

Class II Malocclusion

Angle's class II the mesiobuccal cusp of the lower first molar occludes distal to the Class I position. This is also known as a postnormal relationship.

class II subdivision a class II molar relation in one side and class I molar in the other side .

Angle's classification was based upon the premise that the first permanent molars erupted into a constant position within the facial skeleton, which could be used to assess the anteroposterior relationship of the arches. In addition to the fact that Angle's classification was based upon an incorrect assumption, the problems experienced in categorizing cases with forward drift or loss of the first permanent molars have resulted in this particular approach being superseded by other classifications. However, Angle's classification is still used to describe molar relationship, and the terms used to describe incisor relationship have been adapted into incisor classification.

- **According to British Standards classification:**

CLASS II DIVISION 1 "The lower incisor edges lie posterior to the cingulum plateau of the upper incisors, there is an increase in overjet and the upper central incisors are usually proclined."

CLASS II DIVISION 2 The lower incisor edges lie posterior to the cingulum plateau of the upper incisors. The upper central incisors are retroclined, because of high lower lip line. Overjet is usually minimal or may be increased."

- ***Von-Der-Linden classified Angle's class II/2 malocclusion in to 3 types based on the severity of incisor relationship :***

Type A: Maxillary central incisors and laterals are retroclined. Degree of retroclination is less severe in nature.

Type B: Maxillary lateral incisors are overlapping the retroclined maxillary central incisors.

Type C : Maxillary central and lateral incisors Are retroclined and are overlapped By the maxillary canines.

Features of Class II Division 1

- Proclined maxillary anteriors with resultant inc overjet.
- Proclined maxillary anteriors with resultant inc overjet.
- Patient exhibits convex profile.
- Having increased overbite & excessive curve of spee.
- Patient exhibits “Liptrap”
- Often lack lipseal.
- Patient exhibits abnormal muscle activity leading to constricted upper arch which predisposes to cross bite.

General clinical features of Class II division 2

Extra-Oral:

-Shape of the head: brachycephalic

-Facial profile: convex (straight)

-Chin : Prominent

-Lower Lip: Everted (lower lip line is high relative to the upper incisors)

-Upper Lip: Positioned high in respect to the upper anterior (Gummy smile)

-Mentolabial sulcus: Deep

-Mentalis : Hyperactive

• *Intra-Oral:*

- Class II molar relation (Distocclusion)

- Deep bite: overclosure (closed bite)

- Class II canine relation

- Decreased overjet

***- Retroclined maxillary central
(extruded)***

- Accentuated curve of Spee

***- Labially tipped maxillary lateral
incisors***

***- Retroclined lower incisors
(Extruded → lack of stops)***

AETIOLOGY

- **SKELETAL PATTERN**
- **HABITS**
- **SOFT TISSUES**
- **DENTAL FACTORS**

Skeletal Class II malocclusion Results from a discrepancy in the maxillary-mandibular skeletal relationship. It might be either due to:

- 1) Mandibular deficiency***
- 2) Maxillary excess***
- 3) or a combination of both***

✚ Skeletal Class II → Mandibular deficiency It is a skeletal class II relationship resulting from a mandible that is either small or retruded relative to the maxilla.

- ***Mandibular deficiency due to small size of ramus and body of mandible. This results in a downward or backward rotation of mandible and this result in:***

Cephalometric Features

- * ***Decreased posterior facial height.***
- * ***Steeper mandibular plane angle.***
- * ***A normal SNA angle.***
- * ***Decreased SNB angle.***
- * ***Inceased ANB angle.***
- * ***Increased angle of convexity.***
- * ***Normal position of point A but a posterior positions of point B relative to Nasion perpendicular.***
- * ***It is common in a sever mandibular deficiency to have dental compensation for the skeletal disproportion displayed cephalometrically as protruded lower incisors (increased angulation of mandibular incisors relative to mandibular plane on Frankfort horizontal.***

- ***Class II div 2 with a small mandible → the decreased size is localized more to the mandibular body (Mandibular Ramus is of normal lenght)***

Cephalometrically:

- 1) Flat mandibular plane***
- 2) Increasesd posterior facial height***

3) Short lower anterior facial height

(resulting in both upper and lower lip having a more everted position at rest)

4) Mandibular length measured from Ar-Gn-Pog may appear normal because of the excessive chin projection.

