, bond brackets on the incisors, and use a compressed coil spring on a labial archwire to gain the additional space.



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Expansion for Treatment of Crowding in Early Mixed Dentition (Contd…)

- A key question, which remains unanswered, is whether early expansion of arches (before all permanent teeth erupt) gives more stable results than later expansion (in the early permanent dentition).

Expansion for Treatment of Crowding in Early Mixed Dentition (Contd…)

- Expansion can involve any combination of several possibilities:

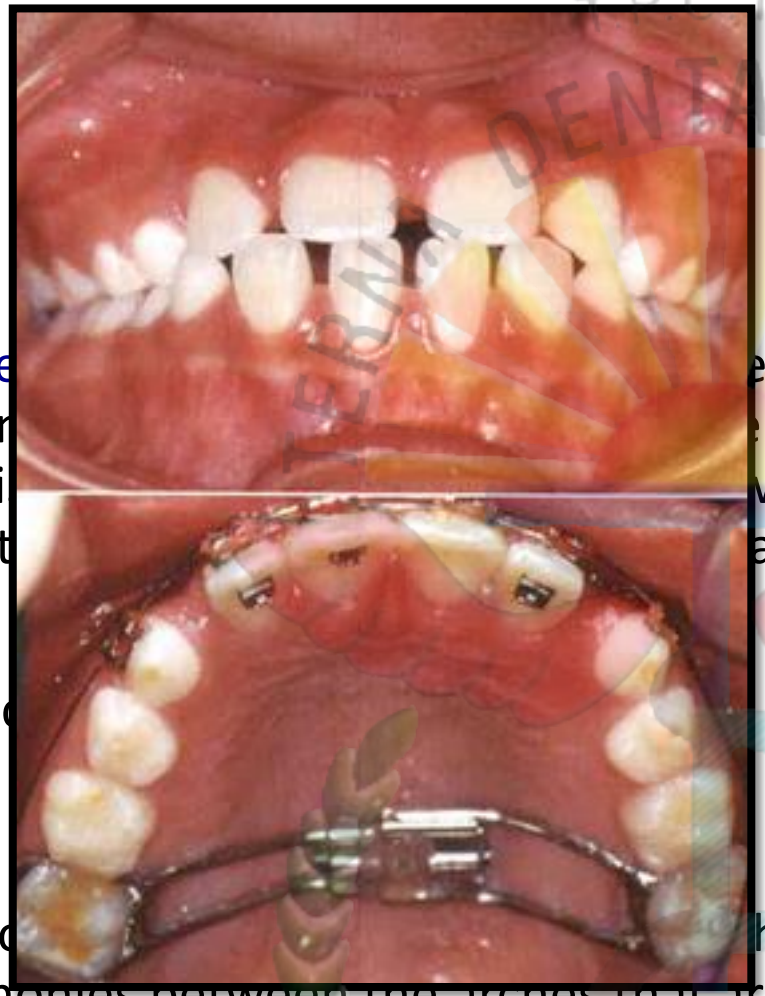
1. Maxillary dental or skeletal expansion,
2. Moving the teeth facially or opening the midpalatal suture;
3. Mandibular buccal segment expansion by facial movement of teeth; or
4. Advancement of the incisors and distal movement of molars in either arch.

- *Most aggressive approach: use of lingual arches in complete primary dentition.*

Expansion for Treatment of Crowding in Early Mixed Dentition (Contd…)

- Conservative approach to moderate crowding in early mixed dentition: place lingual arch after extraction of primary canines and allow incisors to align themselves.

- But when incisors are rotated, irregular or spaced – fixed appliance needed.



- A more aggressive …er arch transversely in early mixed der…erhaps a **jackscrew expander**- but thi…vly in the early mixed dentition) t…ange.
- Expansion not to …create more space.
- Some authors: pro…hetics but also can eradicate disharmonies between the arches that are present in Class II and Class III malocclusions.

