



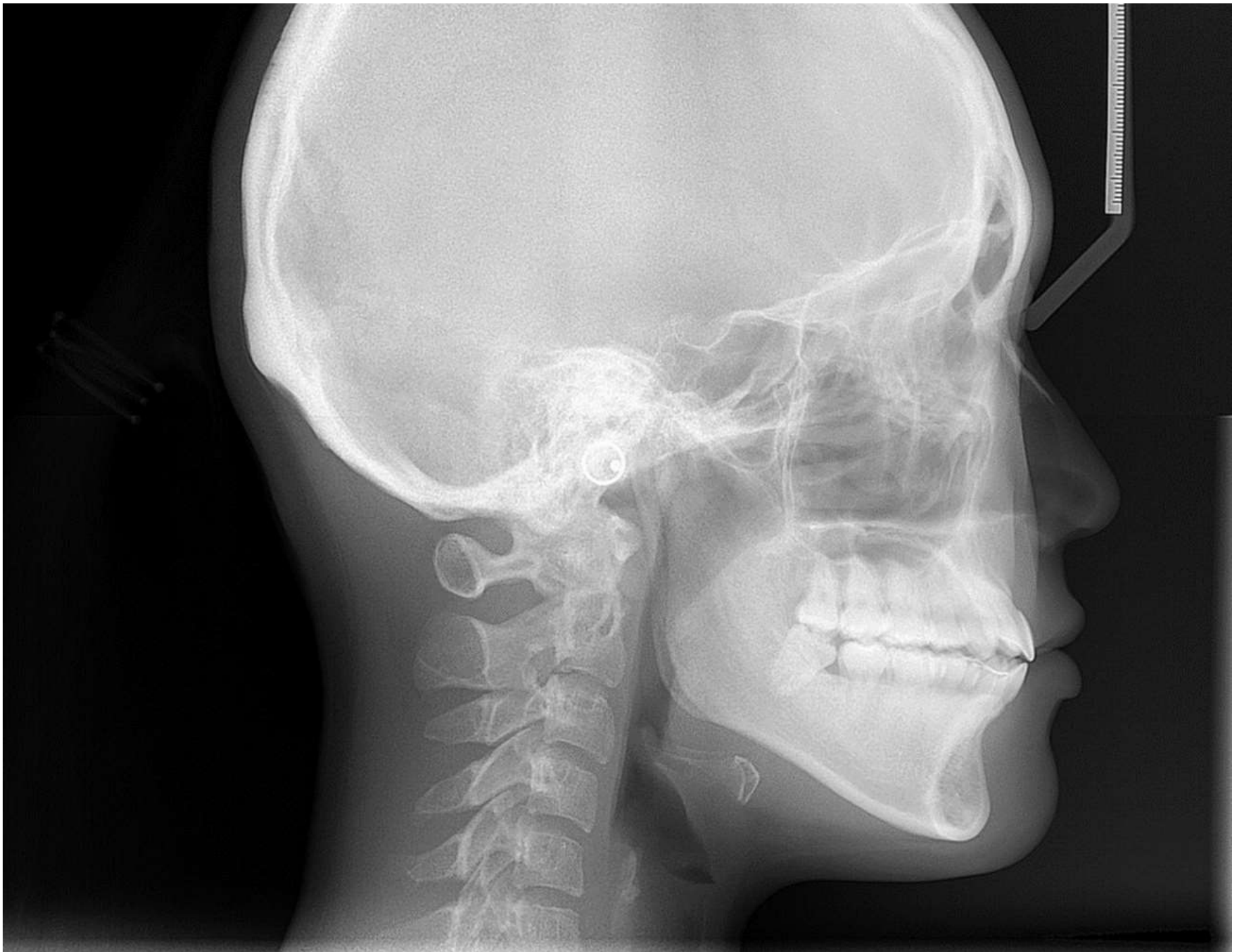
Cephalometric X-ray

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Cephalometric radiography is a standardized method of production of skull radiographs, which are useful in making measurements of the cranium and the orofacial complex. The radiograph thus obtained is called a cephalogram .