5) SNA: normal , SNB: decreased , ANB: increased (Stiener)

- **Mandibular deficiency may result from the retrusion (distal positioning) of a normal-sized mandible.**

Cephalometrically:

SNA: Normal , SNB: Decreased , ANB: Increased (Stiener)

-Distinguishing characteristics:

a)The cranial base defined by (S-N-Basion) is more obtuse

b)Glenoid fossa in a relatively posterior in position.

c)Normal size of mandibular ramus and body

d) normal lower facial height

+ Skeletal Class II → Maxillary excess

- 1. Vertical dimension (Posterior excess ,Or Overall vertical excess)**
- 2. or Anterior-posterior dimension**
- 3. (Combination of both)**

- Vertical Maxillary excess may be localized only to the posterior area → Open bite and incompetent lips (normal vertical display of maxillary incisors in repose and during smiling.)
- Overall maxillary excess includes both the anterior and the posterior area → resulting in an excessive vertical display of the maxillary incisors in repose and during smiling (high smile line)→ Gummy smile.
- In these 2 conditions of maxillary excess→ Mandible is rotated downward and posteriorly (clockwise)→ resulting in a class II skeletal relationship.

- ***Class II with an overall vertical maxillary excess:***

Cephalometrically:

- SNA: Normal , -SNB: Decreased , -ANB: Increased (Stiener)
- Increased lower anterior facial height
- Steeper mandibular plane
- More inferior position of the maxillary molars relative to palatal plane.
- Clockwise rotation of the mandible

- ***Maxillary excess in Ant-Post Dimension is characterized by a protrusion of the entire midface including :***

1. Nose
2. infraorbital area
3. Upper lip

Cephalometrically:

SNA: increased , SNB: Normal , ANB: Increased

- Increased face convexity. -Overjet: excessive
- Over eruption of mandibular incisors -Excessive overbite.
- If midface protrusion is severe →The lower lip will be positioned lingual to maxillary incisors encouraging there protrusion.

- **Skeletal Class II might be a combination of both mandibular deficiency and maxillary excess. Which will add to the severity of the Ant-post skeletal problem.**

- ***SOFT TISSUES FACTORS :- Influence of soft tissue is mainly mediated by skeletal pattern both antero-posteriorly & vertically.***
 - *In a Class II division 1 malocclusion the lips are typically incompetent owing to the prominence of the upper incisors and/or the underlying skeletal pattern. If the lips are incompetent,*
 - *Patient's try to achieve anterior oral seal in one of the following ways:*
 - *Circumoral muscular activity.*
 - *Forward postured mandible.*
 - *Lower lip is drawn up behind the upper incisors.*
 - *Tongue is placed forward between incisors to contact lower lip.*
 - *Combination of these*

Where the patient can achieve lip-to-lip contact by circumoral muscle activity or the mandible is postured forwards, the influence of the soft tissues is often to moderate the effect of the underlying skeletal pattern by dento-alveolar compensation.

More commonly the lower lip functions by being drawn up behind the upper incisors, which leads to retroclination of the lower labial segment and/or proclination of the upper incisors with the result that the incisor relationship is more severe than the underlying skeletal pattern.

