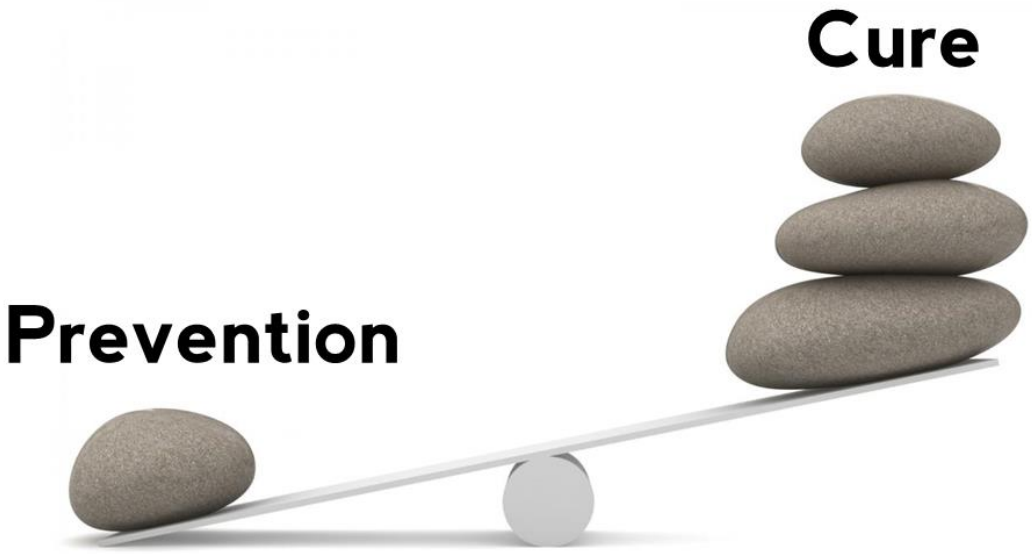
PREVENTIVE ORTHODONTICS



Orthodontics

Orthos = correct
Odontus =teeth

- “Orthodontics includes the study of growth and development of the jaws and face particularly ,and the body generally as influencing the position of teeth ;the study of action and reaction of internal and external influences on the development and the prevention and correction of arrested and perverted development” –british society for study of orthodontics(1992

BRANCHES

- ✓ PREVENTIVE ORTHODONTICS
- ✓ INTERCEPTIVE ORTHODONTICS
- ✓ CORRECTIVE ORTHODONTICS
- ✓ SURGICAL ORTHODONTICS

What is preventive orthodontics?

Definitons

“Action taken to preserve the integrity of what appears to be a normal occlusion at a specific time.” **- Graber (1966)**

“Prevention of potential interferences with occlusal development.”

- Proffit & Ackerman .

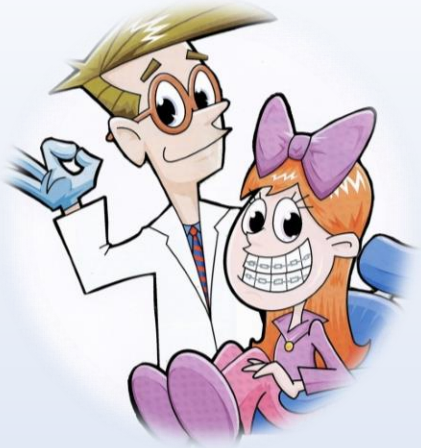
PREVENTIVE MEASURES

1. Parent counseling
2. Caries control
3. Space maintenance
4. Exfoliation of deciduous teeth
5. Abnormal frenal attachments
6. Treatment of locked permanent first molars
7. Abnormal oral musculature and related habits.
8. Extraction of supernumerary teeth

PARENT COUNSELING

Parent counseling though the most neglected, is the most effective way to practice preventive orthodontics.

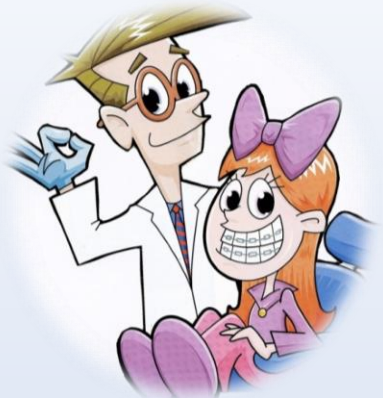
- Parental counseling
  - Prenatal counseling
  - Postnatal counseling



Prenatal Counseling

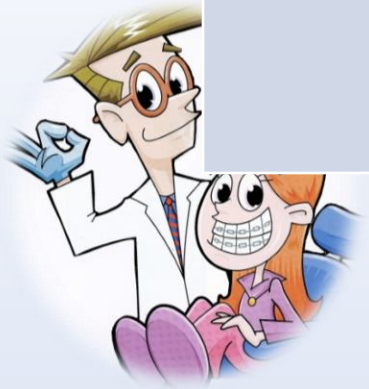
- Prenatal counseling may involve the following:
    1. The importance of oral hygiene maintenance by the mother.
    2. How irregular eating and hunger pangs by the mother can result in her developing decayed teeth, which can be quite painful on pulpal involvement, especially during the third trimester of pregnancy.

