

***Interceptive orthodontics
(BDS- IV year)***

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Teaching objectives

After this lecture the students will be able to

- understand the basic concept of interception
- Basis of management of crowding
- Detailed understanding of serial extraction
- Management of crossbite and midline diastema

Introduction

- Interceptive orthodontics has recently gained importance for pediatric dentists as well as orthodontists as early correction of certain developing malocclusions results in better clinical outcomes and esthetic results

Contents

- Definition
- Early diagnosis
- Space regaining
- Crowding
- Serial Extraction
- Modifications of serial extraction

Definition

That phase of science and art of orthodontics employed to recognize & eliminate the potential irregularities & malpositions in the developing dentofacial complex

Benefits of early diagnosis & treatment

- Guidance of developing occlusion
- Crowding gets worse if not treated early
- In class III malocclusions, early appliance therapy can reduce complexity of treatment at later stage
- Extraction of permanent teeth can be reduced with early treatment
- Early treatment of deleterious habits is easier
- Psychological advantage

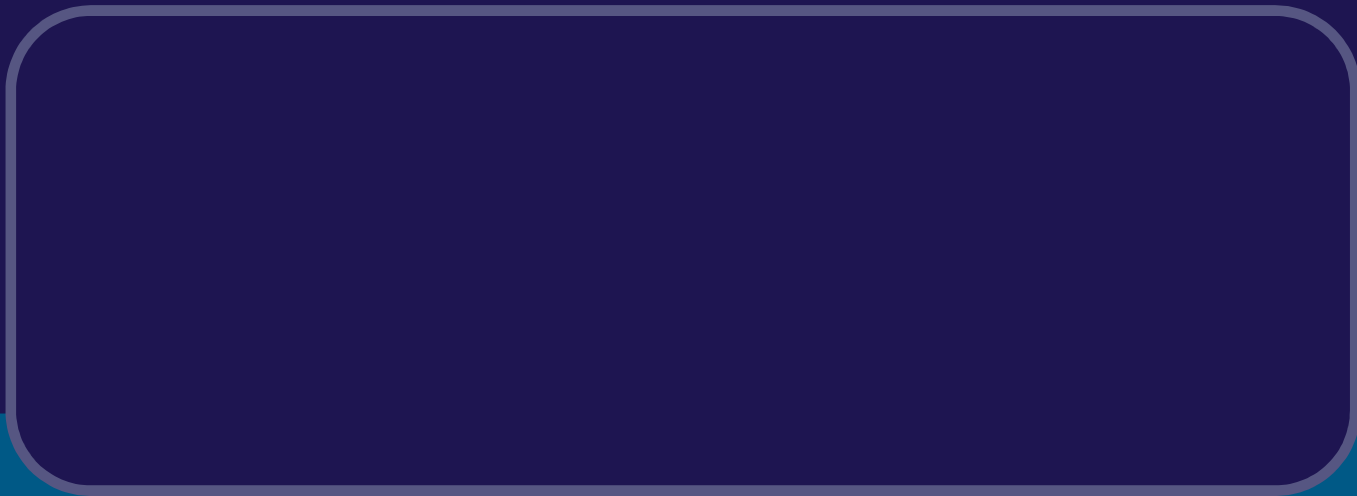
Drawbacks of early treatment

- Misperceptions regarding goals of early treatment
- Diphasic treatment may lengthen total treatment time
- Difficult to predict future growth
- Patient cooperation

Primary dentition

- Anterior & posterior crossbite
- Space loss has occurred
- Unduly retained primary teeth: interfere with eruption of permanent teeth
- Premature contacts affecting pattern of mandible closure
- All habits

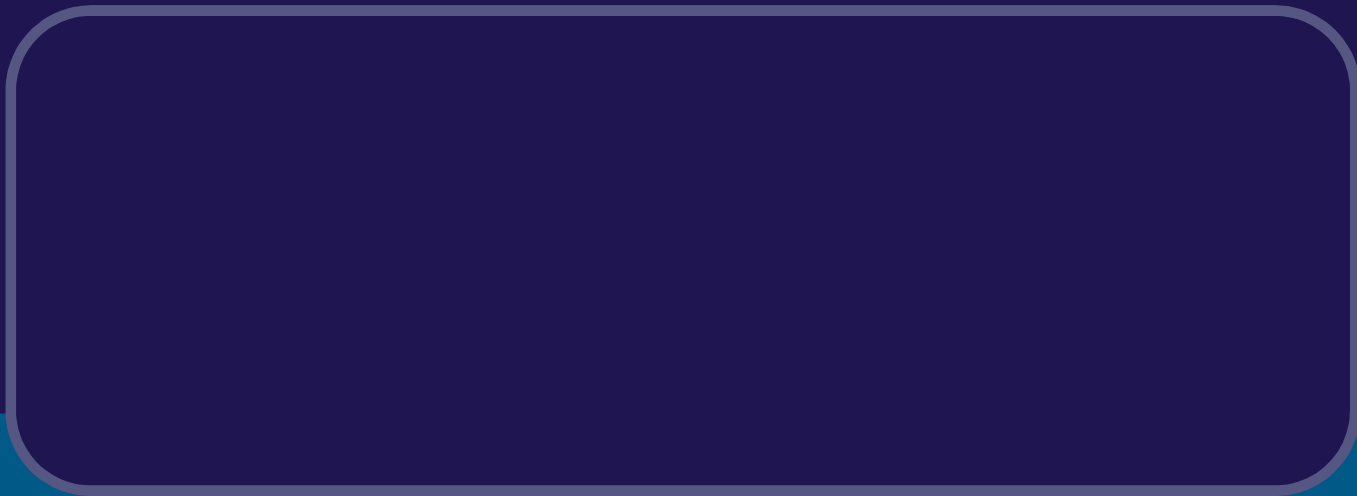
Mixed dentition period



PROCEDURES IN INTERCEPTIVE ORTHODONTICS

- *Serial extraction*
- *Correction of developing cross bites*
- *Control of habits*
- *Space regaining*
- *Muscle exercises*
- *Removal of soft tissue/bony barrier*

Space regaining



Space regaining

- Radiographs, study models & mixed dentition analysis help in making a diagnosis
- How much space to be regained?
- Whether teeth have tipped into space or have bodily moved?

