

Examination

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Learning outcomes

- Understand clinical examination and diagnosis of malocclusion
- Identify normal and abnormal facial growth, physical, mental and dental development and explain their significance.
- Discuss the importance of each component of the patient assessment process
- Understand how relevant special investigations and diagnostic procedures contribute to treatment planning and how the patient assessment process determines what investigations/diagnostic procedures we may choose to select

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Patient's complaint and motivation

- Main concerns and expectations
- Increased demand and awareness among patients
- May be driven by parent or dentist



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Medical history

- Impact on provision of orthodontic treatment
- Cardiac/bleeding disorders
- Diabetes
- Epilepsy
- Medications
- Allergies



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Dental history

- Regular attendance with GDP
- Previous restorations/extractions
- History of trauma
- Previous orthodontic treatment



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Extraoral examination

- Frontal view
- Natural head posture



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Vertical relationship

- Split into thirds
- Lower face height
- Upper lip (1/3)
- Lower lip (2/3)



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Lip relationship

- Competent lips
- Potentially competent
- Incompetent



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Incisor show at rest

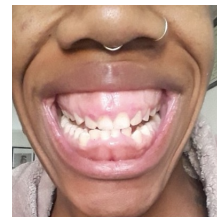
- 3-4mm show at rest
- F>M
- Reduces with age
- Lip length
- Male 22mm
- Female 20mm



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Incisor show on smiling

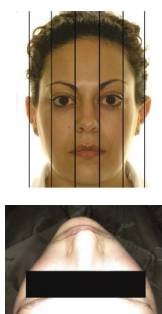
- 75-100% incisor show on smile
- Excessive 'gummy smile' unattractive



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Transverse and symmetry

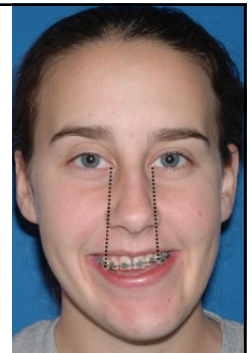
- Face divided into fifths
- No face truly symmetrical
- 'Birds eye' and 'worms eye'



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Mandibular asymmetry

- Hemimandibular hyperplasia
- Hemimandibular elongation
- Maxillary cant



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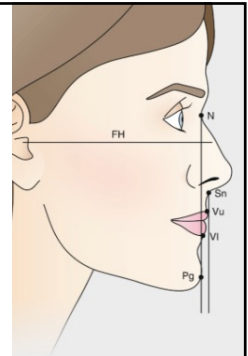
Mandibular asymmetry



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Profile view

- Anteroposterior relationship
- Zero meridian (line perpendicular to Frankfort horizontal plane that intersects with nasion. Looking at where upper lip and chin point are relative to this line)
- Kettles method (Bi-manual palpation of ST A point and B point)



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Anteroposterior
(AP)
relationship

- An assessment should be made of the skeletal dental base relationship between the upper and lower jaws in the anteroposterior plane
- In a normal or skeletal class 1 relationship, the upper jaw should be approximately 2 to 4-mm in front of the lower
- In a skeletal class 2 relationship the lower jaw is greater than 4-mm behind the upper
- In a skeletal class 3 relationship the lower jaw is less than 2-mm behind the upper.

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Skeletal
relationship?

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Skeletal
relationship?

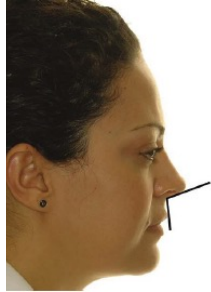
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Skeletal
relationship?

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Nasolabial angle and lip protrusion

- Angle formed between upper lip and base of nose (columella)
- 90-110 degrees



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Vertical relationship

- Divided into thirds (all to be equal)
 - Trichion to Glabella
 - Glabella to ST subnasale
 - ST Subnasale to ST Menton
- Frankfort Mandibular Plane Angle (angle to the mandibular plane)



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Intraoral examination

- Dental health
- Presence of teeth
- Caries, restorations, OH
- Trauma
- Erosion/attrition



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Dental health

- Teeth present clinically should be noted
- Assessment of the general dental condition, including the presence of untreated caries, existing restorations and the standard of oral hygiene.
- Evidence of previous dentoalveolar trauma, such as chipped or discoloured incisor teeth, should also be recorded.
- Previous trauma will warrant further investigation in the form of vitality testing and radiographs.



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Dental arches

- Crowding
- Rotations
- Displacements
- Inclinations
- Permanent canines



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Dental arches

- Arch shape and symmetry
- Depth of curve of Spee
 - Described as normal, increased or decreased
 - This will have a direct bearing on space requirements as an increased curve of Spee is a manifestation of crowding in the vertical plane and, as such, will require space to correct.



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How is crowding measured?