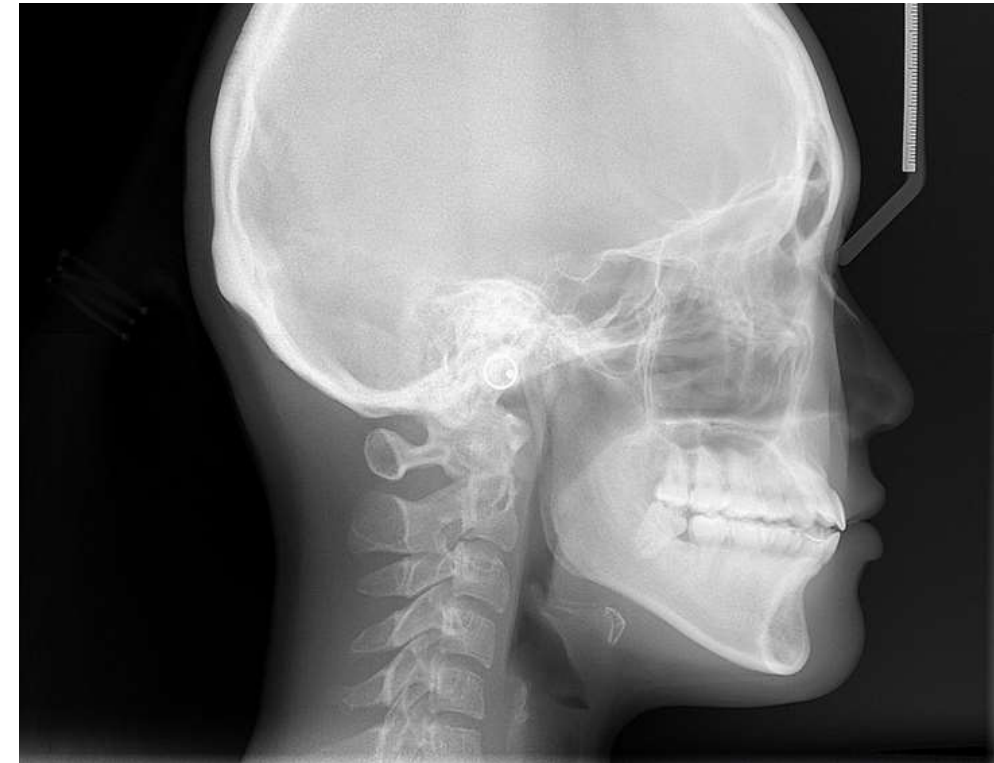
It is of considerable importance not only in the study of growth but also in clinical evaluation of orthodontic patients. The technique depends on precisely orienting the head before making a radiograph, with equally precise control of magnification .



cephalostat was developed by B. Holly Broadbent in the period after the First World War. The cephalostat consists of an X-ray machine which is at a fixed distance from a set of ear posts designed to fit into the patient's **external auditory meatus**. Thus the central beam of the machine is directed towards the **ear posts**, which also serve to stabilize the patient's head. The position of the head in the vertical axis is standardized by ensuring that the patient's **Frankfort plane** is horizontal. This can be done by manually positioning the patient head or, alternatively, by placing a mirror some distance away level with the patient's head and asking him or her to look into their own eyes. This is termed the **natural head position**, and some orthodontists claim that it is more consistent than a manual approach



It is normal practice to cone down the area exposed so that the skull vault is not routinely included in the X-ray beam. The distances from the tube to the patient (usually between 1.5 to 1.8 m and from the patient to the film around 30 cm



Uses of Cephalometric x- ray

1. Study of craniofacial growth

By providing information about :

- 1. The various growth patterns .*
- 2. The formation of standards, against which other cephalograms can be compared .*
- 3. Prediction of future growth .*

2. Diagnosis of craniofacial deformity

Cephalograms help in identifying, locating and quantifying the nature of the problem, the most important result being a differentiation between skeletal and dental mal-relationships .

3. Treatment planning

By helping in diagnosis and prediction of craniofacial morphology and future growth, cephalometric help in developing a clear treatment plan. Even prior to starting orthodontic treatment an orthodontist can predict the final position of each tooth within a given patient's craniofacial skeleton to achieve aesthetic and more stable results .

4. Evaluation of treated cases

Serial cephalograms permit the orthodontist to evaluate and assess the progress of treatment and also helps in guiding any desired change .

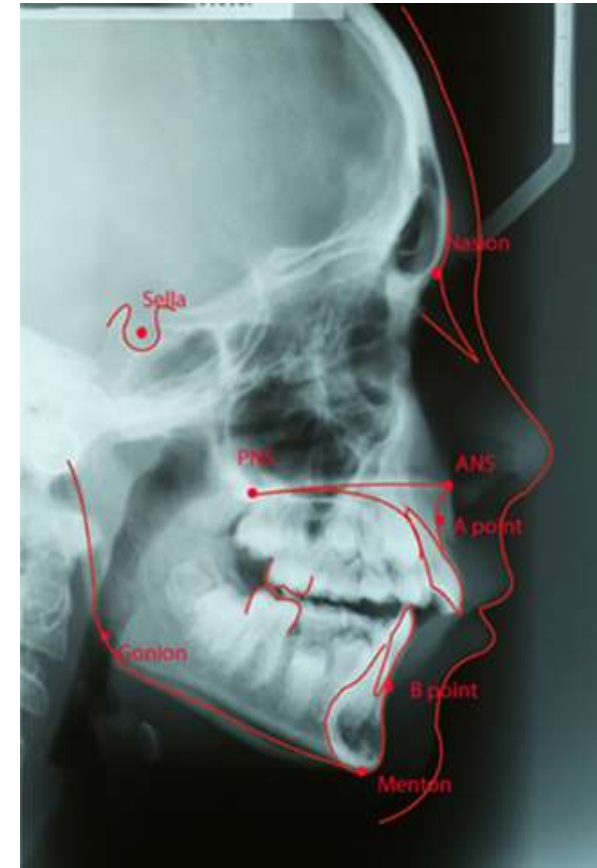
5. Study of relapse in orthodontics

Cephalometric also helps in identifying causes of orthodontic relapse and stability of treated malocclusions. helps in establishing positions of individual teeth within the maxilla or the mandible, which can be considered to be relatively stable

The evaluation of cephalometric x-ray done by :