Space regaining fixed space regainers

- Open coil space regainer
 - Used between 4 & 6
 - Band on 6 with buccal tube
 - Wire bent into 'U' shape to contact 4
 - An open coil spring which is 2-3 mm longer is cut & slide on the wire
 - Appliance is then cemented



Space regaining fixed space regainers

- Gerber space maintainer
 - A 'U' assembly with appropriate length of springs
 - Fitted in tube & appliance placed



Space regaining fixed space regainers

- Hotz lingual arch
 - U loop in the lingual arch to facilitate activation
 - To distalize molars



Space regaining fixed space regainers

- Lip bumper
 - Heavy arch wire along the buccal surfaces of lower teeth
 - Acrylic flange in anterior region away from tooth surfaces
 - Loops in arch wire before it enters tube



Space regaining removable space regainers

- Free end loop
- Jackscrew



Crowding



Crowding

- Incisors erupt lingually in mandibular arch
- Incisors sometimes palatally in maxillary arch



Crowding

- Observe:
 - Initial crowding of less than 2mm would resolve on its own if there some space exists between the primary teeth
 - If space analysis is positive, then keep under observation

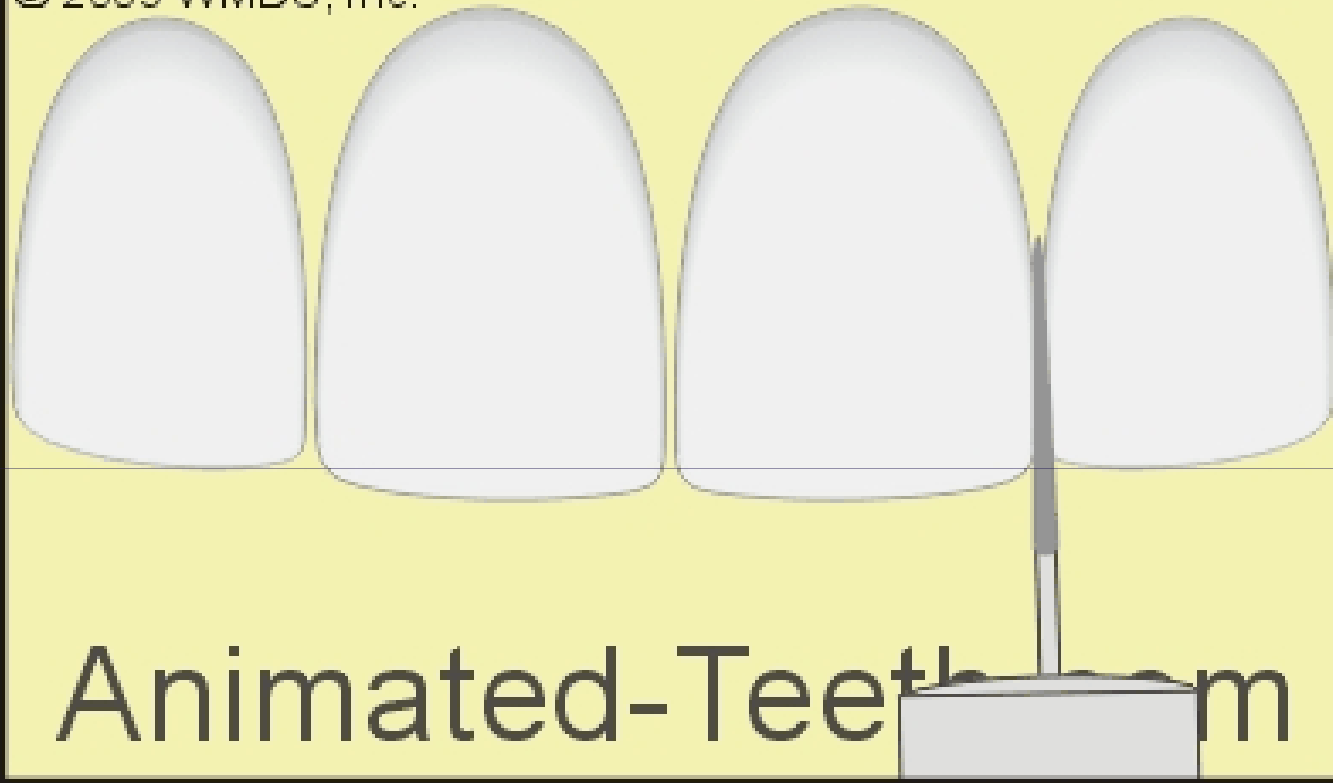
Crowding

- Disking of primary teeth
 - Grinding of mesial surface of canines can help in initial alignment of incisors where space required is not more than 3-4 mm
 - Once space is created, incisors spontaneously move forward by tongue pressure or lingual arch can be used to facilitate alignment.



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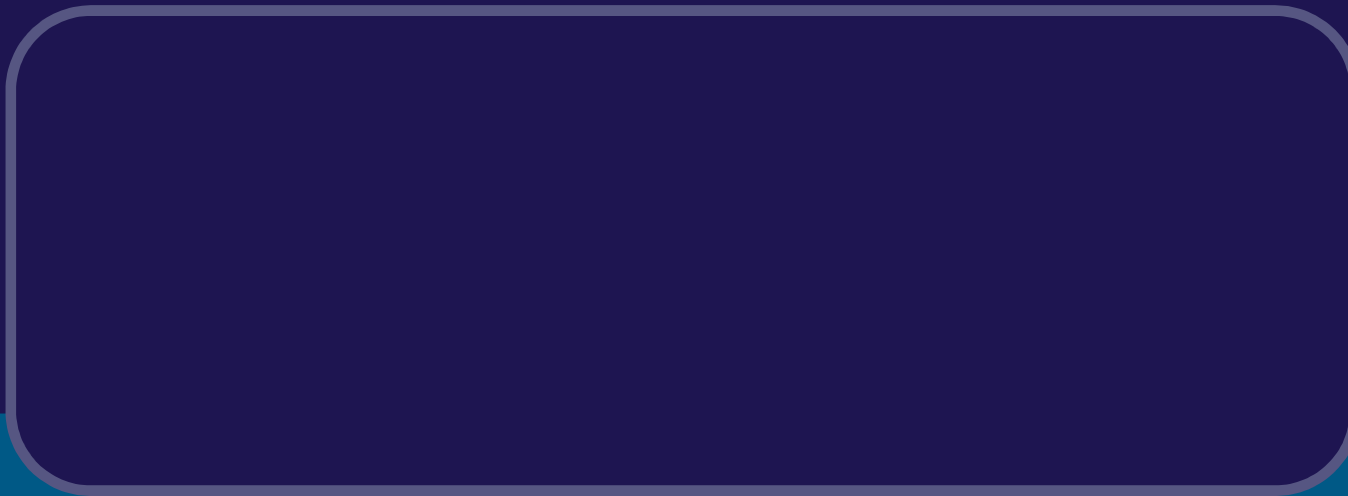


LONG THIN TAPERED FISSURE BUR



METALLIC ABRASIVE STRIPS

Serial Extraction



SERIAL EXTRACTION

- *Kjellgren 1929 – coined the term serial extraction.*
- *Nance 1940 popularized the term in USA and termed it “planned and progressive extraction”.*
- *Hotz 1970 – called it “active supervision of teeth by extraction”.*

Crowding

Serial extraction

(Guidance of eruption)

Defined as correctly timed, planned removal of certain deciduous & permanent teeth in mixed dentition stages with dentoalveolar disproportion in order to:

Alleviate crowding of incisor teeth

Allow unerupted teeth to guide themselves into improved positions

Lessen the time of active appliance therapy or eliminate it

Crowding

Serial extraction

(Guidance of eruption)

- **Indications:**
 - Class I with anterior crowding (discrepancy > 10mm)
 - Lingual eruption of lateral incisors
 - Midline shift potential due to unilateral canine loss
 - Crowded arches with extreme proclination
 - Abnormal primary canine root resorption
 - Lack of developmental spacing
 - Ankylosis, ectopic eruption