- Crowding represents a discrepancy between the size of the dental arch and the size of the teeth. It is important that the degree of crowding is assessed as accurately as possible.
- Ideally the mesiodistal widths of the teeth in each dental arch should be measured, added together and compared to the overall size of the arch.



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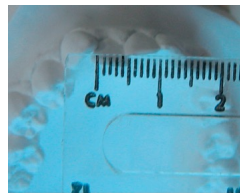
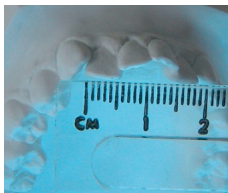
Crowding

- During the initial examination this can be done in the patient's mouth using a small metal ruler; however, a more detailed assessment can be made from the dental study casts during treatment planning.
- An important aspect of this process is deciding upon a suitable dental arch form.



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Measurement

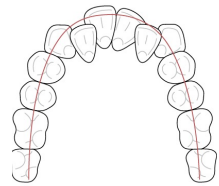


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Crowding

- Crowding is usually described as:

- Mild (0 to 4-mm)
- Moderate (5 to 8-mm)
- Severe (greater than 9-mm).



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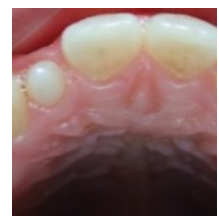
Upper and lower arch crowding



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Tooth size discrepancy

- Tooth size can compromise an ideal occlusal fit
- To achieve a good occlusal fit and an ideal static occlusion, the total mesiodistal dimension of the mandibular dentition should be approximately 93% of that of the maxilla
- "Bolton ratio"
- Commonest cause of a tooth size discrepancy is a diminutive lateral incisors
- Can be masked by composite build up of diminutive teeth or reducing width of teeth in the opposing arch



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Space analysis

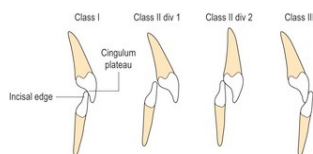
- Space analysis is a process that allows an estimation of the space required in each arch to fulfil the treatment aims.
- Space planning is carried out in two phases: the first phase is to determine the space required and the second calculates the amount of space that will be created during treatment. This includes creating space for any planned prostheses.
- Royal London Space Analysis.

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Calculating space requirements

- Space is required to correct the following:
 - Crowding.
 - Incisor anteroposterior change (usually aiming to achieve a normal overjet of 2 mm).
 - Levelling of occlusal curves (flattening the curve of Spee).
 - Arch contraction (expansion will create space).
 - Correction of upper incisor angulation (mesiodistal tip).
 - Correction of upper incisor inclination (torque).

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INCISOR CLASSIFICATION

British Standards Institute

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Class II malocclusion

- 25% in UK
- Aetiology:
 - Skeletal
 - Soft tissue
 - Digit habit



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Class III malocclusion

- 1-4% in Europe
- E/O assessment
- I/O assessment



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Overjet



- Labial surface of the most prominent maxillary incisor to the labial surface of mandibular incisor
- 2-4mm
- Class III given negative value

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Overbite

- 2-4mm or 1/3-1/2 crown height
- Increased
- Decreased
- Complete
- Incomplete



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Variation in overbite



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Anterior crossbite

- Records teeth in crossbite
- Presence and size of displacement between RCP and ICP
- Gingival recession



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Anterior crossbite with displacement



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Centrelines

- Assessed in relation to facial midline and each other
- Causes:
 - Asymmetric dental crowding
 - Buccal crossbite with displacement
 - Skeletal asymmetry



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Centreline discrepancy due to asymmetric crowding



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Buccal segments

- Angles classification
- Class I
- Class II
- Class III



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Occlusal variation



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Posterior crossbite

- Buccal crossbite
- Lingual crossbite (Scissor bite)
- Unilateral
- Bilateral



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Mandibular lingual crossbite



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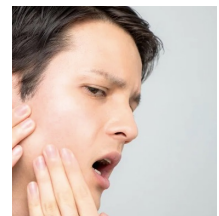
Practical

- 7 sets of study models
- Describe features of both upper and lower arches
- Measure crowding
- Incisor classification

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Temporomandibular joint

- Clicking
- Crepitus
- Locking
- Pain



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TMD

ADVICE SHEET
BRITISH ORTHODONTIC SOCIETY
TEMPOROMANDIBULAR DISORDERS (TMDs) AND THE ORTHODONTIC PATIENT

Is advice sheet gives advice for orthodontists who have patients with temporomandibular disorders (TMD).

Situation
Importance of occlusion in the aetiology of TMD (Temporomandibular Disorders) and the role of orthodontics in the management of these disorders has caused controversy for a number of decades. This is primarily due to some studies finding weak links between some types of malocclusion and TMD.

