Class I Malocclusion

Malocclusion

- Malocclusion may be defined as an irregularities of teeth beyond the accepted range of normal.
- In modern times, Dr. Edward Angles, who is considered as father of “Orthodontics’’, gave us the first indices of malocclusion which is based on the mesio-distal relation of the teeth, dental arches and the jaws.

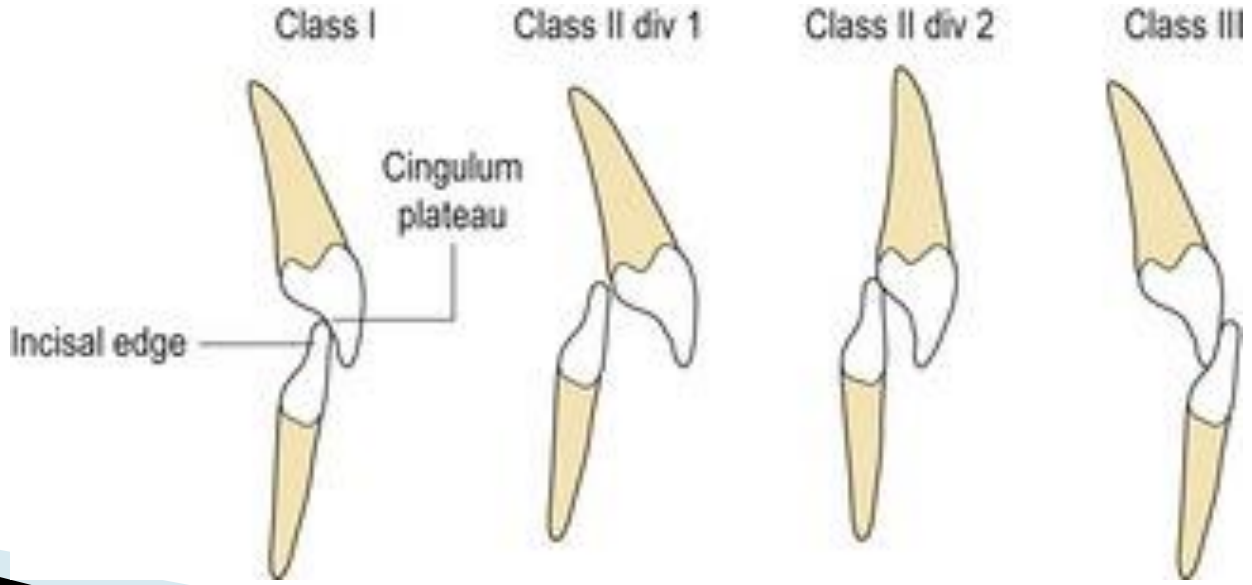
Class I malocclusion

- Angle's class I malocclusion is characterized by the presence of a normal inter-arch molar relationship. The mesio-buccal cusp of the maxillary first permanent molar occludes in the anterior-buccal groove of mandibular first permanent molar.
- The patient may exhibit dental irregularities such as crowding, spacing, rotations, missing tooth, etc.

CLASS I OCCLUSION

Class I malocclusion

- Class I incisor relationship is defined by the British Standards incisor classification as follows: 'the lower incisor edges occlude with or lie immediately below the cingulum plateau of the upper central incisors therefore Class I malocclusions include those where the antero-posterior occlusal relationship is normal and there is a discrepancy either within the arches and/ or in the transverse or vertical relationship between the arches.



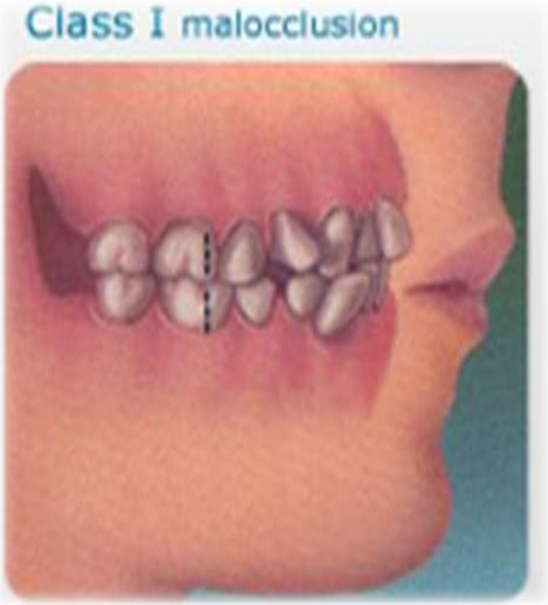
Aetiology

- In Class I malocclusions the skeletal pattern is usually Class I and In most Class I cases the soft tissue environment is favorable and is not an etiological factor. The major exception to this is bimaxillary proclination,

- Dental factors are the main etiological agent in Class I malocclusions. The most common are tooth/arch size discrepancies. Leading to crowding or, less frequently, spacing.

Class 1 malocclusion

- Approximately *60%-70%* of all cases of malocclusion fall into this class.



Features of class 1 malocclusion

- *Extra-oral features*:
  1. Straight profile
  2. Competent/incompetent lips
  3. Normal/deep/shallow mento-labial sulcus
- *Intra-oral features:*
  1. Class I molar canine incisor relationship
  2. Spacing of teeth
  3. Crowding of teeth
  4. Anterior cross bite
  5. Posterior cross bite

Features of class 1 malocclusion *(continued...)*

6. Anterior openbite
7. Proclination
8. Retroclination
9. Rotation of teeth
10. Deep bite
11. Bi-maxillary protrusion

Dental Crowding

Fig. 47 Class I malocclusion with crowding.

Dental Crowding

- Definition
  crowding is a condition where there is malalignment of teeth caused by inadequate space
- Crowding: lack of space for a permanent tooth to erupt. Those teeth that erupt last in segment, e.g. lateral incisors, upper canines, 2nd premolars, 3rd molars are most commonly affected

Dental Crowding

Problems associated with crowding include:

1. difficulty cleaning all tooth surfaces, leading to more dental decay
2. an improper bite pattern
3. incorrect functioning of the teeth
4. an increased chance of developing periodontal disease
5. an unattractive smile, leading to lower self-esteem

Aetiology of crowding

1. Premature loss of primary tooth
2. Proximal caries leading to arch length discrepancy
3. Prolonged retention of primary tooth
4. Altered eruption sequence
5. Discrepancy in individual tooth size
6. Rotation of tooth
7. Ankylosed primary tooth
8. Trauma
9. Iatrogenic treatment
10. Abnormal shape of the tooth
11. Abnormal eruption path
12. Transposition of tooth

1. Tooth size – jaw size discrepancy

Environmental Crowding

Hereditary crowding:

AETIOLOGY of crowding

Dental Crowding

- **Classification of crowding**
  there are different methods of classification of crowding
  1-according to the source
- **Hereditary crowding**
- **Enviromental crowding**

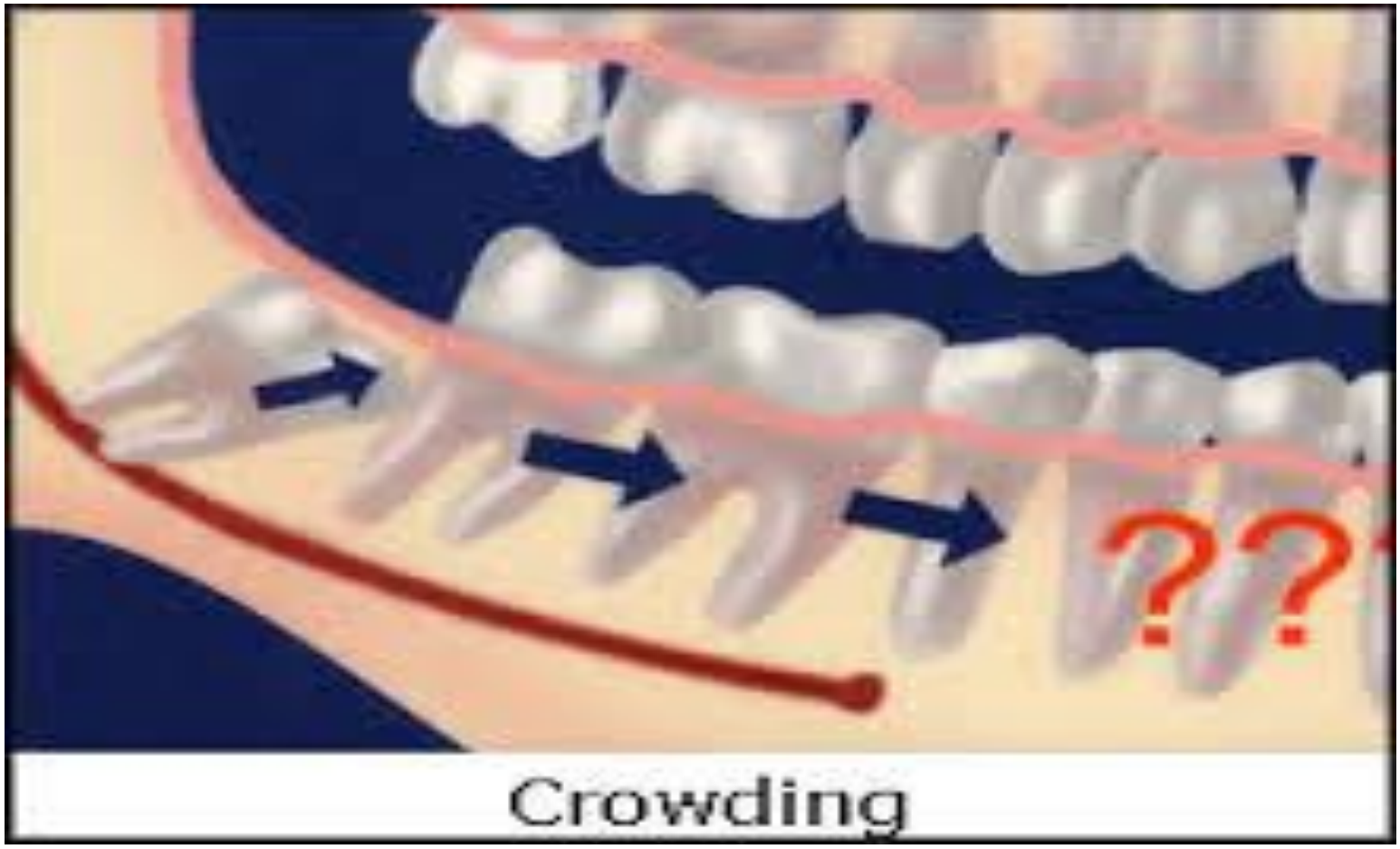
2-According to the time of appearance

- **Primary crowding**
- **Secondary crowding**
- **Tertiary crowding**

Crowding

	Aetiology
Primary / hereditary crowding:- (Determined genetically)	- discrepancy between the size of the teeth & the size of the arches. - Normal teeth & small dental arch - Large teeth & normal dental arch
Secondary crowding: (An acquired anomaly)	After - Premature loss of deciduous (1) mesial drifting of the posterior teeth (in the lateral segment) 2) lingual or distal displacement of the anterior teeth
Tertiary crowding: ✓The etiopathogensis is under debates ✓Occur mainly in the mandibular anterior teeth during & after adolescence	- Forward growth of mandible in conjunction with soft tissue pressures - Mesial migration of the posterior teeth. - Erupting third molars

Tertiary crowding

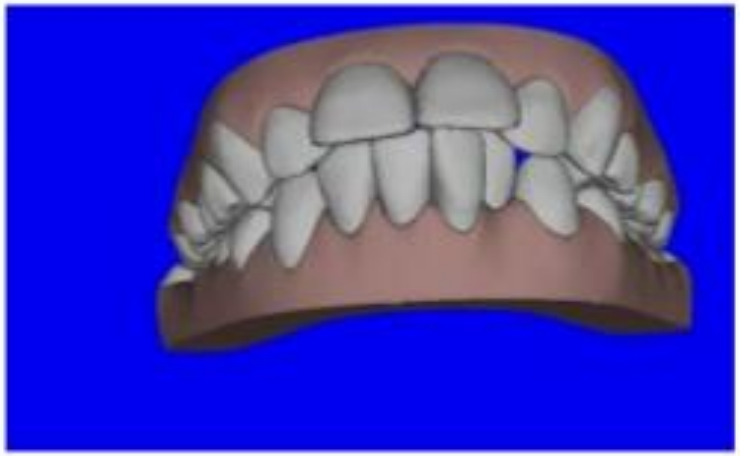


Classification of Crowding

3-according to the severity

Simple crowding

This is due to disharmony b/w the size of teeth & the space available for them without skeletal, muscular or functional occlusal problems



Complex crowding

This is caused & associated with skeletal, muscular or functional occlusal problems

Crowding in mixed dentition:

First degree crowding

Slight malalignment of anterior teeth, No abnormality in supporting zone

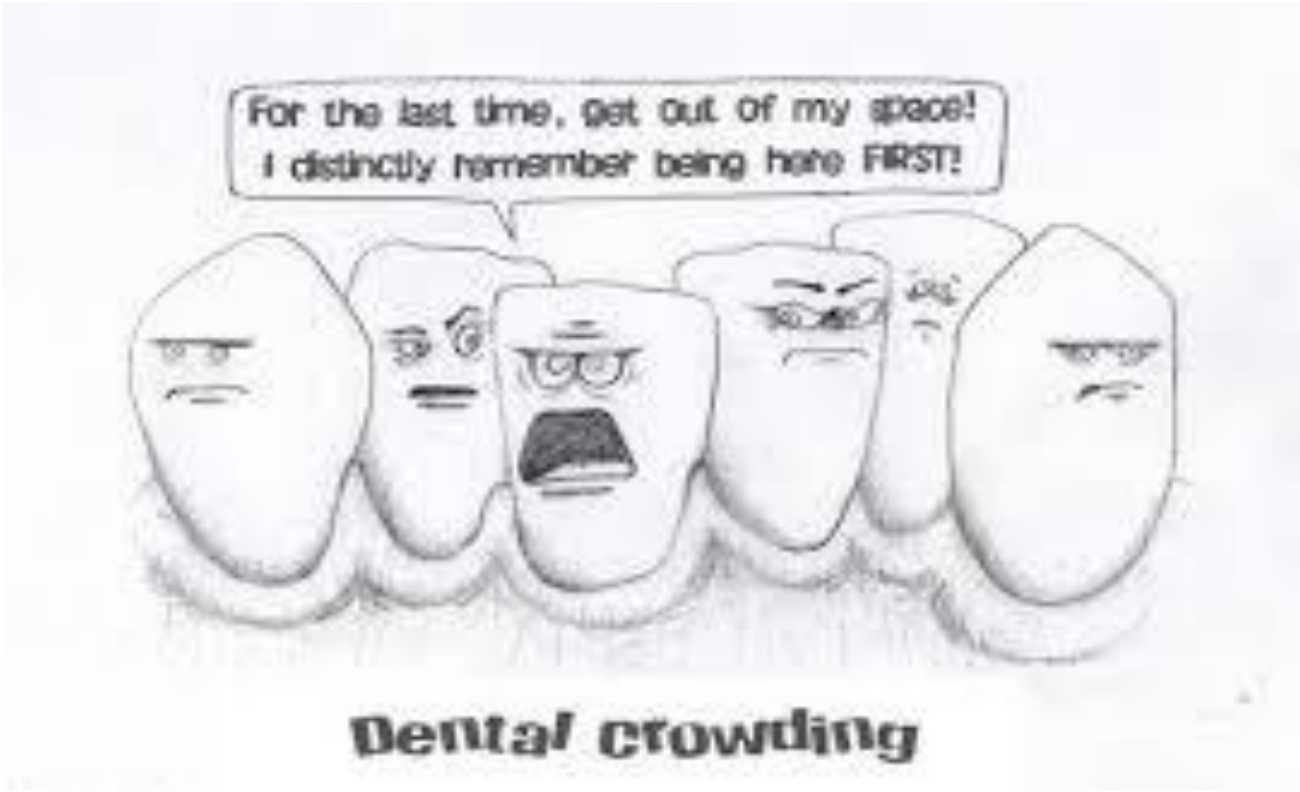
Second degree crowding

Pronounced malalignment of anterior teeth, No abnormality in supporting zone

Third degree crowding

Severe malalignment of all four incisor, supporting zone restricted

Treatments of crowding



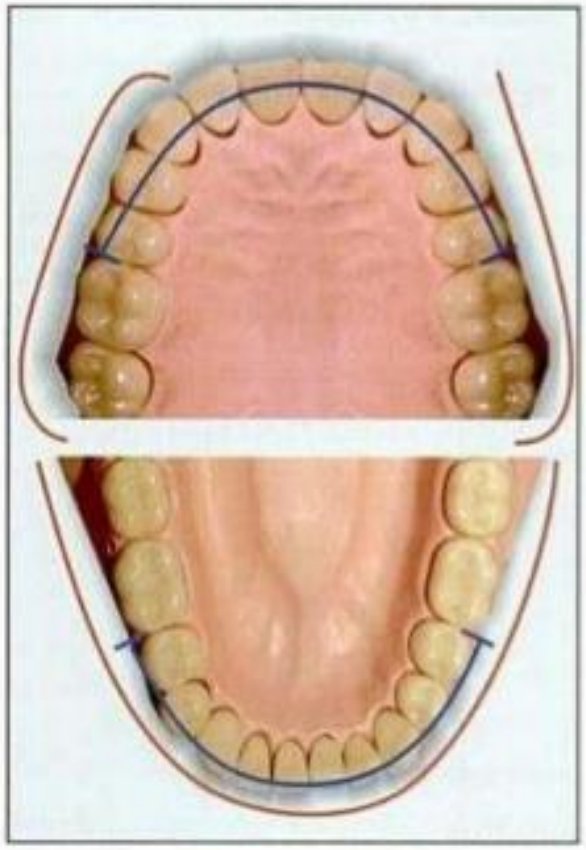
Crowding in mixed dentition : Therapy

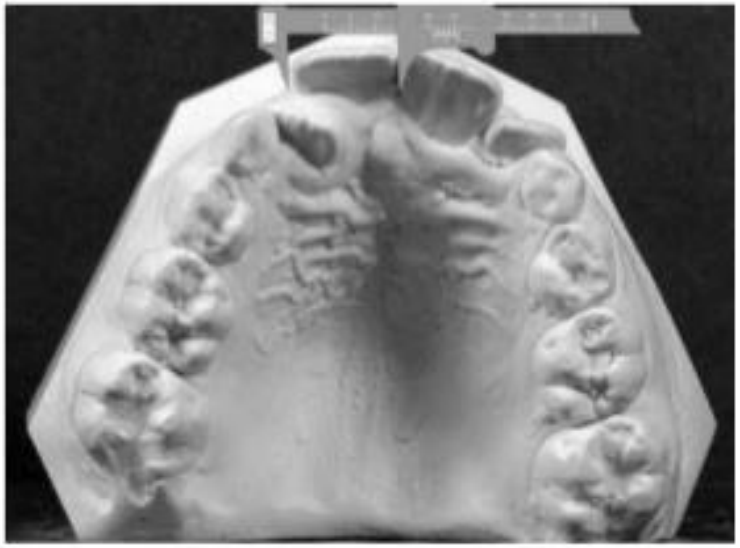
Age – After eruption of 21/12	Timing	Treatment
Slight crowding–slight changes in the position of anterior teeth	Wait and watch	No treatment
Moderate crowding–lack of space by width of one lateral incisor	Can wait till (OR) premolar eruption	Expansion Guidance of eruption
Pronounced crowding	Immediate Treatment	Serial extraction Extraction & orthodontic treatment

Carey's analysis

Crowding is determined by:

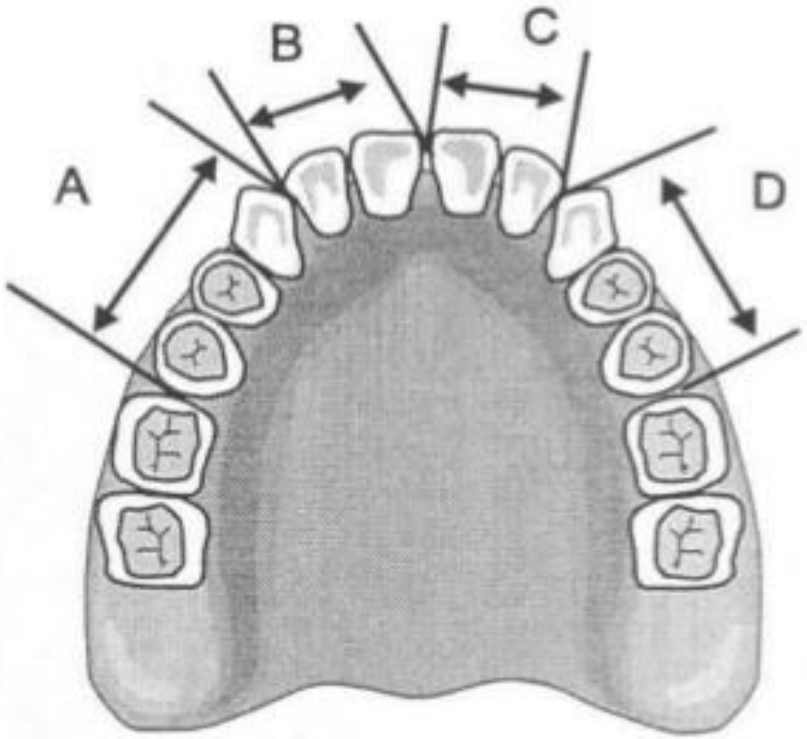
- ***Subtracting the total mesiodistal tooth mass present from the amount of space available***:

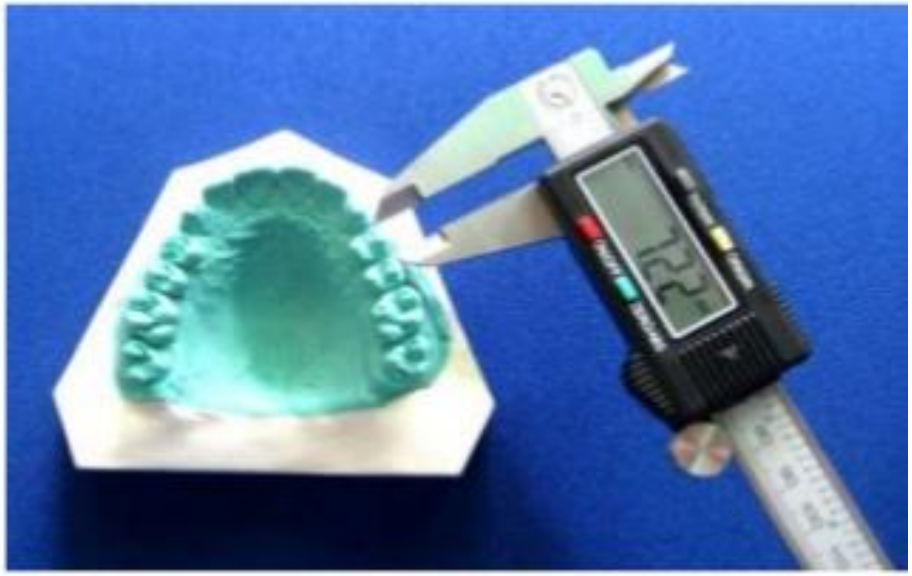




Degree of crowding=

space required - space available





the Permanent Dentition

space required= total mesiodistal tooth mass

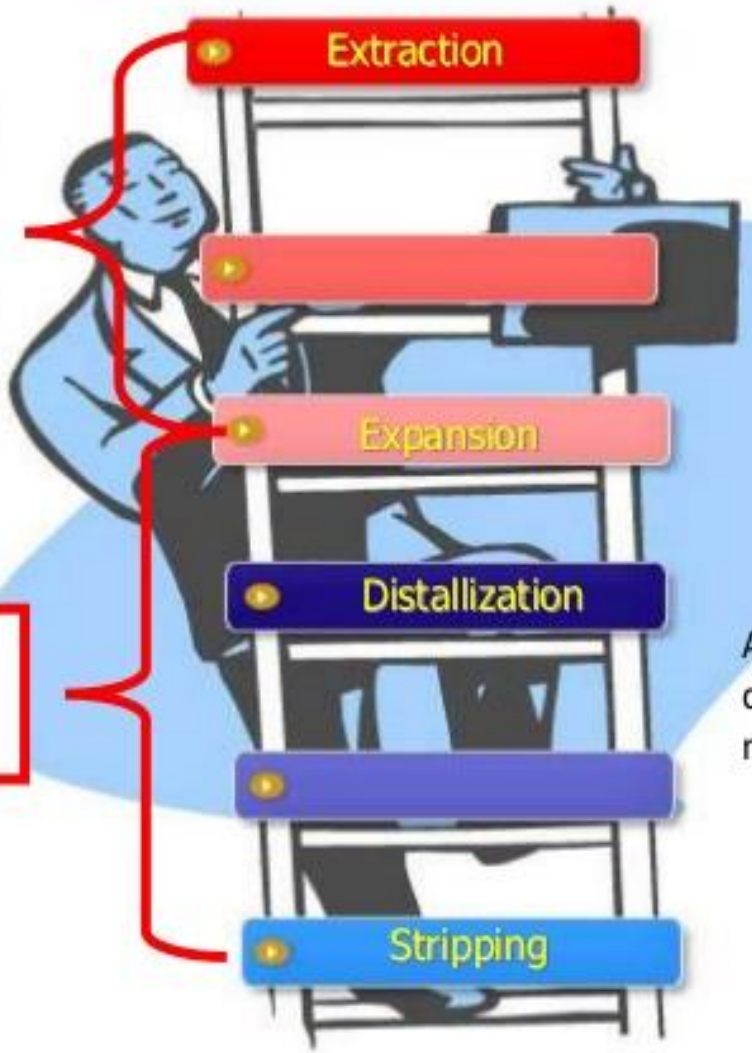
space available= A+B_C+D

Treatment of crowding:

Treatment depends on the *SEVERITY*

moderate to **severe**

MILD or MODERATE



Analyze space discrepancy using model analysis.