Crowding

Serial extraction

(Guidance of eruption)

- **Contraindications:**
 - Mild to moderate crowding (less than 8 mm)
 - Congenital absence of teeth
 - Extensive caries of permanent molars- require removal
 - Accompanying deep or open bites
 - Severe class II or III
 - Cleft lip & palate cases



Crowding

Serial extraction

(Guidance of eruption)

- Diagnosis based on:
 - Clinical examination
 - Study models
 - X rays- IOPA, OPG, Ceph
 - Mixed dentition analysis
 - Facial photographs

Crowding

Serial extraction

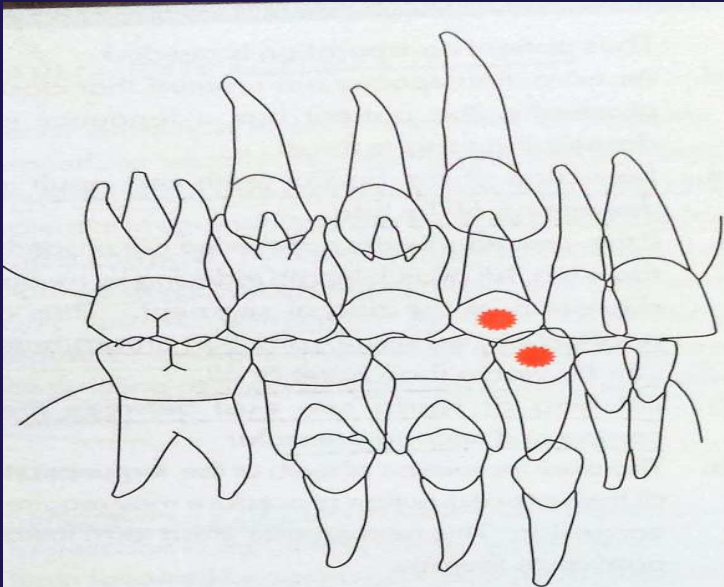
(Guidance of eruption)

- Rules for serial extraction:
 - Class I relationship bilaterally
 - Balanced facial-skeleton relation
 - At least 5 mm discrepancy in all quadrants
 - Dental midline should coincide
 - No open or deep bite

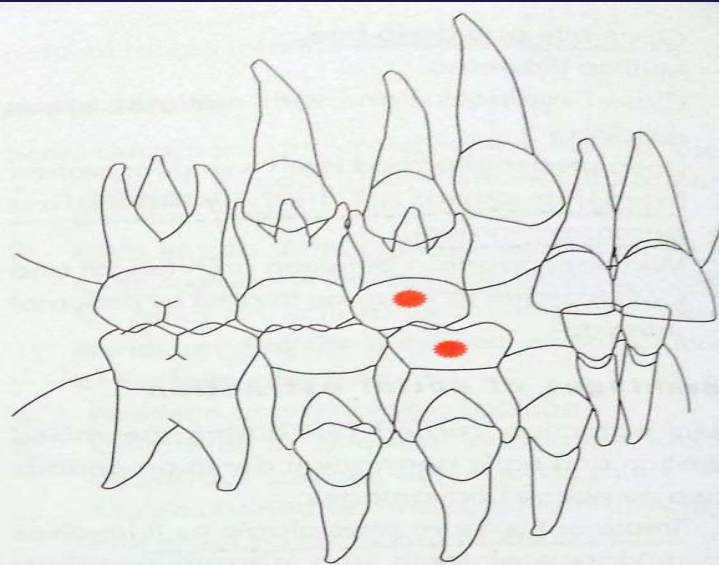
Crowding

Serial extraction (Guidance of eruption)

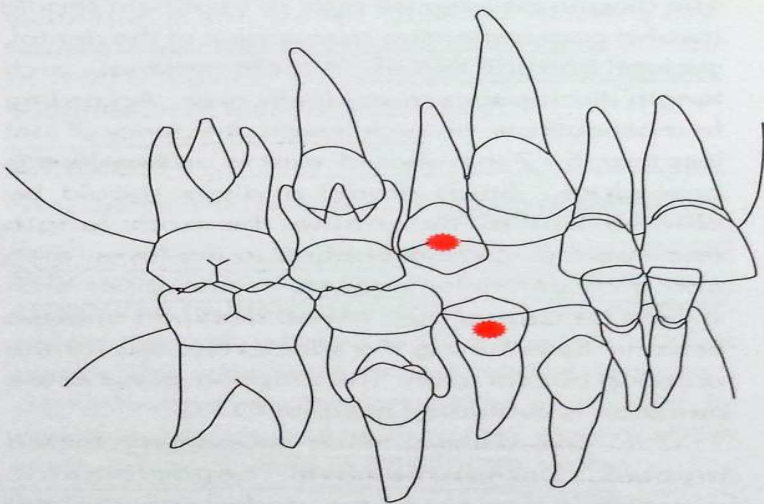
- Dewel's method (1978): CD4
 - Extraction of deciduous canines (8.5 years): allows alignment of crowded incisors
 - Extraction of deciduous 1st molars (9.5 years): to promote eruption of 1st premolars
 - Reassessment of the arch before proceeding further*
 - Extraction of premolars immediately as they erupt: allows alignment of canines
- If canine starts erupting before premolar, then enucleation of premolar