3. A mother suffering from pregnancy induced diabetes mellitus, would be more difficult to manage during the pregnancy period especially if her oral hygiene is poor.
4. The increased risk of a mother suffering from poor oral hygiene transmitting the strains of caries feeding spoon or on tasting the food with the same are high.
5. have natural foods containing calcium and phosphorus, e.g. milk, milk products, egg, etc. especially during the third trimester, as they would allow adequate formation of deciduous teeth crowns.



Postnatal Counseling

Age group	Postnatal Counseling
Six months* to *One-year of Age	1. Teething and the associated irritation, slight loose motions are possible in mildly elevated febrile condition. 2. Most of the parents are palled on seeing the deciduous teeth erupting in rotated positions. 3. Awareness to be brought about as to how they are in that position and that they would eventually straighten out on erupting fully. 4. No sugar addition to bottle milk, however mothers' milk is preferred and the best for the TMJ development as well as for non- development of tongue thrusting habits.



Brushing with the help of a finger brush during bathing should be introduced. Cleaning of the deciduous dentition with a clean, soft cotton cloth dipped in warm saline is also recommended,

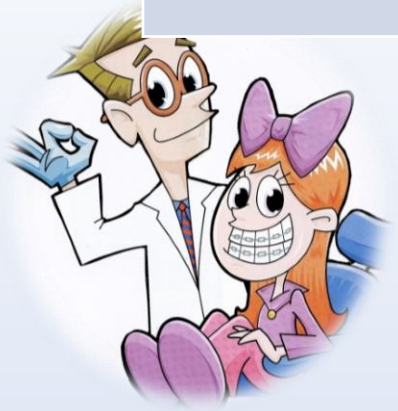
to prevent the initiation of nursing or rampant caries

6. Child should be initiated to drinking from a glass by one year of age.

Two years of Age	1. Bottle-feeding if previously initiated should never be given during the passage to sleep.  Children should never be put to bed with a bottle 2. Bottle feeding to be withdrawn completely by 18 to 24 months of age. These would decrease the chances of initiation of decay and the potential for nursing caries. 3. Brushing to be initiated post-breakfast and post dinner  4. Clinical examination to assess any incipient decay and eruption status of teeth.

Three years of Age	1. Clinical examination-generally the full compliment of deciduous dentition should have erupted by now. To assess the occlusion, molar and canine relationships and if there is the presence of any discrepancies away from the normal, e.g. unilateral cross bite ,supernumerary teeth, missing teeth , fused teeth etc. 2. The child should be on 3 square meals a day. 3. Oral habits such as thumb sucking, lip sucking, oral breathing, etc. and their effects on the development of occlusion should be considered. 4. Parents to be informed accordingly. The use of muscle training appliances to be considered to assess clinically for incomplete eruption of deciduous second molars/pericoronal flaps may lead to decay on the same. 5. Child to be encouraged to begin brushing on his own at least once a day-preferably post breakfast.

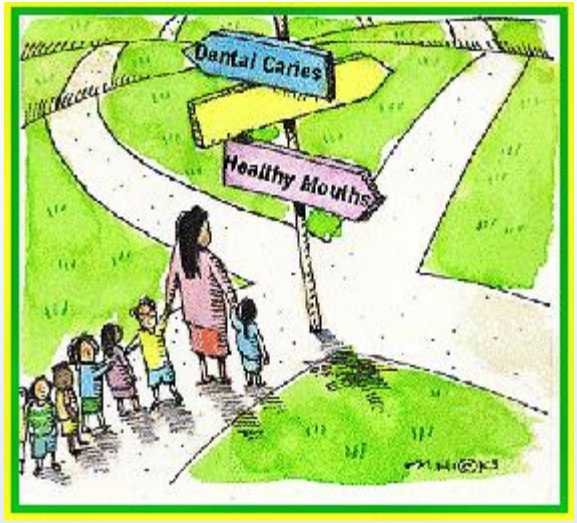
Five to Six years of Age	1. Parents to be informed about the initiation of exfoliation of deciduous teeth and that it would go up to 12 to 13 years of age. 2. Clinical examination. 3. The need for constant review and recall on a regular basis. 4. In case of extraction of deciduous teeth due to decay, etc. the need, advantages and importance of space maintainers should be explained.



CARIES CONTROL

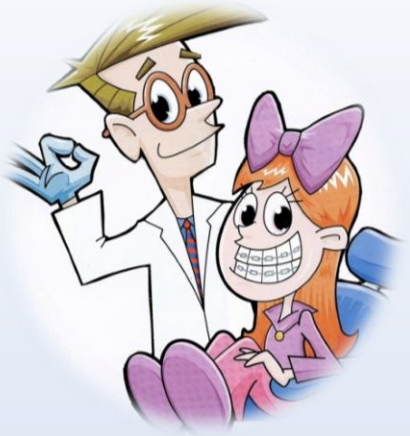
- Caries involving the deciduous teeth, especially the proximal caries is the main cause of development of a malocc1usion.
- There has been a sudden spurt U1 nursing and rampant caries, involving the deciduous and the mixed dentition generally, which has resulted in a sudden demand for preventive and interceptive orthodontics.
- The importance of maintaining and preserving the deciduous dentition should be counseled to the parents and pediatricians.

