

CLASS III MALOCCLUSION

Class III malocclusion A malocclusion that is:very easy to identify but is often difficult to treat Orthodontic treatment not only involves establishment of physiologically and anatomically functional occlusion but also includes correction of the relationship of the maxilla and mandible to each other and to the rest of the craniofacial complex

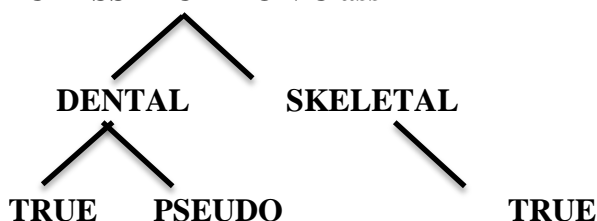
Skeletal Class III malocclusion can be defined as skeletofacial deformity characterized by a forward mandibular position with respect to the cranial base and maxilla. The facial dysphasia can be classified into mandibular prognathism, maxillary retrognathism or combination of both depending variation of the anteroposterior jaw relation

According to British standards Incisor classification, in class III malocclusion the lower incisor edges lie anterior to the cingulum plateau of the upper incisors. The overjet is reduced or reversed.

□ According to Angle's classification, in class III the mesiobuccal cusp of the lower first molar occludes mesial to the class I position (**mesioocclusion**)

- Vertically they can be classified as, long ,average and short face. To obtain an accurate diagnosis of class III malocclusions, a through evaluation of the clinical data is necessary include:
 - ❖ 1) Age, Sex, and family history of patients.
 - ❖ 2) Molar relationship; careful assessment.
 - ❖ 3) Craniofacial morphologic characteristics: i.e. maxilla and mandible relation to cranial base, intermaxillary relationship, mandibular plane angle, gonial angle and vertical dimension.
 - ❖ 4) Position of maxillary and mandibular incisor.
 - ❖ 5) Soft tissue appearance : frontal and profile views can identify the skeletal class III problem.
 - ❖ 6) Functional Shift :- Some ant crossbite and skeletal class III patients shows functional shift, due to premature contact between maxillary and mandibular incisors

CLASSIFICATION Class III



Occlusal features

- A Class III molar relationship.
- A Class III canine relationship.
- A reverse overjet with possibly labially inclined upper incisors and lingually lower incisors .
- A posterior cross-bite unilateral or bilateral (or functional) due to a constricted maxillary arch or a more forward positioned lower arch

CEPHALOMETRIC CLASSIFICATION

+ Dentoalveolar Class III:

- ❖ No apparent sagittal skeletal discrepancy (normal ANB angle)
- ❖ Tipping of incisors : upper- lingual and lower -labial

+ Skeletal Class III:

- ❖ Cranial base :- the linear and angular measurements of the cranial base were decreased. Cranial base angle is acute and exhibited a more anteriorly positioned articulare compared with Class I malocclusion. Middle cranial fossa in Class III patients has posterior and superior alignmet. This alignment positions the nasomaxillary complex in more retrusive relation and contributes to a forward rotation of the mandible.
- ❖ Max retrusion , Mand prognathism or Combination
- ❖ Negative to 0 ANB angle
- ❖ Increased mand length and more obtuse gonial angle
- ❖ Tipping of incisors: upper- labial & lower lingual (compensation)

+ **Pseudo Class III** Ceph values intermediate to class I & III. The only exception was the gonial angle, which was more obtuse in skeletal Class III sample. measurement of gonial angle in pseudo Class III was found to be similar to Class I sample. ***This is main key point in pseudo and Class III***

ETIOLOGY

- + True Class III malocclusion exhibits(Underlying skeletal imbalance) usually inherited have a very strong GENETIC basis.
- + Habitual forward positioning of the mandible (Pseudo Class III) for example Occlusal prematurities, Enlarged adenoids
- + In additions Rakosi and Sehilli suggested a role for environmental influences such as habits and mouth breathing in the etiology of Class III malocclusion. They hypothesized that excessive mandibular growth could arise as a result of abnormal mandibular posture because constant distraction of the mandibular condyle from the fossa may be a growth stimulus