Late Mixed Dentition Treatment for Severe Crowding

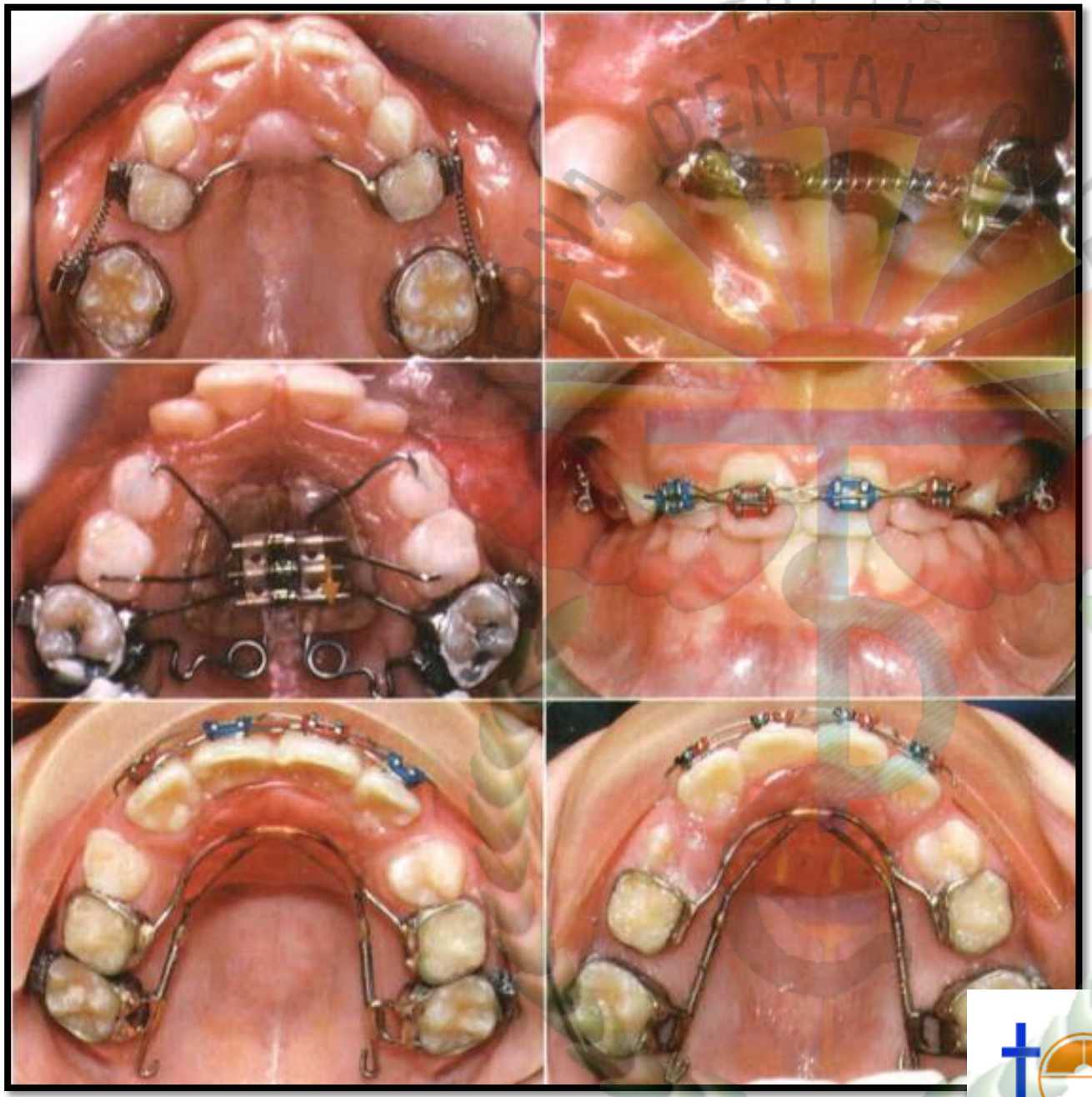
- An additional approach in late mixed dentition is to obtain additional space by repositioning the molars distally.

- Indications for these appliances in the mixed dentition are rare and should be reserved for situations where extraction and space closure will either present other complications or poor facial esthetics

Indications:

- Probably less than 4 – 5mm per side of required space by predominantly tipping.
- Erupted maxillary anterior teeth and ideally 1st premolars for anchorage.
- Lip and maxillary dental protrusion normal or retrusive.
- Limited overjet.
- Normal vertical facial dimensions or short face tendency.
- Overbite greater than normal.

1. Fixed or removable appliances to distalize upper molars,
2. Headgear,
3. Mandibular lip bumper to increase lower arch dimensions by moving incisor and buccal segments facially and lower molars distally and
4. Archwire expansion with bonded and banded appliances are often considered for these situations.



Take home message:

- Interception at the right time can prevent deleterious effects on the developing dentition
- Early orthodontic treatment can help in intercepting a developing malocclusion
- **Expected questions:**

- **SAQ**
- **1. What is interceptive orthodontics**
- **2.Management of crossbite**
- **3.Lower anterior crowding**

THANK YOU