Crowding of teeth

1.Mild crowding:

If the space discrepancy is up to 4mm, accepted or

-Usually resolves without extraction

-Proximal stripping

2. Moderate crowding:

If the space discrepancy is in the range of 5-9mm,treated without extractions by:

-Arch expansion ,lip bumpers

-Molar distalization or anchorage

-Enamel reduction. or by extractions

lip bumpers

Treatment of Crowding

3. Severe crowding:

Patients with space discrepancy of 10mm or more,

-Extraction of all first premolars+ space maintenance

Molar distalisation

↓

Moving the teeth posteriorly

Mild – **Moderate** crowding


Dolphin

Late lower incisor crowding

- In most individuals inter canine width increases up to around 12 to 13 years of age, and this is followed by a very gradual diminution through out adult life . The rate of decrease is most noticeable during the mid to late teens. This reduction in intercanine width results in an increase of any pre-existing lower labial crowding The aetiology of late lower incisor crowding is not fully understood. Most authors acknowledge that the aetiology is multifactorial. the following have all been proposed as major influences in the development of this phenomenon:

Late lower incisor crowding

- 1- Forward growth of the mandible (either horizontally or manifesting as a growth rotation) when maxillary growth has slowed. Together with soft tissue pressures, which result in a reduction in lower arch perimeter and labial segment crowding .
- 2- Mesial migration of the posterior teeth owing to forces from the interseptal fibres and/or from the anterior component of the forces of occlusion.

- 3-The presence of an erupting third molar pushes the dentition anteriorly, i.e. the third molar plays an active role.
- 4- The presence of a third molar prevents pressure developed anteriorly (due to either mandibular growth or soft tissue pressures) from being dissipated distally around the arch, i.e. the third molar plays apassive role.
- Reviews of the many studies that have been carried out indicate that the third permanent molar has a statistically weak association with late lower incisor crowding.

Dental spacing

Definition

Imperfections in teeth alignment & distance, wherein there is gap b/w two teeth or many teeth

Types of Spacing

(i) LOCALIZED Spacing

(ii) GENERALIZED Spacing

LOCALIZED Spacing

A condition in which Spacing is present in localised regions or areas

Classification of Spacing

Primary / hereditary spacing

- ✓ Determined genetically
- ✓ Caused by
  - (1) disproportionately sized teeth & jaws
  - (2) tooth agenesis

Secondary spacing

- ✓ An acquired anomaly
- ✓ Caused by drifting of teeth subsequent to loss of permanent teeth

Tertiary spacing:

- ✓ caused by bone loss due to periodontal disease

Aetiology of localized spacing

1. Missing teeth
   a. Congenitally missing teeth
   b. Unerupted teeth: impacted/unerupted
   c. Premature loss of permanent teeth

   Close the space / maintain

   Replace with an implant or bridge

2. Prolonged retention of primary teeth

   This results in:

   (i) ectopic eruption of permanent successor &

   (ii) when the primary tooth is exfoliated after ectopic eruption of permanent successor space results

3. Sucking habits

GENERALIZED Spacing

The causes for **Generalized spacing are:**

1. Arch length – tooth material discrepancy
2. Macroglossia
3. Sucking habits
4. Abnormal tongue posture

Micodontia

Small teeth in normal jaws

Best treated by :

- jacket crowns, composite build-ups or
- consolidation of spaces & placement of bridges

Macrognathia

Normal teeth in large jaws

a. Best method of treatment:

Protract the Posterior Teeth to close anterior spaces if the profile is acceptable

c. Other methods: jacket crowns, composite build-ups or consolidation of spaces & placement of bridges

Orthodontic Management

LOCALIZED Spacing

- Remove the cause
- can be closed with removable appliances/ fixed appliance
- If there is proclination associated with spacing. Hawley's appliances are used for closing space & retraction

Generalized spacing

- Conditions where spaces are to be closed by protraction of posterior teeth can be achieved only by fixed appliances mechanotherapy

- Retention: cases treated orthodontically usually required long-term retention

- Prosthodontic management: some times localized spaces are best treated by: Jacket crowns or composite build-ups

DIASTEMA

A space between adjacent teeth is called a diastema.

MIDLINE DIASTEMA

Midline diastema refers to anterior midline spacing between the two central incisors.

ETIOLOGY OF MIDLINE DIASTEMA

1. NORMAL DEVELOPING DENTITION
a) Physiologic median diastema/ ugly duckling stage
b) Ethnic and familial
c) Imperfect fusion of midline of premaxilla

2. TOOTH MATERIAL DEFICIENCY
a) Microdontia
b) Macrognathia
c) Missing lateral
d) Peg laterals
e) Extracted tooth

3. PHYSICAL IMPEDIMENT

a) Retained deciduous
b) Mesiodens
c) Abnormal labial frenum
d) Midline pathology
e) Deep bite

4. HABITS

a) Thumb sucking
b) Tongue thrusting
c) Frenum thrusting

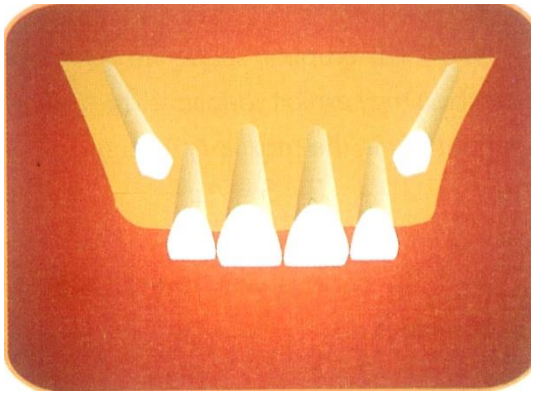
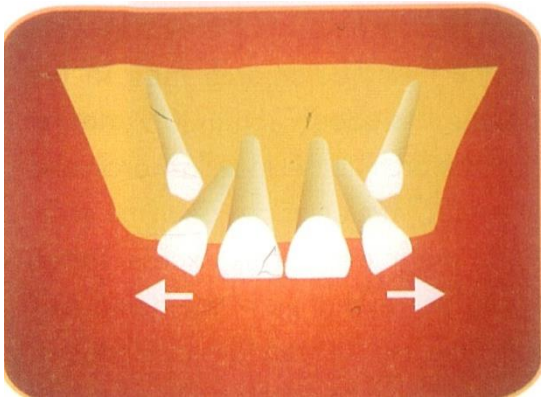
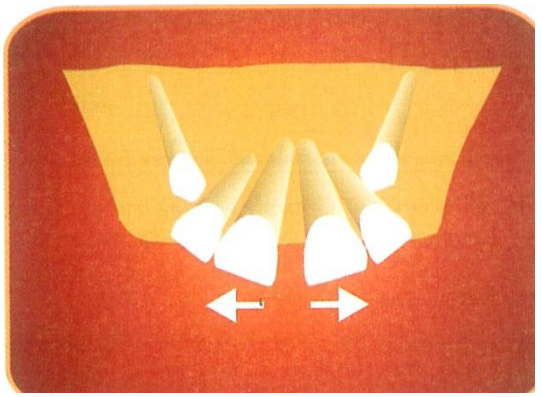
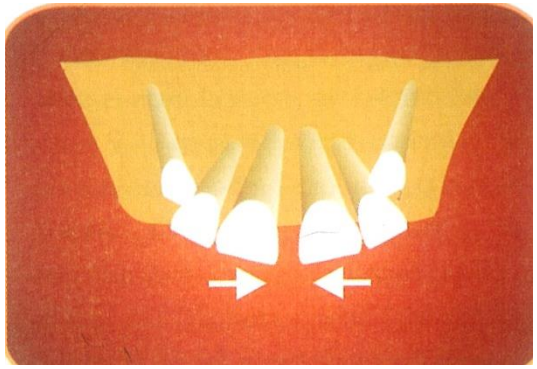
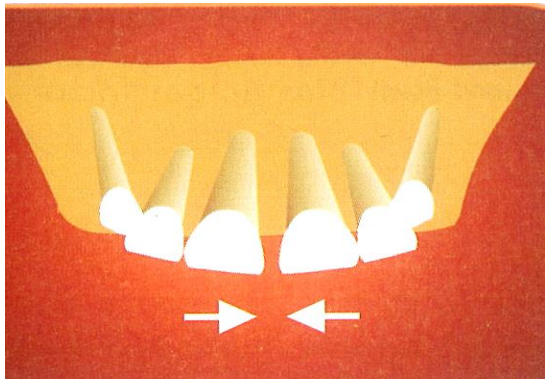
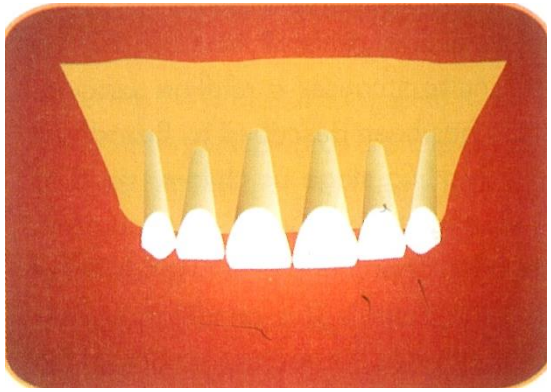
5. ARTIFICIAL CAUSES

Rapid maxillary expansion

1. NORMAL DEVELOPING DENTITION

a) Physiologic median diastema / **ugly duckling stage**

•It is a transient or self correcting malocclusion which is seen in the maxillary incisor region between 8-9 years. It is particularly seen during the eruption of the permanent canines.

b) **Ethnic and familial**

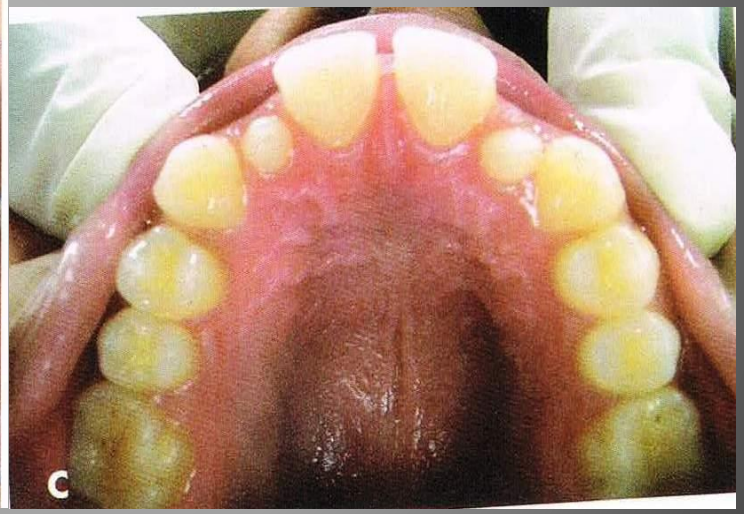
•Certain group of peoples, especially negroid groups exhibit median diastema as an ethnic norm.

c) **Imperfect fusion at the midline**

•Median diastema occurs due to imperfect fusion at the midline of the premaxilla.

2. TOOTH MATERIAL DEFICIENCY

a) **Microdontia**



b) macrognathia
c) Missing lateral.
d) Extracted tooth
.

3. PHYSICAL IMPEDIMENT

a) Retained deciduous teeth.
This causes ectopic eruption of tooth and formation of median diastema.

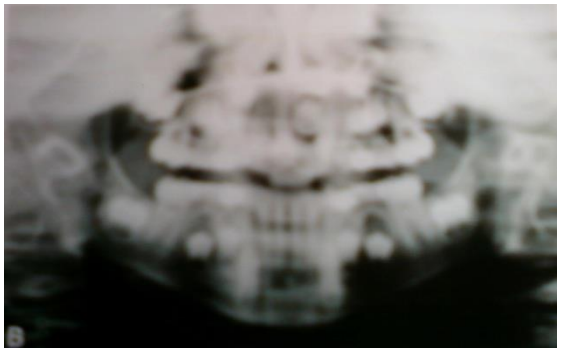
b) Mesiodens
Presence of an unerupted mesiodens between the two central incisors also predispose to midline diastema.

c) Abnormal labial frenum

The presence of a thick and fleshy labial frenum can cause a midline diastema.This type of fibrous attachment can prevent the two maxillary central incisors from approximating each other.

d) Midline pathology

Soft tissues and hard tissue pathologies such as cysts, tumors and odontomes may cause midline diastema.



4. HABITS

a) Thumb sucking

•Thumb sucking is defined as placement of the thumb or one or more fingers in various depths into the mouth.

•It can cause severe proclination of the maxillary anterior teeth along with formation of diastema

b) Tongue thrusting

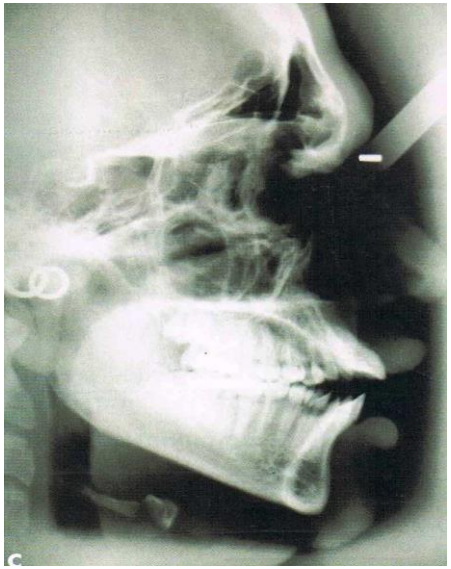
•This is a condition in which the tongue makes contact with any teeth anterior to the molars during swallowing.

•It also causes proclination of anterior teeth along with diastema and open bite.

c) Frenum thrusting

•This habit is a self injurious habit.

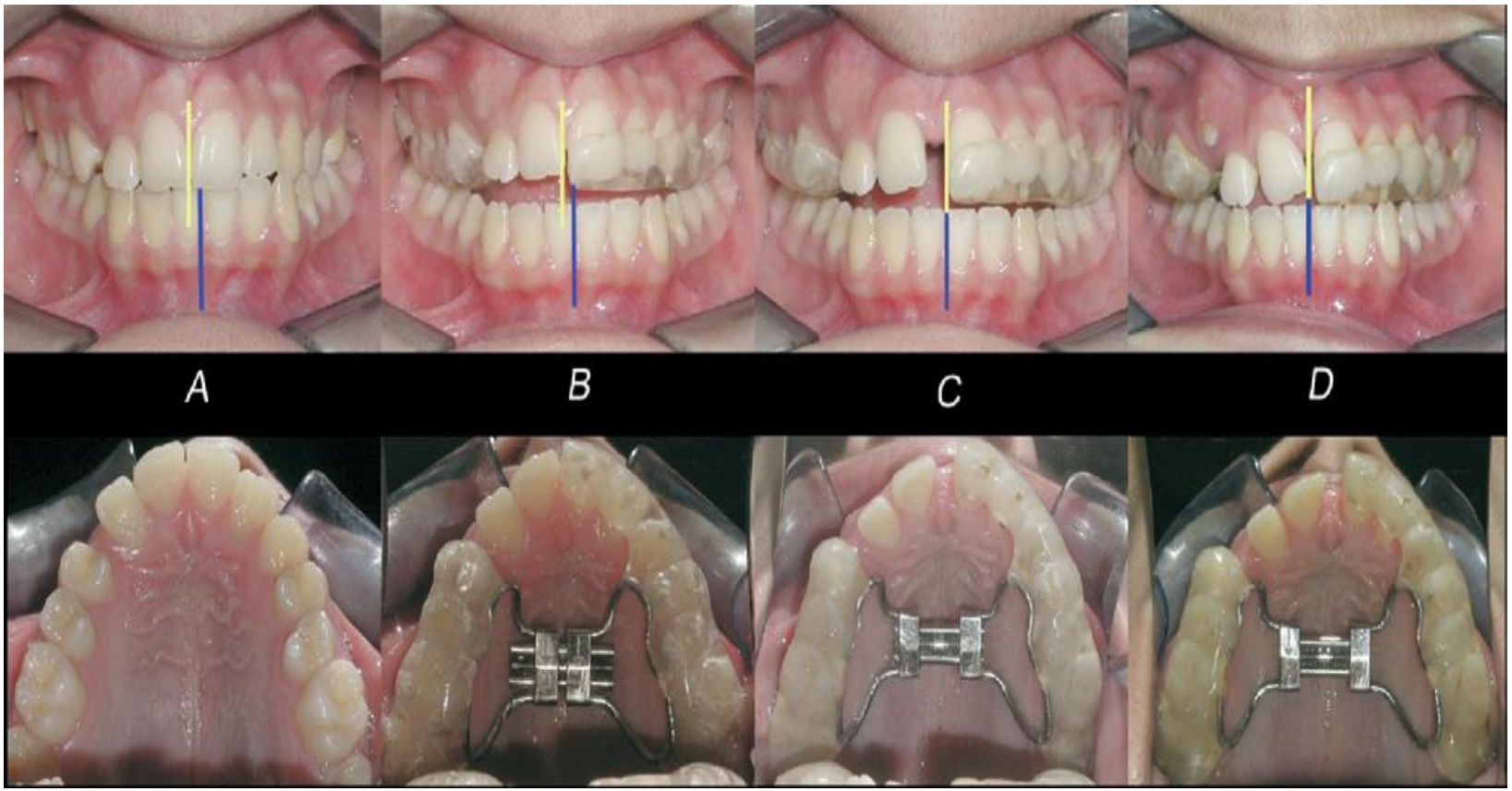
•If the maxillary incisors are slightly spaced apart, the child may lock his labial frenum between these teeth and permit it to remain in this position for several hours.



5. ARTIFICIAL CAUSES/ IATROGENIC CAUSES

Rapid maxillary expansion

- With rapid expansion at a rate of 0.5 to 1 mm/day 1 cm or more of expansion is obtained in 2 to 3 weeks.
- A space is created at the mid-palatal suture which is filled initially by tissue fluids and hemorrhage, and the expansion is highly unstable.
- The opening of the mid-palatal suture is fan-shaped or triangular with maximum opening at the incisor region and gradually diminishing toward the posterior part of the palate.
- As a result there is incisor separation and a midline diastema is formed.
- This diastema closes as a result of the trans-septal fibre traction.



A, Bilateral constricted maxilla with upper midline shift; B, type 1 RME appliance in mouth;
C, end of expansion; D, correction of upper midline shift at end of retention period.

DIAGNOSIS

a. A proper history and clinical examination should be done.
b. Measure the mesiodistal width of the teeth which will help in determining the tooth material-arch length discrepancies.
c. BLANCH TEST:- Lift the upper lip and pull in outward and look for blanching of the soft tissues lingual to and between two central incisors.
Presence of blanch indicates high frenal attachment as cause of midline diastema.
d. check for any pernicious oral habits
e. periapical radiograph:- presence of notching in the interdental bone is a diagnostic of a thick and fleshy frenum.
f. midline radiographs will help in diagnosing midline pathology.

MANAGEMENT

a) REMOVAL OF CAUSE
b) ACTIVE TREATMENT
c) RETENTION

1. REMOVAL OF CAUSE

DIASTEMA DUE TO UGLY DUCKLING STAGE

No treatment required

DIASTEMA DUE TO IMPERFECT FUSION AT THE MIDLINE Excision of included interdental tissue between the incisors.

A flap is raised interdentally and fissure bur inserted gently into the cleft. With the bur, the included tissues are removed and flap sutured. An orthodontic appliance for closure of median diastema is given during healing process.

