

Clinical Examination

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Overview

- **EXTRAORAL ASSESSMENT**
 - Assessment of Skeletal Pattern
 - AP
 - Vertical
 - Transverse
 - Assessment of soft tissues
 - The lips
 - NLA
 - Other body areas
 - TMJs
- **INTRAORAL ASSESSMENT**
 - OH
 - Dental development
 - Pathology of mucosal/dental surfaces
 - The tongue
 - Tooth position within and between the arches

Introduction

- It is important to take a comprehensive history before undertaking an orthodontic examination.
- Orthodontic examination should begin as soon as the patient enters the surgery.
- The general stage of development, including stature/height and the presence of secondary sexual characteristics, should be noted.
- This information will allow one to determine the amount of growth that may be remaining.

EXTRAORAL ASSESSMENT

Assessment of Skeletal Pattern

Assessment of Skeletal Pattern

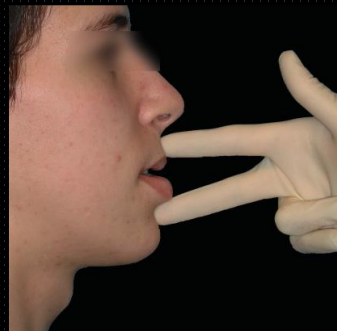
- The relative position of the maxilla and mandible, termed the skeletal pattern, has a large influence on the relationship of the maxillary and mandibular dentition.
- The skeletal pattern should be assessed in three dimensions:
 - Anteroposterior (AP)
 - Vertical
 - Transverse.

Anteroposterior Dimension

- Assessed in the natural head position, which is a standardised reproducible head orientation, as the tilt of the head can greatly influence the interpretation of the skeletal pattern
- The patient should be sitting upright, relaxed, and looking straight ahead at a distant point at eye level and the teeth should be lightly in occlusion.
- The most anterior part of the maxilla and the mandible can be palpated in the midline through the base of the lips

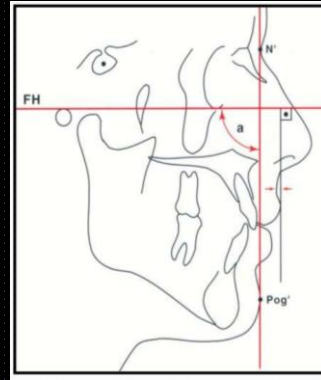
Anteroposterior Dimension

- **Class I** – when the mandible lies 2 – 3 mm posterior to the maxilla. The profile is straight.
- **Class II** – when the mandible is retrusive relative to the maxilla. The profile is convex. The discrepancy should also be classified as mild, moderate or severe.
- **Class III** – when the maxilla is retrusive relative to the mandible. The profile is concave. The discrepancy should also be classified as mild, moderate or severe.



Anteroposterior Dimension

- Position of the mandible and maxilla relative to the cranial base
- Zero meridian line (N'-Pog') represents the anterior limit of the cranial base.
- The anterior limit of the base of the upper lip (soft tissue A - point) should lie 2 – 3 mm ahead this line
- The base of the lower lip (soft tissue B - point) should lie 0 – 2 mm behind this line in Caucasians



Anteroposterior Dimension



Class I



Class II



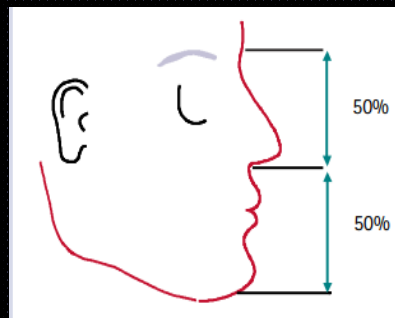
Class III

Vertical Dimension

- The vertical skeletal dimension can influence:
 - the degree of vertical incisor overlap
 - lip competency
 - overall facial aesthetics.
- There are two methods in which the vertical dimension should be assessed:
 - Lower anterior face height (LAFH) proportion
 - Frankfort - mandibular planes angle (FMPA).