Causes of an reversed overjet

cause	Aetiology
Skeletal pattern (Class III)	<ul style="list-style-type: none"> - Long mandible - Forward placement of glenoid fossa positioning the mandible more anteriorly - Short and/or retrognathic maxilla - Short anterior cranial base
Anterior mandibular displacement on closure	- Premature contact
Retained primary upper incisors	These may deflect the eruption path of their successors palatally into crossbite
Restrained of maxillary growth	- Found in repaired cleft lip & palate & attributed to the effect of postsurgical scar tissue

features of true and pseudo class III

True class III

- Concave profile
- a class III skeletal pattern,
- No premature contacts
- Forward path of closure
- Gonial angle increased or decreased.
- Retrusion of mandible is not possible

Pseudo class III

Straight / concave

a class I skeletal pattern,

Premature contacts present

Deviated path of closure

Normal gonial angle

Retrusion of mandible is possible

Treatment planning in class III malocclusions

◆ Many factors should be considered before planning the treatment:

1. **The patients opinion** regarding their occlusion and facial appearance.
2. **The severity of the skeletal pattern.** both- Anteroposteriorly &- Vertically(The major determinant of the difficulty & prognosis of orthodontic treatment).
3. **The expected pattern of future growth.** Both anteroposteriorly &vertically Children with increased vertical proportions The average growth tend to often continue to exhibit Worsening a vertical pattern of the relation between the arches. which reduce the overbite.
4. **Overbite** in Class III malocclusions normal or increased overbite is an advantage as a vertical overlap of the upper incisors with the lower incisors post-treatment is vital for stability.
5. **If the patient can achieve an edge-to-edge incisor position:** Increase the prognosis of correction the incisor relationship.
6. **Dento-alveolar compensation.** Orthodontic treatment aimed to increase it, if it already present, trying to increase it further may not be an aesthetic or stable treatment option.
7. **The degree of crowding.** • crowding occurs more frequently, and to a greater degree, in the upper arch. Extractions should be resisted as it worsening the incisor relationship. Where upper extractions are necessary, it is advisable to extract at least as forwards in the lower arch.

◆ Class III malocclusion characterized by upper arch length deficiency and anterior cross bite
To relief upper arch crowding Additional space can be gained by:

1. **Expansion the arch Anteriorly** to correct anterior cross-bite to correct the incisor relationship and/or
2. **Expansion the arch Buccoligually** to correct buccal segment cross-bite, will have the effect of reducing overbite, which is a disadvantage in Class III (overbite reduction occurs because expansion of the upper arch is achieved primarily by tilting the upper premolars & molars buccaly) palatal cusps swinging and ‘propping open’ the occlusion.

If upper arch expansion is indicated & the overbite is reduced Fixed Appliances should be used to limit tilting of upper molars buccally during expansion.

3. **Distal movement of the upper buccal segment** with Headgear to gain space for alignment (is inadvisable in growing patient due to restraining growth of maxilla).

Mild to Moderate Crowding, space can be made by a Combination of 1. forward movement of the incisors & 2. distal movement of the remaining buccal segment teeth

◆ In case of sever arch length deficiency involving both the arches, the first premolars should be extracted in both the upper and lower arches

Treatment modalities

1. Growth modification
2. Orthodontic correction
3. Surgery

Class III malocclusion should be recognized and treated early due to the

• **The reasons for early treatment:**

1. To correct the anterior displacement of the mandible before the eruption of the canine and premolars so that they can be guided into a Class 1 Relationship
2. To provide space for the eruption of the BUCCAL segments as a result of Proclination of the upper incisor
3. to provide a normal environment for the growth of the maxilla by Elimination the Anterior Crossbite
4. Psychological benefits resulting from improved dental and facial appearance.