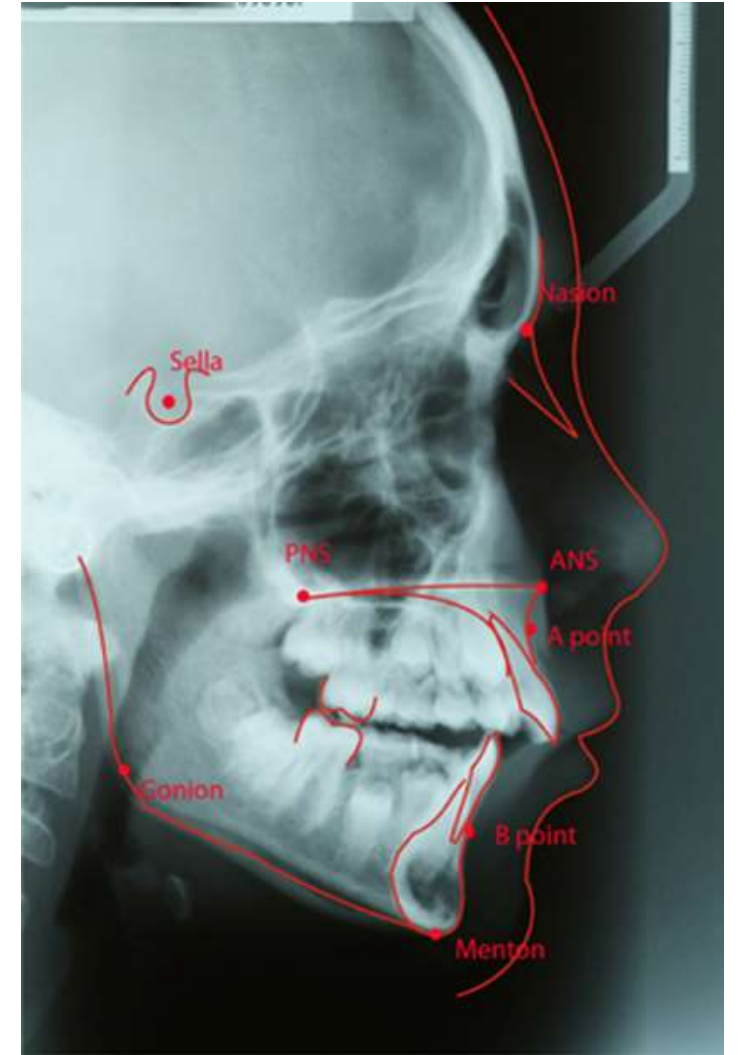
1. Hand tracing : which is done by using ordinary x-ray put on illuminating source of light (viewer) & using tracing paper & pencil .

2. Digitizing tracing : this type depend on the digital x-ray (or normal one) & by using special computerised software.



Commonly used cephalometric points and reference lines

1. Unilateral Landmarks
2. Bilateral Landmarks



Unilateral Landmarks

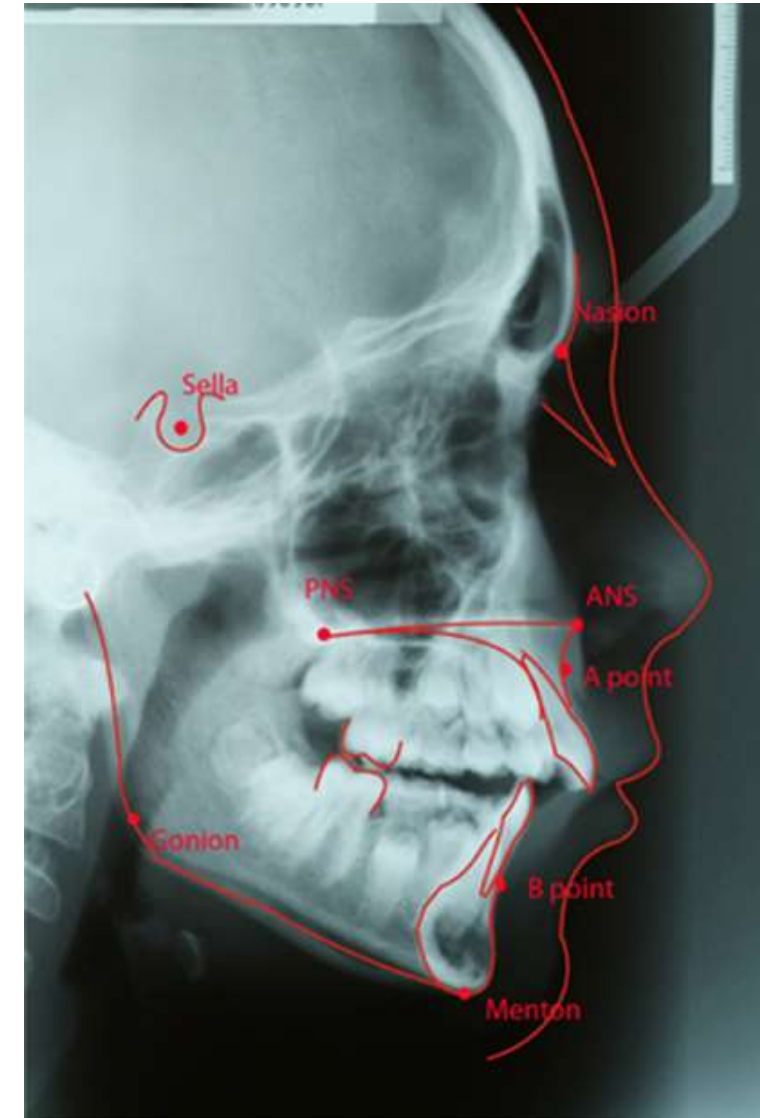
Sella : The center of the shadow of sella turcica

Nasion: The junction of nasal and frontal bones in the mid-line

Anterior nasal spine (ANS): The most anterior projection of the premaxilla in the mid-line below the nasal cavity.