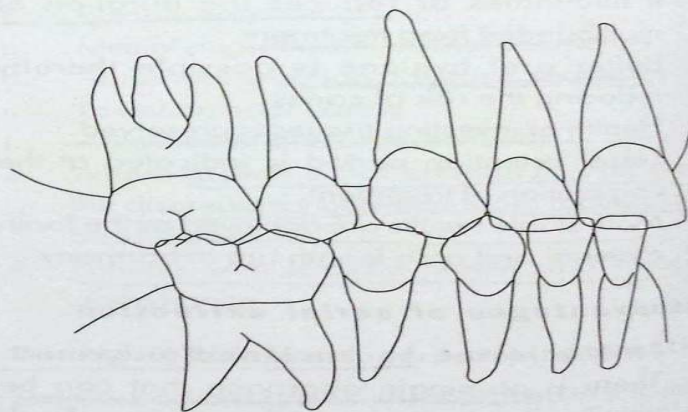
A



B



C



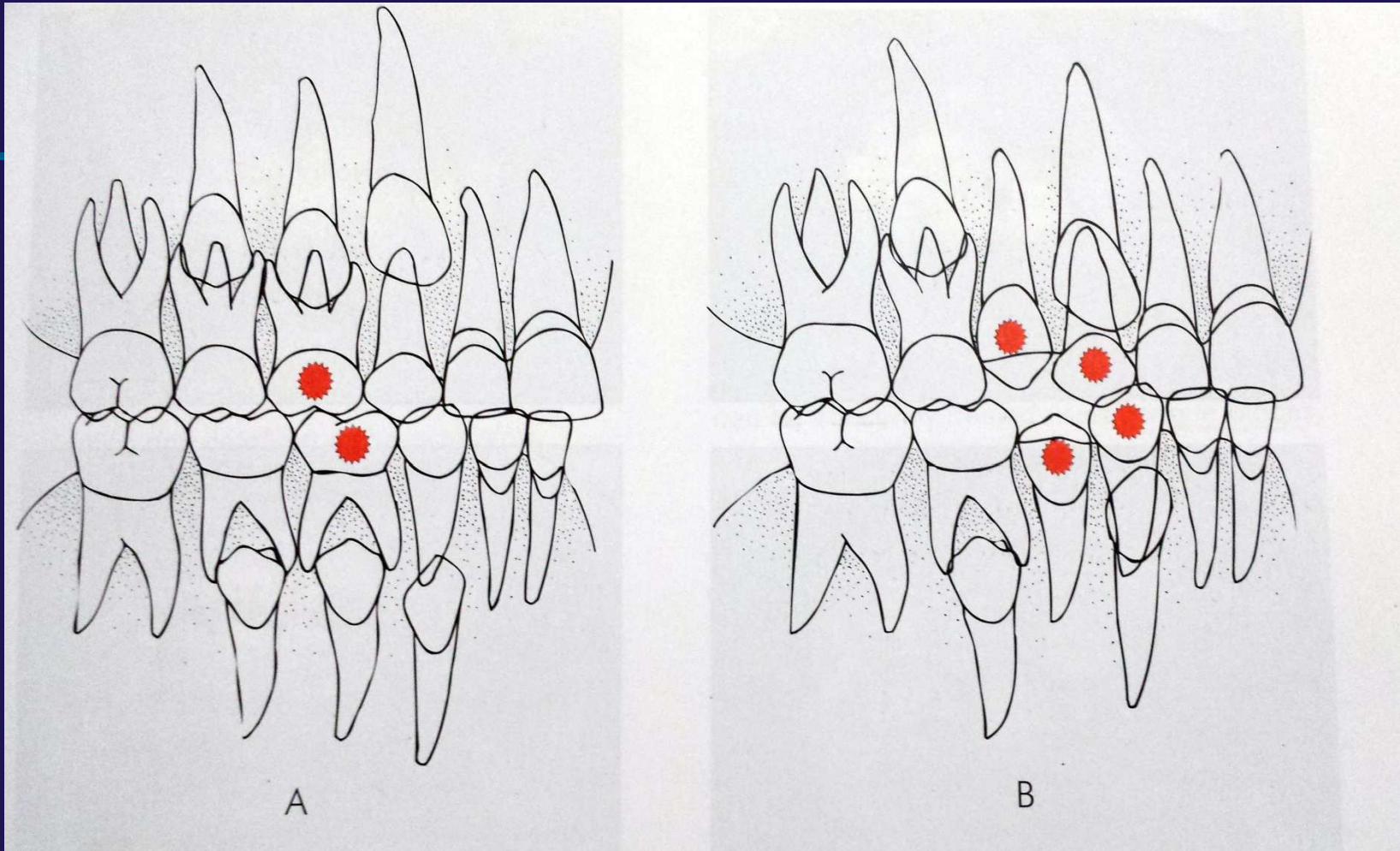
D

Crowding

Serial extraction

(Guidance of eruption)

- Tweed's method (1966): D4C
 - Extraction of deciduous 1st molars (8 years): to encourage eruption of premolars before canines
 - Extract premolars & deciduous canines together



A

B

Crowding

Serial extraction

(Guidance of eruption)

- Moyer's method : BCD4
 - Extraction of lateral incisors to help alignment of central incisors
 - Extraction of deciduous canines (8.5 years): allows alignment of crowded incisors
 - Extraction of deciduous 1st molars (9.5 years): to promote eruption of 1st premolar
 - Extraction of premolars immediately as they erupt: allows alignment of canines

Crowding

Serial extraction

(Guidance of eruption)

- Advantages:
 - Further appliance therapy minimized or eliminated
 - Complexity of treatment reduced

Crowding

Serial extraction

(Guidance of eruption)

- **Disadvantages:**
 - Fixed appliance therapy required in most cases to improve the inclination of teeth & overbite
 - Used only in class I cases
 - Psychological trauma due to extractions
 - Patient cooperation & follow up required for the success of treatment
 - Impacted canines as a complication

Crowding

Timely extraction

- Sequential removal of deciduous teeth but no removal of permanent teeth
 - Gingival recession due to labial positioning of incisor: removal of canines will alleviate incisor crowding. Give lingual arch to maintain space
 - Ectopic eruption of incisors: extract the deciduous counterpart

Crowding incisor extraction

- Occasionally extraction of an incisor may give a good result
 - Where anterior fanning of incisors
 - After space analysis

Crowding

Wilkinson's extractions

- Advocated removal of all permanent molars to relieve crowding in posterior segment
 - Molars used to be the most commonly decayed teeth with poor prognosis
- Not advocated these days as the importance of permanent 1st molar has been understood



DEVELOPING ANTERIOR CROSSBITE

- *DEFINITION :-*

Anterior cross bite is a condition characterized by reverse over jet wherein one or more maxillary anterior teeth are in lingual relation to the mandibular teeth.

(GRABER)

- ***“The best time to treat any cross bite is the first time it is seen”.***

- *It should be intercepted and treated at an early age.*
- *Helps to prevent minor orthodontic problem from its progression into a major dento-facial anomaly.*

*WHY TO TREAT ANTERIOR
CROSSBITE ???*

- *It is self perpetuating.*
-

- *May transform into skeletal malocclusions that may require complicated orthodontic treatment.*
- *May also require surgical interventions, at times.*