Interception during growth

Orthopedic appliance What is Orthopedic appliance ? ♦ Orthopedic appliance that allows orthodontists to control growth of facial structures it is:

- ♦ Various designs
- ♦ Used with growing patients

Class III malocclusions that are a result of maxillary retrusion can be treated by **reverse headgear or face mask** to protract the maxilla

Maxillary skeletal appliances face mask (Reverse Pull Headgear)

APPLIANCE DESIGN: ♦ The orthopedic facial mask consists of three basic components.

- ❖ FACIAL MASK
- ❖ BONDED /BANDED MAXILLARY SPLINT
- ❖ ELASTICS

♦ The facial mask : an extra oral device composed of **a fore head pad** ,**a chin pad** that are connected with **a heavy steel support rod**. To this support rod is connected **a cross bow to which are attached rubber bands** to produce a forward and downward elastic traction of the maxilla. The position of the pads and the cross bow can be adjusted simply

- ♦ (Require a Very Cooperative Patient) ♦ Used to apply an anteriorly directed force, via ELASTICS, on the maxillary teeth and maxilla

The face mask is most effective in the treatment of mild to moderate skeletal Class III malocclusions with a retrusive maxilla

- ♦ This technique also useful in Class III associated with a CLP anomaly & hypodontia where forward movement of the buccal segment teeth to close space is desirable.
- ♦ Side effects include /downward and backward rotation of the mandible /Lingual tipping of the mandibular incisors

Treatment timing for Orthopedic facial Mask Therapy: Recent studies showed first treatment of Class III malocclusion with facial mask in early mixed dentition results in more favorable for craniofacial changes than in late mixed dentition. This is mainly due to changes in maxillary suture which leads to forward displacement of maxilla in early mixed dentition. All these observation suggest that the early mixed dentition phase of dental

development is most appropriate period to perform treatment of Class III malocclusion with the orthopedic facial mask.

In a prospective clinical trial, overjet correction was found to be the result of forward maxillary movement (31%), backward movement of the mandible (21%), labial movement of the maxillary incisors (28%), and lingual movement of the mandibular incisors (20%).

SKELETAL EFFECTS OF MAXILLARY PROTRACTION (sutures involved): The maxilla articulates with nine other bones of the craniofacial complex: frontal, nasal, lacrimal, ethmoid, palatine, vomer, zygoma, inferior nasal concha, opposite maxilla, and occasionally sphenoid. Palatal expansion had been shown to produce a forward and downward movement of the maxilla by affecting the intermaxillary and circummaxillary sutures. The disruption of these sutures may help initiating cellular response in the sutures, allowing a more positive reaction to protraction.

- **Chin cup therapy** Skeletal Class III malocclusion with relatively normal maxilla and moderately protrusive mandible can be treated with the use of a chin cup.
- Early treatment with chin cup provides better growth inhibition or redirection and post positioning of the mandible.
- Effects on mandibular growth: The orthopedic effects of a chin cap on mandible includes
 1. Redirection of mandibular growth vertically.
 2. Backward rotation of mandible.
 3. Remodeling of mandible with closure of the gonial angle
- **Effects on Maxillary growth:** Some studies have indicated that a chin cap appliance has no effect on antero posterior growth of the maxilla. But early correction of an anterior crossbite with chin cap prevents retardation of A-P maxillary growth.
- Chin caps are divided into two types
- 1) occipital chin cap that is used for patients with mandibular protrusion.
- 2) Vertical pad chin cap used in patient with steep mandibular plane angle and excessive anterior facial height.

Force magnitude and duration

- **Orthopedic force is about 300-500 gm / side.** Patient is instructed to wear 14 hr/day. The orthopedic force is usually delivered either through the condyle or below the condyle
- **Treatment timing and duration:** Patient with mandibular excess usually recognized in the primary dentition because most of children will have retrusive mandible. To reduce the mandibular protrusion is more successful when treatment is started in primary or early mixed dentition. The treatment time varies from 1 year to as long as 4 year depending on the severity of the original malocclusion. The stability of chin cup treatment remains unclear. Several investigators reported a tendency to return to the original growth pattern after the chin cup is discontinued.