Posterior nasal spine (PNS): The most posterior projection of the hard palate in the mid-line .

Point A (subspinale): The most posterior point of the concavity on the anterior surface of the premaxilla in the mid-line, below the anterior nasal spine.

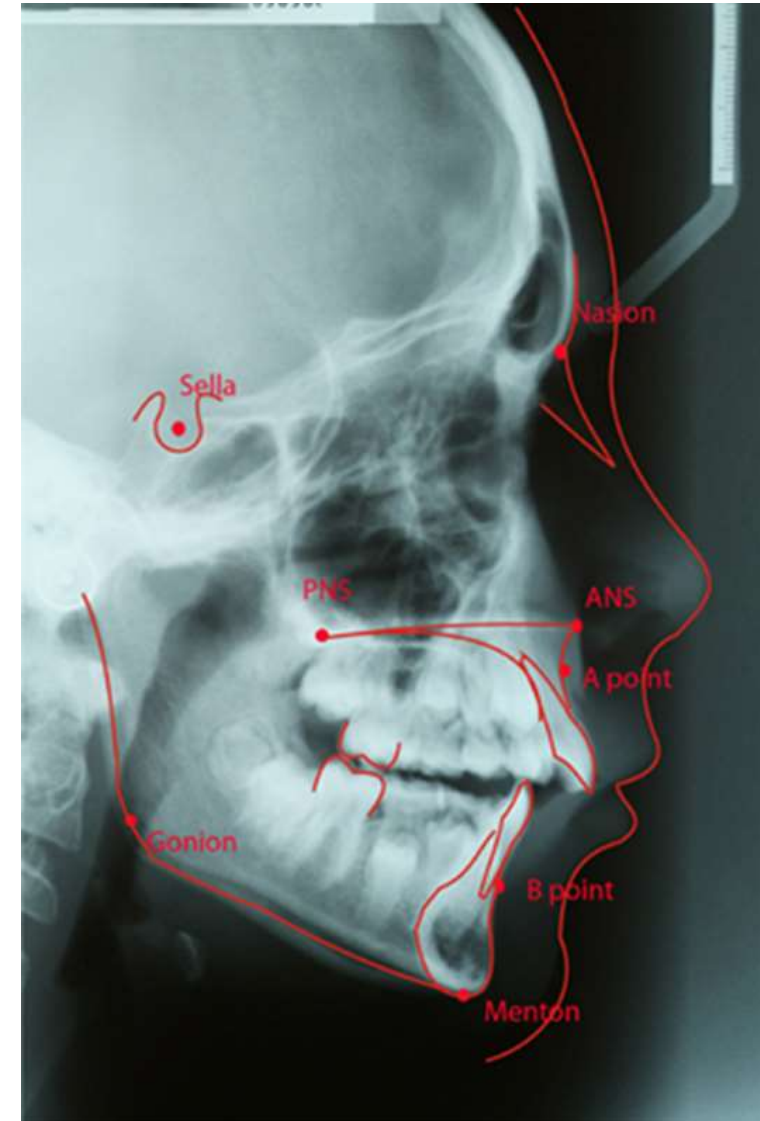


Point B (supramentale): The most posterior point of the concavity on the anterior surface of the mandible in the mid-line, above the pogonion.

Pogonion: The most anterior point on the bony chin.

Gnathion: The most inferior and anterior point on the bony chin.

Menton: The most inferior point on the lower border of the mandible.