Classification

[I] Based on Location

Cross bite

ANTERIOR CROSS BITE

a. According to no. of teeth involved

Single tooth
Cross bite

Segmental
Cross bite

POSTERIOR CROSS BITE

a. According to no. of teeth involved

Single tooth
Cross bite

Segmental
Cross bite

b. According to side involved

Unilateral

Bilateral

c. According to extent

Single posture
Cross bite

Buccal
Non-occlusion

Lingual
Non-occlusion

Unilateral cross bite



Normal occlusion



Bilateral cross bite



[II] Based on the Etiologic Factor

Cross bite

```
graph TD; A[Cross bite] --> B[Skeletal Crossbite]; A --> C[Dental Crossbite]; A --> D[Functional Crossbite];
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A flowchart with a central box labeled 'Cross bite' at the top. A vertical line descends from the bottom of this box to a horizontal line. From this horizontal line, three vertical lines with arrowheads at the bottom lead to three separate boxes below, labeled 'Skeletal Crossbite', 'Dental Crossbite', and 'Functional Crossbite' from left to right.

Skeletal
Crossbite

Dental
Crossbite

Functional
Crossbite

Dental causes

1. Traumatic injury to primary dentition causes lingual displacement of permanent tooth bud
2. Supernumerary tooth.
3. Habit of biting upper lip.
4. Cleft lip repair cases.
5. Arch length inadequacy.

Skeletal causes

1. Genetic.
2. Due to deficient anterior growth of maxilla.
3. Excessive abnormal mandibular growth in anterior region

SCISSOR BITE

is present when one or more of the adjacent posterior teeth are either positioned completely buccally or lingually to the antagonistic teeth and exhibit a vertical overlap.



ANTERIOR CROSSBITE

A malocclusion in which one or more of the upper anterior teeth occlude lingually to the mandibular incisors; the lingual malpositions of one or more maxillary anterior teeth in relation to the mandibular anterior teeth when the teeth are in centric relation occlusion



POSTERIOR CROSSBITE

When one or more posterior teeth locked in an abnormal relation with the opposing teeth of the opposite arch; can be either buccal or a lingual cross-bite and may be accompanied by a shift of the mandible.



[I] IN PRIMARY DENTITION

Elimination of the factors that may lead to the anterior cross bite

E.g.

- Removal of occlusal prematurities.