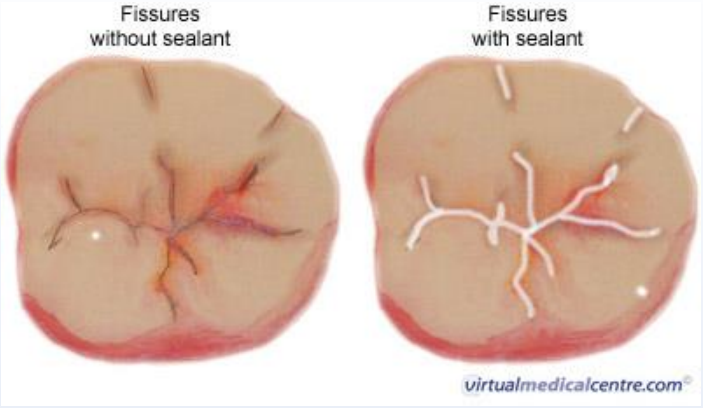
- Most of the parents first seek the opinion of their pediatrician regarding their child's decayed teeth.
- In case of proximal decay, the adjacent tooth tends to tilt into the proximally decayed area resulting in the loss of arch length, thereby resulting in lesser space for the succedaneous tooth to erupt m their rightful place and position. Therefore, the proximal decay should be restored accurately at the earliest and many problems may not arise provided arch length loss is equal to or less than the Leeway Space of Nance.



- In case of pulpal involvement due to caries, partial pulpectomy or pulpotomy is done followed by the placement of stainless steel crown.

- Caries initiation can be prevented by diet counseling, topical fluoride application, pit and fissure sealants and educating parents (prenatal counseling and postnatal counseling).





SPACE MAINTENANCE

The following factors are important when space maintenance is considered after the untimely loss of primary teeth.

- **Time elapsed since loss of tooth:** Maximum loss of space occurs within 2 weeks to 6 months of the premature loss of deciduous tooth. It is recommended to fabricate the space maintainer before the extraction and to be inserted at the time of extraction.
- **Dental age of the patient:** The dental age is more important than the chronological age of the patient.

- **Amount of bone covering the developing succedaneous tooth bud** : The developing premolars usually require 3-5 months to move through 1 mm of covering alveolar bone, as observed on a bitewing radiograph. However, the eruption could be earlier provided the alveolar bone covering the developing tooth bud has been destroyed by the periapical furcation involvement of the deciduous tooth.
- **Stage of root formation**: The developing tooth buds begins to erupt actively if the root is three- fourth formed.

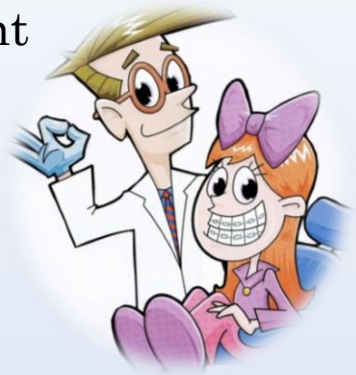
- **Sequence of teeth eruption :** The status of the developing and erupting tooth buds adjacent to the space created by the premature loss of the deciduous tooth is important. Two clinical conditions are of importance:
    - The first one being-premature loss of deciduous second molar. If the level of eruption of the second permanent molar is at a level higher than that of the second premolar, then there is a likelihood of permanent first molar to lip mesially and impact the eruption of the second premolar.

- The second scenario is that of premature loss of deciduous first molar and an erupting permanent lateral incisor, which tends to distally ditch the deciduous canine thus effecting the eruption of permanent first premolar. This also results in the lingual inclination of the anteriors especially in the mandible thus resulting in the collapse of the anterior segment

6. **Congenitally missing teeth***: If* detected before the tooth distal to them erupts, it is advisable to extract their precursor deciduous tooth.
7. **Eruption of the permanent tooth in the opposite arch** : If the permanent tooth in the opposing arch to the prematurely lost tooth has erupted, then an occlusal stop should be placed on the planned space maintainer so as to prevent the supra-eruption of the opposing permanent tooth, which in turn would maintain an acceptable curve of Spee.

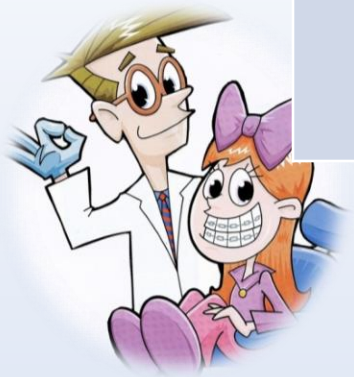
Ideal requirements of space maintainers:

- Maintain entire mesio-distal space created by loss of teeth.
- Restore function as far as possible.
- Prevent over-eruption of opposing tooth.
- Simple in construction.
- Strong enough to withstand functional forces.
- Should not exert excessive stress on opposing teeth.
- Permit maintenance of oral hygiene.
- Must not restrict normal growth and development & natural adjustments which takes place during transition from deciduous to permanent dentition.
- It should not come in the way of other functions



CLASSIFICATION OF SPACE MAINTAINERS

According to Hitchcock	**•Removable or fixed or semi fixed.** **•With bands or without bands.** **•Active or passive.** **•Combinations of the above.**
According to Raymond C. Thurow	a. Removable. b. Complete arch • Lingual arch • Extraoral anchorage. c. Individual tooth space maintainer.



