Orthodontics: Is that branch of dentistry concerned with facial growth; development of the dentitions and occlusion; diagnosis; interception and treatment of occlusal anomalies.

Types of Orthodontic Treatment: - There are 4 types of orthodontic treatments.

1- **Preventive orthodontic treatment**:- It is the action taken to preserve the integrity of what appears to be normal at a specific time , this include :-
   a- Early correction of carious lesion especially proximal caries.
   b- Early recognition and elimination of oral habit.
   c- Using space –maintainer in case of early loss of deciduous.
2- **Interceptive orthodontics treatment**: - It is that phase of science and art that eliminate potential irregularities and mal-position in the developing dentofacial complex, these procedures are employed to eliminate or lessen the severity of developing malocclusion e.g. planning serial extraction.
3- **Corrective orthodontics**:- Recognize or diagnosed the existing malocclusion and the need for using certain technical procedures to reduce or eliminate the problem sequelae.
4- **Surgical orthodontics**: Combination between orthodontic treatment and maxillofacial surgery, in which the orthodontist prepares the patient before surgery or finishes the alignment of teeth after surgery. (pre-operative, postoperative or both).

Occlusion: Any position or relationship in which the upper and the lower teeth come together.

Ideal Occlusion: A theoretical concept of an ideal arrangement of the teeth within the dental arches, combined with an ideal inter-arch relationship, which concentrates optimal esthetic, function, and stability of the dentition and supporting structures. But it is almost never found in nature.

Normal occlusion: That occlusion which satisfies the requirements of function and esthetic but in which there are minor irregularities of individual teeth.

Traumatic occlusion: This is an occlusion which is judged to be a causative factor in the formation of traumatic lesions or muscles and TMJ. Almost every dentition has supra contact that have traumatic potential to alter the status of muscle tones and induce stress. However, the criterion which determines if an occlusion is traumatic or not is not how teeth occlude but whether it produces any injury.





Therapeutic occlusion: This a treated occlusion employed to counteract structural interrelationship related to traumatic occlusion.

Malocclusion: Defined as any deviation from the normal or ideal occlusion

Orthodontic definitions:

Incisal overjet: The horizontal distance between the upper and lower incisors in occlusion, measured at the tip of the upper incisor (Fig. 1).

It is dependent on the inclination of the incisor teeth and the antero-posterior relationship of the dental arches. In most people there is a positive overjet, i.e. the upper incisor is in front of the lower incisor in occlusion(normally 2-4 mm), but the overjet may be reversed (in case of Class III), or edge-to-edge (Fig. 1)

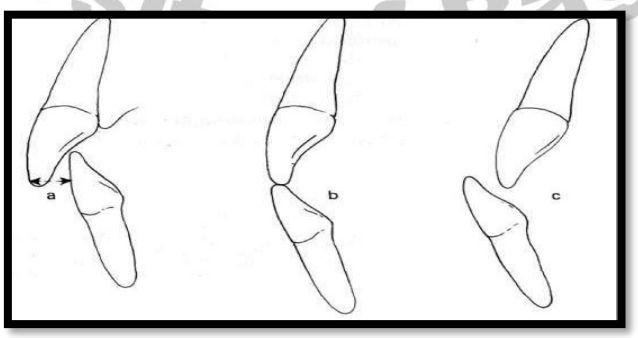


Fig. 1: Incisal overjet: (a) The ideal overjet relationship, (b) Edge to edge incisal position, (c) Reversed overjet.

Incisal overbite: The overbite is the vertical distance between the tips of the upper and lower incisors in occlusion (Fig.2).

It is governed by the degree of vertical development of the anterior dento-alveolar segments. Ideally, the lower incisors contact the middle third of the palatal surface of the upper incisors in occlusion (2-4 mm), but there may be excessive overbite (deep bite), or there may be no incisal contact, in which case the overbite is described as *incomplete overbite* when the lower incisors are above the level of the upper incisal edges, or *anterior open bite*, when the lower incisors are below the level of the upper incisal edges in occlusion.

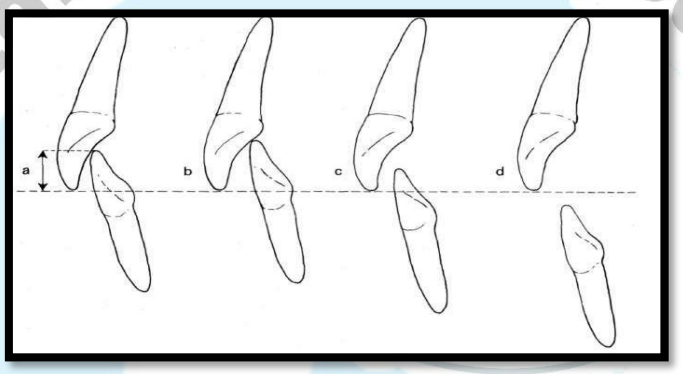


Fig.2: Incisal overbite: (a) Ideal overbite relationship, (b) Excessive incisal overbite (deep bite), (c) Incomplete overbite, (d) Anterior open bite.