Functional appliances/ Frankel III, a myofunctional appliance can be used during growth to intercept Class III malocclusion due to maxillary skeletal retrusion.

- The Frankel III (FRIII) regulator is a functional appliance designed to counteract the muscle forces acting on the maxillary complex.
- According to Frankel the vestibular shields in the depths of the sulcus are placed away from the alveolar buccal plates of the maxilla to stretch the periosteum and allow for forward development of the maxilla.
- The shields are fitted closely to the alveolar process of the mandible to hold or redirect growth posteriorly. The effectiveness of each appliance is dependent on patient cooperation and wearing them full time.

can be useful in mixed dentition where a combination of— Proclination of the upper incisors together with— Retroclination of the lower incisors is required.

Orthodontic correction

Can be achieved by either(i)- Proclination of the upper incisors alone **or(ii)-** Retroclination of the lower incisors with or without proclination of the upper incisors.

This determined by: – Skeletal pattern & – Amount of overbite present before treatment

Proclination of the upper incisors **decrease** the Overbite. Retroclination of the lower incisors **increase** the Overbite

Treatment options:

- 1. Accepting the incisor relationship:**(a) - in mild cases where the overbite is minimal;(b) - if the remainder of the family have a similar facial appearance.
- 2. Proclination of the upper labial segment:** Best carried out in the mixed dentition when the canines are unerupted and high above the roots of the upper lateral incisors. Correction of the incisors relationship by proclination of the upper incisors only can be considered in cases with the following features:
 - a) A Class I or mild Class III skeletal pattern.
 - b) The upper incisors are not already proclined.
 - c) An adequate overbite will be present at the end of treatment to retain the corrected position of the upper incisors.
- 3. Retroclination of the lower labial segment with or without proclination of the upper labial segment:**/In those cases with a mild to moderate Class III skeletal pattern, or where there is reduce overbite, A combination of retroclination of the lower incisors and proclination of the upper incisors will achieve correction of incisors relationship.
To advance the upper incisors & retrocline the lower incisors can be done by:
 - ✚ Removable appliances,
 - ✚ Functional appliances&
 - ✚ Fixed appliances: tooth movements are accomplished more efficiently

. For retroclination the lower labial segment Space is required in the lower arch & Extractions are required unless the arch is spaced naturally.

Role of extractions

◆ Extraction of the lower deciduous canines may allow the lower incisors to drop lingually and assist in the correction of the reverse overjet.

Retroclination of the lower labial segment with or without proclination of the upper labial segment: ◆ Use of a ROUND archwire in the lower arch & a RECTANGULAR arch in the upper arch help to correct the incisors relationship. ◆ Intermaxillary Class III elastic traction from the lower labial segment to the upper molars can also be used to help move the upper arch forwards & the lower arch backwards (care required to avoid extrusion of the molars which will reduce overbite).

Surgery

◆ Severe skeletal pattern and/or ◆ reduced overbite or ◆ an anterior openbite (Precludes orthodontic alone)

Surgery is almost required if the value for $ANB^0 < -4^\circ$ & The inclination of the lower incisors to the mandibular plane $< 83^\circ$.

Treatment of severe Class III after growth

- ❖ Class III Maxillary deficiency Lefort I osteotomy
- ❖ Class III Mandibular prognathism Mandibular set back:
 - ✚ Sagittal split osteotomy procedures
 - ✚ Body osteotomy or
- ❖ Prominent chin : reduction Genioplasty

POST SURGICAL ORTHODONTICS Can be initiated 3 to 4 weeks after the release of immobilization. Stabilization arch wires are removed and replaced by working arch wires with light vertical forces till a good stable occlusion is achieved.