According to Hinrichsen	**1.Fixed space maintainers:** **Class I** **a)Non-functional types** **i) Bar type.** **ii)Loop type.** **b)Functional types** **i)Pontic type** **ii) Lingual arch type.** **Class II-Cantilever type** **(distal shoe, band & loop)** **2.Removable Space maintainers:** **Acrylic partial dentures.**

Removable space maintainers

- It can be functional or non-functional.
- Functional: teeth provided to aid in mastication, speech and esthetics
- Non functional: only an acrylic extension over edentulous area to prevent space closure.

Indications:	Contraindications:
• When esthetics is of importance. • When abutment teeth cannot support fixed appliance • Cleft palate patients: for obturation of palatal defects. • If radiographs reveal that the unerupted permanent tooth is not going to erupt in less than 5 months. • If permanent teeth are not fully erupted so a band cannot be adapted. • Multiple loss of deciduous teeth requiring functional replacement.	• Lack of patient co-operation • Allergy to acrylic • Epileptic patients having uncontrolled seizures.

Fixed Space Maintainers

- Space maintainers that are fixed or fitted onto the teeth are called fixed space maintainers.

Advantages:	Disadvantages:
• Bands & crowns are used so minimum or no tooth preparation • Do not interfere with passive eruption of abutment teeth. • Jaw growth is not hampered. • The succedaneous permanent teeth are free erupt into the oral cavity • Useful in uncooperative patients • Masticatory function is restored if pontics are placed.	• Elaborate instrumentation • Experts skill • May result in decalcification of tooth material under bands • Supra eruption of opposing tooth if no pontics are placed • If pontics used, it may interfere with vertical eruption of abutment teeth & may prevent eruption of replacing permanent teeth, If the patient fails to report.

Indication of space maintainer

Space Maintenance for the First and Second Primary Molar and the Primary Canine Area

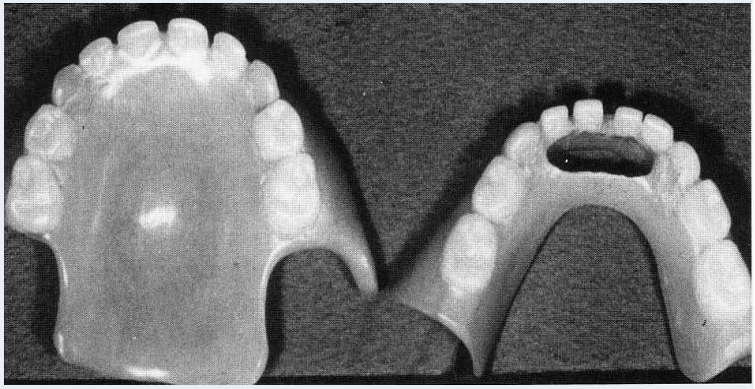
The Band and Loop Maintainer.

Crown and loop

lingual arch

Nance appliance

Transpalatal arch

Loss of the Second Primary Molar Before Eruption of the First Permanent Molar	**The Distal Shoe Appliance** 	
Space Maintenance for the Primary and Permanent Incisor Area	Removable Partial Dentures. Fixed Appliances	
Space Maintenance for Areas of Multiple Tooth Loss	Acrylic Partial Denture 	Full Dentures for Children 

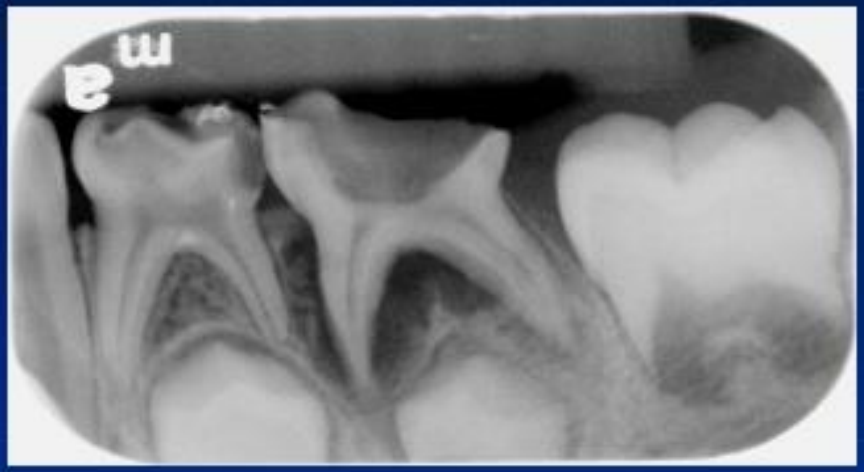
Loss of the First Permanent Molar	The treatment of patients with the loss of first permanent molars must be approached on an individual basis
Loss of the First Permanent Molar Before the Eruption of the Second Permanent Molar.	The removal of the opposing first permanent molar, even when the tooth appears to be sound and caries free, is sometimes recommended in preference to allowing it to extrude or to subjecting the child to prolonged space maintenance and eventual fixed Replacement If the first permanent molars are removed several years before the eruption of the second permanent molars, there is an excellent chance that the second molars will erupt in an acceptable position

Distal Shoe

- **MAXILLARY** or **MANDIBULAR**
- Used when second primary molar requires extraction and first permanent molar has not erupted

Distal Shoe

- Should be evaluated with radiograph prior to cementation
  - Length
  - Position
- Will be replaced with another space maintainer when permanent teeth erupt.