DIASTEMA DUE TO MICRODONTIA AND MACROGNATHIA

Such conditions can be treated by orthodontic means or by mean of jacket crowns or composite build-up.

DIASTEMA DUE TO MISSING TEETH/EXTRACTED TOOTH

Space can be consolidated and replaced with implant or bridge

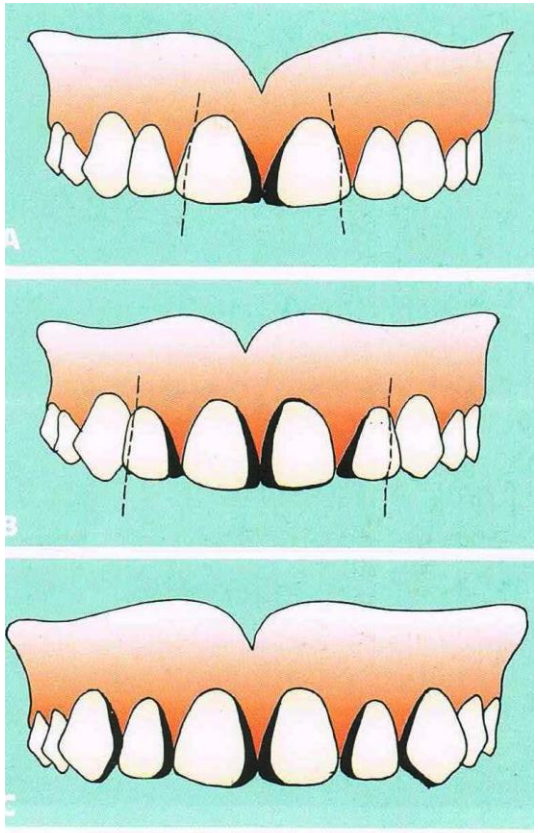


Fig 7
Composite restoration of a midline diastema (A) Composite build up on the mesial aspect of the central incisors and stripping of the distal surface (B) Composite build up on the mesial aspect of the lateral incisors and stripping of the distal surface (C) Composite build up on the mesial aspect of the canines

DIASTEMA DUE TO RETAINED DECIDUOS TEETH/MESIODENS

The retained deciduous tooth or mesiodens should be extracted at the earliest.

DIASTEMA DUE TO ABNORMAL FRENUM

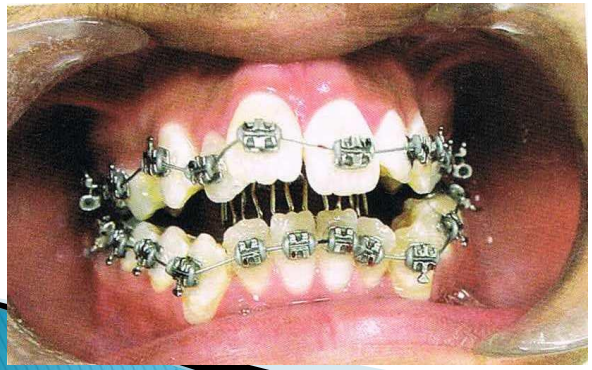
Frenectomy should be done to excise a thick fleshy frenum.

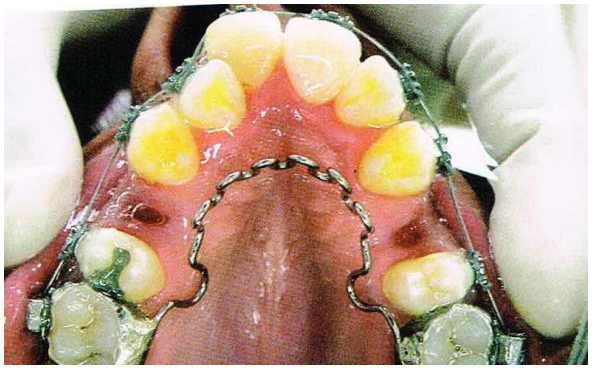
DIASTEMA DUE TO MIDLINE PATHOLOGY

Midline pathology like cysts has to be treated.

DIASTEMA DUE TO ABNORMAL HABITS

Habits should be eliminated using fixed or removable habit breakers.

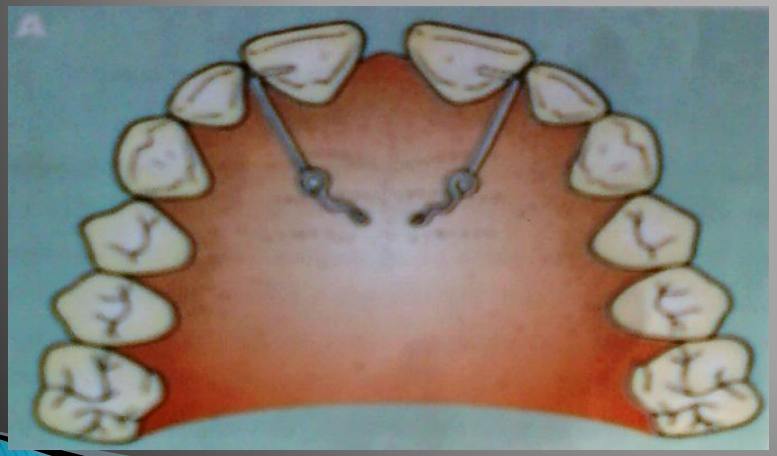


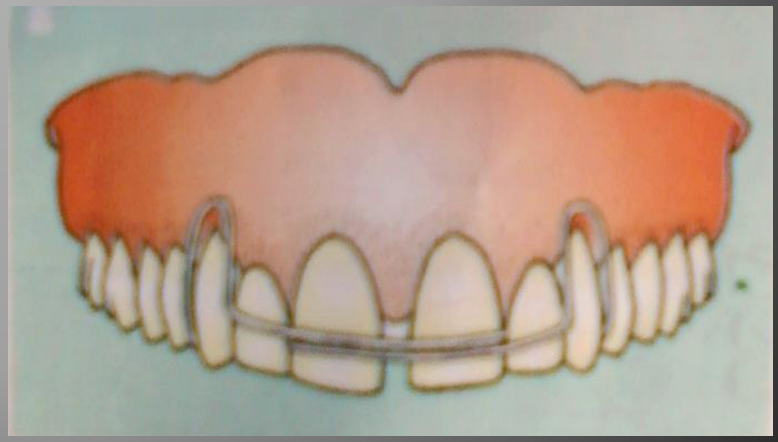


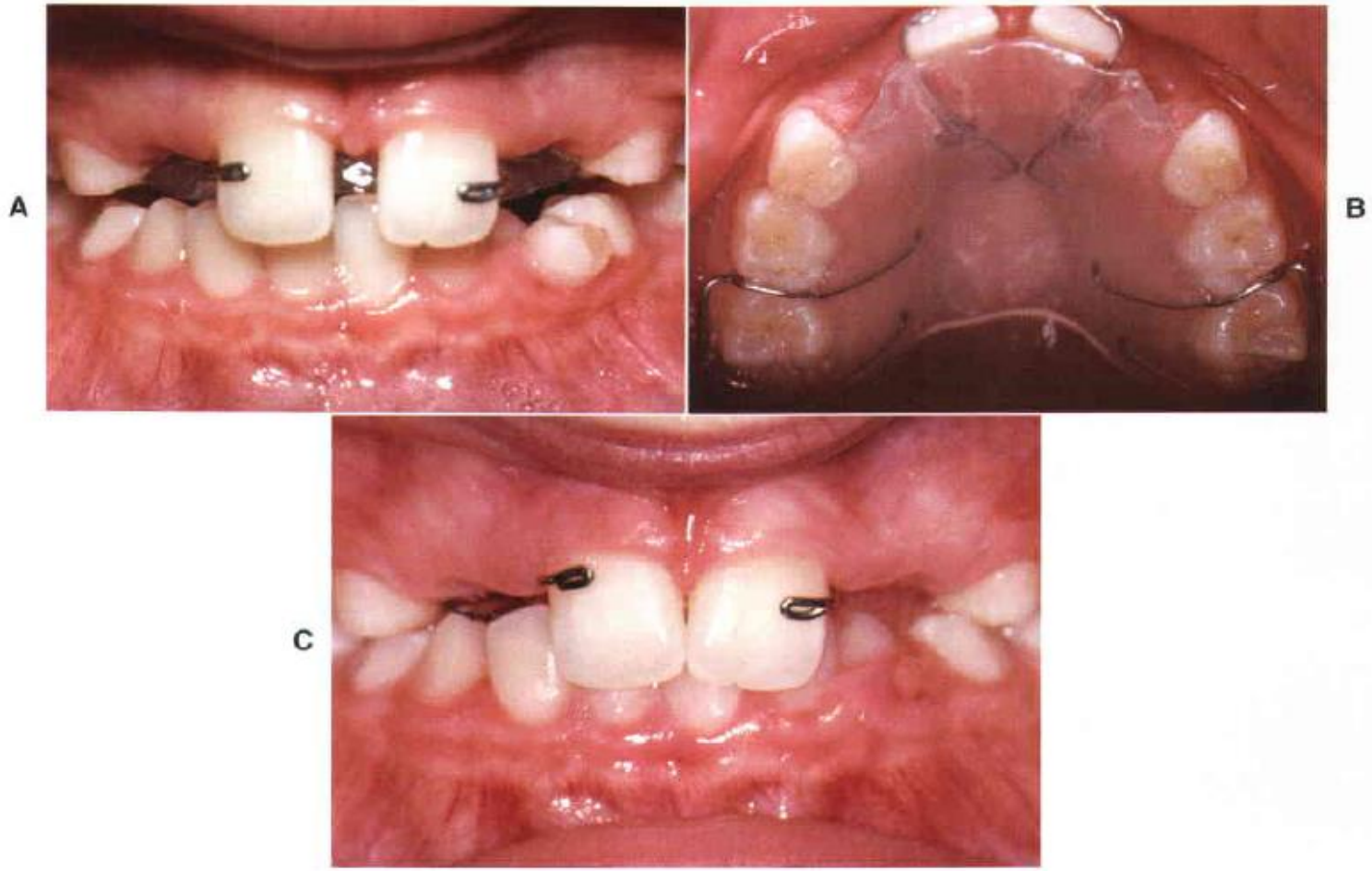
2. ACTIVE TREATMENT

REMOVABLE APPLIANCES

Simple removable appliances incorporating finger springs
Finger springs can be given distal to the two central incisors.
In a reciprocal tooth movement the forces are applied to teeth
Fare equal and opposite as a result each unit moves to a normal occlusion.



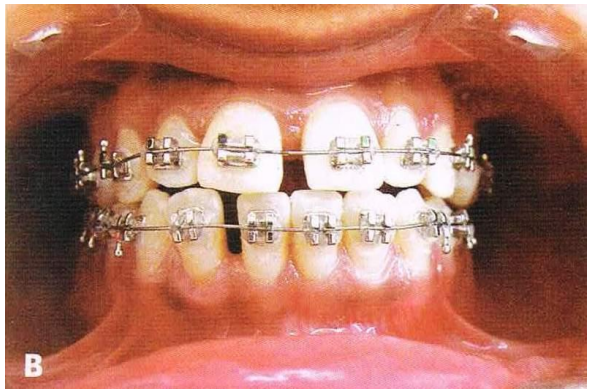


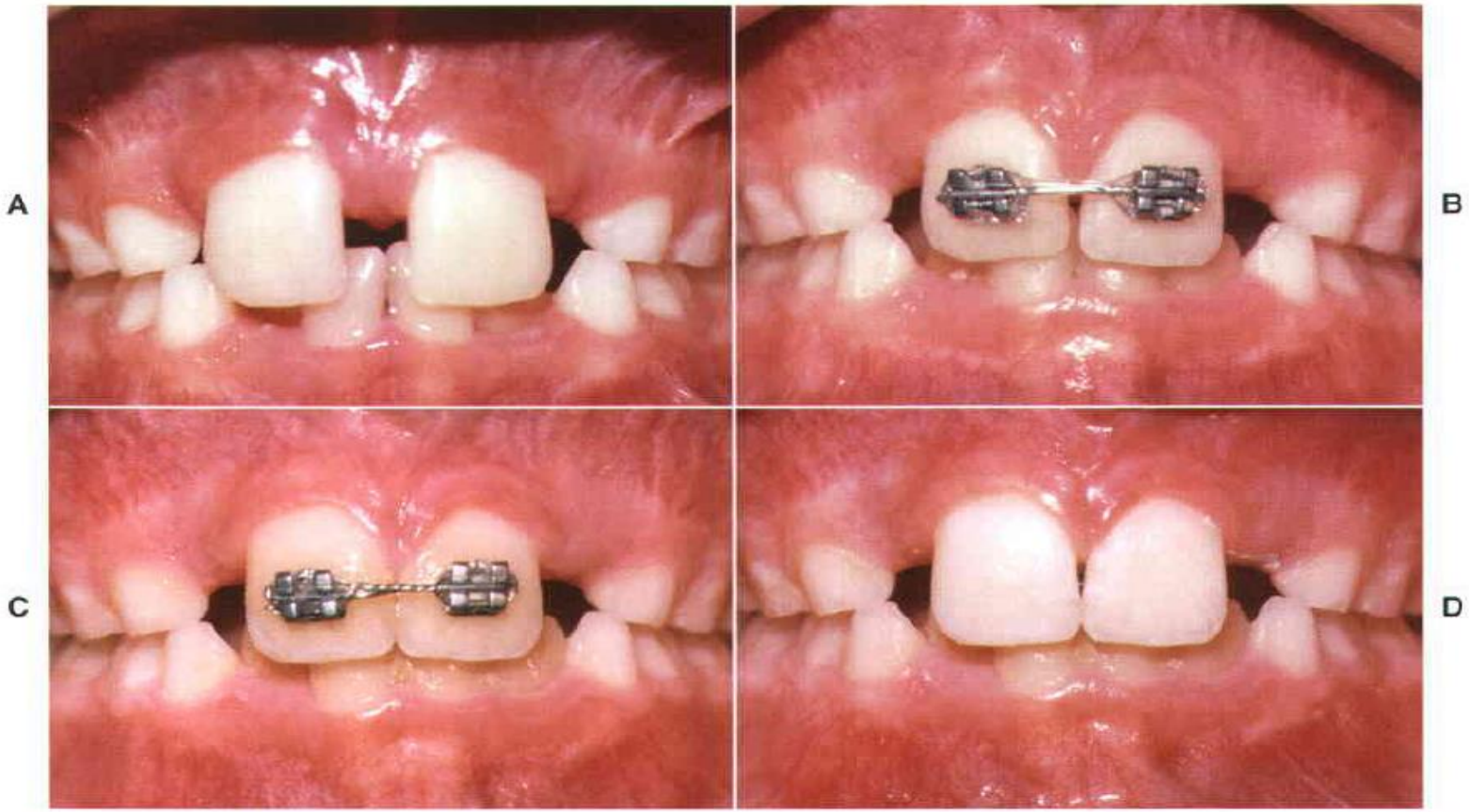


A, Closure of a midline diastema can be accomplished with a removable appliance and finger springs to tip the teeth mesially.

FIXED APPLIANCES

•Fixed appliances incorporating elastics and springs bring about the most rapid correction of midline diastema.





Closure of a diastema with a fixed appliance, immediately after space closure, the teeth are retained, preferably with, (D) a fixed lingual retainer at least until the permanent canines erupt.

3. RETENTION

- Midline diastema is often considered easy to treat but difficult to retain.
- Retention can be achieved by:-
  - Lingual bonded retainers
  - Hawley's retainer

NEWER APPROACH

ROLE OF COSMETIC RESTORATION

•Esthetic composite resins are used to close midline diastema especially in adult patients.

PROSTHESIS/CROWN

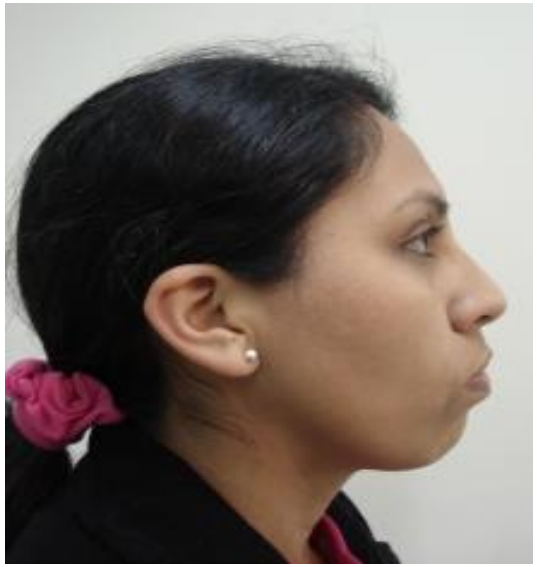
•Presence of peg shaped laterals or teeth with other anomalies of shape and size require prosthetic rehabilitation.

•Missing teeth should be replaced with fixed or removable prosthesis.

Before

After

Bimaxillary protrusion



Definition

- Bimaxillary proclination: the teeth are proclined on normal bases
- Bimaxillary protrusion or bialveolar protrusion refers to a protrusive dentoalveolar position of maxillary and mandibular dental arches that produces a convex facial profile .
- Bimaxillary prognathism: the jaws/basal bones are forward relative to the cranial base

Bimaxillary proclination or protrusion

Prevalence

- Most common in Negros
- It is also common among Arab groups and Asians
- It is less prevalent in white Caucasian populations

Aetiology

1-Soft tissue factors

- Lip length
- Adenoid & nasal blockage
- Endogenous tongue thrust

2-Dental factors

3-Habit factors

4-Pathological factors

Soft tissue factors

nasal blockage

- **Soft tissues stretching theory** that where the patient can't breathe through nose, so adopt a head up posture with extension, so stretch the superhyoid muscles, skin + fascia. This in turn imparts a force on the mandible and in turn the mandible adopts a downward posture this will allow the tongue to drop and imparts less force on maxillary arch in the lateral dimension which with the unopposed action of the cheeks pushes the dentition into a narrower arch which leads to cross bite situation. At the same time the tongue will be pushed forward to increase the phyryngeal space overcoming the lip force and causing bimaxillary proclination.

- **Adenoids**: It was proposed that the “Adenoids” were the most important “soft tissue” responsible for the difficulty in breathing through nose then the adenoids enlarged causing chronic constriction in the nasopharyx followed by the same pathway as “soft tissue stretch theory”.

- Tongue :Occasionally the tongue is very large and is the primary cause of the bimaxillary proclination.
- Lip (length, activity, morphology and position) : in bimaxillary proclination cases, usually the lips are full, loose and everted, and the tongue acts to mould the dental arches forward as they erupt. The effect of abnormality of soft tissues at rest is more influential than that during function

Dental factors:

- Due to way of incisors eruption in a forward direction.
- Tooth size discrepancy has been associated

Habit :e.g. tongue thrust

Pathological conditions :

- Cerebral palsy
- Haemangioma with swelling of the lips/tongue/cheeks produces a “new” zone of balance.
- Untreated cleft lip or palate swings forwards

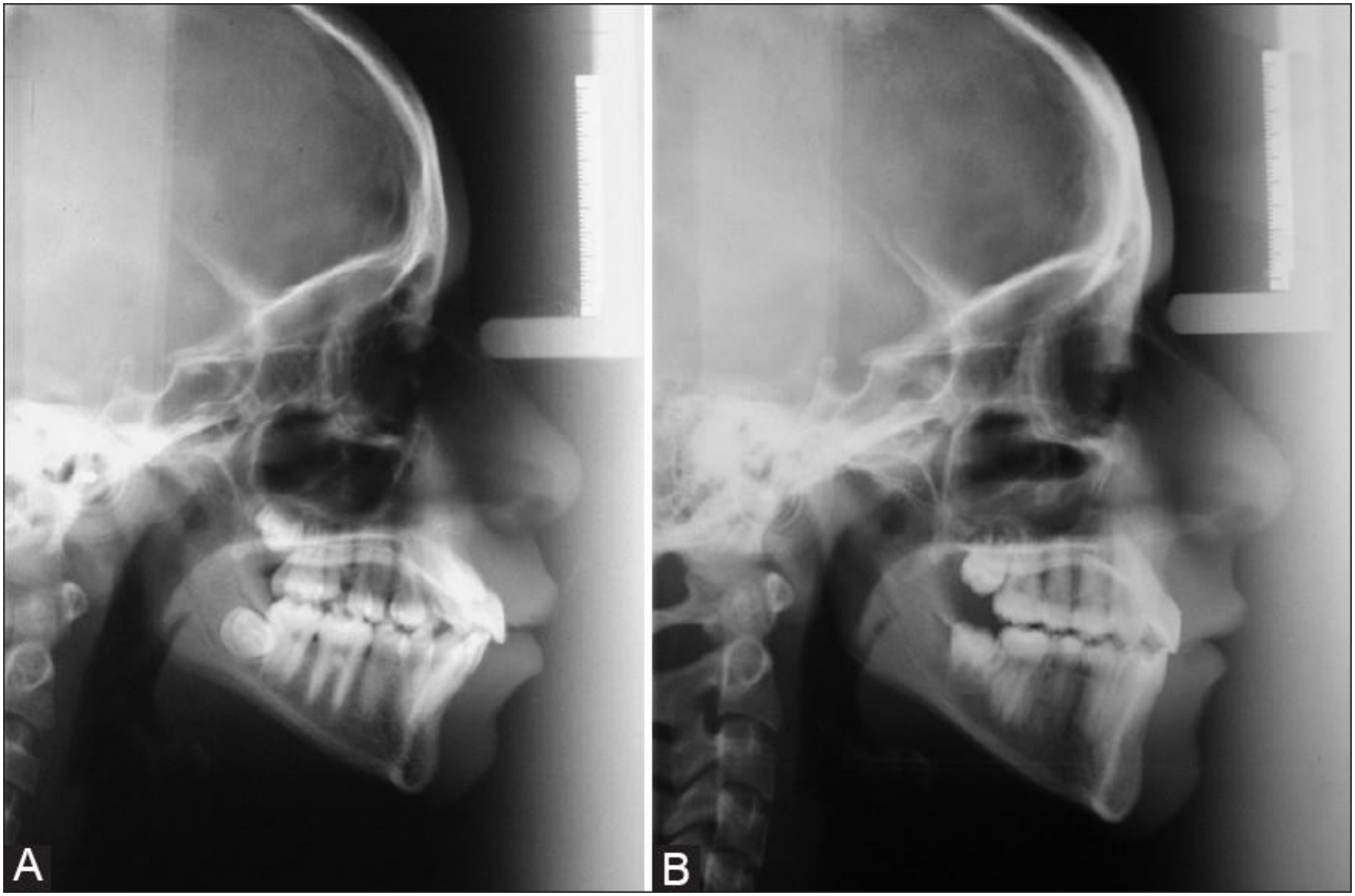
Classification

- From the dental perspective, the severity of the dentoalveolar protrusion is best characterised by the interincisal angle.

