Fig. 2.4: Extraoral picture in Angle Class II

Oral Seal

There are three types of oral seal, namely anterior oral seal, middle oral seal and posterior oral seal.

Anterior oral seal: There is competency of lips and the tip of the tongue lies palatal to the cingulum of incisors.

Middle oral seal: There is contact between the dorsum of the tongue and the vault of the palate.

Posterior oral seal: There is contact between root of the tongue and the soft palate.

When anterior oral seal is broken, the incompetency of the lips is developed and the tongue no longer lies palatal to the cingulum of the incisors but it lies in between the upper and lower incisors.

Variations of Class II Division 2 Incisor Relations

1. Central incisors in lingual inclination with lateral incisors in labial inclination

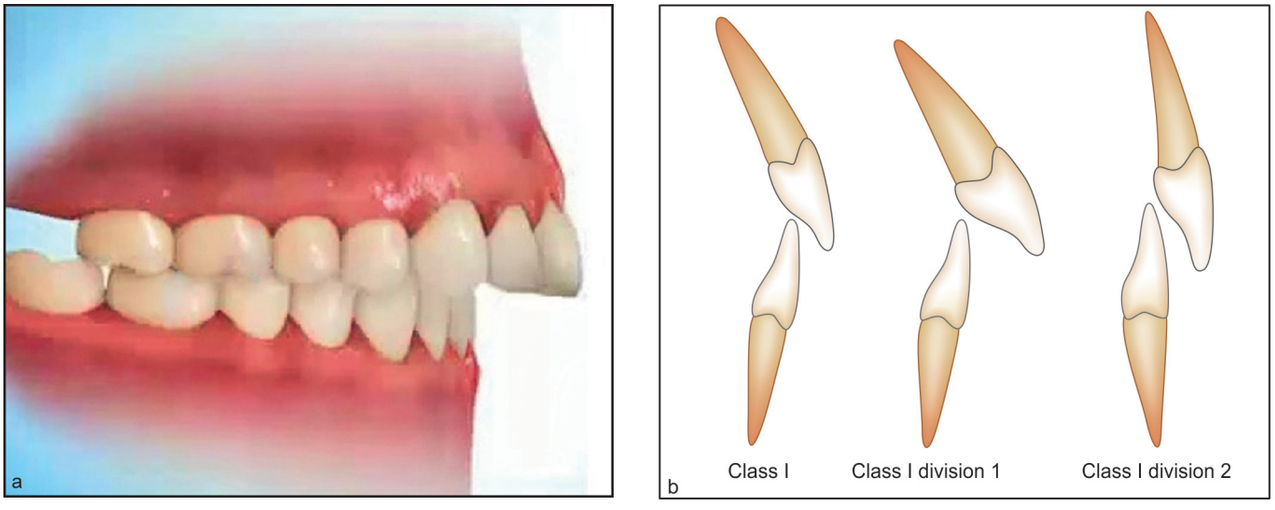

Fig.2.5: Intraoral picture in Angle Class II

Fig. 2.6: Angle's Class II division 2 malocclusion

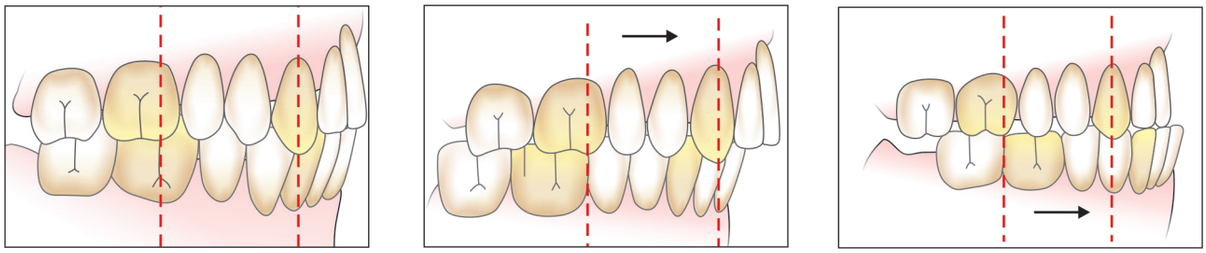

Fig. 2.13: Canine classification

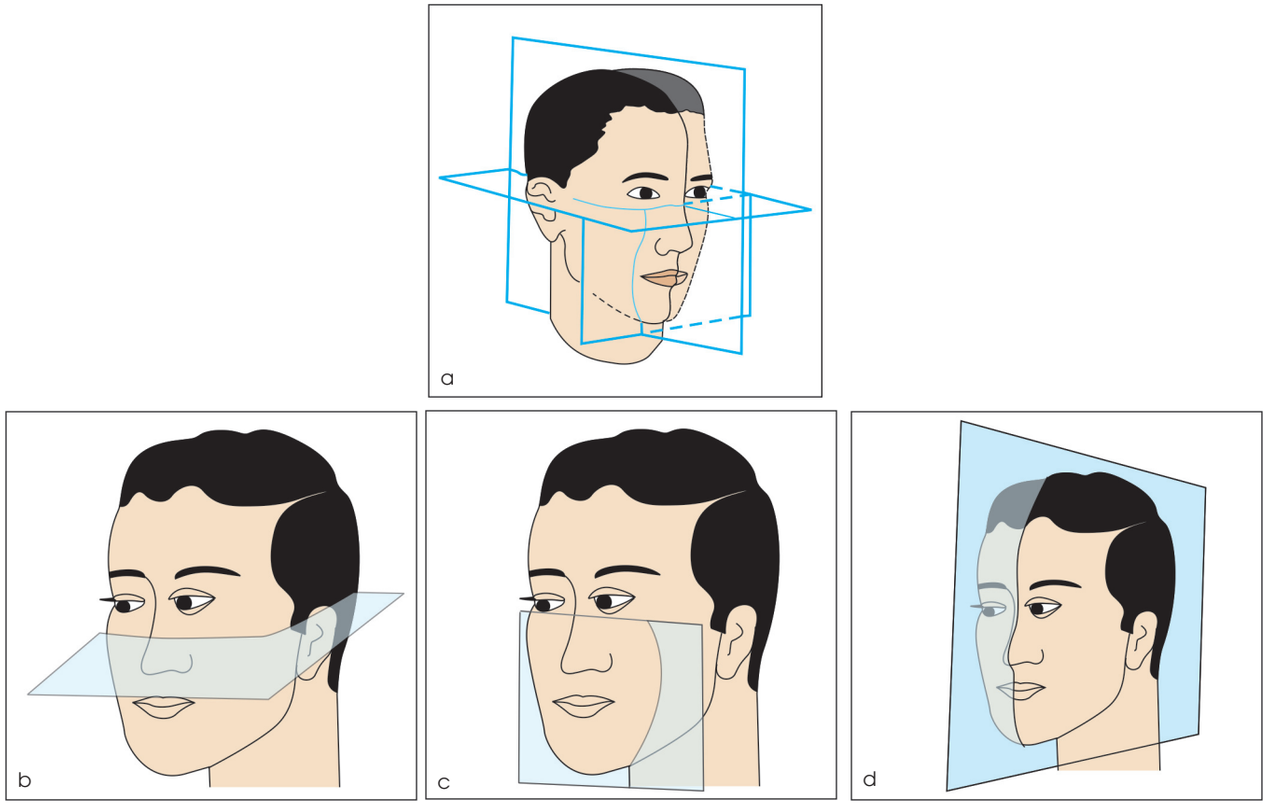

Fig. 2.14: (a) Description of Simon classification in three anthropologic planes; (b) Frankfort horizontal plane; (c) Orbital plane; (d) Sagittal plane

Frankfort horizontal plane: It is determined by the skin landmarks of the eye and ear points and runs parallel to SeN plane.