Distal Shoe

- Example of use in partial eruption case.

Nance Appliance

- **MAXILLARY ONLY**
- Bands on first permanent molars

Nance Appliance

- Cross Palatal Bracing prevents rotation #3 and #14 around palatal root- ***this starts mesial migration of #3 and #14***
- Acrylic Button provides additional stop

Transpalatal Holding Arch (TPA)

- Can be used like a Nance.

- Advantage
  - Lack of acrylic button so less tissue irritation and more cleansible
- Disadvantage
  - Lack of anterior stop = possible tooth shift (?)

Lower Lingual Holding Arch

- **MANDIBULAR <u>ONLY</u>**
- Bands on first permanent molars
- Anterior Stop = Cinguli of #23-#26

Lower Lingual Holding Arch

- Mandibular incisors often erupt lingually and are pushed forward by the tongue
- LLHA should not be placed with primary incisors

LLHA Omega Loops

- Omega Loops in area of premolars allow slight adjustment to fit appliance
- Should **not** be used to activate appliance

Band/Crown and Loop

- **MAXILLARY** or **MANDIBULAR**
- Unilateral most typical
- Can be bilateral if permanent teeth are not present
- Single tooth span

Crown and Loop

- Stronger than band and loop
- Cementation failure or loss less likely
- Excellent choice if tooth needs a restoration

What About Removable Appliances?

- Yes, they are possible, however…….
- High failure rate due to breakage and loss
- Parent **and** patient compliance must be exceptional

Which Space Maintainer?

- **Distal Shoe** = 2nd Primary Molar Extraction with unerupted 1st Permanent Molar
- **Nance or Band/Crown Loop** = Maxillary problem with 1st Permanent Molars present
- **Lower Lingual Holding Arch** = Mandibular Problem with 1st Permanent Molars and Permanent Incisors present
- **Band/Crown and Loop**= Primary 1st Molar Extraction

Space Maintainer Competency

- The following cases require space maintainer consideration. Assume that radiographs have been taken, there is no abnormal pathology (other than dental caries), and a successor is developing.
- Please answer the questions on your worksheets.

Question 1

- What tooth was extracted? How old is this child?
- What is the appropriate space maintainer?
- Will it have to be replaced with a different space maintainer in the future? If so, with what?

Question 2

- What tooth was extracted? How old is the child?
- What is the appropriate space maintainer?
- Will it have to be replaced with a different space maintainer in the future? If so, with what?

Question 3

- Which teeth were extracted? How old is the patient?
- What is the appropriate space maintainer?
- When can the space maintainer be removed?

Question 4

- Which teeth were extracted/
- What is the appropriate space maintainer?

Question 5

- Which teeth have been extracted? How old is the child?
- What is the most appropriate space maintenance?

Question 1

- Band/Crown and Loop #J-H
- Will not need replacement. #12 should erupt before #H or J exfoliate

Question 2

- Tooth #L extracted. 3-5 y.o. child.
- What is the appropriate space maintainer?
- Will it have to be replaced with a different space maintainer in the future? If so, with what?

Question 2

- Band/Crown Loop #K-M
- May need to be replaced by LLHA later. Tooth #M should exfoliate prior to eruption #21.

Question 3

- Teeth #A and #J extracted. Patient 8-9 y.o.

Question 3

- Nance #3-#14
- Can be removed when #4 and #13 erupt-around age 12

Question 4

- Teeth #K and L extracted

Question 4

- Lower Lingual Holding Arch (LLHA) #19-#30

Question 5

- Teeth #K and #S extracted. 5-6 y.o. child.
- Because permanent incisors are not erupted, LLHA not recommended. Options: Reverse band and loop #L-#19 and band and loop #T-#R.

EXFOLIATION OF DECIDUOUS TEETH

- Generally the deciduous teeth should exfoliate in about 3 months of exfoliation of the one in the contralateral arch.
- Any delay more than that should be considered with suspicion and the following should be ruled out:

a) Over-retained deciduous/root stumps. The greatest damage that may result from over retained primary teeth comes in wake of ankylosed primary molars

b) Fibrous gingiva.

c) Ankylosed/submerged deciduous teeth to be

  - Assessed radiographically: Absence of PDL membrane in a small area or whole for the root surface.
  - They do not resorb: prevent permanent teeth from erupting, or deflect them to erupt in abnormal positions.

- Diagnose such tooth and surgical removal at an appropriate time for permanent tooth eruption.