It is generally accepted that TMD is not just one condition but rather several which encompass a variety of signs and symptoms. Many other factors have been linked to TMD including: hyperactive mandibular joint (disc) function, parafunctional habits, inflammatory myalgia and connective tissue dysfunction. Recent research shows that there is no definitive theory, strong relationships and causes are amongst the poor orthodontic factors in TMD, rather than occlusal factors. Genetic factors may contribute to developing TMD.

Advice is being established to indicate that not only can TMD pain be influenced by occlusal changes but there may also be an influence in human upper teeth in the TMJ discs. Furthermore, genetic variation in human stress response and resistance to wear also being found.

AD is common and can be found in individuals from all over the world. Prevalence rates between studies have 1% to 10% with an age range from 15 to 70 years. It is generally accepted that TMD is more common in females than males and tends to peak in late adolescence/early adulthood. It is, therefore, not surprising that in orthodontic patients with TMD on the demographic match those of our orthodontic patients.

Consent of TMD
Joint practice to routinely undertake a TM joint assessment as part of the patient's clinical assessment.

Any pre-existing TMD signs or symptoms should be clearly recorded in the notes. For example: pain on palpation of temporomandibular joint, pain on palpation of associated muscle, limitation or deviation of mandibular movement and joint sounds.

- However, apart if the patient has no signs or symptoms of TMD, this fact should not be recorded.

It is important to inform the patient if they have TMD signs and/or symptoms before orthodontic treatment commences so that the patient does not think they have occurred as a result of orthodontic treatment. It is also helpful to explain that orthodontic treatment is not being undertaken to cure their TMD. Even if a patient has not indicated that they expect improvement of their TMD, they may nevertheless expect the fact that they have been referred previously.

Advice to patients with TMD prior to treatment

- Orthodontists can offer simple conservative advice to patients who are planning to undergo orthodontic treatment.
- There is a patient information leaflet available to download from www.bso.org.uk.
- For those with existing or developing TMD it is often beneficial to give a brief explanation about the aim and how it does not always mean in harmony with the complex. Patients can be reassured that their symptoms are not necessarily progressive and will often resolve spontaneously.
- An explanation of the relationship with stress (e.g. can get worse around exam time) is also useful.

Advice on some practical measures can include:

- Staying in pain - e.g. avoiding over-eating during orthodontic treatment.
- Soft diet - some patients find certain food types trigger symptoms.
- Analgesic - e.g. non-steroidal anti-inflammatory drugs (if not otherwise contraindicated).
- Application of heat - e.g. a heat pack can be used to relax muscles.

Conservative measures are effective, but the orthodontist can consider referral (a clinician with an interest in TMD, although the availability of such help varies) and advice to ensure the most appropriate treatment will include symptoms are advised.

Remember, some patients report relief from symptoms during treatment.

Amount of TMD during orthodontic treatment

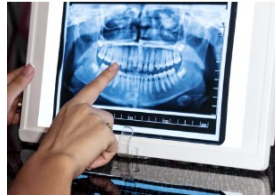
- A team suggested to advise orthodontists that following certain occlusal goals will not appear before TMD.
- A mutually protected occlusion (i.e. some guidance/stop function and anterior guidance).
- Retention of an existing stable occlusion.

If it is straightforward and reasonable to achieve these occlusal goals, then there is no clinical reason not to encourage this. However, there is a lack of consensus as to what precise occlusal scheme is preferred. "Functional occlusion" and "do no harm" that such an occlusal scheme, in any case, be stable or increase stability. It

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Orthodontic records

- Diagnosis
- Monitoring growth
- Medico-legal requirement
- Communication tool
- Research
- Clinical audit



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Study models

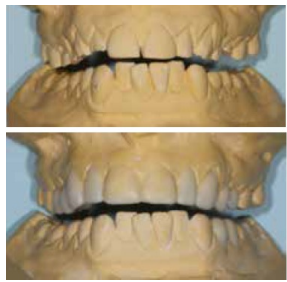
- Impression showing:
 - All erupted teeth
 - Full depth of palate
 - Good soft tissue extension
- Alginate impressions
- Poured in dental stone
- Trimmed with occlusal plane parallel to base



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Kesling set up

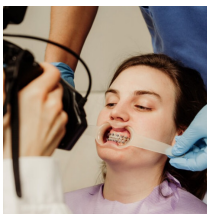
- Aesthetic preview before commencing treatment
- Manage patient's expectations
- Lab technician adds wax to articulated model
- Facilitates: design, occlusal scheme, restoration design and aesthetic outcomes



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Clinical photographs

- Essential part of clinical record
- Baseline record of presenting malocclusion
- Treatment planning
- Monitoring treatment progression
- Teaching



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Extra-oral photographs

- Full facial frontal
- Full facial frontal smiling
- Facial three-quarters
- Facial profile



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Intra-oral photographs

- Frontal occlusion
- Buccal occlusion (left and right)
- Maxillary dentition
- Mandibular dentition



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Radiographs

- Required prior to orthodontic treatment:
- Presence or absence of permanent teeth
- Root morphology
- Presence of dental disease
- Presence of supernumerary teeth
- Position of ectopic teeth
- Relationship of dentition to dental bases and relationship to cranial base.