If the lower facial height is reduced

- *A high lower lip line will tend to retrocline the upper incisors.*
- *Class II division 2 incisor relationships may also result from bimaxillary retroclination caused by active muscular lips irrespective of the skeletal pattern..*

❖ *HABITS FACTORS digit sucking lead to :-*

- *Proclination of the upper incisors.*
- *Retroclination of the lower labial segment.*
- *Incomplete overbite or localized anterior open bite.*
- *Narrowing of maxillary arch, Due to alteration in the balance between cheek & tongue pressure*

❖ **Dental factors:** *The causes of dental Class II malocclusions can be subdivided into two groups:*

1- Maxillary dental protrusion

Maxillary dental protrusion may be confused with anteroposterior maxillary excess or midface protrusion, maxillary dental protrusion is not a skeletal problem but a dentoalveolar one that is limited to the maxillary dental arch. The facial appearance of anteroposterior maxillary excess is a protrusion of the entire midface, whereas maxillary dental protrusion only affects the lips. Excessive overjet is a reliable feature of this dental malocclusion, and there may be generalized maxillary spacing.

2- Mesial drift of the maxillary first permanent molars.

Mesial and occlusal drift of the permanent first molars occurs if there is loss of mesial proximal contact with the second primary molars from congenital absence, extraction, dental caries or ankylosis.

Ectopic molar eruption, if left untreated, the maxillary first permanent molar assumes a more mesial position, resulting in a Class II permanent molar relationship if the mandibular arch is unaffected .

○ **Factors influencing a definitive treatment plan**

1-Severity of malocclusion

- The skeletal pattern is the major determinant of the difficulty of treatment.
- Those cases with a marked anteroposterior discrepancy and/ or significantly increased or reduced vertical skeletal proportions will require careful evaluation, an experienced orthodontist, and possibly surgery for a successful result

2) Age of the patient Timing of the treatment: is an important factor in the amount of change that can be produced

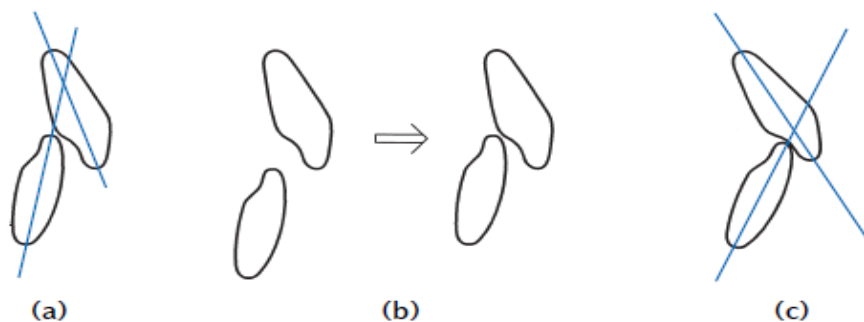
- Optimum time for growth modification → Pre-pubertal growth spurt
- therefore proper diagnosis of the patient at early age and the use of correct functional appliances will cause the patient to → avoid surgery

3-The patient's facial appearance

- 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.
- Features include an obtuse nasolabial angle or excessive upper incisor show a surgical approach may be preferred

4-The likely stability of overjet reduction

- The soft tissues are the major determinant of stability following overjet reduction
- **Ideally, at the end of overjet reduction the lower lip should act on the incisal one-third of the upper incisors and be able to achieve a competent lip seal.**
- If this is not possible, consideration should be given as to whether treatment is necessary (if alignment is acceptable and the overjet is not significantly increased) and, if indicated, whether prolonged retention or even surgery is required.



If a Class II division 2 incisor relationship is to be corrected not only the overbite but also the inter-incisal angle must be reduced to prevent re-eruption of the incisors post-treatment: (a) Class II division 2 incisor relationship; (b) reduction of the overbite alone will not be stable as the incisors will re-erupt following removal of appliances; (c) reduction of the inter-incisal angle in conjunction with reduction of the overbite has a greater chance of stability.

The inter-incisal angle in a Class II division 2 malocclusion can be reduced in a number of ways:

- Torquing the incisor roots palatally/lingually with a fixed appliance
- Proclination of the lower labial segment. This approach should only be employed by the experienced practitioner as, although it provides additional space for alignment of the lower incisor teeth, any excessive movement of the lower arch would increase the risk of relapse.
- Proclination of the upper labial segment followed by use of a functional appliance to reduce the resultant overjet and achieve intermaxillary correction.
- A combination of the above approaches.
- Orthognathic surgery. This approach may be the only alternative for patients with a marked Class II skeletal pattern and/or reduced vertical skeletal proportions.