- Extraction of supernumerary tooth, before they cause displacement of other tooth.
- Any habit

[III] IN MIXED DENTITION:

(In pre-adolescent age group)

Anterior cross bite should be treated at an
early ↓ stage.

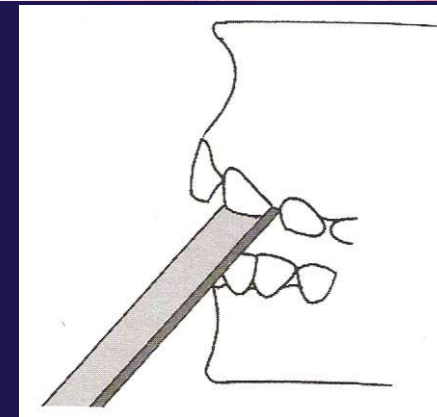
Because

1. If a cross bite present in the deciduous dentition, it may manifest in the mixed & permanent dentition ↓ as well.

Tounge Blade

Indications

- Used when a cross bite is seen at the time the permanent teeth are making an appearance in the oral cavity.
- It is placed inside the mouth contacting the palatal aspect of the maxillary teeth.
- Upon slight closure of jaw the opposing side of the stick come in contact with the labial aspect of the opposing mandibular tooth.
 - This is continued for 1-2 hours for about 2 weeks.
- acts as a fulcrum.



Drawbacks of using tongue blade

- Only effective till the clinical crown not completely erupted in the oral cavity.
- Used only if sufficient space is available for the correction.
- Patients cooperation is required.

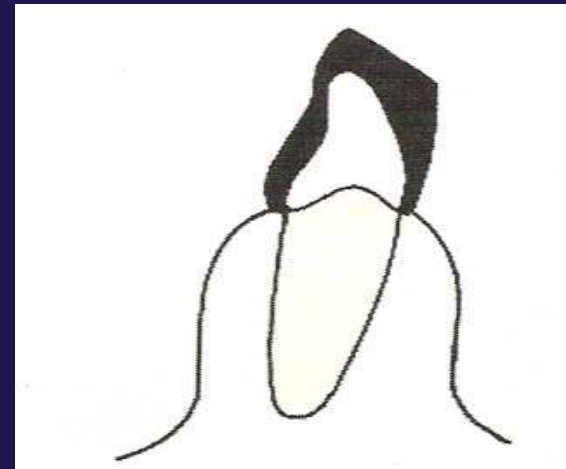
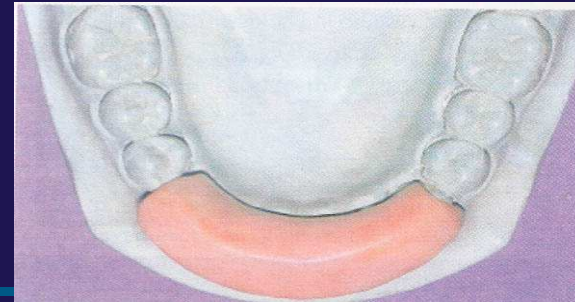
Catlan's Appliance

- **This is used on lower anterior where appliances make use of muscle forces and guide erupting teeth in normal occlusion**

Indications

- **Used only in those cases where the cross bite is due to a palataly placed max incisors.**

(Constructed at 45 degree angulations on the lower anterior teeth by acrylic or cast metal).



Disadvantages of Catlan's Appliance

- 1) Difficulty in speech & chewing
- 2) Patient cooperation required
- 3) Require frequent recementation
- 4) Catlance appliance also act as a anterior bite plane
Prevent the posterior teeth from coming into contact
If prolonged use,
Supra eruption of posterior teeth ,causes Anterior open bite.
- 5) Can not be given if Mandibular incisors are malaligned and are periodontally compromised.

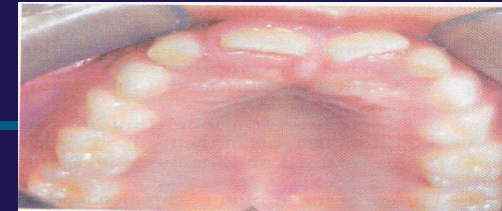
Double cantilever spring / z-spring

Indication

Used when anterior cross bite involving 1 or 2 max. anterior teeth.

Disadvantage

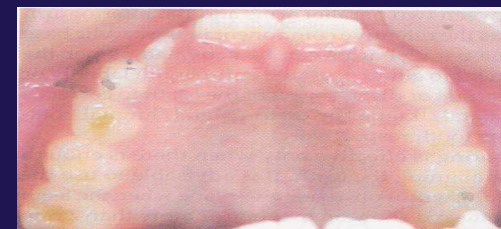
Effective only when there is enough space for aligning the teeth.



Pre-treatment



During treatment



Post-treatment

Screw appliance

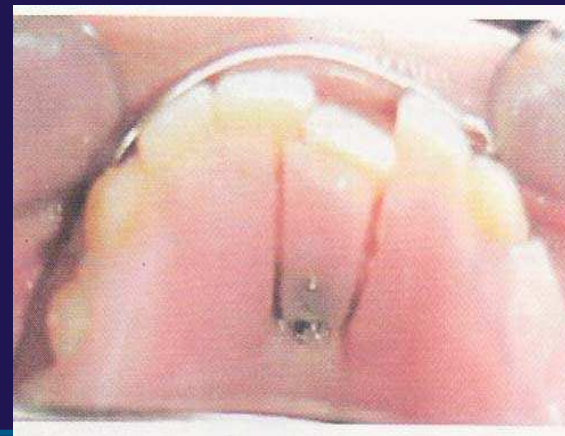
Micro screw

- Used on individual tooth
- Multiple micro screw can be used to correct individual tooth in segmental cross bite