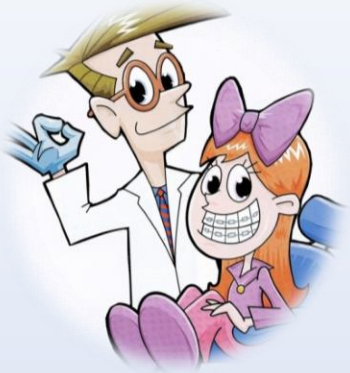
d. Restoration overhangs of the adjacent tooth.

e. Presence of any supernumerary tooth: Supernumerary & supplemental teeth can interfere with eruption of nearby normal teeth.

- They deflect adjacent teeth and erupt in abnormal positions.
- They should be identified and extracted before they cause displacement of other teeth.

ABNORMAL FRENAL ATTACHMENTS

Thick and fleshy maxillary labial frenum may cause the development of diastema /excess spacing between the teeth, which in turn may not allow the eruption of succedaneous teeth. Surgical correction of the high frenal attachments is therefore *advised* . The tongue should also be assessed for ankyloglossia/ tongue-tie.

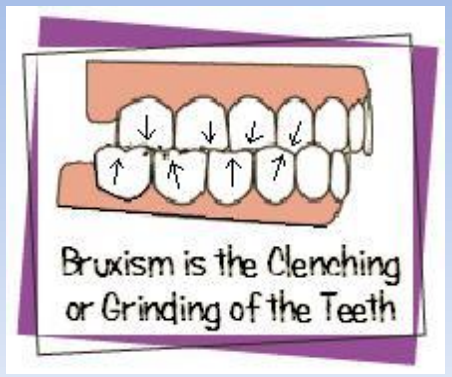


- Diagnosis –blanch test.
- Treated at an early stage for prevention.
- If orthodontic closure is advocated, it should occur before surgery to reduce the chance that scar tissue will impede tooth movement. If there is sufficient arch space for the eruption of incisors and canines, it is best to delay frenum surgery until these teeth have fully erupted.

LOCKED PERMANENT FIRST MOLARS

The permanent first molars may get locked distal to the deciduous second molars, at times. Slight distal (proximal) stripping of the deciduous second molar allows the permanent first molar to erupt in their proper place.

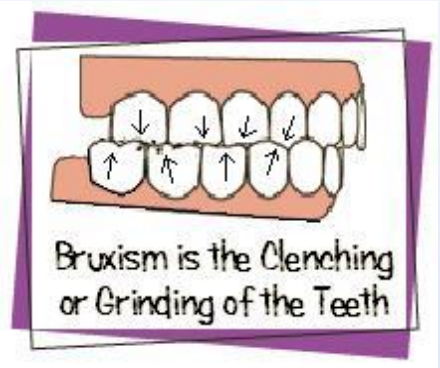
Abnormal oral musculature and related habits



Bruxism.

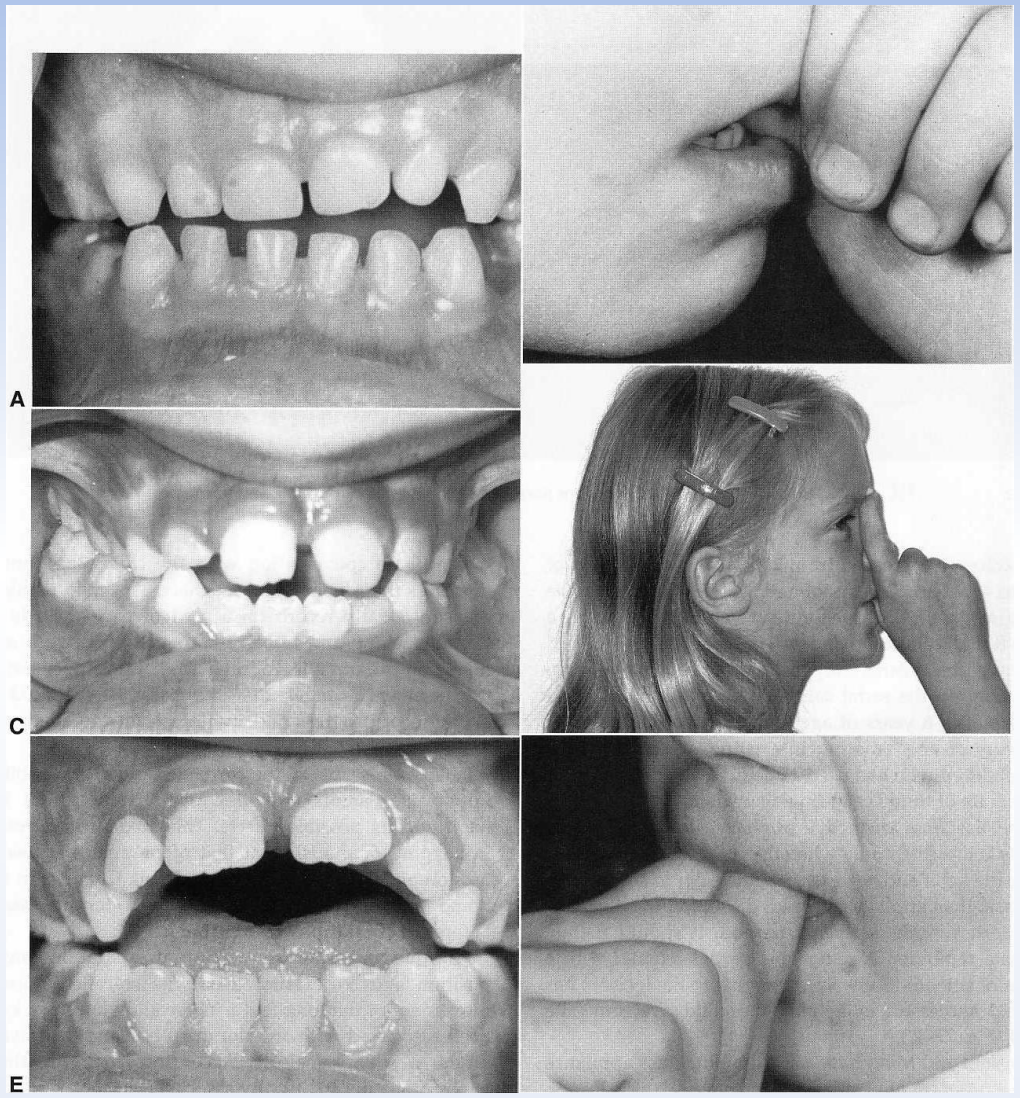
- Bruxism is a nonfunctional grinding or gnashing of teeth
- The habit usually occurs at night and, if continued over a prolonged period, can result in abrasion of primary and permanent teeth occlusal interference may trigger bruxism, particularly if it is combined with nervous tension. Therefore occlusal adjustment should be the first approach to the problem if interferences are presents the construction of a palatal bite plate, which allows the continued eruption of the posterior teeth." This eruption is desirable if the teeth have 'been abraded by the habit.