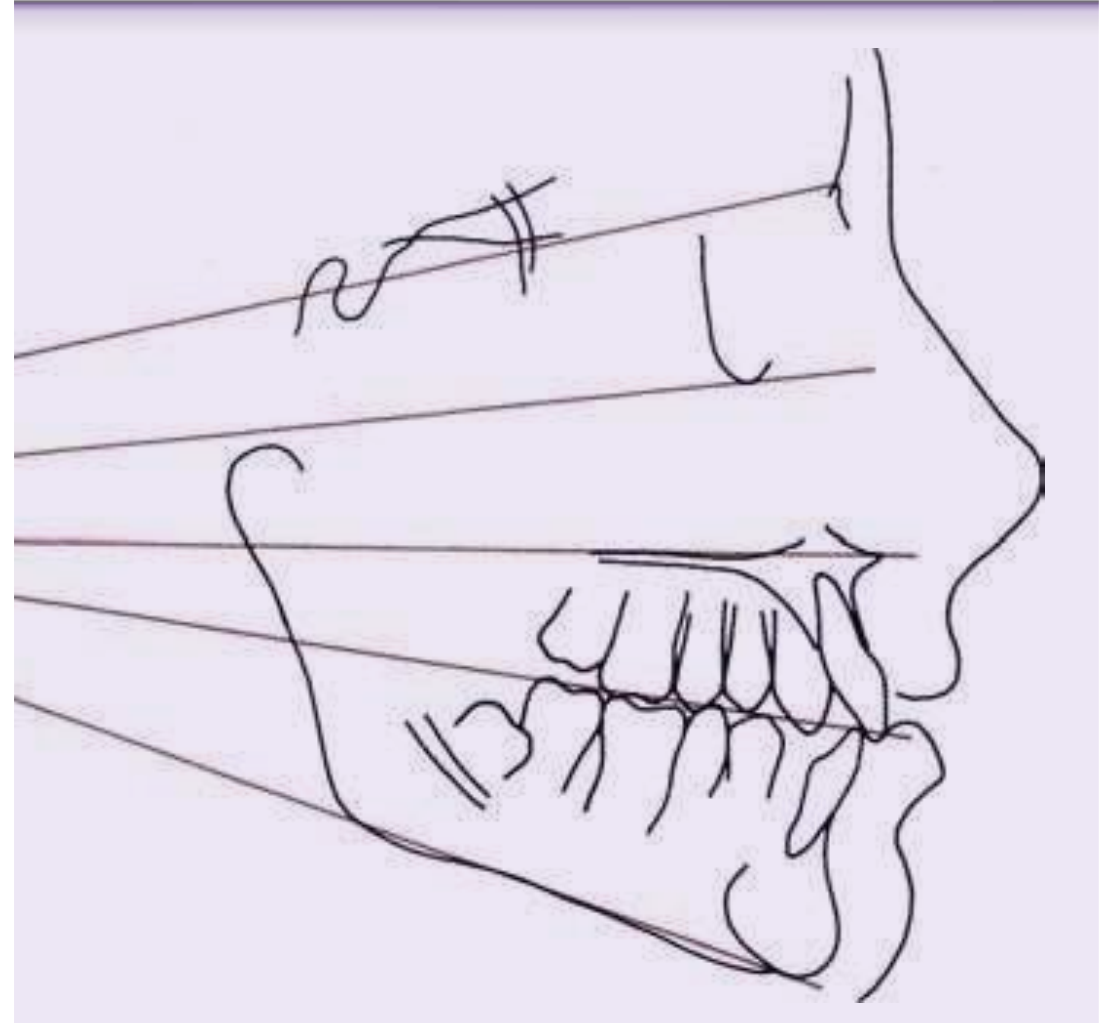
Bilateral Landmarks

- 1. Porion:** The highest point on the margin of the external auditory meatus.
- 2. Orbitale:** The lowest point on the infra-orbital margin.
- 3. Gonion:** The most inferior and posterior point at the angle of the mandible.
- 4. Articulare:** The point of intersection of the outlines of the posterior border of the mandible and the inferior border of the temporal bone.

Cephalometric lines

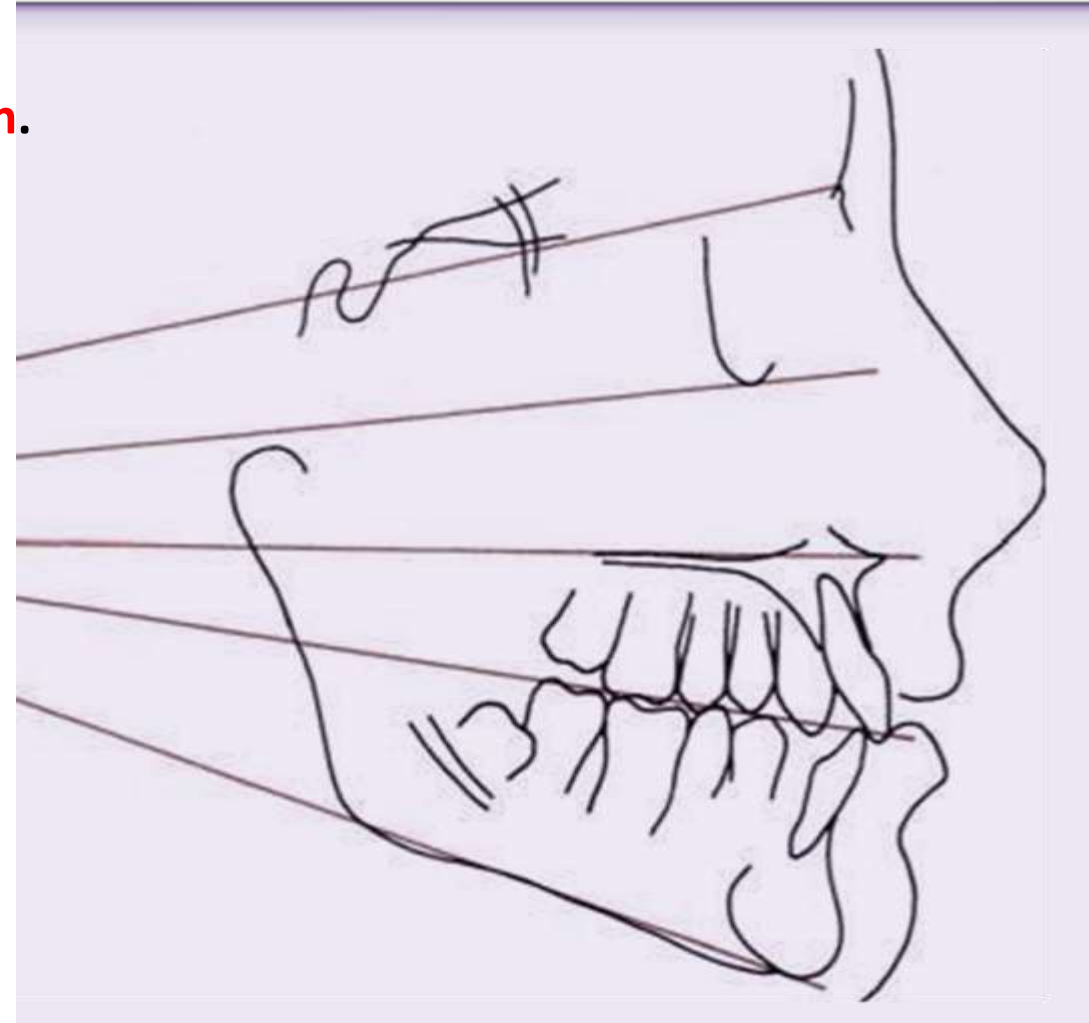
1. Sella-nasion(S-N) line : The line joining the centre of the **sella turcica** and the **nasion**

