# Lecture 8 Treatment of Class III malocclusion (Part 2)

## 1 Treatment of Class III malocclusion

### 1.1 Treatment objectives and limitation

1. Reduction of crowding.
2. Correction of reversed overjet.
3. Correction of incisal overbite.
4. Correction of crossbite and buccal segment relationship.

**1- *Reduction of crowding:***

It is necessary to create a space to treat crowding by proclination of upper incisors and / or expansion of upper arch. Where these treatment measures do no provide adequate space, then the maxillary second premolars are the teeth of choice for extraction. Whilst in the lower arch, teeth extraction may be required to create space in the treatment of crowding and retroclination of the lower incisors.

**2- *Correction of reversed overjet:***

In mild and moderate cases, it can be treated with growth modification or orthodontic treatment [camouflage] using either fixed orthodontic appliances or removable appliances for proclination of the upper incisors and or retroclination of the lower incisors. While if there is severe skeletal discrepancy, surgical treatment may be required.

**3- *Correction of incisal overbite:***

Class III malocclusion can be associated with a deep bite or open bite. The correction of deep bite is based on the correction of reversed overjet. The treatment of open bite is limited to minor cases using fixed appliances to extrude the upper and lower incisors.

**4- *Correction of crossbite and buccal segment relationship:***

Unilateral crossbite associated with the initial contact and translocated closure of the mandible can be treated by expansion of the upper arch. On the other hand, a bilateral crossbite can be accepted unless there is a very narrow upper arch associated with crowding. In this case, it is possible to expand the upper arch either by rapid maxillary expansion (RME) or by means of an expansion screw.

## 1.2 Treatment modalities:

**A. Growth modification.**
**B. Orthodontic treatment and camouflage.**
**C. Orthognathic surgery.**

***Treatment planning in Class III cases is difficult and influenced primarily by***:

1. The skeletal discrepancy.
2. Size of the reverse overjet.
3. Extent of crowding.
4. Degree of existing dento-alveolar compensation.
5. The future growth.

### 1.2.1 Growth modification:

Class III malocclusions usually present in the early mixed dentition following eruption of the permanent incisors. Orthopaedic correction of Class III malocclusions aims to enhance or encourage maxillary growth and/or restrain or re-direct mandibular growth.

***Class III malocclusion should be recognised and treated early due to the following reasons:***

1. To correct the anterior displacement of the mandible before the eruption of the canines and premolars so that they can be guided into a class I relationship.
2. To provide space for the eruption of the buccal segments as a result of proclination of the upper incisors.
3. To provide a normal environment for the growth of the maxilla by elimination of the anterior crossbite.
4. Psychological benefits resulting from improved dental and facial appearance.

#### *1.2.1.1 Maxillary Deficiency:*

There are two common growth modification methods to correct maxillary deficiency:

**1) Functional appliances**

They have been used to try and modify the skeletal pattern by enhancing the growth of the maxilla and restricting or redirecting the growth of the mandible.

**a) Frankel's FR-III functional appliance:**

The FR-III appliance (Fig.1) is made with the mandible positioned posteriorly and with pads to stretch the upper lip forward. In theory, the lip pads stretch the periosteum in a way that stimulates forward growth of the maxilla.

- Used in mild skeletal problems
- Causes the mandible and chin to rotate downward and backward, thus the Class III relationship will improve.

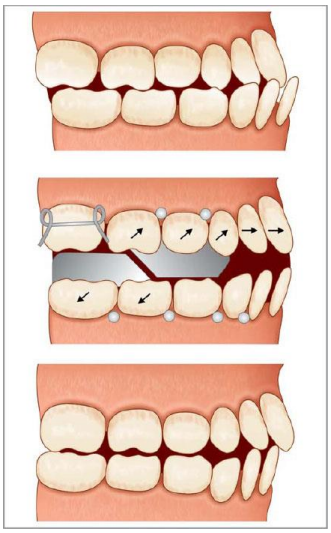
- Causes the occlusal plane to rotate downward and backward rotation as the upper molars erupt more than the lowers contributing to a change from a Class III to a Class I molar relationship.
- Causes a proclination of the upper incisors and a retroclination of lower incisors.
- Has little or no effect on maxilla.
- Increases the lower facial height.
- Can be used effectively during the early mixed dentition period.
- Can be used with a functional shift on closure

**Figure 1**

**b) <u>The reverse twin-block:</u>**

- Is a modification of the traditional twinblock, which was originally designed for treatment of Class II.
- The blocks are positioned so that there are posterior forces on the mandible and anterior forces on the maxilla.