Mini screw

- Capable of moving up to 2 teeth



Face mask (or face mask along with RME)

indications

Used to correct skeletal anterior cross bite (Anterior cross bite due to actual skeletal deficiency of the maxilla)

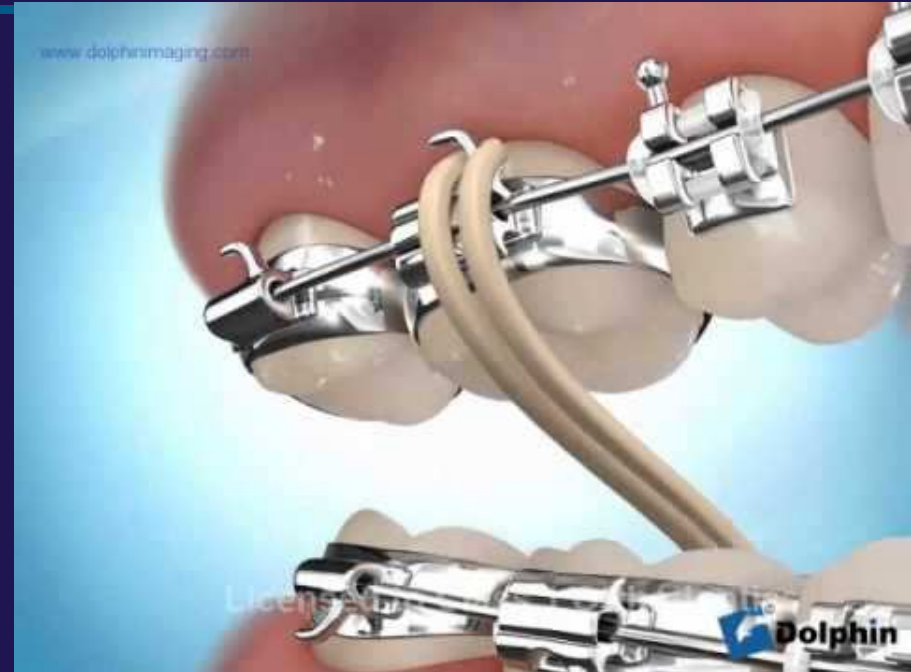
Protraction face mask or Reverse head gear



If maxilla is narrow
RME screw also used for transverse expansion.

▶ *POSTERIOR CROSSBITE*

- 1) Cross bite elastics.
- 2) Coffin spring.
- 3) Quad helix.





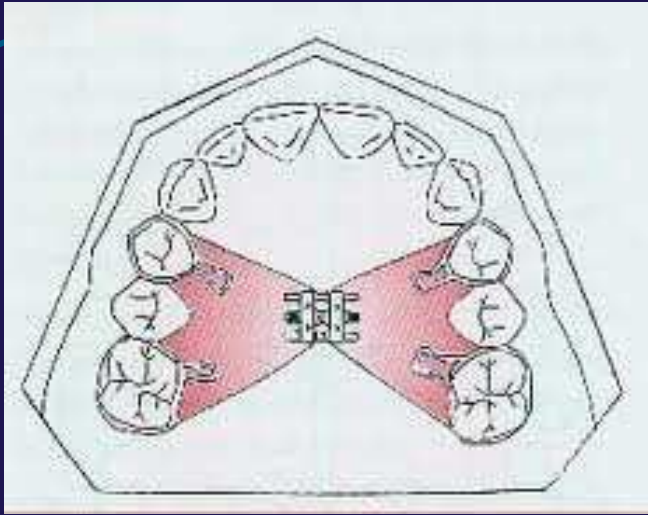
COFFIN SPRING

QUAD HELIX

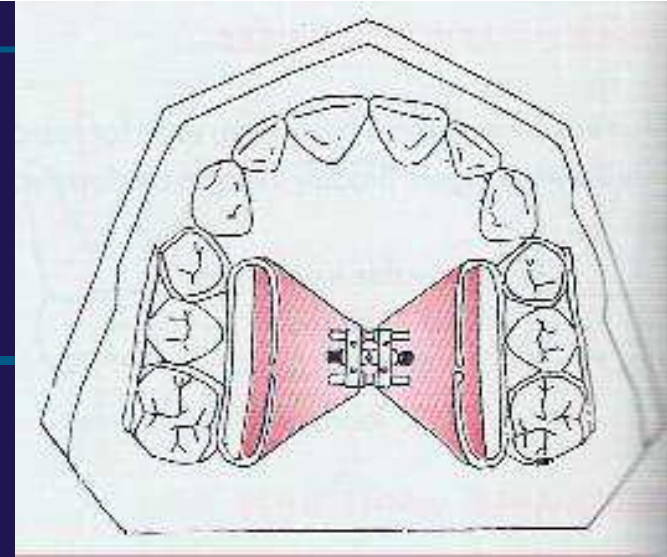


1) Fixed appliances

- i) Hass type.
- ii) Derichsweiler type.
- iii) Hyrax type.
- iv) Isaacson type.



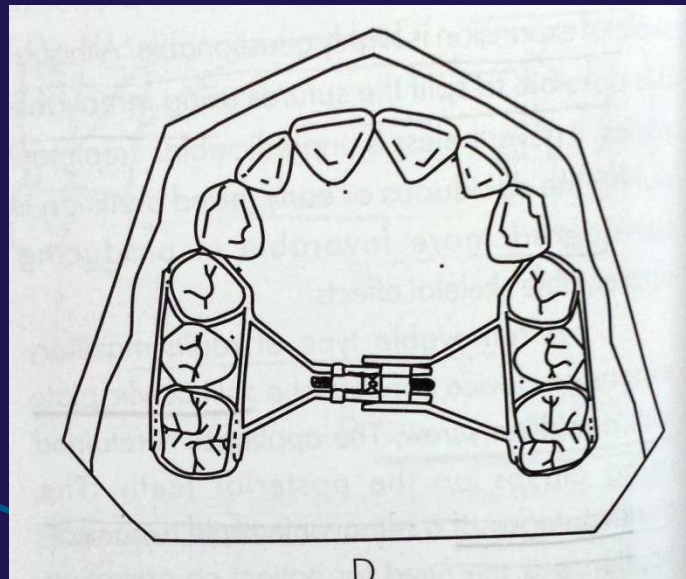
DERICHSWEILER



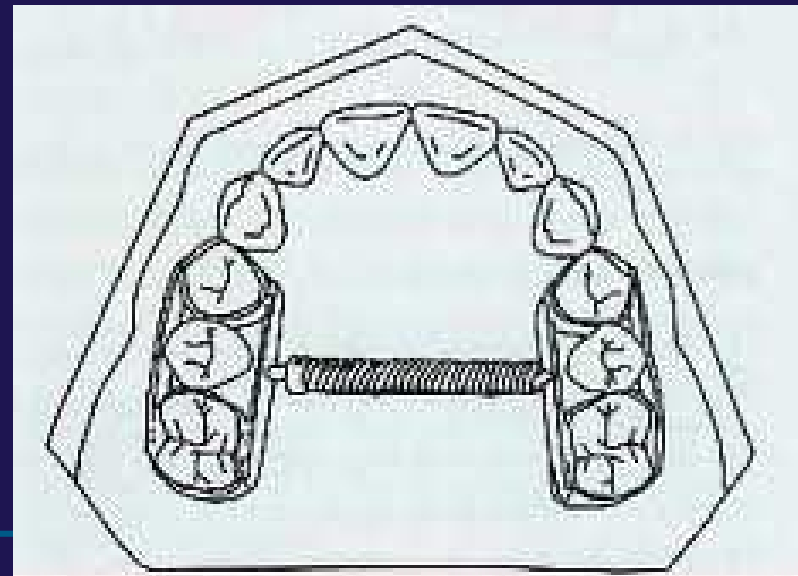
HASS

HYRAX

ISSACSON



D



75

TREATMENT

- Protraction face mask (Reverse head gear).
- Chin cap.
- Combination of both

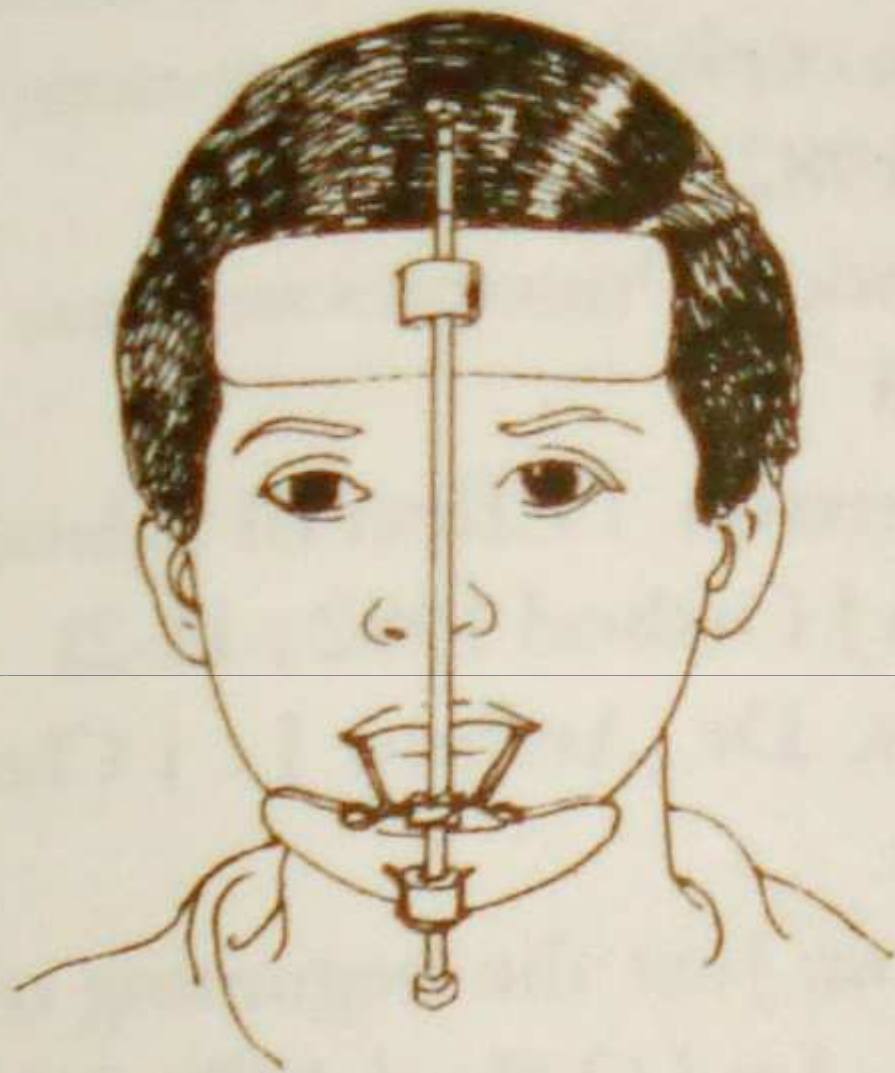


Fig 10 Face mask

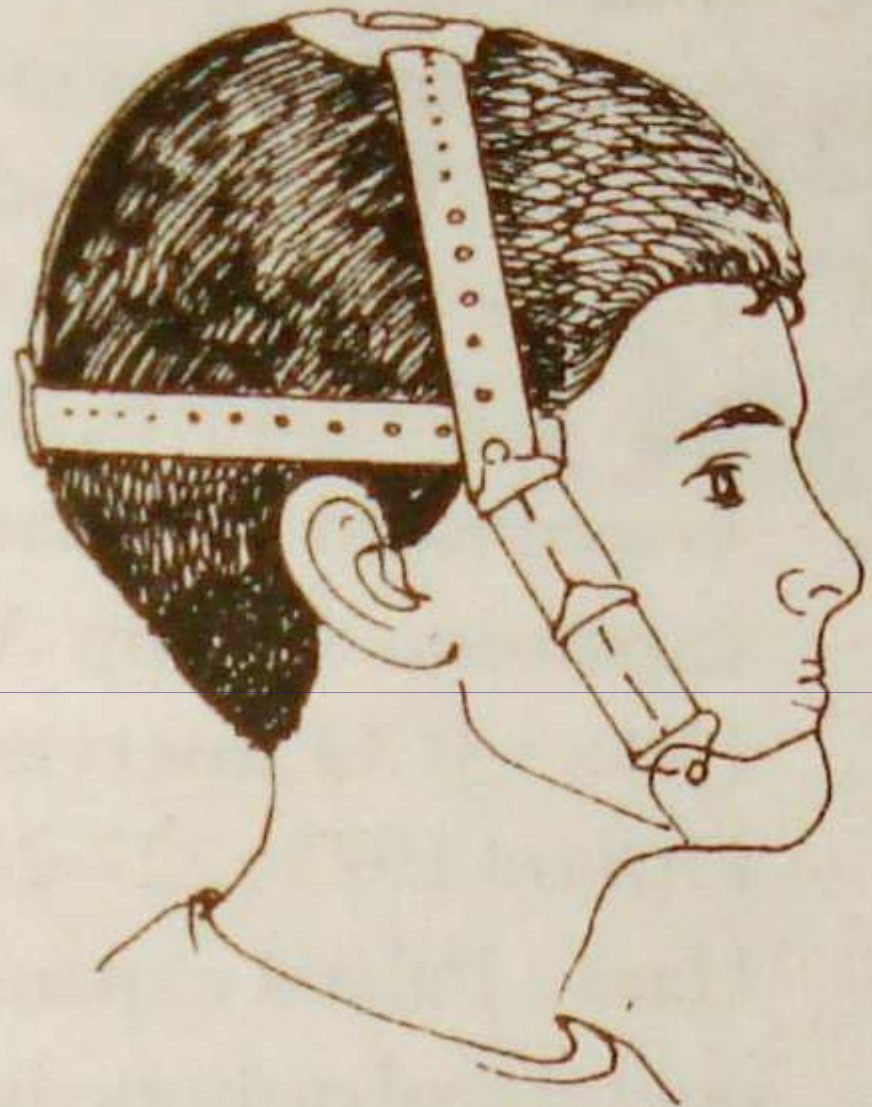
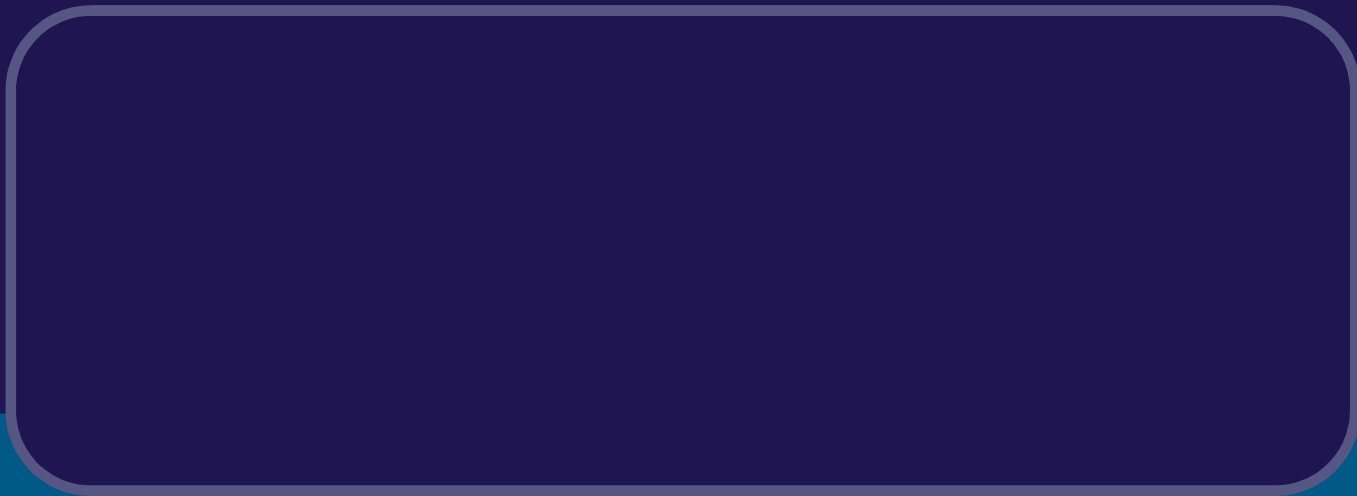


Fig 11 Chin cap with head gear

Midline diastema



Midline diastema

- Defined as a space greater than 0.5 mm between the proximal surfaces of adjacent teeth.
- Maxillary midline diastemas most common
- Management depends upon etiology

ETIOLOGY

Main etiological factors are:-

TRANSIENT
MALOCCLUSION

TOOTH MATERIAL-ARCH
LENGTH DESCREPENCY

UNERUPTED MESIODENS

ABNORMAL FRENAL
ATTACHMENT

PROCLINATION

MIDLINE PATHOLOGY

IATROGENIC

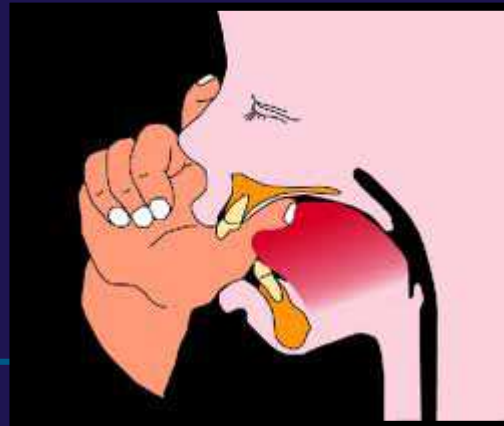
Midline diastema

- Diastema present before eruption of canines (ugly duckling stage)
- Self correcting anomaly
- Observe till eruption of canine



Midline diastema

- Some parafunctional habits like tongue thrust & thumb sucking
- Correction of habits may lead to spontaneous correction *or*
- Appliance therapy along with habit breaking



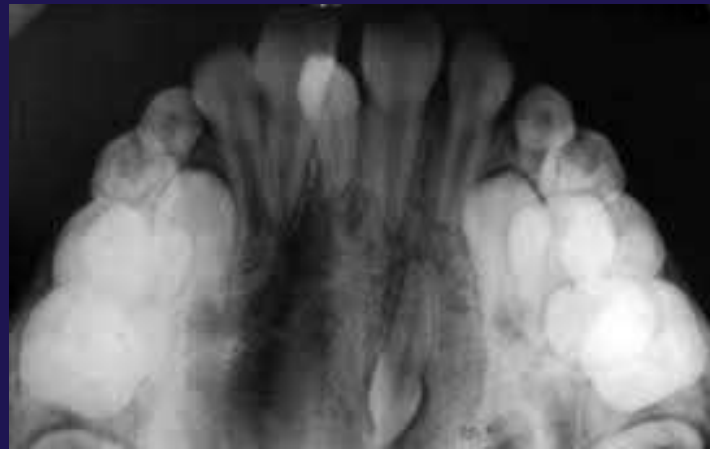
Midline diastema

- High frenum attachments
- Close diastema with appliance followed by frenectomy
- If surgery done before space closure, scar tissue might not allow complete space closure



Midline diastema

- If due to presence of supernumerary tooth
- Extraction of supernumerary tooth followed by correction



Midline diastema

- If peg shaped laterals or absence of laterals