It is used to represent the anterior cranial base, to which the position of the jaws and teeth are often related in cephalometric analysis



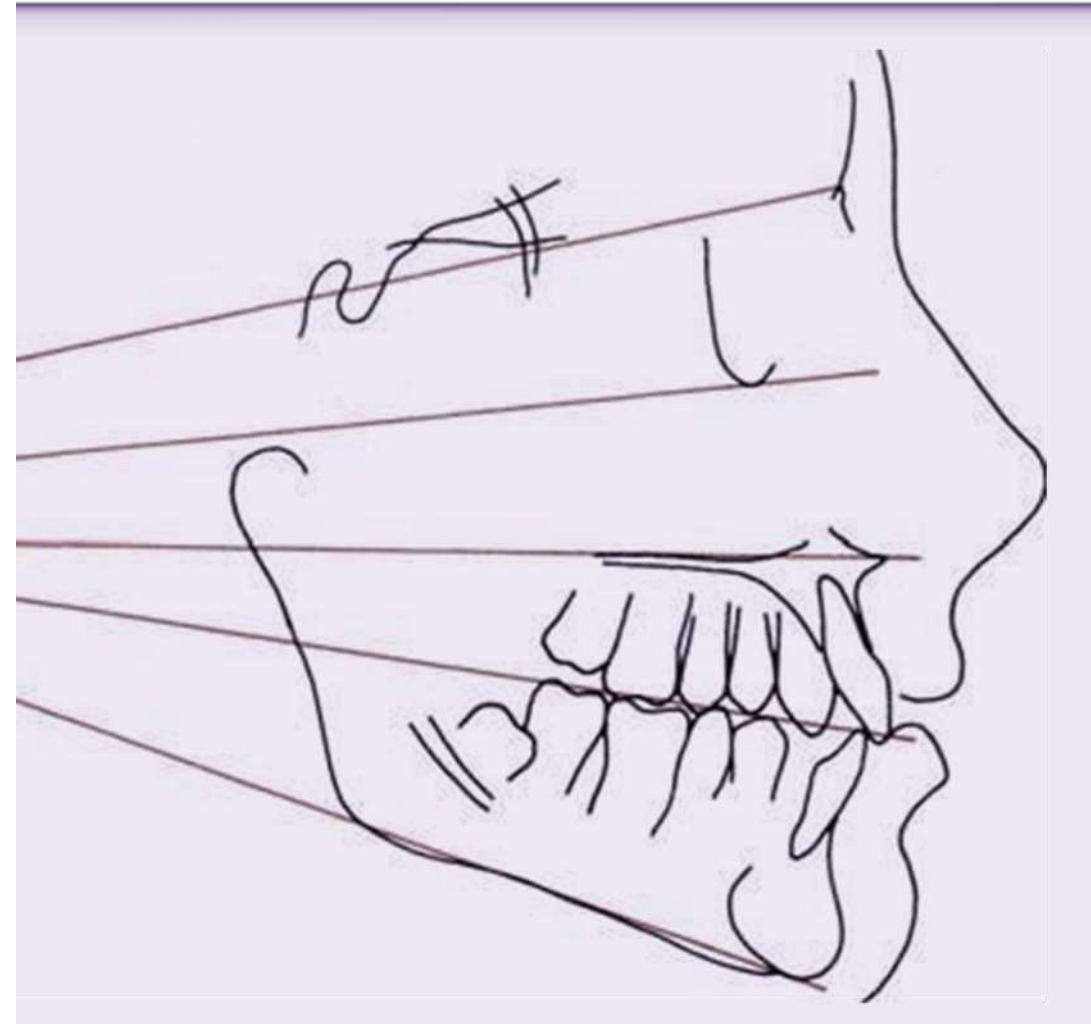
2. Frankfort line : The line joining the **orbitale** and the **porion**.

It is commonly used for orientation of the head in clinical and radiographic assessments



3. Maxillary line : The line joining the **anterior nasal spine** and the **posterior nasal spine**

This line is sometimes used instead of the Frankfort line in radiographic assessment.

