Lecture 6 **Treatment of Class II division 2 malocclusion**

1. Class II division 2 malocclusion:

A class II division 2 malocclusion is a subdivision of the Angle class II classification. It can be defined as advancement of the upper 1st permanent molar about ½ a cusp or cusp from the lower 1st permanent molar with the incisal edges of the mandibular incisors occluding posterior to the cingulum plateau of the maxillary central incisors, which are retroclined (***distocclusion or postnormal relationship***). Class II division 2 includes those malocclusions where the upper central incisors are retroclined. The overjet is usually minimal, but may be increased. The prevalence of this malocclusion in a Caucasian population is approximately 10 per cent (Fig.1).

Figure 1 Class II division 2 malocclusion.

1.1 Aetiology:

The skeletal and dental factors are generally similar to class II division 1 malocclusion with exception of the soft tissue factor demonstrating less variation.

1.1.1 Skeletal pattern

Class II division 2 malocclusion is commonly associated with a mild Class II skeletal pattern, but may also occur in association with a Class I or even a Class III dental base relationship. Where the skeletal pattern is a severe Class II, the upper incisors will lie outside the control of the lower lip, resulting in a Class II division 1 relationship, but where the lower lip line is high relative to the upper incisors a Class II division 2 malocclusion can result.

The vertical dimension of Class II division 2 malocclusions is reduced. A reduced lower face height in conjunction with a Class II jaw relationship results in the absence of an occlusal stop to the lower incisors, which continue to erupt leading to an increased overbite (Fig.2). FMA and gonial angle are low giving a rather square facial profile due to forward rotation pattern of the mandible, which in turn will decrease the severity of skeletal Cl II but give a deep bite.

Another feature associated with a more severe underlying Class II skeletal pattern is lingual crossbite owing to the relative positions and widths of the arches. The maxillary arch is broad relative to mandibular arch (square facial profile).

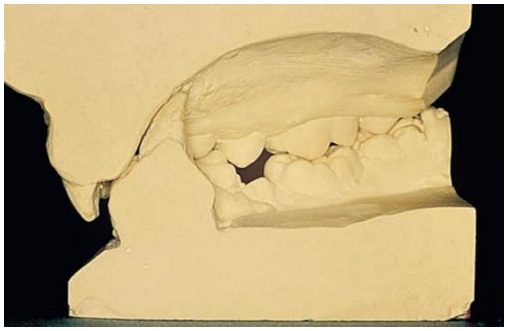

Figure 2 A cross-sectional view through the study models of a patient with a very severe Class II division 2 incisor relationship. Lack of an occlusal stop allowed the incisors to continue erupting, leading to a significantly increased overbite.

1.1.2 Soft tissues:

The lips are typically competent, with a high lower lip line, which may rest on the cervical one-third of the maxillary central incisors. The lower lip also covers a greater surface of the upper central incisors as they erupt, leading to retroclination. If, however, the lower lip rests below the lateral incisors, these tend to be proclined (Fig.3). The position of the lower lip has a significant role in the development of a class II division 2 incisor relationship. If both upper and lower labial segments are retroclined resulting in a retrusive soft tissue profile. The position of the lower lip in combination with reduced lower face height can result in a deep labio-mental fold and relative prominence of the chin button.

Class II division 2 incisor relationships may also result from bimaxillary retroclination caused by active muscular lips regardless of the skeletal pattern.

Figure 3 high lower lip position retroclining the upper central incisors and proclining the upper lateral incisors in a class II division 2 incisor relationship (the upper lip has been retracted).

1.1.3 Dental factors

Crowding is commonly seen in conjunction with a Class II division 2 incisor relationship. If there is a crowding in the upper dental arch, the upper laterals and / or canine may be

proclined in front of the lower lip function. Any pre-existing crowding in the lower arch will be exacerbated by the retroclination of the lower labial segment. A reduced crown–root angle has also been reported for the upper incisors in class II division 2 malocclusions, which can contribute to their characteristic inclination. The retroclination of the incisors and deep bite are the main characteristic features of Cl II div. 2 and this will lead to:

1- Trauma in both upper and lower gingival tissue. .A traumatic overbite to the gingivae of the lower labial segment labially and / or the upper incisors palatally (bitraumatic) can be seen with Class II div. 2.