Open bite (Negative overbite):

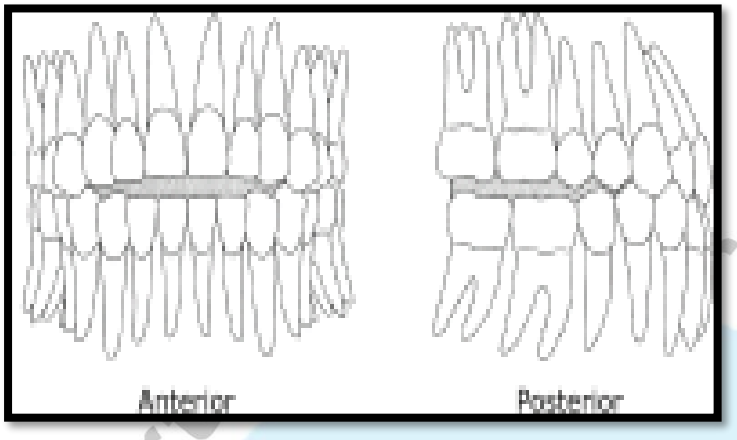
Inherited, developmental or acquired malocclusion whereby no vertical overlap exists between maxillary and mandibular anterior teeth (anterior open bite), or no vertical contact is exhibited between maxillary and mandibular posterior teeth (posterior open bite).

Subdivided to:

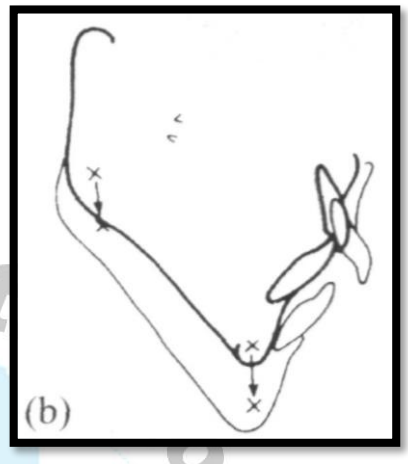
1- Dental open bite: A localized open bite that involves only a few teeth due to a digit-sucking habit or other local factors.



2- Skeletal open bite: Caused by divergence of the skeletal mandibular or / and maxillary planes leading to increased facial height as in case of posterior rotational growth of the mandible (Fig. b).



a-Anterior and posterior dental openbite



b-Posterior rotational growth of the mandible

Deep bite (Excessive overbite): Type of malocclusion in which the vertical overlap of the anterior teeth is increased beyond the ideal relationship(more than the normal range which is 2-4 mm); it is frequently associated with decreased vertical facial dimensions, subdivided into;

1- None traumatic deep bite: In which the deep bite still associated with teeth –teeth relation.



2- Traumatic deep bite: in which the deep bite associated with the Impingement of the mandibular incisors in the mucosa palatal to the maxillary incisors commonly is seen in malocclusions with extremely deep bite as in sever Class II malocclusion.

3- Bi-traumatic deep bite: usually seen in some Class II, Division 2 malocclusions with minimal overjet, the retroclined maxillary incisors may impinge in the keratinized tissue labial to the mandibular incisors, causing gingival recession at the same time there is a trauma to palatal mucosa caused by lower incisors.



Buccal overjet:

The distance between the buccal surfaces of the maxillary posterior teeth and the buccal surfaces of their mandibular antagonists. An unofficial term sometimes used to indicate whether or not there is a tendency for a posterior crossbite.

Crossbite:

An abnormal relationship of one or more teeth to one or more teeth of the opposing arch, in the buccolingual or labiolingual direction. A crossbite can be dental or skeletal in etiology. [Note: The appropriate type of crossbite can be specified by identifying the teeth or jaws that deviate the most from their ideal position (e.g. when a crossbite is mainly due to a narrow maxillary arch the correct term is "maxillary posterior lingual crossbite" as opposed to "mandibular posterior buccal crossbite" which indicates wider mandibular arch).

Anterior crossbite: If the one or more of the lower incisors are in front of the upper incisors, the condition is called reverse overjet or anterior crossbite.