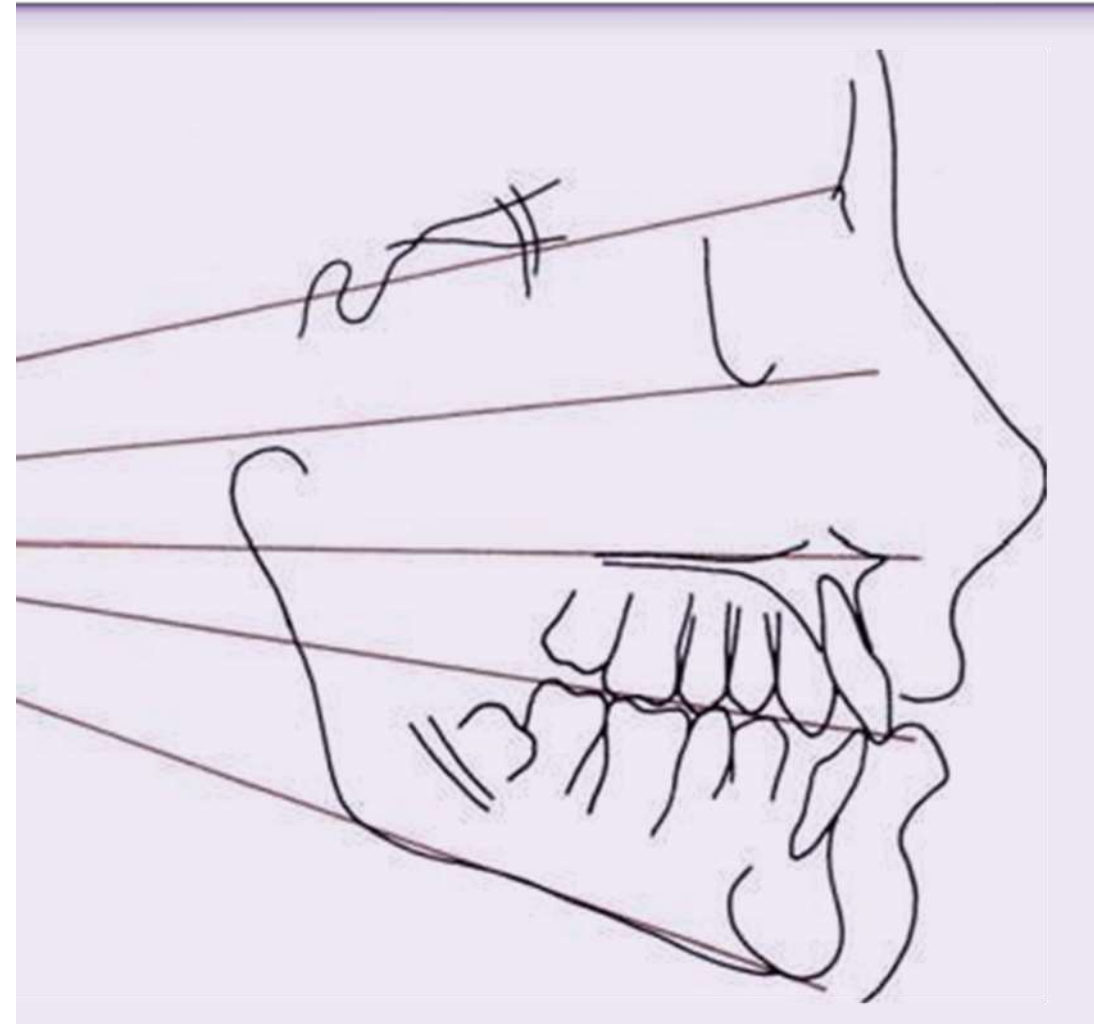


4. Mandibular line : The line joining **gonion** and **menton**

It represents the line of the lower border of the mandible .

The angular relationship between the facial line and the Frankfort line is used as a measurement of mandibular prognathism

