ASSESSMENT OF ANTEROPOSTERIOR JAW RELATIONSHIP

A fair picture of the sagittal skeletal relationship can be obtained clinically by placing the index and middle fingers at the approximate A and B points after lip retraction (Fig. 1). Ideally, the maxilla is 2 to 3 mm anterior to the mandible in centric occlusion. In skeletal Class II cases, the index finger is much ahead of the middle finger whereas in Class III the middle finger is ahead of the index finger.

Fig. 1: Assessment of anteroposterior jaw relationship

ASSESSMENT OF VERTICAL SKELETAL RELATIONSHIP

A normal vertical relationship is one where the distance between the glabella and subnasale is equal to the distance from the subnasale to the underside of the chin (Fig. 2). Reduced lower facial height is associated with deep bites while increased lower facial height is seen in anterior open bites.

Fig. 2: Evaluation of facial proportion
Examination of the Soft Tissues

Extraoral

1. Forehead  The esthetic prognosis of an orthodontic case is determined by its profile, which in turn is influenced by the shape of the forehead and the nose. For a face to be harmonious, the height of the forehead (distance from hairline to glabella) should be as long as the mid-third (glabella-to-subnasale) and the lower third (subnasale-to-menton), i.e. each of these is one-third the total face height (Fig.2). Dental bases are more prognathic in cases with a steep forehead, than with a flat forehead.

2. Nose  Size, shape and position of the nose determines the esthetic appearance of the face and is therefore important in the prognosis of a case.

3. Lips  Lip length, width and curvature should be assessed. In a balanced face, the length of the upper lip measures one-third, the lower lip and chin two thirds of the lower face height. The upper incisal edge exposure with the upper lip at rest should be normally 2 mm. Lips can be classified into:
   a. Competent lips: Slight contact of lips when musculature is relaxed (Fig. 3A)
   b. Incompetent lips: Anatomically short lips which do not contact when musculature is relaxed. Lip seal is achieved only by active contraction of the orbicularis oris and mentalis muscles (Fig. 3B).
   c. Potentially competent lips: Lip seal is prevented due to the protruding maxillary incisors despite normally developed lips (Fig. 3C)
   d. Everted lips: These are hypertrophied lips with redundant tissue but weak muscular tonicity (Fig. 3D).
Fig. 3 classification of lips A: Competent lips. B: Potentially competent lip. C: Incompetent lips. D: Everted lip

**NASOLABIAL ANGLE**

This is the angle formed between a tangent to the lower border of the nose and a line joining the subnasale with the tip of the upper lip (labrale superius) (Fig. 4). Normal value is 110 degrees. Proclined upper anteriors this angle reduces whereas it becomes more obtuse in cases with a retrognathic maxilla or retroclined maxillary anteriors.

![Fig. 4: Nasolabial angle](image)

**Chin**

The configuration of the chin is determined not only by the bone structure, but also by the thickness and tone of the mentalis muscle.

- Mentalis activity A normal mentalis muscle becomes hyperactive (Fig. 5) in certain malocclusions like Class II di v 1 cases, wherein puckering of the chin may be seen.

![Fig. 5: Hyperactive mentalis](image)
Mentolabial sulcus: It is the concavity present below the lower lip (Fig. 6A). Deep sulcus (Fig. 6B) is seen in Class II cases whereas a shallow sulcus (Fig. 6C) is seen usually in bimaxillary protrusion cases. Along with the chin width, development of chin height is important. Chin height is the distance from:

- Mentolabial sulcus to menton over development of chin height alters the lower lip position and interferes with lip closure.
- Chin position and prominence: prominent chin is usually associated with Class III malocclusions whereas recessive chin is seen in Class I malocclusion.

### Fig 6 Mentolabial sulcus. A: normal Mentolabial sulcus. B: Deep mentolabial sulcus C: Shallow mentolabial sulcus

#### INTRAORAL EXAMINATION

### Tongue

Tongue is examined for shape, color and configuration it may be small, long on broad. Tongue size can be roughly estimated with the help of a lateral cephalogram an excessively large tongue (macroglossia) usually shows imprints on its lateral margins, which gives the tongue a scalloped appearance. However diagnosis of macroglossia requires a detailed diagnostic investigation (e.g. cineradiography). The lingual frenum should be examined for tongue tie. Tongue tie (Fig. 7) can lead to impaired tongue movements. Abnormalities of the tongue can upset muscle balance and equilibrium leading to malocclusion.
Lip and Cheek Frena

Among the different frena, the maxillary labial frenum is most commonly the cause of a malocclusion. A thick fibrous, low labial frenum (Fig. 8A) prevents upper central incisors from approximating each other leading to a midline diastema. A frenectomy is indicated when the frenum is inserted deeply with fiber extensions into the interdental papilla. An IOPA of the area may show a bony fissure between the roots of the upper central incisors (Fig. 8B). Blanch test can be done to confirm diagnosis wherein the upper lip is stretched upward and outwards. Presence of blanching in the papilla region indicates an abnormal attachment. The mandibular labial frenum is less often associated with a diastema. However, it can exert a strong pull on the free and attached gingiva leading to recession in the lower anterior region. The presence of buccal attachments must also be examined carefully especially in adolescents and adults (Fig. 8C)

Fig 7: Tongue tie, restricted movement of the tongue

Fig 8: A: Fleshy labial frenum. B: 'V' shaped notching seen in the interdental region on an IOPA. C: Blanching seen in the inter-denial region
• Gingiva

The gingiva should be examined for the type (thick fibrous or thin fragile), inflammation and mucogingival lesions. In children, most commonly generalized marginal gingivitis occurs due to plaque accumulation and can be resolved by improving the oral hygiene. In adults, scaling followed by curettage and sometimes mucogingival surgery is usually required. Local gingival lesions may occur due to occlusal trauma (Fig. 9), abnormal functional loadings or medication (e.g. Dilantin). In mouth breathers, open lip posture causes dryness of the mouth leading to anterior marginal gingivitis. Gingivitis is a contraindication for orthodontic treatment. Treatment should be started only when the gingival condition improves.

Fig. 9: Trauma from occlusion causing gingival recession in relation to 41

• Palate

The palatal mucosa is examined for:

a. Pathologic palatal swelling: Indicative of displaced impacted tooth germ, cysts, etc.

b. A traumatic deep bite can lead to mucosal ulcerations and indentations.

c. Palatal depth and shape varies in accordance with the facial form, e.g. Brachyfacial patients have broad and shallower palates as compared to dolicofacial patients.

d. Presence of clefts of varying degree may be seen. Scar tissue following palatal surgery prevents normal development of the maxillary arch Fig. 10.
• Rugae can be used as a diagnostic criterion for anterior proclination. Third rugae is normally in line with the canines.

- Tonsils and Adenoids

The size and presence of inflammation in the tonsils if present, should be examined. Prolonged inflammation of the tonsils causes alteration of the tongue and jaw posture, upsets the orofacial balance and can result in "Adenoid facies".

Fig. 10: Scarring following cleft palate repair