125 degree- 115 degree = mild

115 degree- 105 degree = moderate

<105 degree = severe.


A
B

Features

Soft tissue

1. Convex facial form.
2. Reduced lip length.
3. Lips incompetency.
4. Low lower lip line and high upper lip line
5. prominent lips.
6. Receded chin.

FIGURA 1 - Fotografias extrabucais pré-tratamento.

Dental

1. Dental bimaxillary proclination
2. Larger dental arch length with resultant spacing and diastema
3. Normal or increased OJ
4. Variable molar relationship but usually normal.
5. Large teeth compared to normal population
6. May have other superimposed malocclusion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Treatment

- **Mild cases**

Better to accept because

- Aging can mask the protrusion by down and forward growth of the nose and chin
- The high risk of relapse.

Moderate cases

- **Enmass retraction with or without & extraction**
- **Extraction** in both arches usually first premolars.
- If the condition is class II then it might be treated with **extraction in the upper alone.**

In severe cases

- Orthognathic surgery is required to correct significant skeletal problems using subapical osteotomies with extraction and with or without Genioplasty.

- **Stability & Relapse**
- 30% of cases showed almost relapse.
- Long-term stability is unpredictable, depends on lip adapting to incisor retraction, i.e. lower lip becoming competent
- Permanent fixed retainer in both arches

The aims for a good stability at the end of treatment should be:

- Interincisal angle should be normalized
- Lower lip should cover one third of upper incisor
- If the tongue is very large, then surgical reduction can be justified

THANK YOU

Metal Dental Braces

Invisalign

Class II division one Malocclusion

Dr . Jamal aldori

According to Angles classification the mesiobuccal cusp of the maxillary first molar occlude more than one half cusp width anterior to mesiobuccal groove of the mandibular first molar. indicates that mandibular arch is in a distal relation to that of the maxilla.

In sagittal plane this malocclusion is called as postnormal occlusion or distoclusion.

Subdivisions of Class II Malocclusion

Class II division 1 : The molar relationship in class II with the upper anterior teeth proclined. It is the most frequently encountered and treated malocclusion in orthodontic practice

Subdivisions of Class II malocclusion

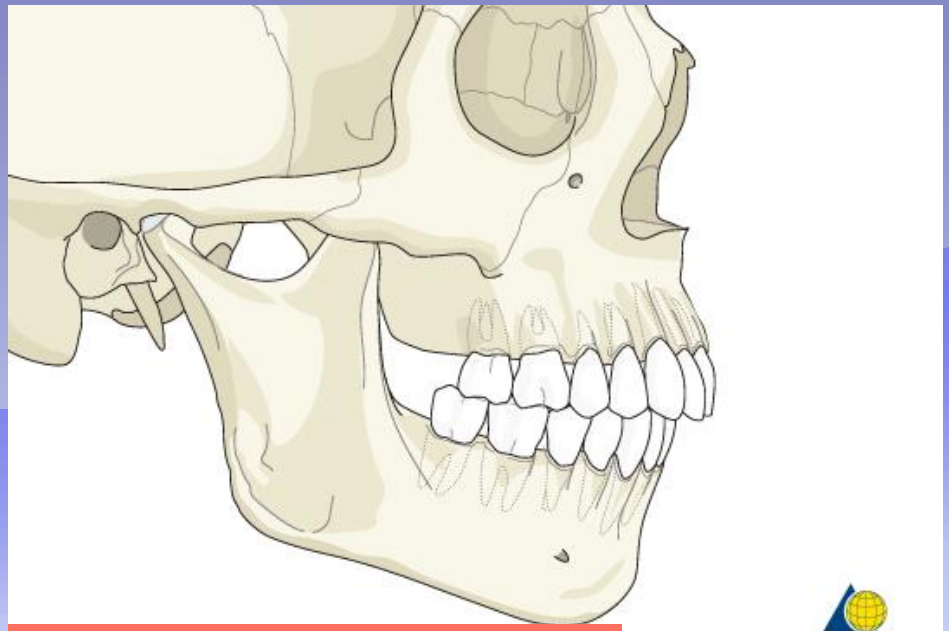
Class II division 2: The molar relationship in class II with the upper central incisor are retroclined and overlapped by the lateral incisors.

In more sever cases both upper central and lateral incisors are retroclined and overlapped by canines.

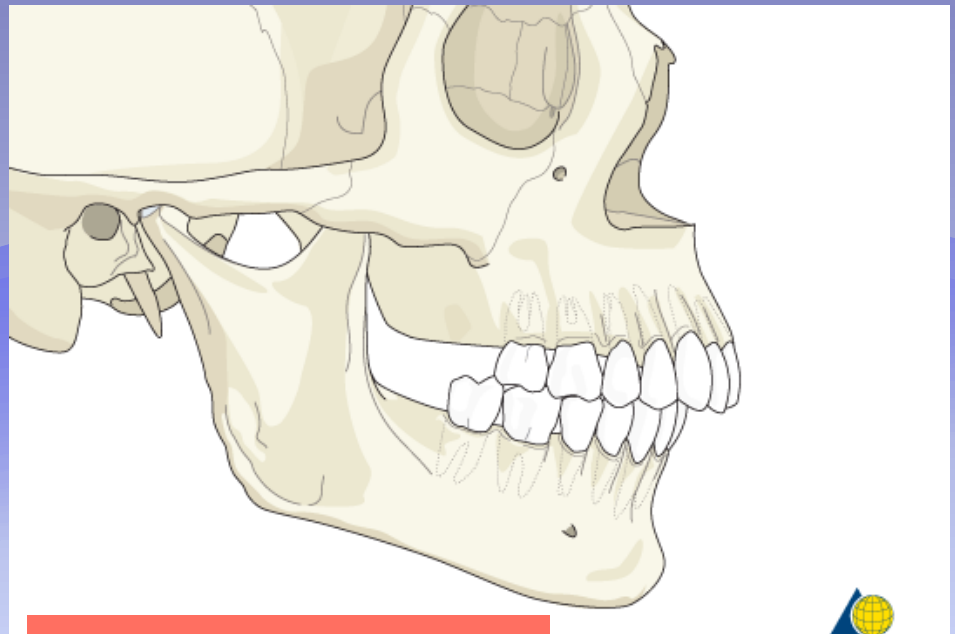
Classification of Class II malocclusion

1- Dentoalveolar Class II malocclusion:
Normal maxillo-mandibular skeletal relation but the defect in alveolar bone or dentition

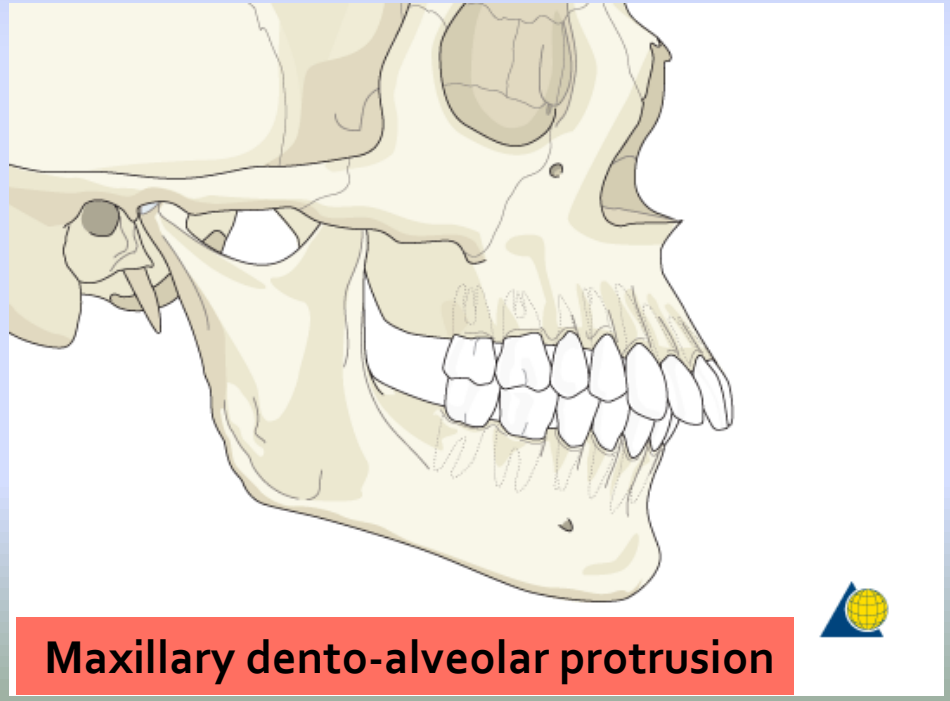
2- skeletal class II malocclusion:
1- maxillary protrusion.
2- mandibular retrusion.
3- combination of above.



Mandibular Retrognathisim



Maxillary prognathisim



Maxillary dento-alveolar protrusion

Class II Division 1 malocclusion

Etiology

1- skeletal genetic component

A class II skeletal pattern is usually present in patients with a class II division I malocclusion. This is most commonly due to a retrognathic mandible. It is also possible for patients to present with a protruded maxilla but this is less common. Size discrepancies between the mandible and maxilla may also be the cause of the class II malocclusion and would be due to decreased mandibular size and increased maxillary size. Vertical skeletal discrepancies are also common.

2- soft tissue factor

Patients with class II division I malocclusion usually have incompetent lips due to the prominence of the upper incisors. This can encourage upper incisor proclination and lower incisor retroclination as the lower lip is drawn behind the upper incisors (high lip line) and therefore worsening the incisor relationship with the result that the incisor relationship is more severe than the underlying skeletal pattern. However, dentoalveolar compensation can occur to mask the underlining skeletal pattren if the patient postures the mandible forwards or uses their circumoral muscles to achieve an anterior oral seal.

3- Dental factors

Crowding in the upper arch can result in a lack of space for the upper incisors, pushing them labially out of the arch and cause an increase in overjet.

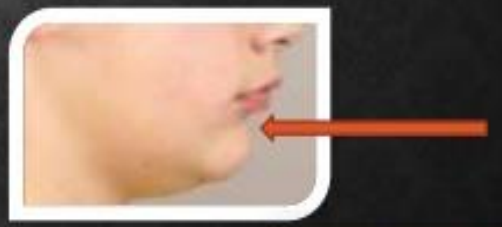
4-Local factors

Habits such as digit sucking can have a significant effect on a patient's malocclusion. Digit sucking causes proclination of the upper incisors and retroclination of the lower incisors. This will cause an increase in overjet and can exacerbate an existing class II malocclusion.

CLINICAL FEATURES OF CLASS II DIV 1

EXTRAORAL FEATURES

- Profile : convex
- Deep mento-labial sulcus
- Upper lip short hypotonic
- Lips- incompetent/competent
- Lip trap



Textbook of orthodontics by Dr. Samir Bishara

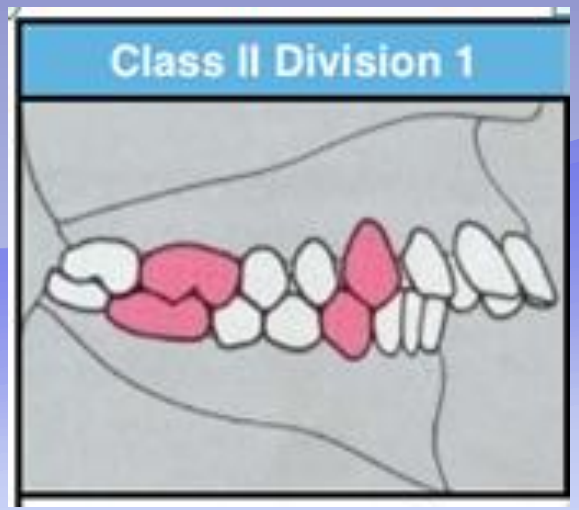
Extraoral features

- Oval shaped face.

- Deficient lower facial height.

Intraoral features:

1- Class II molar , canine and incisors relationship
2- Proclined maxillary incisor or normally inclined
3- Increased overjet
4- V shaped upper arch and deep palate
5- Exaggerated curve of spee (over eruption of lower incisor)
6- open bites ,normal over bites or deep bite
7- Deep bite may be traumatic
8-Flaring and spaced dentition


Class II Division 1

Management of class II division 1 malocclusion

Treatment is depend on:

1- patient age.

2- severity of malocclusion.

3- patient facial profile.

4- etiology of malocclusion.

In some cases a consideration of the profile may help to make the decision between two alternative modes of treatment. For example, in a case with a Class II skeletal pattern due to a retrusive mandible, a functional appliance may be preferable to distal movement of the upper buccal segments with headgear. The profile may also influence the decision whether or not to relieve mild crowding by extractions.

There are three approach for the treatment of class II malocclusion:

1- Prevent malocclusion from occurrence.

2- Intercept the developing malocclusion.

3- Correct an already existing malocclusion.

Timing of the treatment is an important factor in the amount of changes that can be produced.

Optimum time for growth modification is prepubertal growth spurt.

Therefore proper diagnosis of the patient at early age and the use of correct functional appliances will cause the patient to avoid surgery.

At present many clinicians feel that treatment is best deferred until the eruption of the secondary dentition where space can be gained for relief of crowding and reduction of the overjet by the extraction of permanent teeth (if indicated), and soft tissue maturity increases the likelihood of lip competence. In the interim a custom- made mouth guard can be worn for sports. However, if the upper incisors are thought to be at particular risk of trauma during the mixed dentition, treatment with a functional appliance can be considered

1- prevent malocclusion from occurrence.

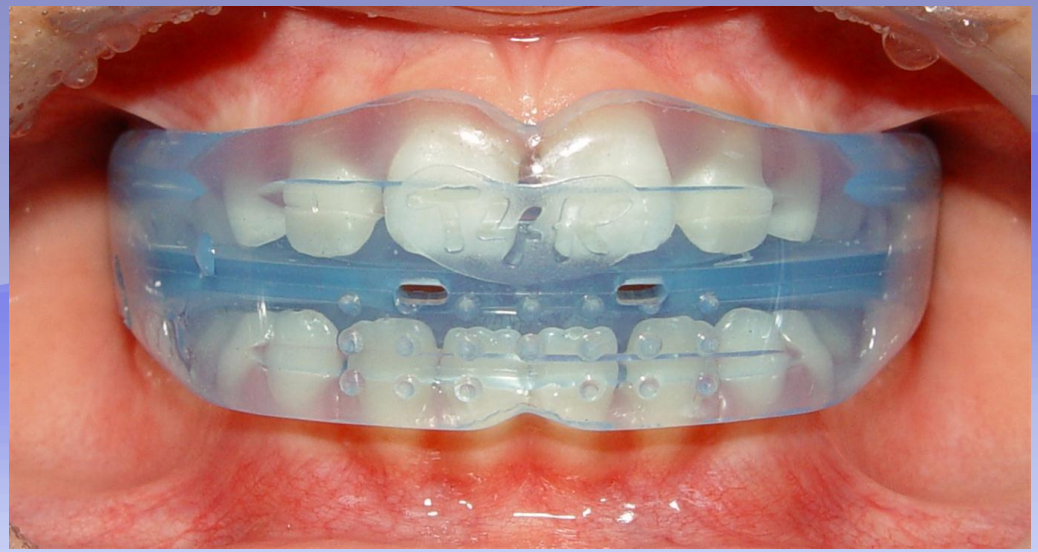
Management of functional disturbances:

Mouth breathing – **habit breaking appliances**

Abnormal tongue position and swallowing patterns – **fixed or removable habit breaking appliances**

Lip posture and activity – **lip exerciser**

Finger sucking habit - **fixed or removable habit breaking appliances**



2- intercept the developing malocclusion.

Skeletal Class II In growing patient:

functional appliances is indicated for growth modification in growing patients.

Mild to moderate class II division 1
Proclined upper incisors
No lower and upper arch crowding
Deep overbite
Average or reduced lower facial height

2- intercept the developing malocclusion.

Mixed dentition period (modifying growth)

Prognathic maxilla – headgears

Retrognathic mandible – activator, frankle and other bite jumping devices

3- correct an already existing malocclusion

Dentoalveolar class II is treated with:

Removable appliances – robert retractor

Fixed appliances

3- correct an already existing malocclusion

Indication of removable appliances (Robert retrector)

1- Proclined upper incisors
2- Spaced upper incisors
3- Normal or reduced overbite

3- correct an already existing malocclusion

3- fixed appliances
Indicated for most complicated tooth movements which involve bodily tooth movement, intrusion, extrusion

Use class II elastics

3- correct an already existing malocclusion

In adults

Dentoskeletal compensation for the skeletal defect through reduction of tooth material is the treatment of choice (camouflaging). using fixed appliances to achieve bodily retraction of the upper incisors .
The severity of the case that can be approached in this way is limited by the availability of cortical bone palatal to the upper incisors and by the patient's facial profile.
Generally maxillary first premolars are extracted.

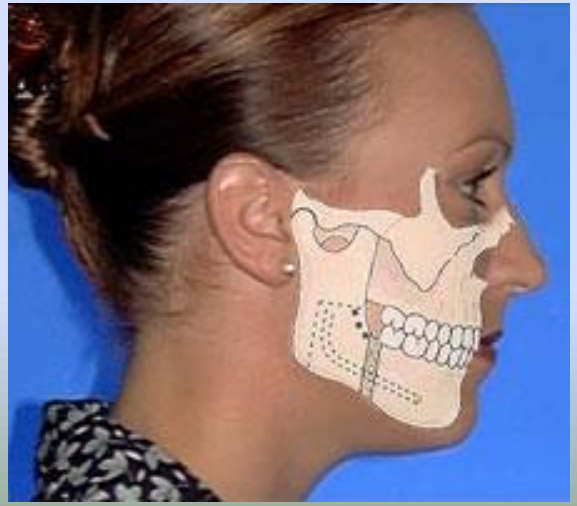
Orthognathic surgery

Indicated in adults with no growth potential

mandibular advancement

Indication : skeletal class II caces with mandibular deficiency

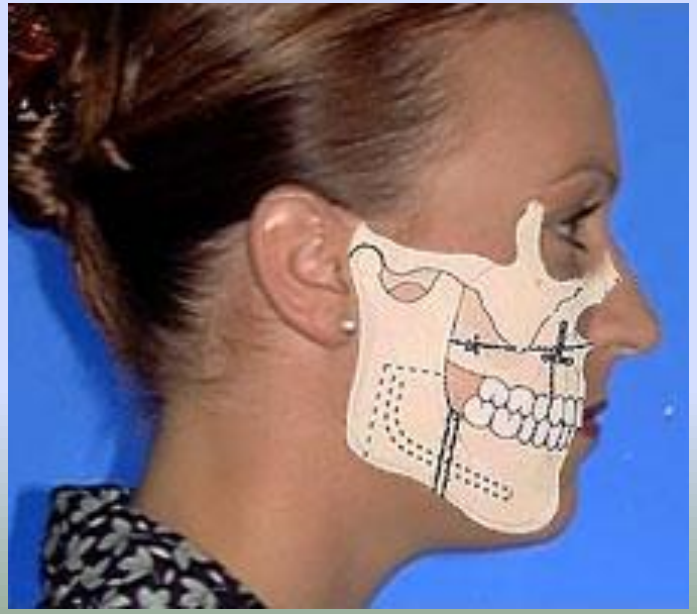
The intraoral sagittal split ramus osteotomy is the popular technique for surgical mandibular advancement.



Orthognathic surgery

Maxillary impaction (Le Fort 1 maxillary osteotomy)
Indication : Vertical maxillary excess

Anterior maxillary sub-apical set back
Indication : maxillary excess in antero-posterior dimentional mid-face protrusion (no vertical excess)



Orthognathic surgery

Combined surgical approaches : maxillary and mandibular

Indication : maxillary excess and mandibular deficiency

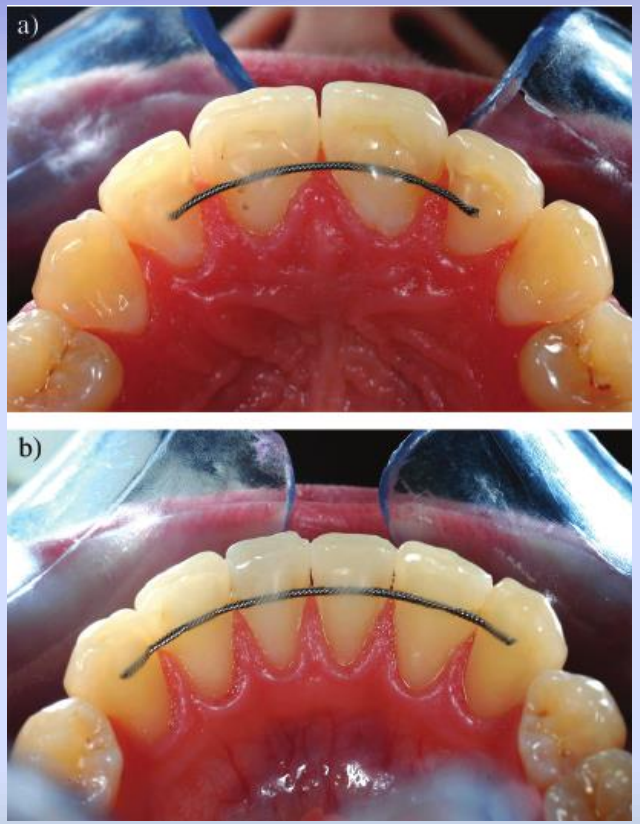
Retention and stability

For overjet reduction to be stable , anterior lip seal must be achieved, lower lip contact the upper incisor

Appliances used for retention

1- lingual fixed retainer

2- Howly labial arch

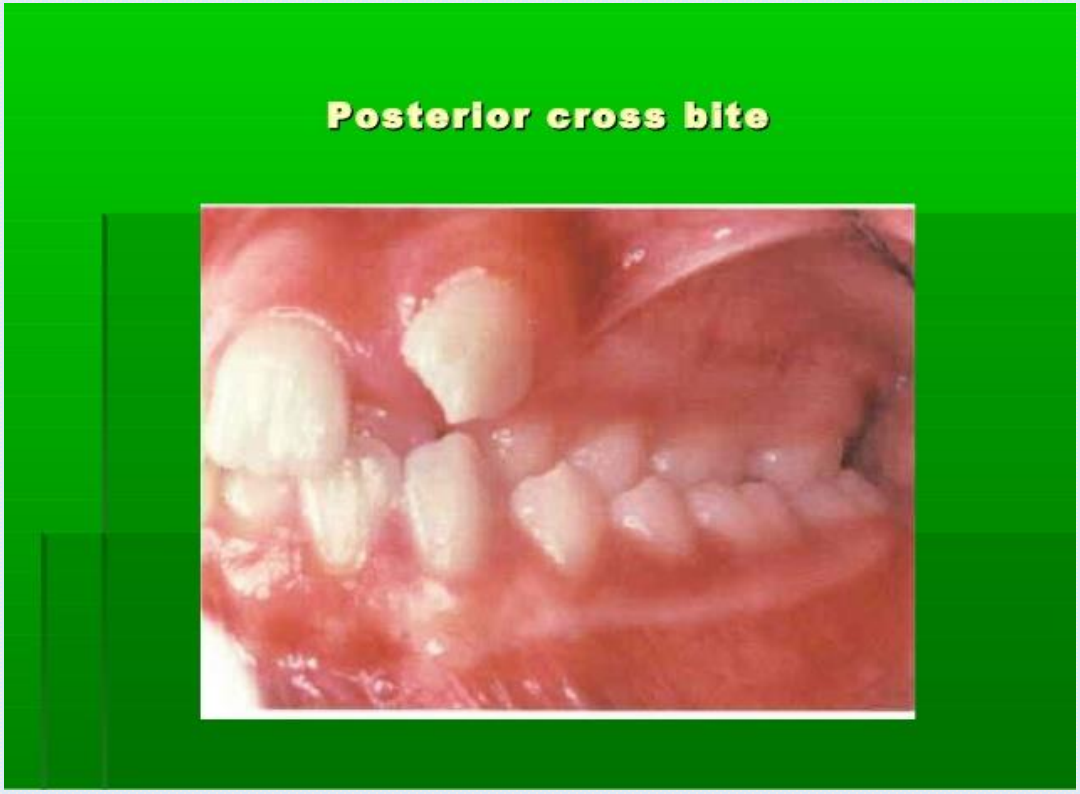


Crossbite

Dr.jamal aldori

Posterior crossbite

- A discrepancy in the transverse (buccolingual) relationship of the lower teeth relative to the upper teeth.