- A vinyl plastic bite guard that covers the occlusal surfaces of all teeth plus 2 mm of the buccal and lingual surfaces can be worn at night to prevent continuing abrasion. The occlusal surface of the bite guard should be flat to avoid occlusal interference. A mouth guard may also help in overcoming the habit.



Digit and Nonnutritive Sucking Behaviors

- Many children suck their thumbs or fingers for short periods during infancy or early childhood. Although the habit may be considered normal during the first 2 years of life, many children never develop a digit-sucking habit.
- Parents should be advised to observe the habit periodically. If it gradually diminishes, the child probably will stop the habit. On the other hand, if the habit persists or increases in frequency and adverse dental and skeletal changes are noted, specific corrective measures may be needed to avoid undesirable occlusion problems
- Many children stop the habit during the preschool years, but some continue into the teenage or adult years.
- Even if there were no ill effects on occlusion, thumb sucking is not socially acceptable; it should be discouraged when the habit is persistent and when the patient is mentally capable of understanding why it should be stopped.


A
C
E

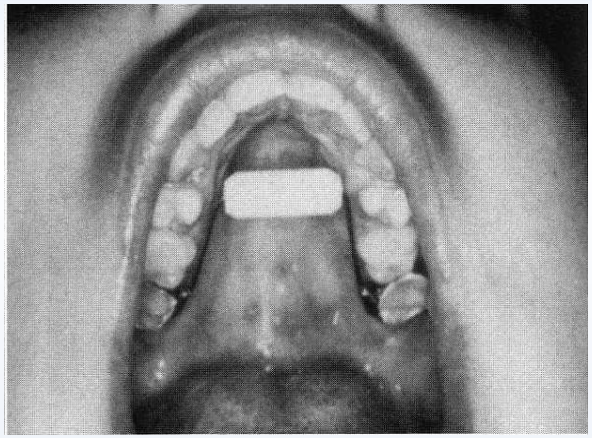
Methods use to prevent digit sucking

- The use of a corrective appliance to manage oral habits is indicated only when the child wants to discontinue the habit and needs only a reminder to accomplish the task.

- If an appliance is used, it should not be painful or interfere with occlusion; instead, it should merely act as a reminder.
- A removable partial retainer with a series of smooth loops placed lingual to the incisors has proved successful in helping the child overcome the habit

- An entirely different approach has been practiced by some dentists when it is evident that a child wants to discontinue the habit. This approach requires cooperation of the parents and their consent to disregard the habit and not mention it to the child.
- In a private conversation with the child, the dentist discusses the problem and its effect. The child is asked to keep a daily record on a card of each episode of thumb sucking and to call the dentist each week and report on progress in stopping the habit. A decrease in the number of times that the habit is practiced is evidence of progress and indicates that the child will discontinue the habit.
- The parents' role in the correction of an oral habit is important. Parents are often overanxious about the habit and its possible effects. This anxiety may result in nagging or punishment that often creates a greater tension and intensification of the habit. Changes in the home environment and routine are often necessary before the child can overcome the habit.

- Haskell and Mink have used the Bluegrass appliance with a program of positive reinforcement to stop thumb sucking in children.26 A modified, six-sided roller machined from Teflon which permits purchase of the tongue, is constructed to skip over a 0. 045-inch stainless steel wire that is soldered to molar orthodontic bands previously fitted and in place on a poured plaster model



Tongue and Swallowing Habits

- Abnormal tongue position and a deviation from the so-called normal movement of the tongue during swallowing have long been associated with anterior open bite and protrusion of the maxillary incisors.
- Three major problems are usually associated with the anterior tongue position, These problems are open bite; protrusion of the incisors, particularly the maxillary incisors; and lisping.