- Orthodontic correction with or without restoration of lateral incisors



Midline diastema

- If there is juvenile periodontitis
- Systemic & periodontal therapy followed by appliance therapy

Midline diastema removable appliance therapy

- A removable plate with finger springs
- A split labial bow
- Hawley's appliance with active labial bow

Midline diastema fixed appliance therapy

- Brackets bonded on both the teeth with a rectangular wire followed by elastic traction leads to bodily movement
- Lingual button with elastics leads to tipping movement

Midline diastema

- After correction, midline diastema needs fixed retention as the relapse rate is high

Treatment of etiologic factor

S.no	Etiologic factor	Timing of treatment	treatment
1.	Tongue thrust	Start before continuing orthodontic treatment proper	Tongue rake(fixed or removable)
2	Thumb sucking	Start before continuing orthodontic treatment proper	Tongue rake(fixed or removable)
3	High frenal attachment	During treatment	Frenectomy with or without gingivoplasty
4	Peg shaped lateral	After orthodontic treatment or sometimes before	Composite build up crowns
5	Tooth material deficiency	After orthodontic treatment	Veneers(porcelain/composite crowns)
6	Supernumerary	Before starting	extract
7	Missing lateral incisor	After orthodontic treatment	Implants crown/bridges

Summary

- Crowding is the most common manifestation of malocclusion
- Early detection and management can improve the health of oral tissues
- Serial Extraction requires proper clinical assessment and diagnosis with long term follow up

References

- Tandon S. Textbook of Pedodontics
- Profitt W. Contemporary Orthodontics
- Graber. Orthodontics

Video

<https://www.youtube.com/watch?v=UGXf8DitStQ>

<https://www.youtube.com/watch?v=SJ0IaXOyILU>

Suggested reading

https://www.aapd.org/globalassets/media/policies_guidelines/bp_developdentition.pdf

Questions: Short notes

- Midline diastema
- Anterior crossbite
- Serial extraction

MCQs:

1. A 8 year old boy complains of space between the incisors.
Orthodontic intervention is advised

- a. Immediately b. at 10 years
c. after eruption of all permanent teeth d. after 12 years

2. A 8 year old boy complains of palatally erupting maxillary incisor.
Orthodontic intervention is advised

- a. Immediately b. at 10 years
c. after eruption of all permanent teeth d. after 12 years