Buccal crossbite:

The buccal cusps of the lower teeth occlude buccal to the buccal cusps of the upper teeth

Lingual crossbite :

The buccal cusps of the lower teeth Occlude lingual to the lingual cusps of the upper teeth. This is also known aa scissors bite

Etiology

1- Dental crossbite

The most common local cause is crowding where one or two teeth are displaced from the arch. For example, a crossbite of an upper lateral incisor often arises owing to lack of space between the upper central incisor and the deciduous canine. which forces the lateral incisor to erupt palatally and in linguoocclusion with the opposing teeth.

Posteriorly, early loss of a second deciduous molar in a crowded mouth may result in forward movement of the first permanent molar. forcing the second premolar to erupt palatally.

Etiology

2- Skeletal crossbite

Generally, the greater the number of teeth in crossbite. the greater is the skeletal component of the aetiology.

1- A crossbite of the buccal segments may be due purely to a mismatch in the relative width of the arches, or to an anteroposterior discrepancy, which results in a wider part of one arch occluding with a narrower part of the opposing jaw. For this reason buccal crossbites of an entire buccal segment are most commonly associated with Class Ill malocclusions and lingual crossbites are associated with Class II malocclusion.

Anterior crossbites are associated with Class Ill skeletal patterns.

Etiology

Skeletal crossbite

2- Cleft lip and palate where growth in the width of the upper arch is restrained by the scar tissue of the cleft repair

3-Trauma to , or pathology of the temporomandibular joints can lead to restriction of growth of the mandible on one side, leading to asymmetry.

Etiology

3- Habits

A posterior crossbite is often associated with a digit-sucking habit. as the position of the tongue is lowered and a negative pressure is generated intra-orally.

4- Functional crossbite

The mandible displaced laterally due to occlusal interferance (premature contact)

Types of posterior crossbite

1- Unilateral buccal crossbite with displacement

This type of crossbite can affect only one or two teeth per quadrant, or the whole of the buccal segment. When a single tooth is affected, the problem usually arises because of the displacement of one tooth from the arch. plus or minus the opposing tooth, leading to a deflecting contact on closure into the cross bite. his type of crossbite may be associated with a center line shift in the lower arch in the direction of the mandibular displacement

2-Unilateral buccal crossbite with no displacement

This category of crossbite is less common. It can arise as a result of deflection of two (or more) opposing teeth during eruption. but the greater the number of teeth in a segment that are involved. the greater is the likelihood that there is an underlying skeletal asymmetry.

Types of posterior crossbite

3- Bilateral buccal crossbite

Bilateral crossbites are more likely to be associated with a skeletal discrepancy, either in the anteroposterior or transverse dimension, or in both.

4-Unilateral lingual crossbite

This type of crossbite is most commonly due to displacement of an individual tooth as a result of crowding or retention of the deciduous predecessor.

5-Bilateral lingual crossbite (scissors bite)

This crossbite is typically associated with an underlying skeletal discrepancy. often a Class II malocclusion with the upper arch further forward relative to the lower arch.

Diagnosis

Clinical Examination:

It is important to determine whether a unilateral crossbite is associated with lateral mandibular shift, this is achieved by examining mandibular position in centric relation and centric occlusion.

Unilateral posterior crossbite with lateral shift may result from:

1. **Occlusal interferences from primary canine: there is normal occlusal relations at initial contact but in centric occlusion there is mandibular shift leading to unilateral crossbite.**

2. In the majority of children with unilateral posterior crossbite there is moderate bilateral narrowing of the upper arch leading to posterior interferences upon closure. This forces the mandible to shift to a new position for maximum intercuspation.

- Marked bilateral narrowing produce no interference and the patient will have bilateral crossbite in centric relation.
- Less frequently unilateral posterior crossbite is caused by true unilateral narrowing of the upper arch, the patient has crossbite in centric relation and centric occlusion.

Bilateral crossbite

True unilateral crossbite

Diagnosis

Study cast analysis:

dental and skeletal transverse dimensions can be recorded using study cast by:

- Measuring the width of palatal vault.
- Measuring the intermolar distance.

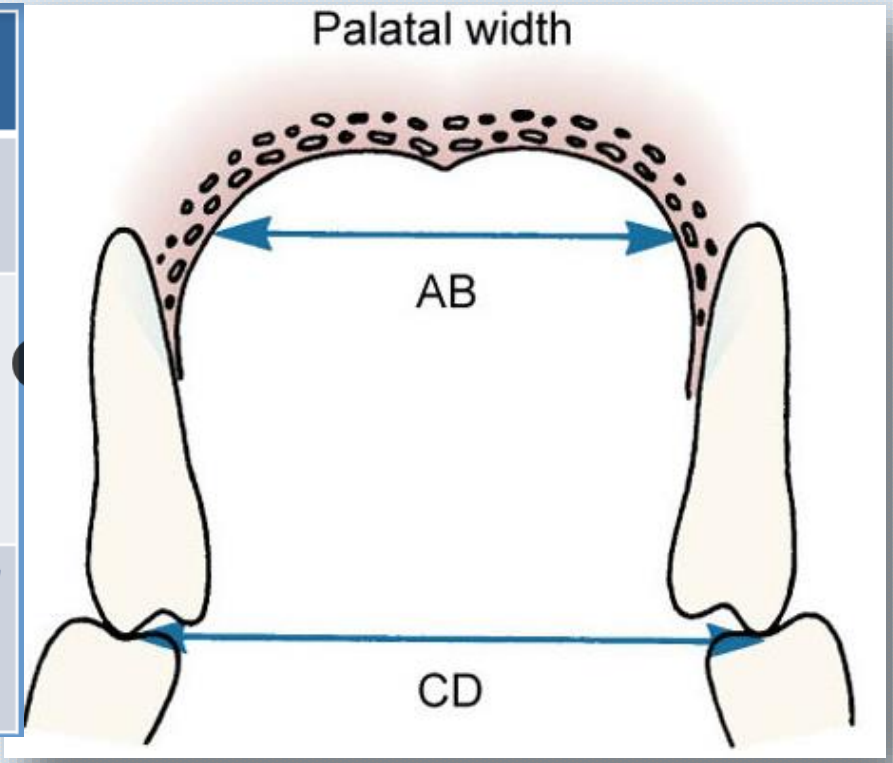
These 2 measurements should be compared to each other to verify the skeletal and dental contribution to crossbite.

Dental crossbite

Normal width of palatal vault

Intermolar width is approximately equal to palatal width

Palatal inclination of posterior teeth

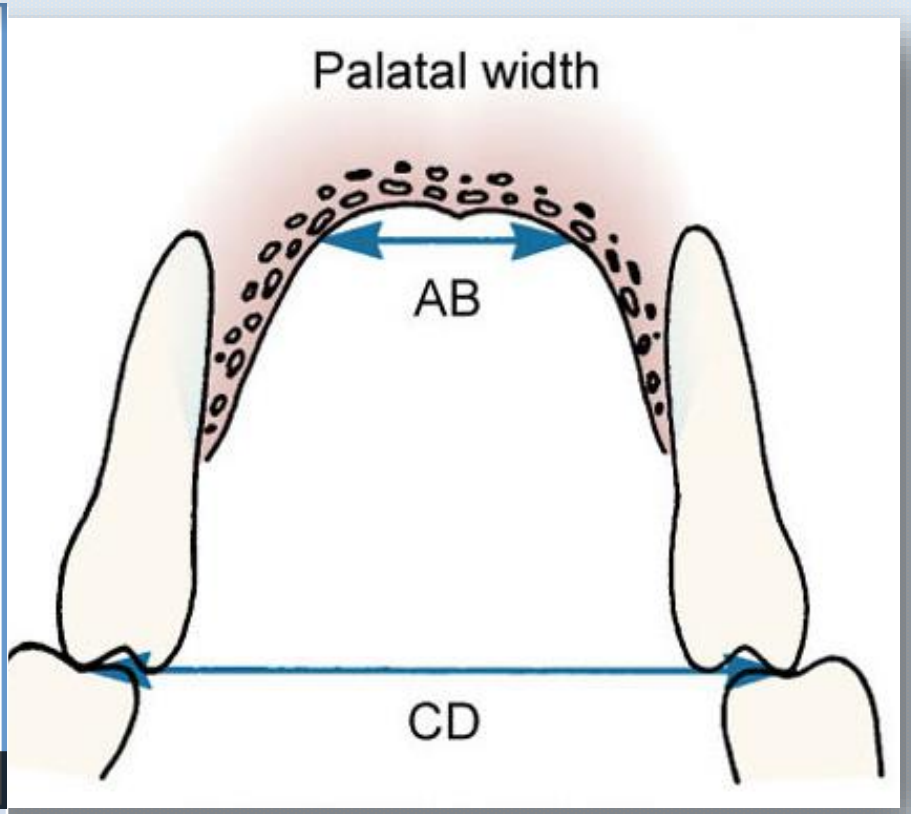


Skeletal crossbite

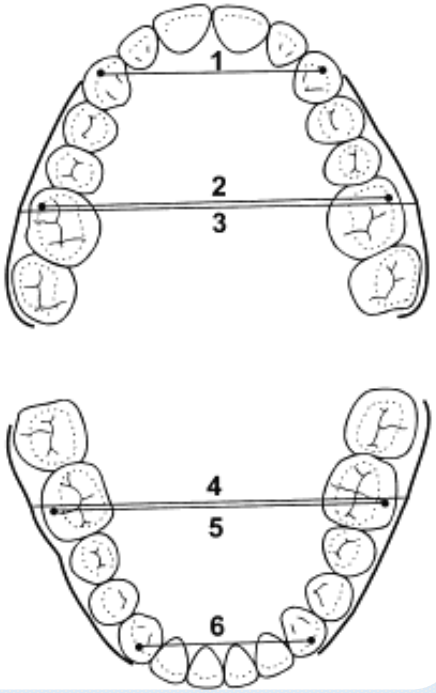
Narrow palatal vault

intermolar width is considerabely larger than palatal width

There may be buccal inclination of posterior teeth as a compensation for skeletal problem



- Arch width measurement is used to estimate the amount of expansion needed to correct the crossbite:
- In normal occlusion the arch width between tips of MB cusps of upper first molars should be 2 mm greater than the width between buccal grooves of lower molars.
- maxillary intermolar width – mandibular intermolar width = sum of intermolar difference.
- expansion needed = intermolar difference +2mm.



Treatment plan considerations

- Skeletal and dental contribution to crossbite.
- Age of the patient
- Functional contribution to crossbite.

Rationale for early treatment

Posterior crossbite should be treated as early as possible even in the primary dentition.

- Early correction will eliminate mandibular shift on closure and reduce the possibility of mandibular skeletal asymmetry.
- Correcting posterior crossbite in the mixed dentition increases arch circumference and provides more room for the permanent teeth to erup.

Treatment of transverse maxillary constriction

- Skeletal maxillary constriction is characterized by a narrow palatal vault and can be corrected by opening the midpalatal suture.
- Like all craniofacial sutures the midpalatal suture becomes more tortuous and interdigitated with increasing age.

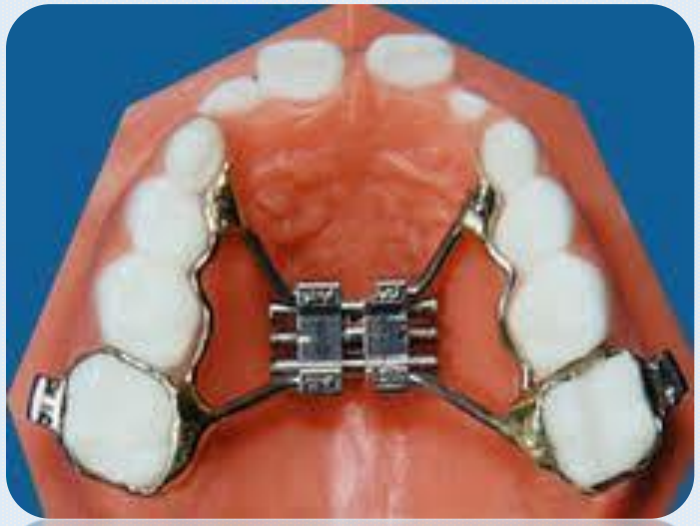
Methods of expansion

There are 2 approaches for palatal expansion either rapid or slow expansion.

1- Rapid expansion

is recommended to maximize skeletal change and reduce dental changes produced by treatment.

- Fixed appliance with rigid jackscrew is used. It is activated at a rate of 0.5 mm/day (2 turns daily) which creates 10-20 pounds of pressure across the suture.



Rapid expansion

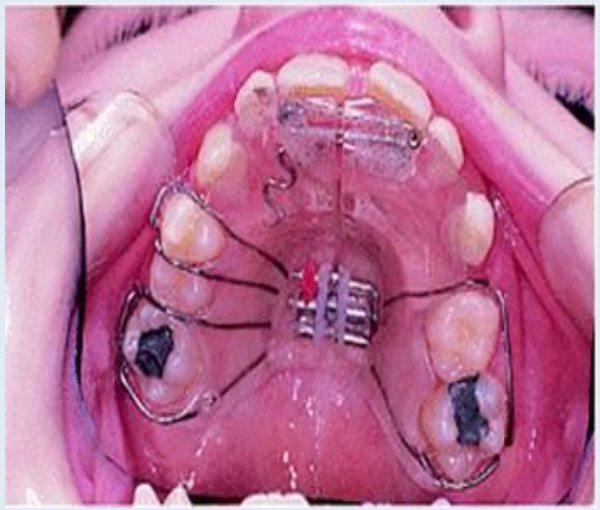
- About 10mm or more of expansion is obtained in 2-3 weeks.
- The suture opens as if on a hinge superiorly at the base of the nose and opens more anteriorly than posteriorly. The space created is filled initially by tissue fluids and hemorrhage.

Rapid expansion

- A diastema appears between central incisors as the bone separate.
- The appliance should be stabilized and left in place for 3~4 months, during this time new bone fill the space and midline diastema disappear.
- At the end of retention period the net result would be equal amount of skeletal and dental expansion.

Slow expansion

- The suture is opened at rate of 1 mm/week (one quarter turn twice a week) this rate is close to maximum speed of bone formation, this produces 2 pounds of pressure
- No midline diastema appear and tissue damage and hemorrhage are minimized.
- This method produces 10mm expansion over 10-12 weeks period which consists of equal amount of skeletal and dental change.



Expansion of narrow maxilla in primary and early mixed dentition

Heavy forces and rapid expansion are not indicated in young children, since there is significant risk of distortion of nose.

Expansion of narrow maxilla in primary and early mixed dentition

- Palatal expansion can be achieved with slow activation using either of the following appliances:

1. Split-plate removable appliance with expansion screw. However, it depends on patient compliance and treatment can take long time.

- To expand arch with middle screw

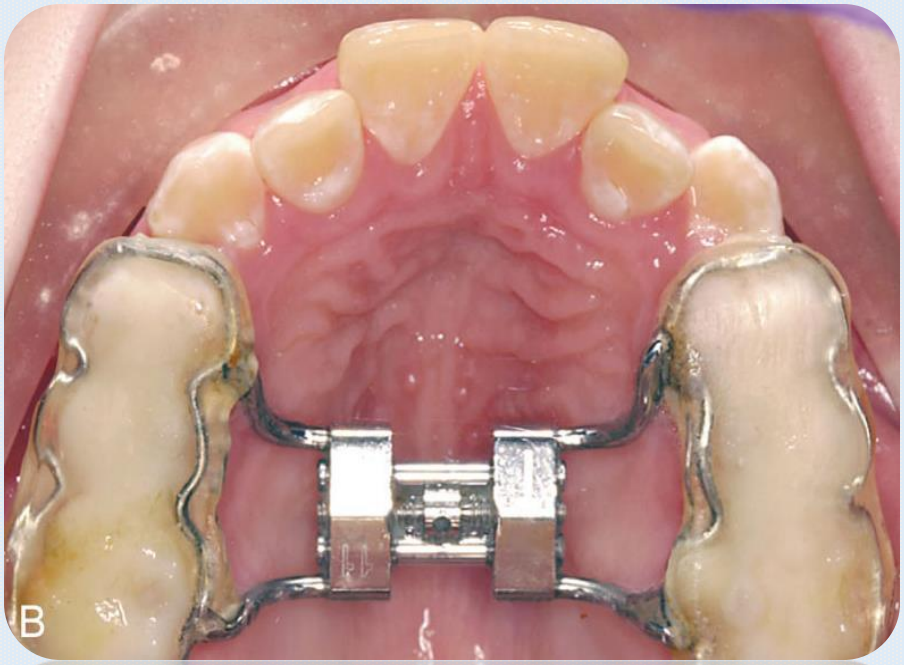
2. Lingual arch either of W arch or quad helix design.

- Both produce slow expansion and deliver a force of few hundreds grams and produce both skeletal and dental expansion.

Expansion of narrow maxilla in late mixed dentition

In this age sutural expansion require placing a relatively heavy force across the suture.

- This is achieved using fixed expander with rigid jackscrew. The appliance should include as many teeth as possible in anchorage unit.
- It is activated to produce slow expansion since its more physiologic and effective in these young patients



Expansion of narrow maxilla in adolescence

In this age slow and rapid expansion can be used. However, as the patient matures heavy forces and more rapid activation is required to open the suture.

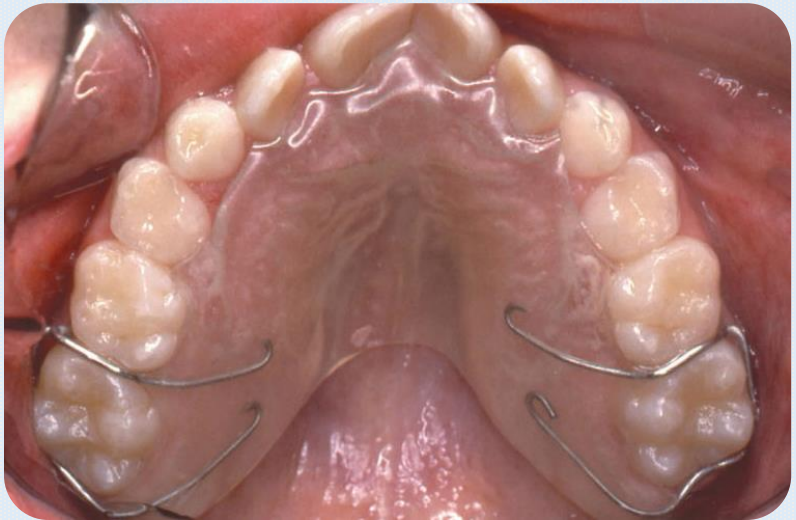
1. Bonded or banded expander. (can produce both rapid and slow expansion)

Expansion of narrow maxilla in Adolescence

2. Implant supported expansion

- Force can be directly applied to maxilla using palatal screws for attachment of expansion device.
- Slow expansion is used since the effect is mainly skeletal.

- In all patients whether children or adolescents, the crossbite should be overcorrected so that the palatal cusps of upper teeth occlude on the lingual inclines of buccal cusps of lower molars.
- After active treatment the appliance is left passively in place for 3 months.
- A removable retainer that covers the palate is needed to prevent relapse for 6 months or more.



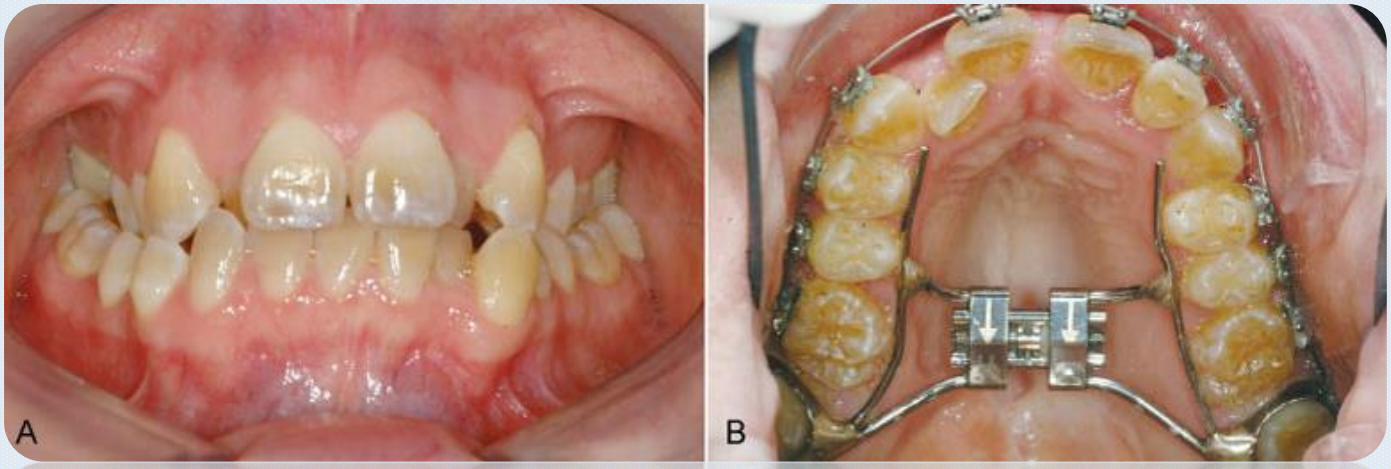
Correction of Narrow Maxilla in Adults

Surgically assisted rapid palatal expansion

In this procedure the surgeon make bone cuts similar to LeFort I osteotomy except the down fracture to reduce resistance, followed by expansion with rigid screw to separate halves of maxilla.