- The two major reasons for it relate to the physiology of the child (maturation) and to anatomy (growth).
- Normal infants position the tongue anteriorly in the mouth at rest and during swallowing.
- An infant's normal swallow is characterized by strong lip activity to seize the nipple, placement of the tongue tip against the lower lip beneath the nipple, and relaxation of the elevator muscles of the mandible so that the mouth is wide open.
- As oral function matures, there is a gradual activation of the elevator muscles of the mandible so that the mandible is brought up toward what ultimately will be occlusal contact of the teeth. This act occurs while the tongue tip is still placed against the lower lip.

- Physiologic transition in swallowing begins during the first *year* of life and normally continues over the next several years.
- A mature swallow pattern is characterized by relaxation of the lips, placement of the tongue behind the maxillary incisors, and elevation of the mandible until posterior teeth are in contact. This pattern is not usually observed before a child is 4 or 5 years of age.

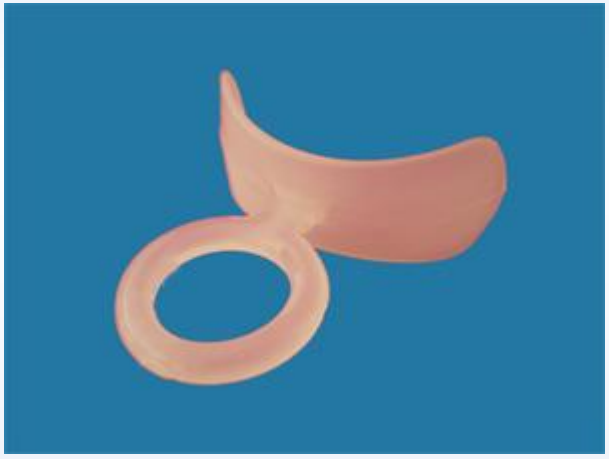
Methods to prevent tongue thrusting

- Although appliances are often recommended for the treatment of tongue thrust, myofunctional therapy should be attempted first.

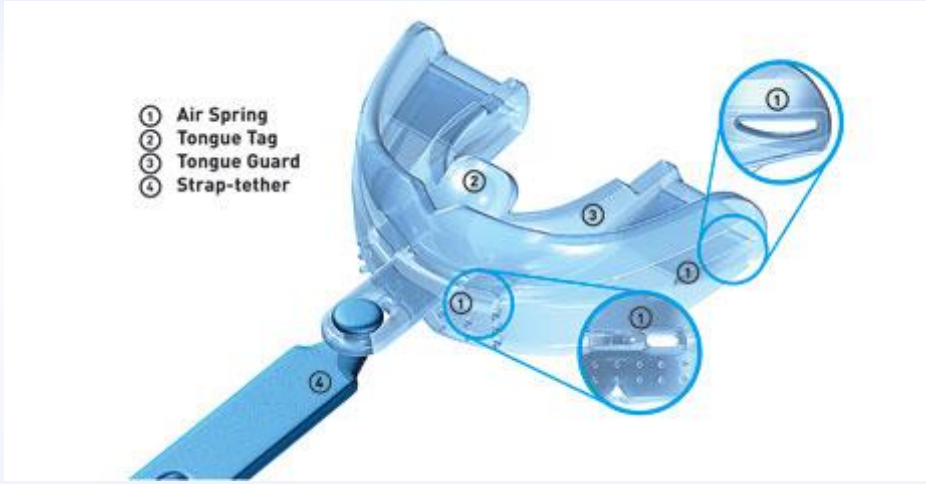
- Andrews recommends that the patient be instructed to practice swallowing correctly 20 times before each meal.'-s Holding a glass of water in one hand and facing a mirror, the child takes a sip of water, closes the teeth into occlusion, places the tip of the tongue against the incisive papilla, and swallows. This is repeated and each time is followed by the relaxation of the muscles until the swallowing progresses smoothly.

- The use of a sugarless mint has also resulted in successful management of simple tongue thrusting. The child is instructed to use the tip of the tongue to hold a mint on the roof of the mouth until it melts. As the mint is held, saliva flows and makes it necessary for the child to swallow. After the patient has trained the tongue and muscles to function properly during swallowing, a mandibular lingual arch with a crib or an acrylic palatal retainer with a fence may be constructed as a reminder to position the tongue properly during swallowing

- Mouth breathing-the child can be given adequate medical attention, regarding recurrent upper respiratory tract infection. Oral screens and the recently introduced myofunctional appliances such as the pre-orthodontic trainers, train the child to breathe through the nose, thus allowing the proper development of nasal passage, regression of adenoid mass and the development of a shallow, broad palate.



Oral screens



Pre-orthodontic trainers

CONCLUSION

As the word goes, PREVENTION IS ALWAYS BETTER THAN CURE, preventing orthodontic malocclusions at a very early age can do so much good for the children than interceptive and corrective procedures at a later age. Hence it is the need of the age, for children and parents to be well informed, educated and motivated to take preventive measures against dental malocclusions.

THANK YOU