- Helps to detect deviations in the vertical plane.
- Dental arch closer to the plane is called attraction and farther away is called abstraction.

Orbital plane:

- Helps to detect deviations in the transverse plane.
- Dental arch more anteriorly placed is called protraction and posteriorly placed dental arch is called retraction.

The law of the canine: In normal arch relationship, according to Simon, the orbital plane passes through the distal axial aspect of the canine. This is known as 'the law of the canine'.

Mid-sagittal plane: This plane is formed by points approximately 1.5 cm apart on the median raphe of the palate. This plane passes at right angle to FHP.

- Helps to detect deviations in the sagittal plane.
- Dental arch closer to mid-sagittal plane is called contraction and farther away is called distraction.

4m: Reversed overjet >1 mm, <3.5 mm with reported masticatory or speech difficulties
4t: Partially erupted, tipped and impacted against adjacent teeth
4x: Presence of supernumerary teeth

Grade 5: Need treatment
5a: Increased overjet >3.5 mm with reported masticatory or speech difficulties.
5h: Extensive hypodontia with restorative implication
5i: Impeded eruption of the teeth crowding, displacement, supernumerary teeth, retained deciduous teeth and pathological cause
5m: Reversed overjet >3.5 mm with reported masticatory or speech difficulties
5p: Defects of cleft lip and palate and other craniofacial anomalies
5s: Submerged deciduous teeth.

PEER ASSESSMENT RATING

It is referred to a quantitative occlusal index measuring how much a patient deviates from normal alignment and occlusion. It is designed to quantitate the outcome of the treatment by comparing the severity of occlusion on pretreatment and post-treatment casts. Unlike IOTN, the scores are cumulative. The features recorded are listed below, with the current weightings within parenthesis.

- Crowding—by contact point displacement (x1)
- Buccal segment replacement—in the anteroposterior, vertical and transverse planes (x1)
- Overjet (x6)
- Overbite (x2)
- Centerlines (x4)

The difference between pre- and post-treatment is calculated. The percentage change in score is determined to estimate the success of treatment. If the percentage is greater than 70%, it indicates a high standard of treatment. If a change of 30% or less, it indicates that no appreciable improvement has been achieved.

INDEX OF COMPLEXITY OUTCOME AND NEED (ICON)

The new index incorporates the features of both the Index of Orthodontic Treatment Need (IOTN) and the Peer Assessment Rating (PAR). The esthetic component of IOTN is included along with the scores for upper arch crowding/spacing, presence of crossbite; overbite/open bite and buccal segment relationship. As in the PAR < weightings are added to reflect current orthodontic opinion. The sum of the scores and their weightings gives a pre-treatment scores, which is said to reflect the need for and likely complexity of the treatment required. Following treatment, the index is scored again to give an improvement grade (pre-treatment score – 4 × post-treatment score) and thus the outcome of treatment. This index is currently undergoing evaluation.

ICON Scoring Method

ICON score interpretation:

Need and acceptability	*Threshold*
Pretreatment need	>43
End treatment acceptability	<31 acceptable

Pretreatment complexity	*Score value*
Easy	<29
Mild	29–50
Moderate	51–63
Difficult	64–77
Very difficult	>77

Improvement grade	*Score range*
Pretreatment score – 4 × post-treatment score	
Greatly improved	>1
Substantially improved	–25 to 50
Moderately improved	–53 to –26
Minimally improved	–85 to –54
Not improved or worse	<–85

HANDICAPPING LABIOLINGUAL DEVIATION INDEX (HLD INDEX)

It was developed by Harry L. Draker in 1960. It is only applicable to the permanent dentition (the patient age should be at least 13 years). The main intention is to measure the presence or absence and the degree of handicapping malocclusion and dentofacial anomalies. It is commonly used index.