The effects of functional appliances appear to be dentoalveolar, with minimal or no effects on the underlying skeletal pattern. The effectiveness of each appliance is dependent on patient cooperation and wearing them full time.



## 2) Reverse-pull headgear (Facemask)

The appliance is composed of two components: an external framework that fits on the face and an internal attachment to the maxillary dentition.

- Indicated in patients with retrusive maxilla.
- Is most suited for children with minor-to moderate skeletal problems.
- Obtains anchorage from forehead and chin.
- Exerts force on maxilla via elastics that attach to maxillary splints providing forces of 300–500g *per side* in a forward and slightly downward vector.
- To be worn for 12–14 hours each day, often for 4–6 months to correct a Class III incisor relationship fully.
- **Effects include:**
  1. Forward and downward movement of maxilla.
  2. Downward and backward rotation of mandible.
  3. Lingual tipping of lower incisors.

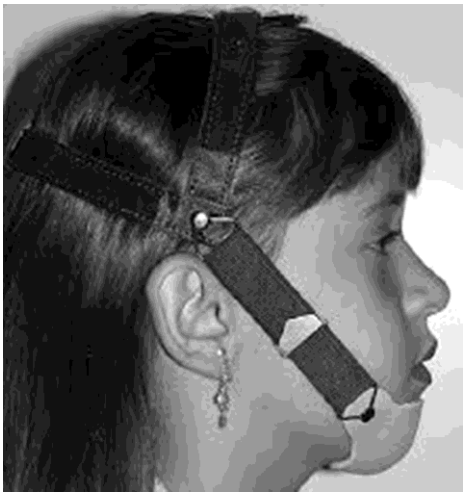
- To maximize the skeletal change when using protraction headgear, rapid maxillary expansion (RME) should be used initially for palatal expansion if the maxilla is narrow; this combination treatment is most effective during the pre-pubertal growth period.
- Treatment given at the mixed dentition is advocated by most researchers (from 8 to 10 years, after first molars and incisors have erupted but before adolescence).
- After age 10 to 11, facemask therapy largely produces tooth movement and down–back mandibular rotation.
- Requires great patient cooperation.

### *1.2.1.2 Mandibular Excess*

Children who have Class III malocclusion because of excessive of the mandible are extremely difficult to treat.

**1) Chin cup therapy**

- An effort to restrain mandibular growth.
- Is more successful when it is started in the primary or early mixed dentition.
- Redirects mandibular growth in a more vertical direction.
- Ideal in patients with
  1. Mild skeletal problem.
  2. Reduced lower anterior facial height.
  3. Normal or proclined lower incisors.
- Most of the reported studies recommended an orthopedic force of 300 to 500g *per side* directly at the head of the condyle.
- Patients are instructed to wear the appliance 14 hours per day.
- Effects of chin cup therapy:
  1. Lingual tipping of the mandibular incisors- leading to crowding.
  2. Downward and backward rotation of mandible.
  3. May lead to skeletal open bite in patients with initially increased lower anterior facial height.



### *1.2.1.3 Combinations:*

- Devices which combine midface protraction and chin cap are ideal for the cases.

- Reverse-pull headgear can be used.
- FR III with chin cap can be used.

3 Lateral extra-oral view of reverse chin cup

### 1.2.2 Orthodontic treatment and camouflage:

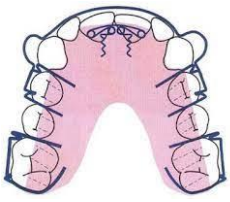
#### *1.2.2.1 Treatment of Class I and very mild Class III:*

Where permanent incisors erupt palatally to their predecessors, the retained primary teeth should be removed. Cases associated with anterior cross bite due premature contact and mandibular displacement can be treated by extraction or grinding of cusp tips (usually primary canines) and proclining maxillary permanent incisor(s) using an upper removable appliance (URA) or a fixed appliance.