Surgical widening of maxilla is the least stable of orthodontic surgical procedures because of the pull of stretched palatal tissues that cause relapse.

Overcorrection of crossbite followed by retention for at least one year after surgery is recommended



Correction of dental posterior crossbite

In primary and mixed dentition

Posterior crossbite associated with lateral shift is an indication for treatment in primary dentition otherwise its better to defer treatment to mixed dentition when the permanent first molars are erupted.

1. Occlusal equilibration to eliminate mandibular shift due to occlusal interference from primary canine.

Correction of dental posterior crossbite

2. Expansion of a narrow upper arch

Different types of appliances can be used for primary or mixed dentition child and all will produce some opening of the midpalatal suture in addition to dental expansion:

a) Split-plate removable appliance with expansion screw, this type depends on patient compliance and the treatment is longer.

The preferred appliance is adjustable lingual arch that is banded to molars and requires little patient cooperation.

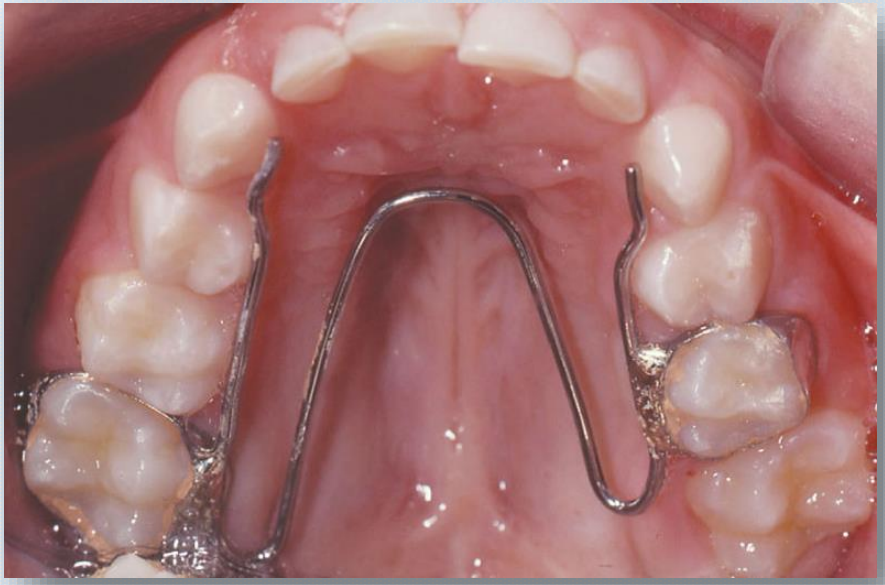
b) W arch and quad helix are reliable and easy to use.

- Both are constructed from 0.9 mm stainless steel wire and can be adjusted to produce anterior or posterior expansion.
- The lingual wire should contact the teeth involved in crossbite.
- The appliance is activated by opening it 3-5 mm wider than passive width.

3. Correction of true unilateral crossbite

These are treated by asymmetric expansion of upper arch to move teeth on the constricted side.

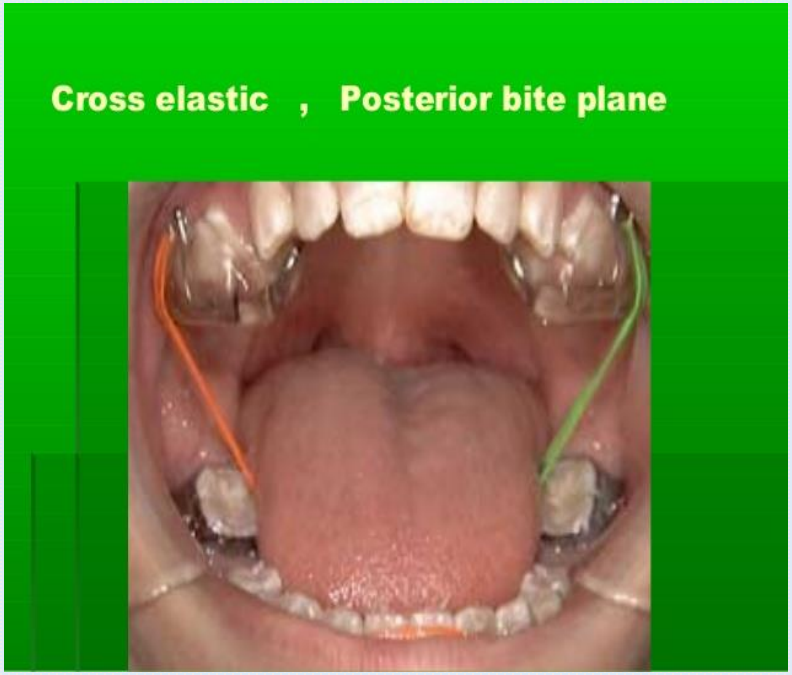
A. Asymmetric W arch with different length arms. The side of the arch to be expanded has fewer teeth than the anchorage unit. However, some bilateral expansion must be expected.



3. Correction of true unilateral crossbite

B. Cross-elastics from upper molars to lower teeth that are stabilized with mandibular lingual arch.

This produce more unilateral effect but should be used for short duration to prevent excessive extrusion of posterior teeth.



- The crossbite should be slightly overcorrected so that the palatal cusps of upper teeth occlude on the lingual inclines of buccal cusps of lower molars.
- After active treatment the appliance is left passively in place for 3 months.

Correction of dental posterior crossbite

In adolescence

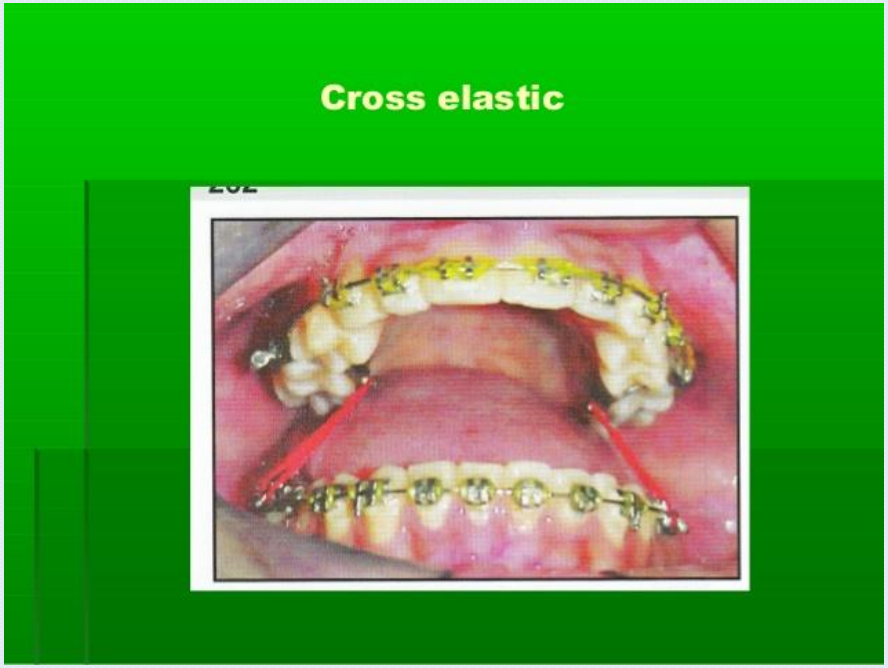
Posterior crossbites are corrected during the first stage of comprehensive orthodontic treatment. Two approaches are possible:

1. Heavy labial expansion arch: made from 0.9 mm wire and adjusted so that its slightly wider than headgear tubes and must be compressed by patient on insertion.

Correction of dental posterior crossbite

2. Cross-elastics: from the lingual of upper molars to the buccal of lower molars that are stabilized with mandibular lingual arch. This method is also useful when there is true unilateral crossbite.

After correction of crossbite retention is achived using heavy rectangular archwire



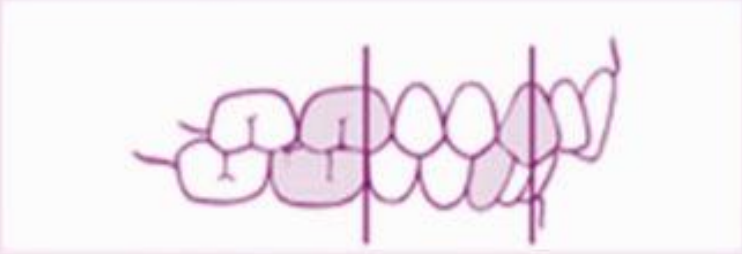
Thank you

Class II division 2 malocclusion

Class II division 2

According to Angle's classification:

It is when the buccal groove of the first mandibular molar occludes distal to the mesiobuccal cusp of the first maxillary molar, with retroclination of the maxillary central incisors.

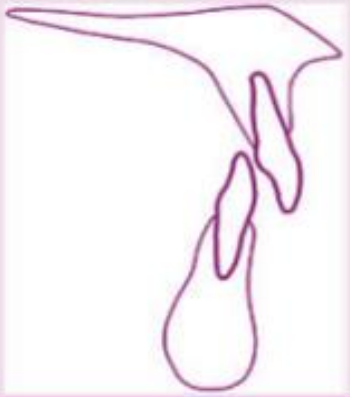


Class II division 2

- British standards classification of incisor relationships:

  - The lower incisor edges occlude posterior to the cingulum plateau of the upper incisors and the lower centrals are retroclined.

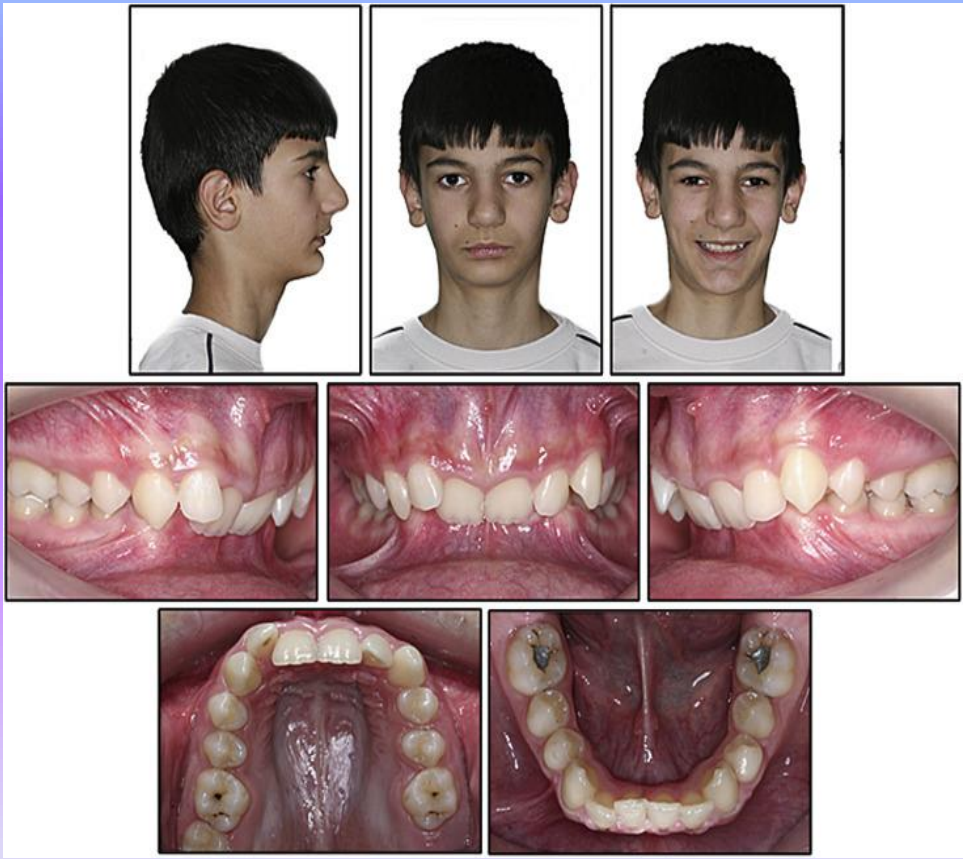
  -The overjet is minimal but may be increased.



Features of class II division 2 malocclusion:

Extraoral features:

1- profile is straight to convex.
2- shape of head mesocephalic to dolichocephalic.
3- high upper lip (gummy smile).
4- deep mentolabial sulcus.
5- hyperactive mentalis muscles
6- everted lower lip (high lip line relative to upper incisor)
7-prominent chin



Features of class II division 2 malocclusion:

Intraoral features:

1-Deep bite & Decreased overjet.

2- with a more severe Class II skeletal pattern the overbite may be complete may cause ulceration of the palatal tissues.

3- Stripping of labial gingiva caused by severely retroclined upper incisors (traumatic overbite)

4- Excessive lingual inclination of maxillary central incisors and labialy tipped lateral incisor . In some cases both maxillary central and lateral incisors are lingually inclined and overlapped by canines on laterals.

Features of class II division 2 malocclusion:

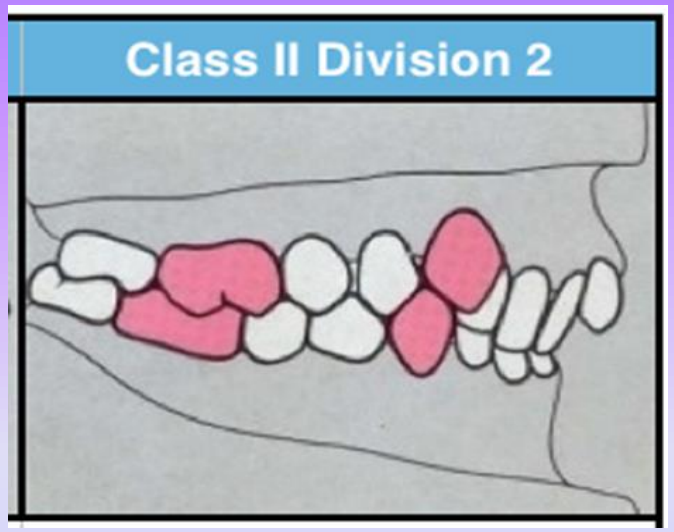
Intraoral features:

5- U shaped palatal arch.

6- Class II molar & Class II canine relation (distoocclusion).

7- Lingual crossbite.

8- Accentuated curve of spee



Etiology

1- Skeletal pattren

Class II division 2 malocclusion is commonly associated with a mild Class II skeletal pattern. The vertical dimension is also important in the etiology of Class II division 2 malocclusions, and typically is reduced. A reduced lower face height occurring in conjunction with a Class II jaw relationship often results in the absence of an occlusal stop to the lower incisors. Which then continue to erupt leading to an increased overbite.

Etiology

2-Soft tissues

The influence of the soft tissues in Class II division 2 malocclusions is usually mediated by the skeletal pattern. If the lower facial height is reduced, the lower lip line will effectively be higher relative to the crown of the upper incisors (more than the normal one-third coverage).

A high lower lip line will tend to retrocline the upper incisors. In some cases the upper lateral incisors, which have a shorter crown length, will escape the action of the lower lip and therefore lie at an average inclination, whereas the central incisors are retroclined .

Class II division 2 incisor relationships may also result from bimaxillary retroclination caused by active muscular lips .

Etiology

3-Dental factor

crowding is commonly seen in conjunction with a Class II division 2 incisor relationship. In addition, any preexisting crowding is exacerbated because retroclination of the upper central incisors results in them being positioned in an arc of smaller circumference. In the upper labial segment this usually manifests in a lack of space for the upper lateral incisors which are crowded and are typically rotated mesiolabially out of the arch.

In the same manner lower arch crowding is often exacerbated by retroclination of the lower labial segment

Treatment of class II division 2

Class II division 2 malocclusion is either dental or skeletal

1- dental class II division 2 is corrected by orthodontic treatment (extraction or non extraction method)

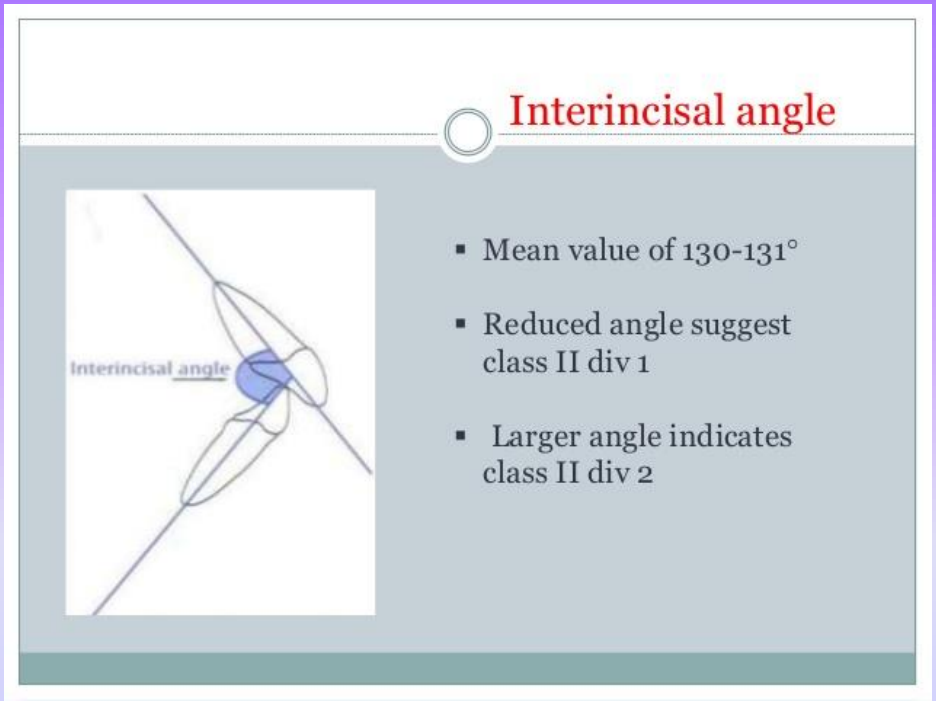
2- skeletal class II division 2

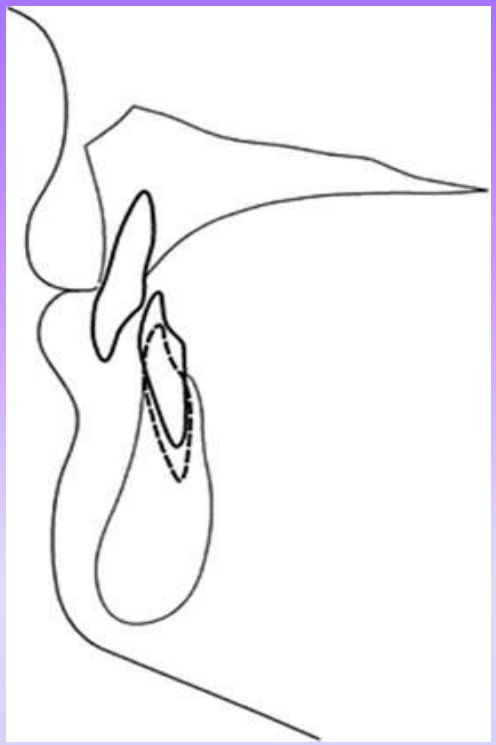
a- Growth modification (growing patient)

b- Dental camouflage (extraction or non extraction)

c- Orthognathic surgery with orthodontic treatment (moderate to severe class II cases)

Stable correction of a Class II division 2 incisor relationship is difficult as it requires not only reduction of the increased overbite but also reduction of the inter- incisal angle which classically is increased





Mechanics for reduction of inter incisal angle

1-Torquing the incisor roots palatally / lingually with a fixed appliance
2-Proclination of the lower labial segment
3-Proclination of the upper labial segment followed by use of a functional appliance to reduce the resultant overjet
4.A combination of the above approaches
5-Orthognathic surgery.

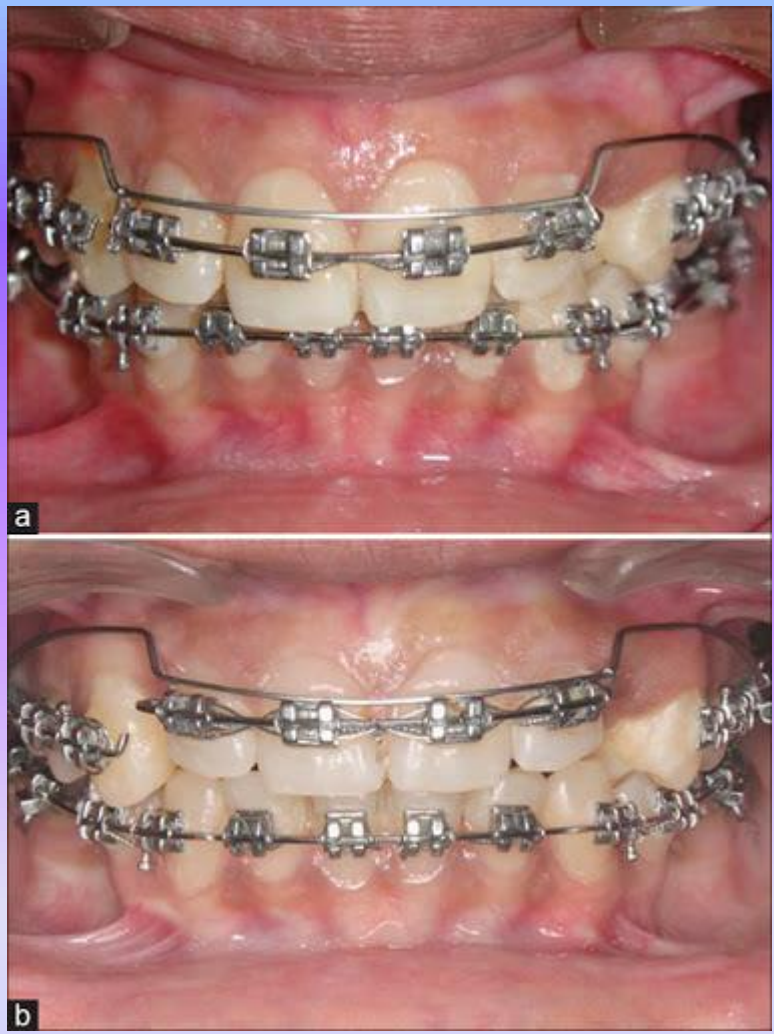
Approaches to the reduction of overbite

1-Intrusion of the incisors

Actual intrusion of the incisors is difficult to achieve. Fixed appliances are necessary and the mechanics employed pit intrusion of the incisors against extrusion of the buccal segment teeth,

Increasing the anchorage unit posteriory by including second permanent molars will aid intrusion of the incisors and help to limit extrusion of the molars.