5. Facial line : The line joining **nasion** and **pogonion**.



Anteroposterior skeletal pattern

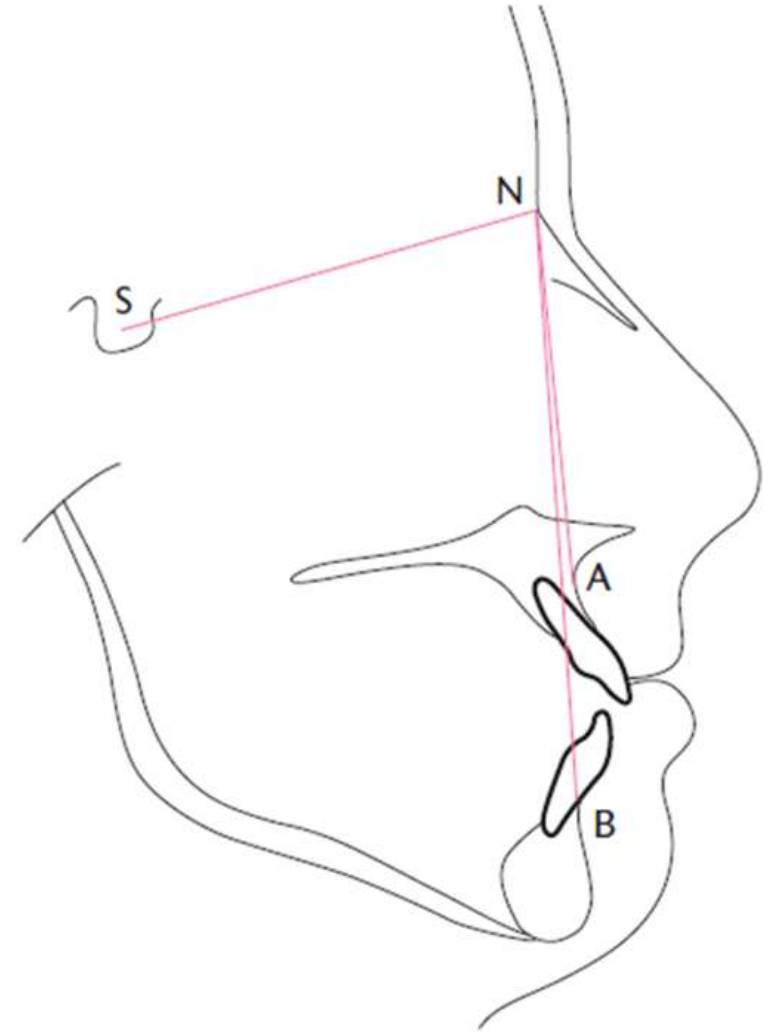
1. Angle ANB

Basic measurement of angles

$$\text{SNA} = 81^\circ (\pm 3)$$

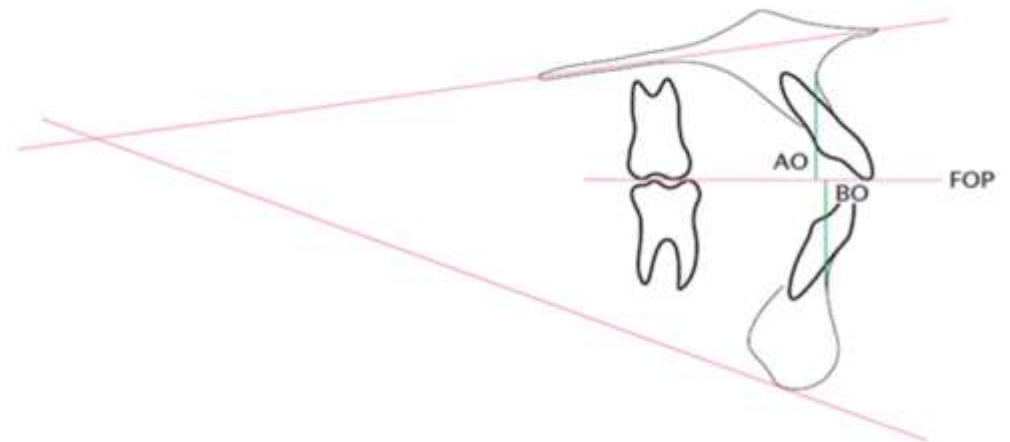
$$\text{SNB} = 79^\circ (\pm 3)$$

$$\text{ANB} = 3^\circ (\pm 2)$$



2. Wits analysis

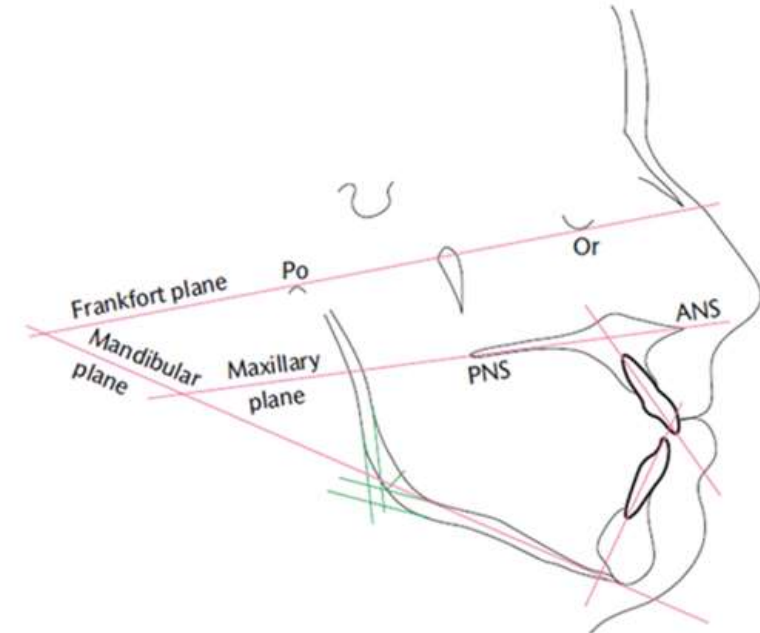
This analysis compares the relationship of the maxilla and mandible with the occlusal plane. There are several definitions of the occlusal plane, but for the purposes of the Wits analysis it is taken to be a line drawn between the cusp tips of the molars and premolars (or deciduous molars), which is known as the functional occlusal plane. Perpendicular lines from both point A and point B are dropped to the functional occlusal plane to give points AO and BO. The distance between AO and BO is then measured.



Vertical skeletal pattern

There are many different ways of assessing vertical skeletal proportions. The more commonly used include the following.

- The Maxillary–Mandibular Planes Angle. The average angle between the maxillary plane and the mandibular plane (MMPA) is $27 \pm 4^\circ$
- Frankfort Mandibular Planes Angle (FMPA). The average angle is $28 \pm 4^\circ$. However, the maxillary plane is easier to locate accurately and is therefore more widely used.



Cephalometric errors:

1. Projection errors: Because a cephalometric radiograph is a slightly enlarged, two-dimensional representation of a three-dimensional patient, angular measurements are generally to be preferred to linear measurements.

2. Landmark identification: Accurate identification of cephalometric points is often difficult particularly if the radiograph is of poor quality.

Analysis can be divided into three parts :

i. Skeletal Analysis .

ii. Dental Analysis .

iii. Soft tissues Analysis .

Next Year in the 5th stage of the college

The image features a central teal watercolor splash on a background of a light-colored checkered pattern. The splash is irregular and textured, with varying shades of teal. The words "Thank You" are written in a dark teal, cursive font across the middle of the splash.

Thank You