Cases associated with anterior crossbite with postural position of mandible can be occurred in cases of inadequate nasal breathing in which the patients try to push the mandible to break the posterior oral seal. So that the patients will facilitate the oral breathing in case, for example, an adenoid patient or chronic tonsillitis. They have edge to edge relationship in centric, then they displace the mandible forward into occlusion to produce typical appearance of Class III or reversed overjet and overbite.

Correction of an anterior crossbite in a Class I or mild Class III skeletal pattern (no appreciable skeletal discrepancy) can be treated in the mixed dentition by proclination of the upper labial segment with a removable appliance. This approach can performed when the unerupted permanent canines are high above the roots of the upper lateral incisors. Retention must be excellent because the lower jaw acts as a good retainer.

However, later in the mixed dentition when the developing canines drop down into a buccal position relative to the lateral incisor root there may be a risk of resorption if the incisors are moved labially. In this situation correction is then best deferred until the permanent canines have erupted.



### *1.2.2.2 Treatment of mild to moderate Class III*

This is the most common type of Class III and is confused with the previous type (Pseudo-Class III malocclusion) in which the patient can achieve an edge-to-edge relationship of incisors. In this type, the upper incisors are not retroclined as in the previous types, that is, the long axis of the upper incisors forms a normal inclination with the maxillary plane about 110º, while the lower incisors are retroclined and the skeletal pattern is marked as a Class III. Treatment of these cases can be done using upper and lower fixed appliance and is done by a professional and well-trained orthodontist.

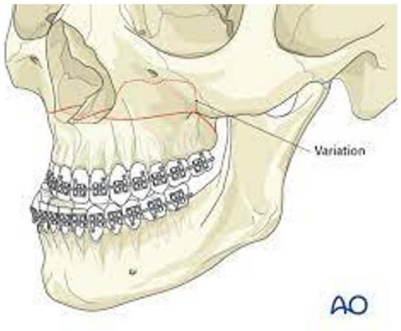
### 1.2.3 Orthognathic surgery;

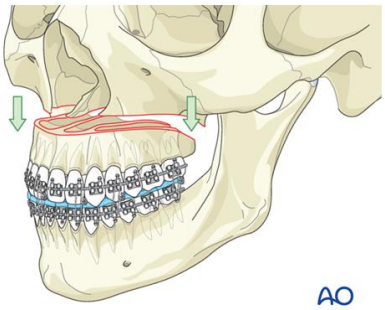
For those cases with a significant anteroposterior or vertical skeletal component to their malocclusion, combined orthodontic–surgical treatment is required for definitive correction. Surgery should ideally be deferred until growth is complete; otherwise continued mandibular growth will result in skeletal relapse. In this type, the skeletal pattern is very obvious; the patient cannot close in edge to edge relation and facial appearance is unacceptable.

It has been suggested that surgery is almost always required if the value for the ANB angle is below –4° and the inclination of the lower incisors to the mandibular plane is less than 80°. However, the cephalometric findings, in all three planes of space, should be considered in conjunction with the patient's concerns and facial appearance.

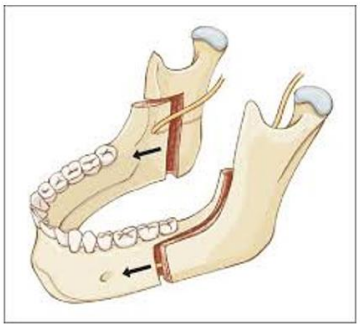
***Common surgical procedure:***

1. Lefort I maxillary advancement for retrognathic maxilla.
2. Bilateral sagittal split mandibular setback for prognathic mandible.




LeFort 1 osteotomy



Bilateral Sagittal Split Osteotomy (BSSO)