2- Excessive vertical development of anterior dentoalveolar segments.

1.2 Occlusal Features:

- Class II molar relationship.
- Class II division 2 incisor relationship
- There are three types of incisor relationship (Fig.4). They are:
  - ✓ Type A: Retroclined upper central and lateral incisors.
  - ✓ Type B: Retroclined upper central incisors and proclined lateral incisors.
  - ✓ Type C: Retroclination with the canine labial positioned.
- Retroclined lower anterior teeth (Fig.5).
- Excessive deep overbite.
- Increased curve of Spee.
- Increased interocclusal clearance or increased freeway space.
- Class II canine relation.
- Lower anterior crowding.

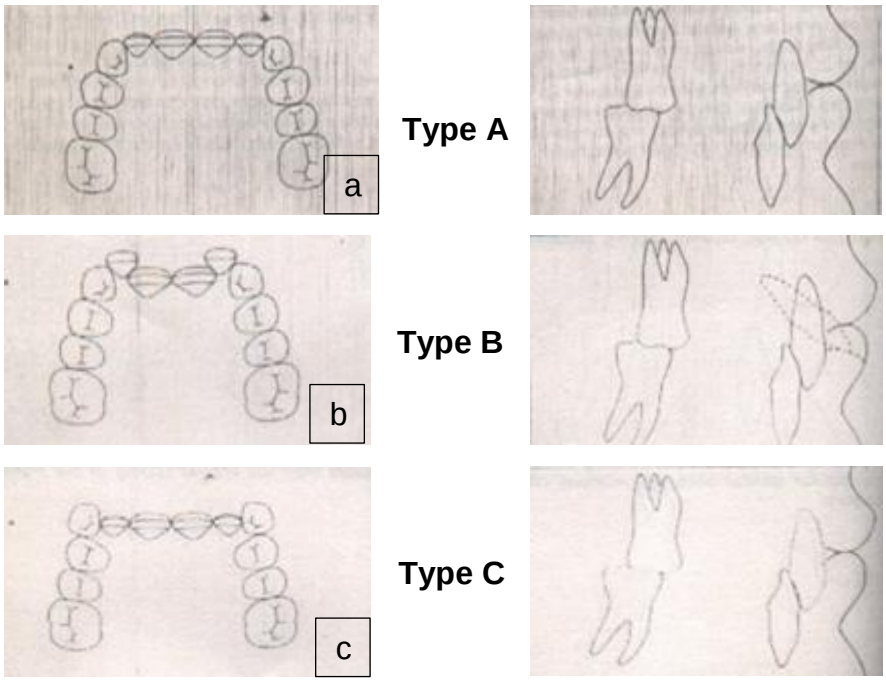

Figure 4 Types of Class II division 2 incisor relationship; a) Type A; b) type B; c) type C

- ***The combination of the following is usually central to the Class II div 2 malocclusion***:

- Reduced lower face height.
- Increased overbite.
- Mild skeletal class II base.
- Specific lip position and morphology.

- ***In general, the following clinical situations where lower incisor proclination may be acceptable:***

• Mild lower incisor crowding;

• Class II division 2 cases with retroclined lower incisors;

• Lower incisors retroclined by an active lower lip; and

• Decompensation prior to orthognathic surgery.

1.3 Facial Growth:

- Anterior mandibular rotation or horizontal type of growth pattern seen.
- Favourable for functional appliance therapy after alignment of incisors.

1.4 Treatment objective and limitation:

- Relief of crowding and local irregularities.
- Relief of anterior gingival trauma and correction of incisal inclination.
- Correction of buccal relationships.