Buccal crossbite : A crossbite due to buccal displacement of the affected posterior tooth (or group of teeth) from its (their) ideal position relative to its (their) antagonist(s).Subdivided into:

1- Unilateral posterior crossbite: Affect only one side of the dental arch, and can be either:

a-True unilateral posterior crossbite: Caused by the asymmetry present in the dental arch and usually does not associated with deviation of the mandible.

b- False unilateral posterior crossbite: caused by narrowing of the maxilla or widening of the mandible leading to cusp –cusp relation then the patient tries to get maximum intercuspation by deviation of the mandible to one side leading to unilateral crossbite.

2- Bilateral posterior crossbite: Caused by sever maxillary collapse or/ and mandibular widening, there is no mandibular deviation during closure.

Scissors-bite:

Situation in which several adjacent posterior teeth overlap vertically in habitual occlusion with their antagonists, without contact of their occlusal surfaces. The deviation of the affected teeth from their ideal position could occur either in a buccal or a lingual direction.



Spacing of the dentition: A dental arch with spacing of more than accepted range (2 mm or more), it is either :

a- Localized: Localized in one position like median Diastema that caused by abnormal frenal attachment.

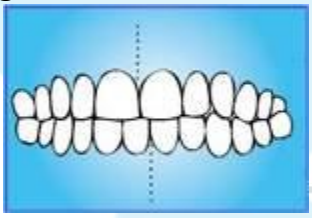
b- Generalized: Affect the whole dental arch mostly caused by abnormal soft tissue function like tongue thrust.

Crowding of the dentition: A dental arch with crowding of more than accepted rang (2 mm or more), either caused by local factor like early extraction of deciduous teeth or general factor like collapsed maxillary arch that lead to crowding of the whole arch.

Imbrication: The overlapping of incisors and canines in the same arch, usually due to crowding.

Midline shift(deviation): Occur when the upper and lower dental midline are not coinciding and subdivided into :

1- Associated with mandibular deviation during closure as in case of premature occlusal contact.
2- Not associated with mandibular deviation during closure as in case of unilateral missing of the teeth or crowding.



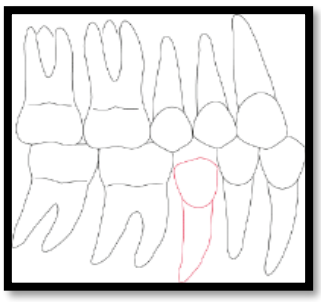
Midline shift may be due to shift of upper or lower teeth or some time may both of them and it is very important to determine that during diagnosis and treatment planning specially to choose a tooth or teeth to be extracted, in addition to that it is important to differentiate between midline shift of the dentition and the face because we may see one of them or some time both of them.

Midline shift of the face mostly caused by abnormal skeletal factor (like unilateral hyperplasia of the mandible) or deviation of the nose.

Midline shift of the dentition mostly associated with unilateral (extraction or congenital missing or impaction) of a tooth.

Infra position (Infra occlusion):

A situation in which a tooth or group of teeth is positioned below the occlusal plane; commonly due to a deleterious habit or to ankylosis.



Overeruption (Supraeruption, Supraposition, Supraocclusion):

The situation whereby an unopposed or non-occluding tooth extends beyond the occlusal plane.



Dental retrusion:

Posterior position of a tooth or group of teeth but keeping their long axis with normal inclination.

Dental retroclination:

Posterior positioning of a tooth or group of teeth but their long axis is tipped labio-lingually .

[Note: A tooth can be retrusive without being retroclined, if it is positioned too far posteriorly but has a normal inclination.]

Dental proclination:

Anterior positioning of a tooth or group of teeth but their long axis are tipped labially.

Dental protrusion:

Anterior positioning of a tooth or group of teeth but keeping their long axis with normal inclination.

Impaction of teeth:

Occurs when eruption is completely blocked by other teeth due to crowding, it tends to affect the last teeth to erupt in each segment (as in case of canine) or 2nd premolars or 3rd molars.

Rotation of teeth:

A type of malocclusion in which there is a rotation of a tooth about its long axis, most evident when viewing the tooth from an occlusal perspective mostly, caused by crowding and sub divided into :

1- Mild (less than 90°): Can be treated easily by removable orthodontic appliance using couple force system.
2- Sever (more than 90°): Must be treated by Fixed orthodontic appliance only

Displacement of tooth:

Abnormal position of the tooth (crown and root) in the dental arch

Overlapping of teeth:

Abnormal position of the crown of the tooth in the dental ach while there is normal position of root in the jaw.

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