Arches which bypass the canines and premolars to pit the incisors against the molars, for example the utility arch



Approaches to the reduction of overbite

2-Eruption of the molars

Use of a flat anterior bite-plane on an upper removable appliance to free the occlusion of the buccal segment teeth and allow the lower molars to erupt. thus reducing the overbite. This method requires a growing patient

3-Extrusion of the molars

he major effect of attempting intrusion of the incisors is often extrusion of the molars

4-Proclination of the lower incisors

5- Surgery

Figure 5- Anterior Inclined Bite Plate

Dental class II division 2 malocclusion:

No treatment

In milder cases , where the overbite is slightly increased, the arches are not significantly crowded and the aesthetics acceptable, it may be prudent to accept the malocclusion.

It is not surprising that Class II division 2 malocclusions are managed more frequently on a non-extraction basis, particularly in the lower arch, than are other types of malocclusion.

Extraction or non extraction treatment of dental class II division two is depend on the severity of mesial drift of the maxilary first molar

Slight mesial drift (mesial crown tipping) with minimal crowding ------ non extraction with distalization of maxillary first molar

Sever mesial drift (roots and crown are mesially positioned) ------ extraction is indicated to obtain space.

Skeletal class II division 2

Three treatment approach are available

1- growth modification
2- dental camouflage
3- orthognathic surgery (with orthodontic treatment)

Growth modification (orthopedic treatment)

Functional appliances can be utilized in the correction of Class II division 2 malocclusions in growing patients with a mild to moderate Class II skeletal pattern

If the upper incisors are retroclined it may be helpful to have a pre-functional phase this can be achieved using a removable appliance to expand upper arch and procline upper incisor.

Alternatively a sectional- fixed appliance can be placed on the upper labial segment teeth

Two types of orthopedic appliances used

Headgear (extra-oral force)
Functional appliances (removable or fixed)

Headgear : it deliver an extra-oral orthopedic force to compress the maxillary sutures and modify the pattern of bone apposition at these sites

Two types
1- face bow (maxillary excess)
2- J hooks (maxillary anterior retraction and intrusion)

Functional appliances

Class II functional appliances are designed to position the mandible in a downward and forward to enhance its mandibular growth pattern

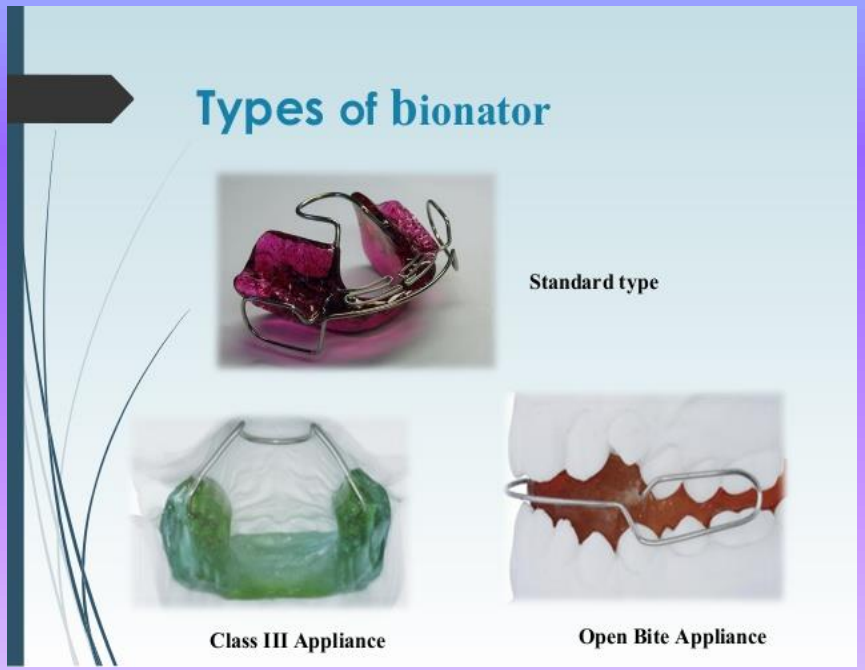
Indication : mandibular deficiency

Types:

1- removable Functional appliances (activator, bionator, twin block, frankyle II)

Frankyle II

Twin block

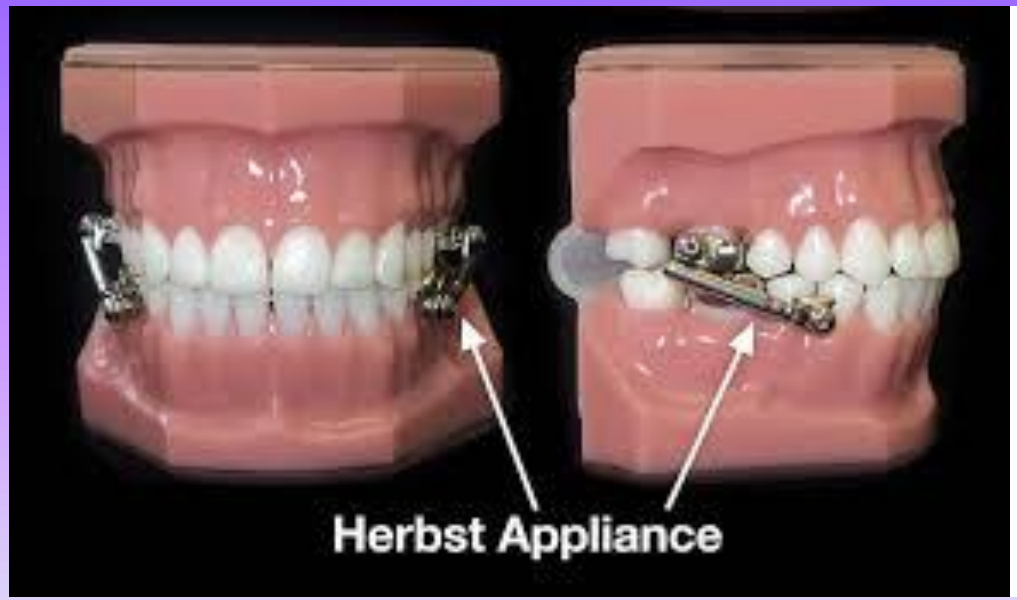


Activator

Bionator

Functional appliances

2- fixed functional appliances (herbst , Jasper jumper)



Dental camouflage

Indication

1- adult
2- mild to moderate class II cases
3- minimal dental crowding
4- acceptable facial esthetics
5- usually require extraction

Dental camouflage without extractionis rare in cases of skeletal classII

Mild skeletal class II cases
Mild excessive overjet
Adequate space available
Maxillary molar distalization

Orthognathic surgery

In adults

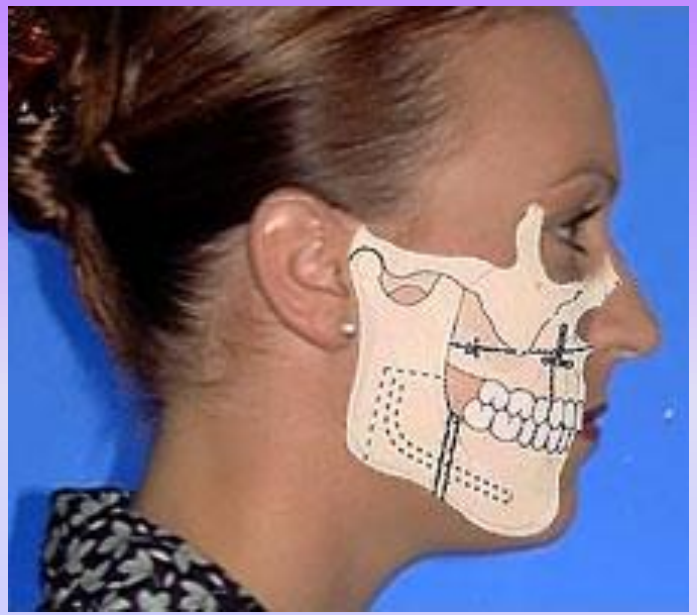
Sever class II skeletal discrepancy

Orthognathic surgery is considered.
Done only after cessation of growth.
Pre surgical orthodontics should be considered in all cases
Maxillary prognathisim – partial maxillary retropositioning (most commonly done)
Mandibular retrognathism – intraoral sagittal split osteotomy.

Orthognathic surgery

Maxillary impaction (Le Fort 1 maxillary osteotomy)
Indication : Vertical maxillary excess

Anterior maxillary sub-apical set back
Indication : maxillary excess in antero-posterior dimensional mid-face protrusion (no vertical excess)



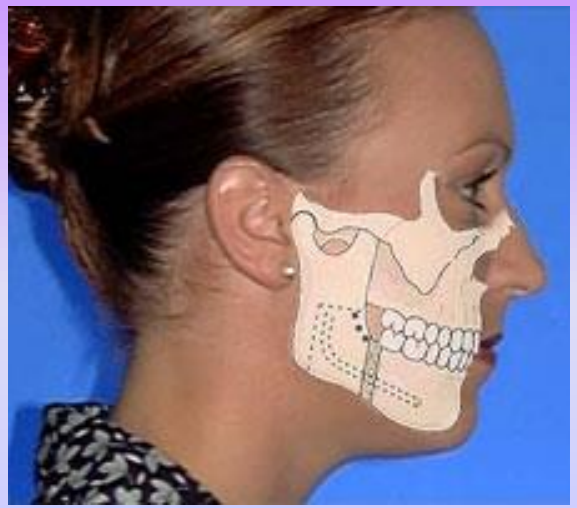
Orthognathic surgery

Indicated in adults with no growth potential

mandibular advancement

Indication : skeletal class II caces with mandibular deficiency

The intraoral sagittal split ramus osteotomy is the popular technique for surgical mandibular advancement.



Orthognathic surgery

Combined surgical approaches : maxillary and mandibular

Indication : maxillary excess and mandibular deficiency


Thank you

Dr.jamal aldori

Adult orthodontics

- **An ADULT is defined as a person who has ceased to grow. Biologically this happens at around 18-20 years of age.**

Adults that request orthodontic treatment fall into 2 distinct groups:

1-Younger adults (under 35) who desired but did not receive orthodontic treatment as youths and now seek it (comprehensive treatment). Due to increasing demand for improved dental aesthetics and better social acceptance of orthodontic appliances, more adults are willing to wear appliances.

2- An older group (typically in their 40s or 50s) are those who require orthodontic treatment to facilitate restorative and/ or periodontal cares known as **adjunctive orthodontic treatment**.

Specific problems in adult orthodontic treatment

- Lack of growth
- Periodontal disease
- Missing or heavily restored teeth
- Physiological factors affecting tooth movement
- Adult motivation and attitude towards treatment

1-Lack of growth

The majority of growth changes have occurred by the end of puberty.

This means that there is no scope for growth modification, so skeletal discrepancies can only be treated with either orthodontic camouflage, or combined orthodontics and orthognathic surgery.

It can also be more difficult to reduce overbites without the benefit of growth. overbite reduction should be achieved by intrusion of the incisors, rather than the more common method of extruding the molars. This is because extrusion of posterior teeth is more prone to relapse in adults.

2-Periodontal disease

Adult patients are more likely to be suffering, from periodontal disease. A reduced periodontium is not a contraindication to orthodontic treatment, but it is vital that any active periodontal disease is treated and stabilized before orthodontic treatment can begin.

3-Missing or heavily restored teeth

Tooth loss may lead to drifting and/or tilting of adjacent teeth and over eruption of opposing teeth into the space. In addition, atrophy of the alveolar bone can occur , leading to a narrowing or ·necking· in the site of the missing tooth or teeth.

This can make tooth movement into these areas more difficult.

Heavily restored teeth are more common in adults and may complicate the orthodontic treatment. The choice of extractions may be determined by the prognosis of the restored teeth , and bonding to certain restorative materials is more difficult than bonding directly to enamel

4-Physiological factors affecting tooth movement

There is a reduced tissue blood supply and decreased cell turnover in adults. which can mean that initial tooth movement is slower in adults,

and may be more painful, Lighter initial forces are therefore advisable.

5-Adult motivation and attitude towards treatment

Adult treatment should take longer than it does in children. It has been suggested that the increased co-operation may compensate for slower initial tooth movement.

Adults tend to be more conscious of the appearance of the appliance, so there has been a drive towards more aesthetic orthodontic appliances .

Adults are not prefer to wear extra-oral appliances, alternative sources of anchorage are therefore more commonly used in adult patients. such as implant-based anchorage

Disease control before orthodontic treatment

Periodontal disease is more common in adults. and is therefore an important factor that must be considered. Periodontal attachment loss is not a contraindication to orthodontic treatment, but active periodontal disease must be treated and stabilized before orthodontic treatment begins.

Loss of periodontal support can lead to pathological tooth migration of a single tooth or a group of teeth. The forces from the tongue are higher than those exerted by the lips and cheeks.
In addition, if posterior teeth are lost then this lack of posterior support produces more pressures on the labial segment. leading to further proclination of the incisors.

Orthodontic management of patients with periodontal disease

1-Once the periodontal disease has been fully stabilized. and the patient is able to maintain a good standard of oral hygiene, treatment can begin. Lighter forces are required, due to the reduced periodontal support. and ideally bonds rather than bands should be used on the molars to aid oral hygiene .Removal of excess adhesive will also help to reduce plaque retention

Orthodontic management of patients with periodontal disease

2. Self ligating brackets or steel ligatures are preferred over elastomeric rings, as patients with elastomeric rings have higher levels of microorganisms in gingival plaque.

3-Retention at the end of treatment needs to be carefully considered. Even when the teeth are aligned and the periodontium is healthy, the problem of reduced periodontal support remains. With reduced per iodontal attachment there will always be a tendency for the forces of the tongue to procline the incisors. These cases require permanent retention, often in the form of bonded retainers, and the patient must be taught how to maintain excellent oral hygiene around these retainers

Adjunctive Orthodontic Treatment

- Usually it involves only part of the dentition.
- Most commonly undertaken in older adult patients.
- Treatment duration tends to be a few months.

Goals of Adjunctive Orthodontic Treatment

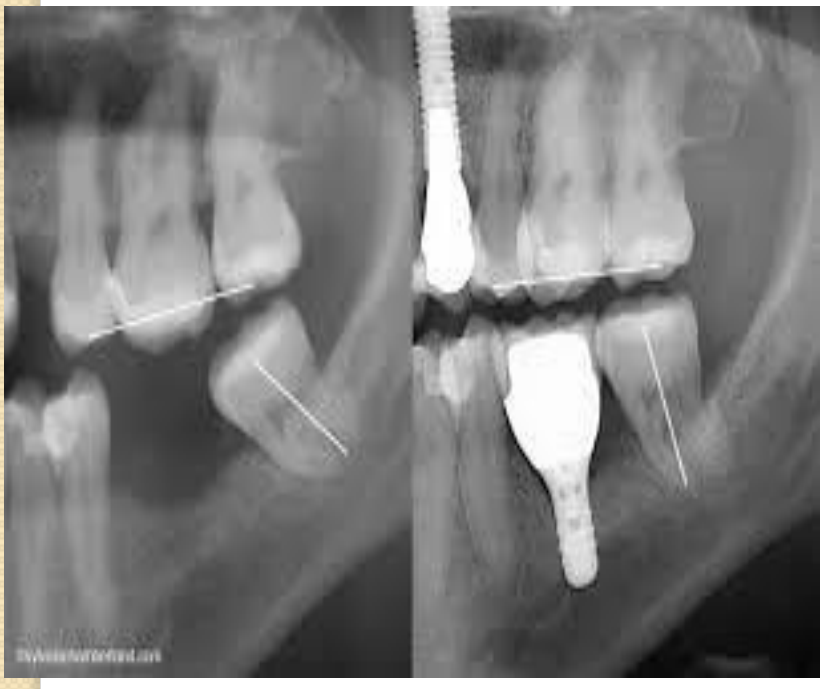
1. Improve the periodontal health by reducing areas that harbor plaque, .
2. Position the teeth so that occlusal forces are transmitted along the long axes of the teeth.
3. Facilitate restorative treatment by appropriate positioning of the teeth

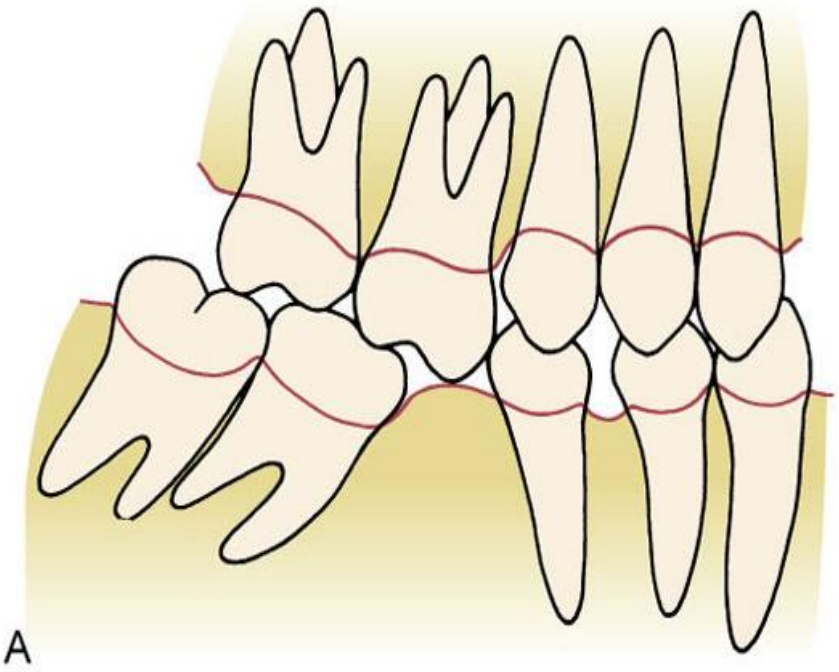
Adjunctive Orthodontic Treatment procedures

1. Uprighting of abutment teeth: following tooth loss adjacent teeth may drift into the space. Up righting these abutment teeth can facilitate the placement of replacement prosthetic teeth.
2. Distribution or closure of spaces: following tooth loss it may be possible to close the remaining space. or move a proposed abutment tooth into the middle of an edentulous span, in order to aid construction of a more robust prosthesis.
3. Intrusion of over erupted teeth.
4. Extrusion of fractured teeth to bring the fracture line supragingivally to allow the placement of crown or restoration .
5. Cross bite correction

Up righting Posterior Teeth

- Loss of lower molar can lead to tipping and drifting of adjacent teeth, poor gingival contour and supra eruption.

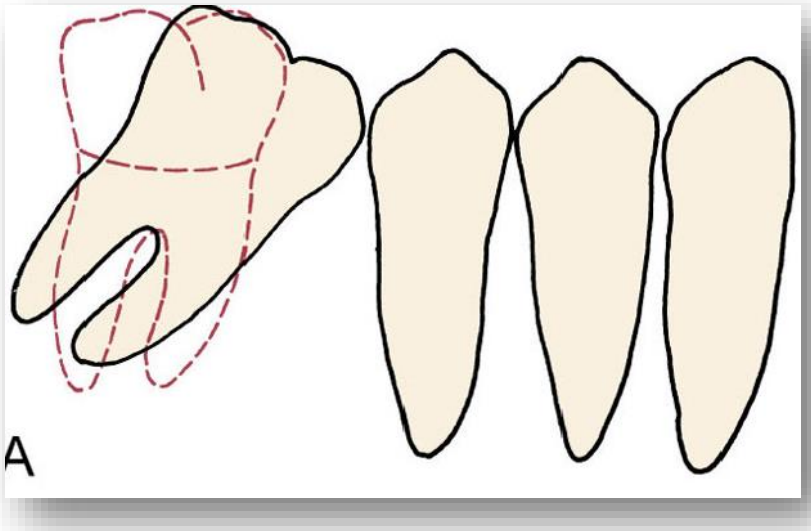




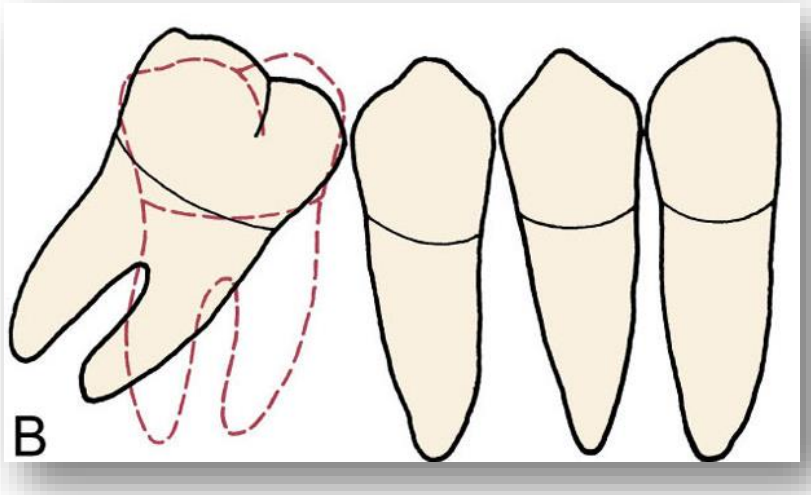
Up righting Posterior Teeth

There are 2 ways to upright tipped teeth:

1. By distal crown movement which would increase the space available for a bridge pontic or implant.

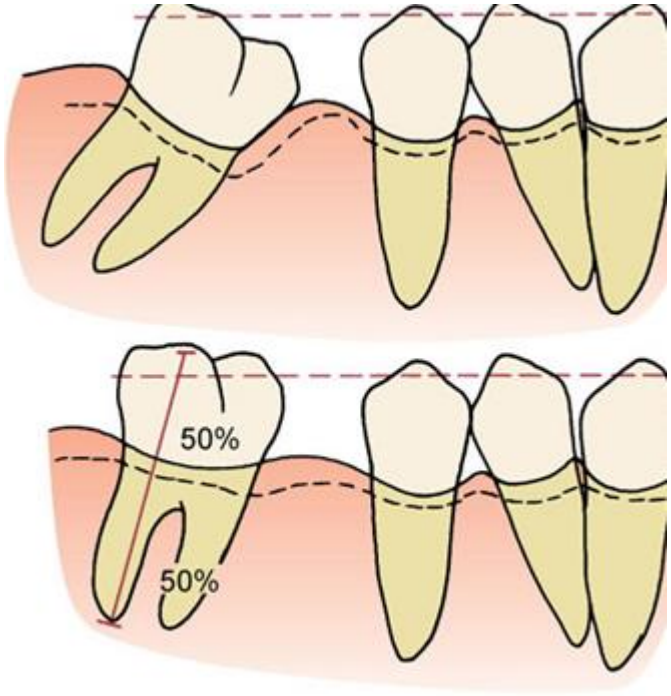


2. By mesial root movement which would reduces or even close the edentulous space.



Up righting Posterior Teeth

- As a general rule **distal tipping is preferred** as mesial root movement can be very difficult especially across old extraction site where there is extensive alveolar bone resorption.