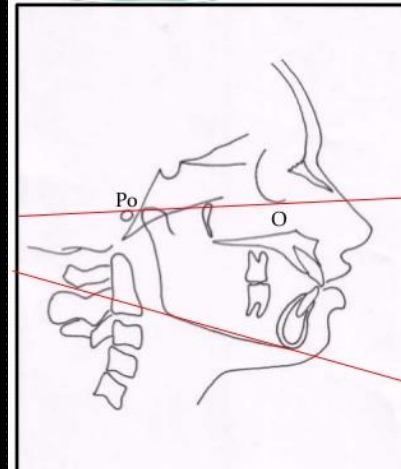
Vertical Dimension

- Assessment of facial proportions.
- The upper and lower anterior face heights should be approximately equal



Vertical Dimension

- The FMFA is assessed in the profile view and gives an indication of the relationship between the LAFH and posterior face height (i.e. ramus height)
- **Normal**: when the line of the mandibular plane and Frankfort plane intersect in the occipital region
- **Increased**: If the point of intersection is anterior to the occiput
- **Reduced**: If the point of intersection lies posterior to the occiput

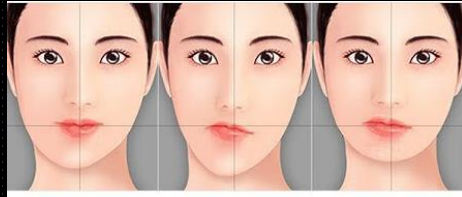


Transverse Dimension

- The two components of the transverse dimension that should be assessed are:
 - Facial symmetry
 - Arch width

Facial symmetry

- Assessed by constructing the facial midline between soft tissue **nasion** and the middle part of the **upper lip** at the vermillion border.
- The chin point** should be coincident with this line. If there is an asymmetry of the chin point, it is also important to check for a compensatory cant in the maxillary occlusal plane.
- Asymmetries** in the chin point can be produced by a lateral mandibular displacement on closing if there is an occlusal interference.



Arch width

- The relative width of the upper and lower arches affects the transverse relationship of the teeth.
- Often the **maxilla is narrow**, which results in a crossbite of the buccal segments if there has been inadequate dentoalveolar compensation
- On intraoral palpation, **the maxilla should be slightly wider than the mandible at the corresponding points.**

Arch width

- The absolute transverse dimensions of the maxilla may be normal, but a relative transverse maxillary discrepancy, manifesting as a posterior crossbite, may exist due to incorrect AP positioning of the maxilla/mandible.
- The AP position can affect the transverse relationship as the dental arches get wider as one moves distally.

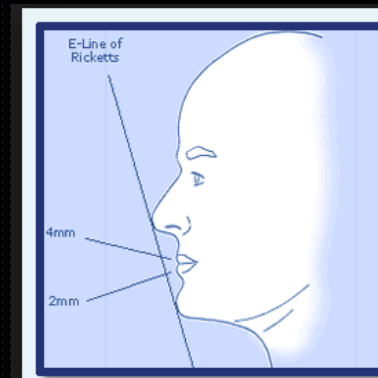
Assessment of soft tissues

The Lips

- Upper Lip length
 - females = 20 – 22 mm
 - males = 22 – 24 mm
- The following aspects of the lips should be examined:
 - Lip fullness
 - Lip tone
 - Lower lip line
 - Lip competency
 - Method of achieving an anterior oral seal at rest/swallowing.

The Lips-Ricketts ' aesthetic line (E - line)

- The upper lip should lie 4 mm behind this line.
- The lower lip should lie 0 – 2 mm behind it



The nasolabial angle (NLA),

- Give an indication of upper lip position.
- In Caucasians, the upper lip should slope slightly anteriorly to the vertical ($8-14^\circ$).
- The NLA can be classified as
 - normal ($102 \pm 8^\circ$ males and females)
 - acute ($< 90^\circ$)
 - obtuse ($> 90^\circ$)
- Ethnic variation



The Lips

- The lower lip line is the vertical relationship between the lower lip and maxillary incisors at rest. It is determined by the LAFH, AP mandibular position and the lower lip length.
- Ideally, the lower lip should lie adjacent to the middle third of the maxillary central incisor crown.
- In Class II division 1 malocclusion the lip line can be lower down, leading to proclination of the upper incisors
- In Class II division 2 malocclusion it can be high leading to their retroclination.
- In Class II division 1, the stability of overjet correction is questionable if the lower lip does not cover at least the incisal third of the maxillary central incisors at rest.