It measures the malocclusion in all three planes, namely vertical, sagittal and transverse planes. All measurements are made with a Boley gauge scaled in millimeters. Absence of any conditions must be recorded by entering –O. Any condition marked as –X without any further scoring indicates severe handicapping condition that is automatically considered to qualify for orthodontic services.

The modified component conditions of the HLD index can be entered as described below.

Category-1: *Cleft palate:* Mark X in the sheet and no further scoring as it is severe handicapping condition.

Category-2: *Craniofacial anomalies:* Indicate mark X in the sheet and should be supported with acceptable documentation by a craniofacial specialist.

Variability of individual growth can also be studied by this method.

Disadvantages include small sample size, difficulties in the maintenance of laboratory research, personal data storage over long periods and possible (sample decay) reduction in the sample size due to change of place and other reasons. Furthermore, inference of the study can only be obtained after analyzing the data at the end of the long study period.

Mixed/Semilongitudinal Studies

They are combinations of the cross-sectional and longitudinal types of studies to obtain the advantage of both methods of data collection.

Subjects at different age levels are seen longitudinally for shorter periods. For example, in a study of 6 years span, growth can be studied between birth and 6 years for 1 group, between 6 and 11 years for second group, between 10 and 16 years for the third group; and between 15 and 21 years in yet another age group. In this way, growth from birth to 21 years can be studied in only 6 years.

Interpretation of Growth Data

Growth data is presented in the form of graph to facilitate easy understanding of the findings. The rates of growth can be indicated by increments in body length or weight which when plotted form a growth curve. There are two basic curves of growth which are described below.

Distance curve/cumulative curve: It indicates the distance a child has traversed along the growth path. Data derived from the cross-sectional and longitudinal studies can be plotted as cumulative curve.

Velocity/incremental curve: It indicates the rate of growth of the child over a period of time. The velocity curve is drawn by plotting the increments in height or weight from one age to the next. For velocity curve, data is derived from longitudinal studies.

BASIC TENETS OF GROWTH: PATTERN, VARIABILITY AND TIMING

Concepts of Growth

Concept of Normality

- Normal refers to that which is usually expected, is ordinarily seen or is typical.
- The concept of normality must not be equated with that of the ideal. While ideal denotes the central tendency for the group.
- Normal refers to a range. Another aspect of craniofacial growth is that normality changes with age.

Variability

Rhythm of Growth

Hooton: Human growth is not a steady and uniform process wherein all parts die and body enlarge at the same rate and the increments of one year are equal to that of the proceeding or succeeding year.

- This growth rhythm is most clearly seen in stature or body height.
- The first "wave" of growth is seen in both sexes from birth to the fifth or sixth year

Pattern

Pattern of growth in human is allometric. There is a difference in the relative rates of growth between one part of the body and another. Different parts and organs of the body grow at different times and to different extents. This is termed as "differential growth."

Differential growth in humans is reflected in:

- Cephalocaudal gradient of growth
- Scammon's growth curve

Cephalocaudal Gradient of Growth

There are differences in the relative rates of growth between one part of the body and another. Overall proportions changes as one grows from fetal life to adulthood. There is an axis of increased growth extending from the head towards feet. The head is in advance of the trunk and the trunk in advance of the limbs regarding growth and maturity at all times. This axis of increased growth gradient extending from head towards the feet is called the cephalocaudal gradient of growth (Fig. 4.3).

- In fetal life, at around 2–3 months of intrauterine life, the head is nearly one-half of the total embryonic life. At this stage, limbs are rudimentary and trunk is underdeveloped.
- Subsequently, the head grows proportionally more slowly and limbs and trunk grow faster so that the proportion of entire body occupied by head is reduced to one quarter of the body length at birth.
- During childhood, this pattern of growth continues with lengthening of the torso and limbs. At adulthood, the head is reduced to one-eigth of the entire body length and lower limbs occupy one-half of the total length.