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Radiation protection

- *Currently in the UK, the medical use of ionizing radiation is covered by two articles of legislation.*
- *The Ionising Radiation Regulations (2017) are concerned primarily with the safety of workers and members of the general public*
- *Whilst the Ionising Radiation (Medical Exposure) Regulations (2017) relate to the safety and protection of the patient.*

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Radiation protection

- Legislation is based on three basic principles:
- *Justification*
- *Optimization*
- *Limitation*
- *The dental practitioner is responsible for justifying the exposure of a patient to ionizing radiation and this should be based upon a defined clinical need. Once an exposure is clinically justified it should be optimized, keeping the dose as low as reasonably practicable (the ALARP principle) and maximizing the risk-benefit ratio to the patient.*

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Radiographs used in orthodontic

Radiographic examination	Effective radiation dose (µSv)	Equivalent background radiation (days)	Risk of fatal cancer (per million)
DPT	3-30	0.5-5	0.2-1.9
Cephalometric lateral skull	2-3	0.3-0.45	0.34
Upper standard occlusal	8	1.2	0.4
Bite-wing/periapical	1-10	0.15-0.27	0.02-0.6
CT scan (maxilla)	100-3000	15-455	8-242
CT scan (mandible)	350-1200	53-182	18-88
Chest	20	3	2

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Dental Panoramic Tomography

- Dental panoramic tomograph (DPT) provides a useful screen for the presence or absence, position and general health of the teeth and their supporting structures with a relatively low-radiation dose.
- Because these radiographs are sectional in nature, they can be unclear in some regions, particularly the labial segments where variations in the depth of the anterior focal trough for different patients can influence clarity of the incisors.

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Occlusal radiographs

- Occlusal radiographs are taken with the film placed on the occlusal plane and can offer greater detail in the labial segments.
- They are particularly useful in the maxillary arch, for assessing root form of the incisors, the presence of midline supernumerary teeth and canine position, either alone or in combination with additional views using parallax.

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Periapical radiographs

- Periapical radiographs are also useful for the assessment of local pathology, root form and the presence or position of unerupted teeth.
- They can also be used for parallax, particularly in identifying the position of maxillary canine teeth.
- Either two periapicals are taken, incorporating a horizontal tube shift between them; or a single periapical is taken in conjunction with another radiographic view, such as an upper standard occlusal or DPT and a vertical tube shift utilized.
- SLOB rule

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Bitewing radiographs

- Bitewings are useful for the accurate detection of caries, the assessment of existing restorations and periodontal status.

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Cephalometric lateral skull radiograph

- A cephalometric lateral skull radiograph is a specialized view of the facial skeleton and cranial base from the lateral aspect, with the head position at a specific distance from the film.

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Presence or
absence of
permanent
teeth



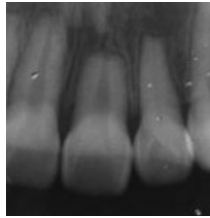
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Presence or
absence of
permanent
teeth



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Root morphology



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Root morphology



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Presence of dental disease



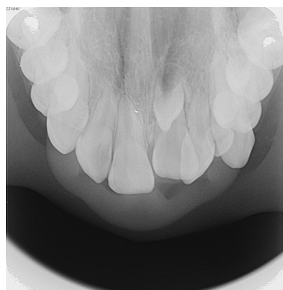
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Presence of dental disease



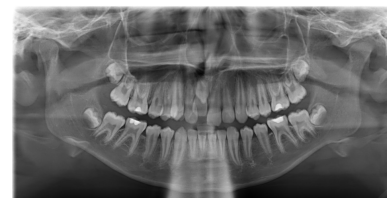
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Presence of supernumerary teeth



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Presence of supernumerary teeth



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Position of ectopic teeth



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Position of ectopic teeth



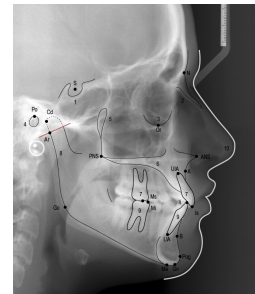
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Relationship of dentition to dental bases and relationship to cranial base.



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Cephalometric tracing



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Three-dimensional imaging

- Plain film are invaluable for diagnosis
- Only provide a 2D image of a 3D structure
- Computed tomography (CT)
- Cone Beam Computed Tomography (CBCT)



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3D reconstruction



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