Treatment of Class II

- **Class II malocclusion → Dental or Skeletal**

Dental Class II → Orthodontic treatment (extraction or non extraction)

Skeletal Class II →

- 1) Growth modification (Growing patient)**
- 2) Dental camouflage (extraction vs non extraction)**
(mild to moderate skeletal class II)
- 3) Orthognathic surgery + with orthodontic treatment**
(moderate to severe Class II)

For a dental Class II malocclusion:

Extraction or non-extraction treatment. → depending on the severity of mesial drift of the maxillary 1st molar.

-slight mesial drift (mesial crown tipping) + minimal crowding → Nonextraction + distalization of maxillary 1st molar

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

Treatment of skeletal Class II malocclusion

- **Growth modification for class II skeletal problem: (Orthopedic treatment)**

- the goal of growth modification is to enhance the unacceptable skeletal relationship by modifying remaining facial growth pattern of the jaws.

- Optimum timing : Pre-pubertal growth spurt (*active growth period*)

Type :- 1) Headgear (extra-oral force)

2) Functional appliances (Removable and fixed)

- **Headgear:**

it delivers an extra-oral orthopedic force to compress the maxillary sutures and modify the pattern of bone apposition at these sites as well as distalize the maxillary dentition or maxilla itself. It derives the anchorage from cervical or cranial regions.

The goal of treatment is to restrict the maxillary growth, while the mandible continues to grow forward to forward to “catch up” the maxilla

Components of Head gear:

-1) Face bow:- It is a metallic component that helps in transmitting extra oral forces on to the posterior teeth. It consists of outer bow, inner bow & junction.

2) Force element:- It provides the force to bring about desired effect comprises of springs, elastics & stretchable materials.

3) Head cap or Cervical strap:- The appliance takes anchorage by means of head cap or cervical strap.

- 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

Removable Functional:

- Activator
- Bionator
- Twin block
- Frankyl II

Fixed Functional:

- Herbst
- Jasper jumper

Dental Camouflage:

- It is a treatment that seeks to create a dental compensation to hide the skeletal discrepancy → Maxillary Retroclination and Mandibular Protraction.
- **Indicated:**
 1. Adults
 2. Mild to Moderate skeletal Class II cases
 3. Minimal dental crowding .
 4. Acceptable facial esthetics
 5. Usually requires extraction

Orthognathic surgery:

- A combination of orthodontic therapy and Orthognathic surgery for the correction of moderate to severe skeletal class II malocclusion (*Adults, no growth potential*)
 - Indicated:
 - 1) Moderate to Severe skeletal discrepancy
 - 2) Facial imbalances or asymmetries: long lower face , Gummy smile
 - 3) Limitations of tooth movement : Upright on basal bone
 - 4) Relapse potential of orthodontic treatment.
 - 5) Severe crowding and protrusion in the dental arches with skeletal class II malocclusion (extraction space is not sufficient to correct buccal occlusion)
 - Surgical correction includes:

1) Mandibular Advancment: skeletal class II cases with mandibular deficiency

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

2)Maxillary Impaction: (Le Fort 1 maxillary osteotomy)

Indicated: Vertical Maxillary excess ,

Vertical maxillary excess in the anterior and posterior region of maxilla

→ Requires maxillary impaction by a total maxillary ostoetomy .

To correct the:

- 1) Gummy smile
- 2) Excessive lower facial height
- 3) Incompetent lips
- 4) Mandible will rotate anti-clock wise

3)Anterior Maxillary sub-apical setback

Indicated: Maxillary excess is in A-P dimension/ Mid-face protrusion (No vertical excess)

- **Combined Surgical approaches :**

Indicated: Maxillary excess (vertical or A-P) combined with mandibular deficiency.