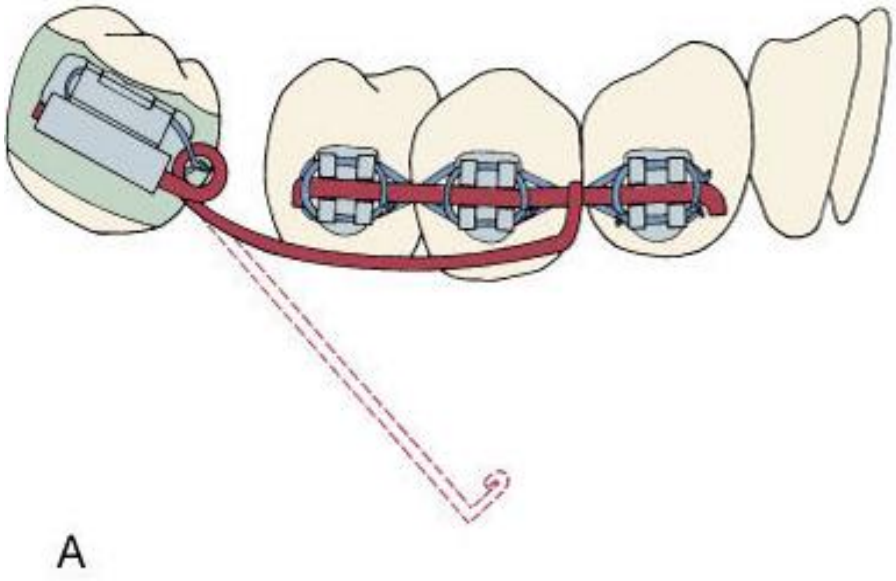
Appliances for Molar Uprighting

- A partial fixed appliance is used consists of bonded brackets on the **premolars and canine** in that quadrant and either a bonded tube on the **molar** or molar band depending on the periodontal condition.
- for better control of anchorage a **bonded canine to canine lingual** wire is used especially if 2nd and 3rd molars need to be uprighted.

- Uprighting can be accomplished either with:

1. a continuous flexible rectangular wire.

2. or with an auxiliary uprighting spring and rigid stabilizing wire on premolars and canine teeth.



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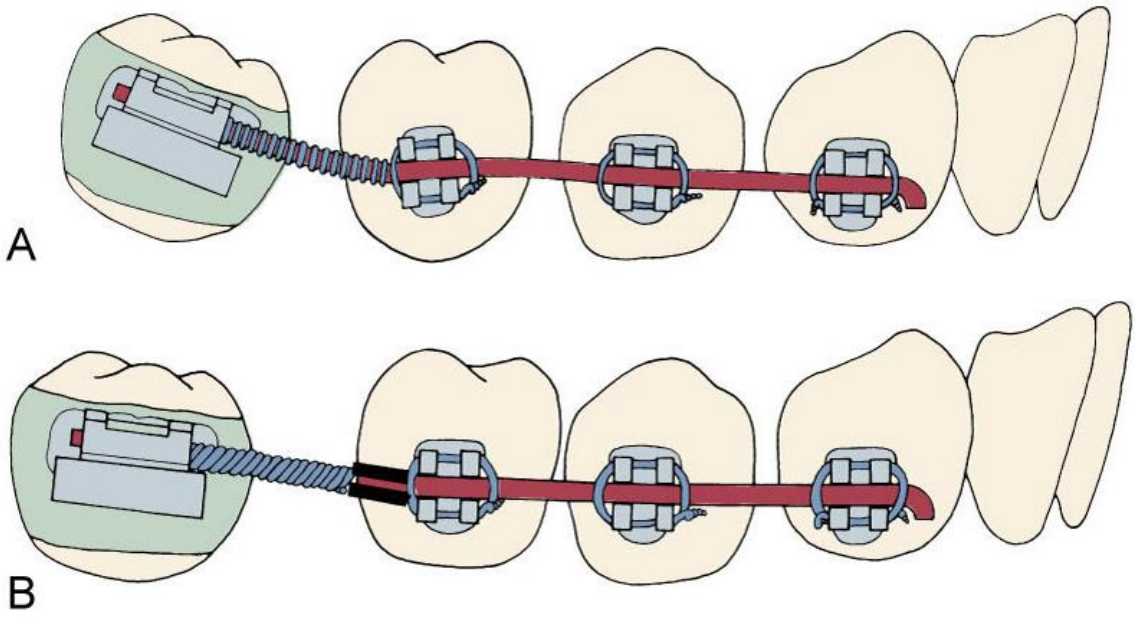
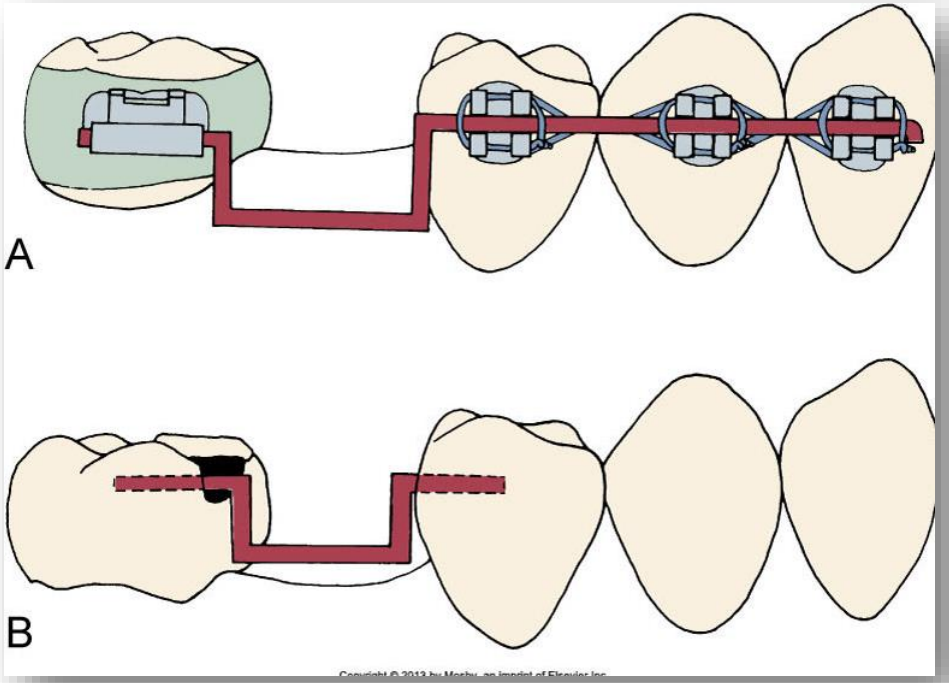
- An open coil steel spring is used to complete molar uprighting and close remaining spaces in the premolar region.



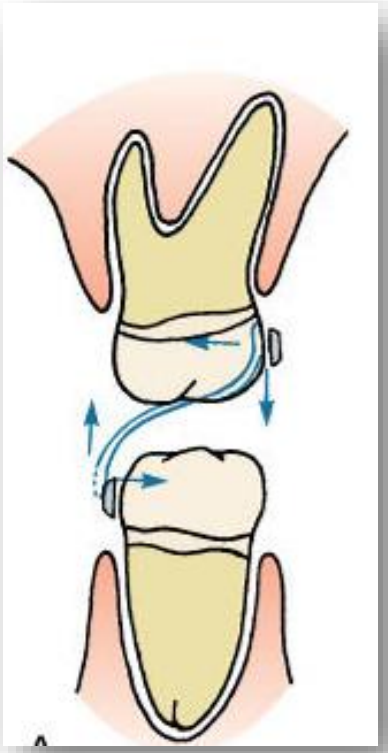
Retention after Molar Uprighting

- After uprighting is completed the molar must be maintained in its new position until a fixed bridge or implant is placed.
- This is achieved using either a heavy rectangular wire engaging the brackets passively, or intracoronal splint that is bonded into shallow preparations in the proximal enamel.



Crossbite correction

- Posterior crossbites are corrected using cross elastics after *stabilizing the teeth in the opposing* arch with heavy arch wire to reduce extrusion of posterior teeth while crossbite is corrected.



Crossbite correction

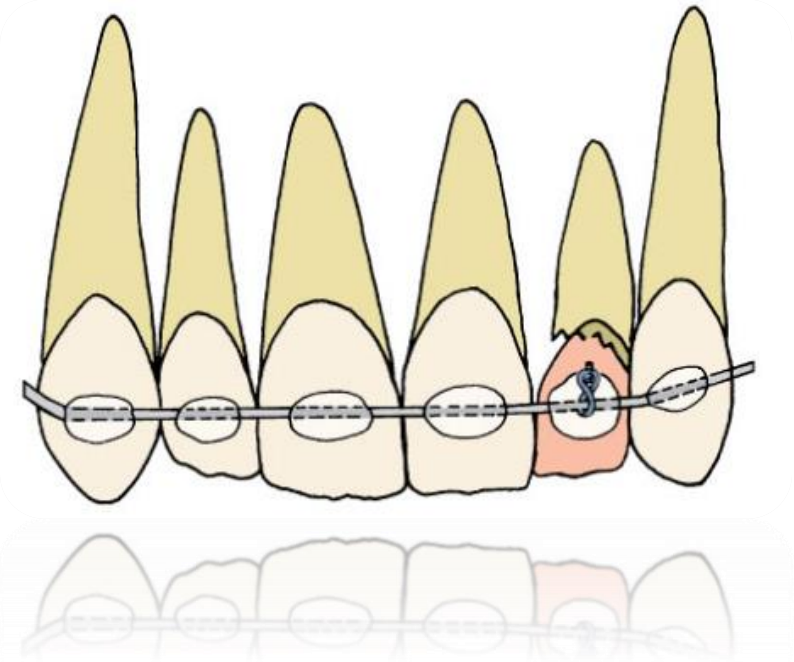
- *Anterior crossbites* are corrected using fixed orthodontic appliance on anterior teeth and molars to control vertical position of anterior teeth.

Extrusion

- Controlled extrusion (forced eruption) is used to move a tooth that is unrestorable because of subgingival pathology into a position that allows treatment.

- Control of apical infection with endodontic treatment should be completed before extrusion of root begins.
- The distance the tooth should be extruded is determined by location of the defect, the tooth should be extruded to the level of *3mm above* alveolar crest.

- Extrusion of teeth occurs ***most readily*** and can be as rapid as 1mm/week without damage to the PDL. Active treatment can be completed in 3-6 weeks.



Extrusion Technique

1. Extrusion can be done using stabilizing wire on *adjacent teeth* and an *elastomeric* module stretched between the wire and a pin placed directly into the crown of the tooth to be extruded.
2. Or placing stabilizing wire on the *opposing teeth* and using *interarch elastics* stretched between the stabilized teeth and a button bonded to the tooth to be extruded.

- After active tooth movement is completed *3-6 weeks* of stabilization is needed to allow reorganization of PDL.
- If periodontal surgery is needed to recontour gingiva, it can be done a month after completion of extrusion.
- The final prosthetic treatment should be completed without delay.

An apically repositioned flap is used to create the correct gingival contour

Alignment of anterior teeth

- Adunctive orthodontic treatment to correct malaligned teeth is indicated to:

1. Allow placement of other restorations, veneers or implant.
2. To close small spaces between teeth.
3. To redistribute larger spaces between teeth to allow composite buildups.

Alignment of anterior teeth

- Alignment is achieved using:

1. Partial or complete fixed appliance with bonded brackets on anterior teeth or all teeth and a bonded tube on first molars for anchorage.
2. The use of a sequence of clear aligners (Invisalign, Clear Correct).

Invisalign aligner

Fixed orthodontic appliance is used to distribute large spaces between the teeth followed by composite buildups

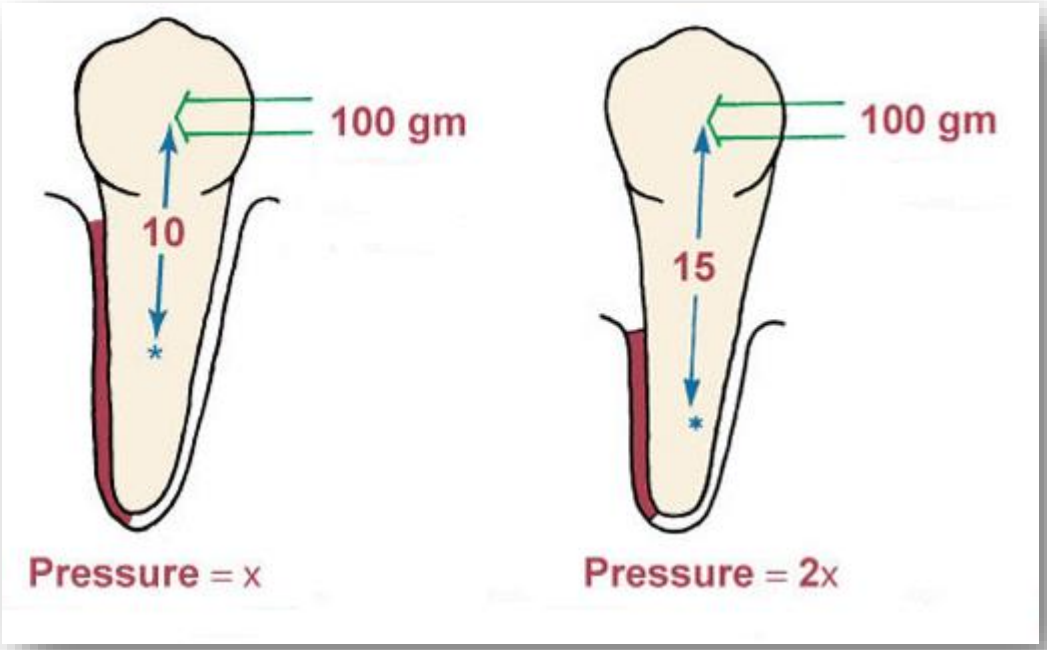
Treatment Modifications for Adult Orthodontic Patients

The stages of comprehensive treatment for adults are the same as those for adolescents but certain aspects need modification:

1. The patient's desire for invisible orthodontic appliance or *esthetically enhanced appliances* like ceramic or other nonmetallic brackets, clear aligners or lingual orthodontics.

Treatment Modifications for Adult Orthodontic Patients

2. Orthodontic force must be kept *light* in patients who have lost some periodontal support, because reduced area of PDL after significant bone loss means higher pressure in PDL from any force with the center of resistance moved apically.

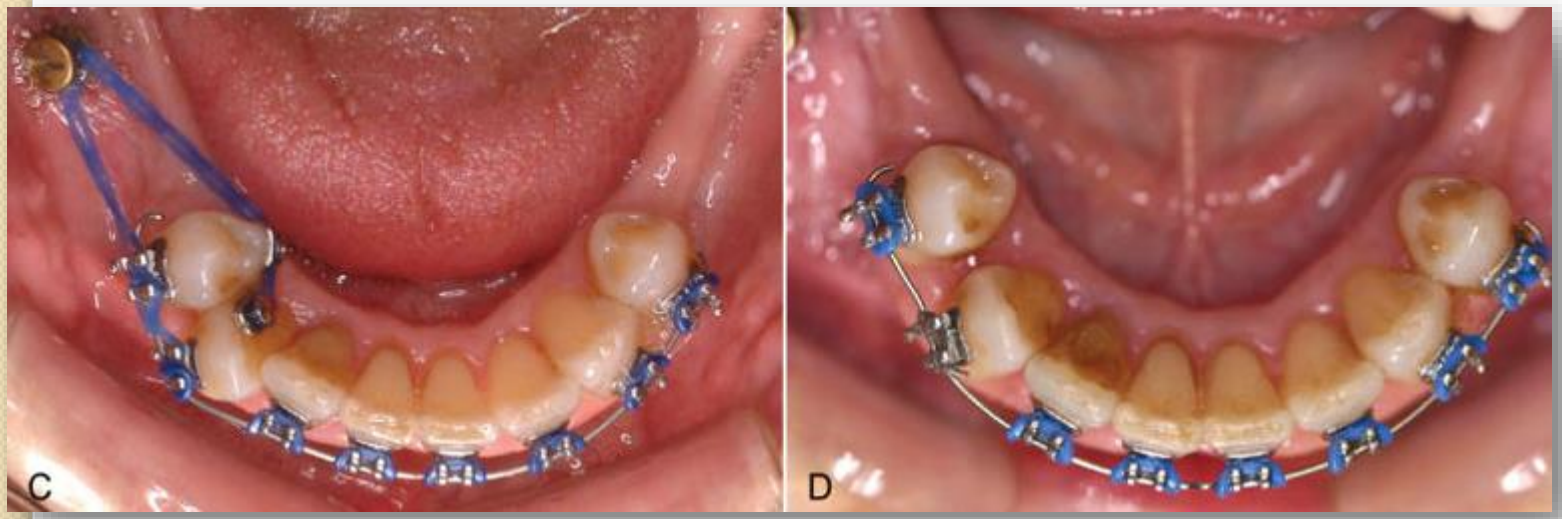


3. Intrusion is often needed in the leveling of both arches because of lack of growth, that allow some extrusion of posterior teeth in adolescents without leading to mandibular rotation.

Treatment Modifications for Adult Orthodontic Patients

4. *Skeletal anchorage* in the form of miniplates or miniscrews is likely to be required for certain tooth movements:
   1. Intrusion of posterior teeth.
   2. Protraction of posterior teeth.
   3. Distal movement of posterior teeth.
   4. To support maximum retraction and/or intrusion of anterior teeth.

5. positioning individual teeth when no other satisfactory anchorage is available (usually because of loss of many teeth)



Esthetic orthodontic Appliances in Treatment of Adults

1) Ceramic or tooth colored brackets: are more desired in treatment of adults than adolescents, their use dose not require change in treatment procedures.
2) Lingual orthodontics: provides an invisible fixed appliance with especially designed attachments bonded on the lingual surface of teeth.
3) Clear aligner therapy (CAT): is almost totally limited to adult treatment and require a quite different approach.

Disadvantages of ceramic brackets

1. **Bonding and band strength :** Ceramic brackets cannot bond chemically with composite resin,
2. **Frictional resistance:** Ceramic brackets offer more friction to sliding of the arch wire, than standard metal brackets.
3. **Bracket breakage:** particularly of the tie-wings is more common with ceramic brackets approach.
4. **Iatrogenic enamel damage:** Ceramic brackets are harder than enamel, so if these brackets are in occlusal contact with the opposing teeth there is a significant risk of enamel wear

Advantages of lingual orthodontic

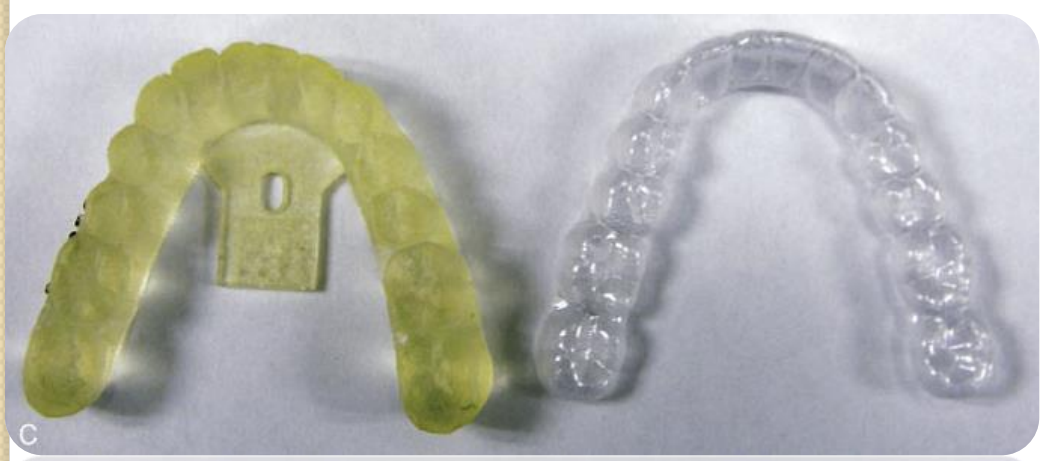
1. Aesthetics
2. No risk to the labial enamel through decalcification.
3. Some lingual brackets create a bite-plane effect on the upper incisors and canines. making these types of brackets useful for treating deep overbites

Disadvantages of lingual orthodontic

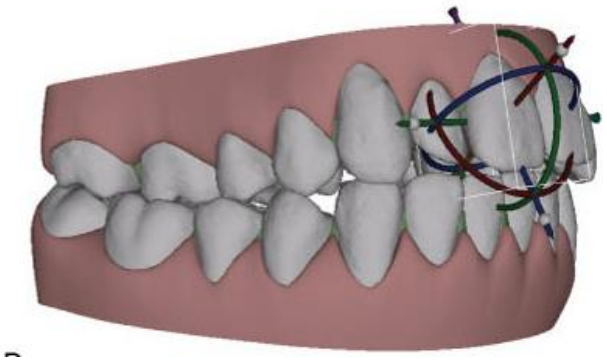
1. Speech alteration
2. Discomfort to the patient's tongue
3. Some lingual brackets create a bite-plane effect on the upper incisors and canines. making these types of brackets useful for treating deep overbites .
4. More technically demanding for the operator which increases the chair-time and therefore the cost of this approach.
5. Increased bracket loss and rebonding failed brackets can be difficult

Clear aligner therapy (CAT)

Treatment with this approach involves the use of a series of aligners on stereolithographic casts produced from virtual 3D models. This 3-D model can then be manipulated by the orthodontist and the malocclusion 'virtually' corrected using special software .



stereolithographic cast and the aligner formed from it



Virtual tooth movement created on virtual model

Many systems are available like Invisalign and Clear Correct, they are usually indicated for treatment of mild to moderate orthodontic problems and when few teeth need to be moved.

Advantages of Invisalign

1. Aesthetics
2. Ease of use and comfort for patient
3. Ease of care and oral hygiene

Disadvantages of Invisalign

1. Limited control over root movement
2. Limited intermaxillary correction without the use of elastics between the aligners
3. Costs

Thank you