Lower lip line



The Lips

The lips may be described as:

- **Competent** – a lip seal is produced with minimal muscular effort when the mandible is in the rest position.
- **Potentially competent** – the positioning of the upper incisors prevents a comfortable lip seal from being obtained.
- **Incompetent** – excessive muscular activity is required to produce a lip seal.

Signs of excessive activity include

- puckering of the skin overlying the chin, due to mentalis contraction
- flattening of the labiomental fold when the lips are held together
- If the interlabial distance at rest is > 4 mm the lips can be considered incompetent.
- Pt may learn to habitually keep the lips together with increased muscular effort and forward mandibular posturing

Habits

- A clue to the presence of a vigorous digit sucking habit is the presence of a **callous on the digit sucked** in the area in contact with the incisors
- **Nail biting** habits can potentiate orthodontically induced **root resorption** and are easily identified by examining the nails.



Temporomandibular Joint

- Tenderness in the muscles of mastication
- Clicking or crepitus in the joints
- The range of mandibular movements

If pathology is found, there may be a history of parafunction or facial trauma.

INTRAORAL ASSESSMENT

INTRAORAL EXAMINATION

The aims of intraoral examination are to:

- Determine the level of oral hygiene
- Establish whether dental development is normal
- Assess the mucosal/dental surfaces for pathology
- The tongue
- Assess tooth position within and between the arches.

Oral Hygiene

Assessed:

- gingivitis
- probing to elicit gingival bleeding
- visual aids such as disclosing tablets/solution

Poor OH during orthodontic treatment predisposes to:

- decalcification
- gingival hyperplasia
- gingivitis/ periodontal breakdown
- removable appliance - related stomatitis

Assessment of Dental Development

The stage of dental development can be classified as follows:

- Deciduous dentition
- Early mixed dentition – marked by eruption of the permanent incisors and first molars
- Late mixed dentition – marked by eruption of all successional teeth, excluding the second premolars
- Permanent dentition.

Assessment of Dental Development

- Abnormalities in the **sequence of eruption** are more informative in detecting developmental disturbances.
- **Asymmetries in dental development**, particularly when ≥ 6 months, are also indicative of developmental disturbances and warrant radiographic assessment.
- Developmental disturbances of **tooth size** are common and should be noted

Assessment for Pathology

- Dental caries
- Gingivitis, periodontitis and gingival recession
- Dental hypoplasia and hypomineralisation
- Tooth wear
- Sequelae of traumatic injuries to the dentition

Assessment for Pathology

All dental disease must be controlled before contemplating orthodontic treatment and it is important that patients understand that they must continue to visit their general practitioner for routine dental maintenance during orthodontics

The tongue

- It is difficult to assess the size and position of the tongue unless it is grossly abnormal
- Signs of a tongue thrust and macroglossia include:
 - Proclination of the upper and lower incisors
 - Reverse curve of Spee in the lower arch
 - Anterior open bite
 - Presence of a lisp
 - Presence of the tongue interposed between the incisors at rest
 - Crenulations of the lateral border of the tongue

Assessment of Tooth Position

- The segments of each arch should be assessed in turn:
 - labial segments
 - canines
 - buccal segments
- It is important to quantify the amount of crowding or spacing within each segments and the inclination of the incisors and molars
- The existence of an abnormal frenal attachment should always be considered in the presence of a diastema
- Canine angulation may be classified as mesial, upright or distal
- It is important to note the inclination of the upper molars

Static and Dynamic Occlusion

- The following features should be noted in the intercuspal position:
 - Overjet
 - Overbite (complete or incomplete)
 - Centrelines
 - Incisors relationship
 - Canines and molars relationships
 - Crossbites (mandibular displacement on closure?)

Static and Dynamic Occlusion

- As well as the static occlusion, it is important to check for occlusal interferences during excursions of the mandible. These may predispose to later temporomandibular joint dysfunction