The relief of anterior gingival trauma requires moving the incisor teeth to a position where the lower incisors come into contact with the palatal surface of the upper incisors upon occlusion. This can only be achieved by reducing the inter-incisal angle. However, the limiting factors for this treatment are:

- **The musculature of the lower lip**: if the lower lip line is high, the proclination of upper anterior segment with simple tipping movements is not possible.
- **The degree of Class II skeletal discrepancy:** if there is a severe Cl II skeletal relationship, the lower anterior segment cannot be proclined sufficiently to meet the upper teeth.

1.5 Treatment :

In milder cases, where the overbite is slightly increased, the arches are not significantly crowded and the aesthetics acceptable, the malocclusion can be accepted without treatment (Fig.6).

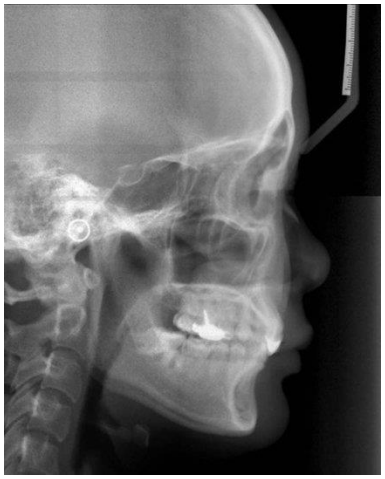

Figure 6

Stable correction of the Cl II incisors relationship requires treatment of increased overbite and correction of the interincisal angle that usually increased beyond the normal limit of 125-135º. It can be corrected by:

- ✓ One of the chief reasons for employing a twin arch fixed appliance is to correct the overbite to a stable result. This is achieved by active intrusion of the lower incisors to flatten the curve of Spee.
- ✓ Torquing of the incisor roots palatally in the upper anterior segment and lingually in the lower anterior segment using fixed orthodontic appliances.
- ✓ Edge–centroid relationship (Fig.7): the stable reduction of overbite requires a favourable interincisal angle and the lower incisor should be 0–2 mm in front of the upper incisor centroid (centroid a constructed point half-way along the root).
- ✓ The upper incisors can be proclined with removable appliance or fixed appliances (***adjunctive support***) followed by using a functional appliance to reduce the resultant overjet. This approach can be performed for the growing patient; some functional appliances are most effective in cases where the lower facial height is reduced.

Types of functional appliances used in Class II div. 2:-

- Andersen appliance.
- The Frankel appliance.
- Clark's Twin-Block appliance.
- Herbst appliance.

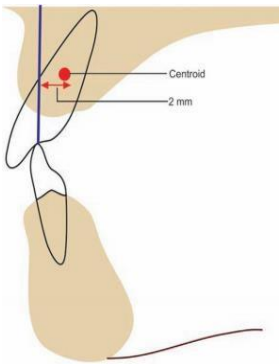

Figure 7

Note:-

The usage of removable appliance then followed by myofunctional appliances is depended on the aetiology of Cl II div. 2, the presence or absence of crowding (using fixed appliance), the patient profile and the age.

- **Removable appliances:**

In very limited cases, a simple upper removable appliance alone may be used to correct the proclined lateral incisor after using an “en masse” appliance to move the buccal teeth distally.

Adjunctive support: Upper removable appliance can be used to reduce the deep overbite during the early stage of a fixed appliance treatment.

- **Fixed orthodontic appliance:**

Upper and lower fixed appliance are the most common approach used to treat Class II div.2 malocclusion.

- **Orthognathic surgery:**

In the more severe cases of Cl II div. 2 characterized by a poor facial profile and a very deep overbite (and traumatic), the combination of orthodontics and jaw surgery is considered to be the best prognosis.

Initially, the upper incisors can be proclined using fixed orthodontic appliance to create an overjet. Then, the mandible can be advanced with surgery to reduce the resultant overjet and correct the facial profile.

feature	Div 1	Div 2
profile	convex	Convexity/ straight
lips	incompetent	competent
Lower facial height	Increase/normal	decrease
Arch form	V-shape	Square/ U-shape
incisors	proclined	CI ➡ retroclined LI ➡ proclined
Overjet overbite	Increase deep, **sometime openbite**	Decrease deep

Figure 8 The main differences between Cl II div.1 and div. 2.