

Orthodontics

Growth and development

Cleft lip and palate

The most common craniofacial anomaly, caused by failure of fusion between certain embryological processes during facial morphogenesis, Failure of fusion between the medial and lateral nasal and the maxillary processes results in a cleft of the lip and/or alveolar process. Failure of fusion between the lateral palatine processes results in a cleft of the palate.

The etiology of cleft lip and palate is thought to be multifactorial. Genetic is implicated in 20%-30% of the patients. Environmental factors that have been shown in experimental animals to result in cleft include: nutritional deficiencies, radiation, several drugs, hypoxia, viruses, and vitamin excesses or deficiencies.

In case of complete or bilateral clefts of the lip, alveolus and palate, the maxillary arch typically is collapsed in the transverse direction, especially in the area of the cleft. The maxillary permanent lateral incisors at the line of cleft may be congenitally missing or malformed, and many atypically shaped supernumerary teeth may be present in the area of the cleft.

Classification

A cleft can be complete or incomplete, and it can occur unilaterally or bilaterally. A useful classification divides the anatomy into primary and secondary palates. An individual thus may have cleft of the primary palate, the secondary palate, or both.

Cleft lip:

Cleft lip is classified either unilateral or bilateral and it could be minor cleft of the lip (small notch in the upper lip) or increase in the severity to complete cleft of the upper lip or continue to reach the nostril or to the internal angle of the eye, mostly unilateral, sometimes cleft lip may include cleft of the alveolar ridge.

Cleft palate:

The fusion of the palatal components that form the palate usually start from the anterior aspect and continue posteriorly so that cleft palate could happen at any site through this process of fusion. Cleft palate can be classified according to its severity as follows:

Class 1 : Cleft of soft palate (uvula)

Class II : Cleft of the secondary palate (median palatine cleft)

Class III: Complete unilateral cleft palate

Class IV: Complete bilateral cleft palate

Facial growth and the occlusion

- Dento-alveolar compensation

Variations in vertical jaw relationships are compensated, to a greater or lesser degree, on eruption of the teeth and growth of the alveolar processes. Where the skeletal mal-relationships are too severe, the dento-alveolar compensation described above may not be sufficient to establish a normal occlusion and so cross bite, open bite and anteroposterior arch mal-relationships may develop.

Dento-alveolar compensation is not always advantageous: in some cases of mandibular retrusion, for example, compensation occurs by retroclination of the upper incisors. This type of incisor relationship is usually associated with a deep (sometimes traumatic) overbite.

- Dento-alveolar adaptation

As the face grows, the intermaxillary space increases in height and the anteroposterior jaw relationship

may change. As a result of vertical growth of the teeth and alveolar processes, occlusal contacts, and the soft tissue environment of the teeth, so the existing occlusion tends to be maintained. Dentoalveolar adaptation is a dynamic process (occurs as a result to normal growth in normal jaws relation)..

Dento-alveolar adaptation is greatest vertically, in response to vertical growth of the intermaxillary space. Little change in transverse jaw relationships occurs with growth. Commonly the mandible grows forwards slightly more than the maxilla, so the upper incisors expected to procline whilst the lower incisors retrocline.

Growth rotations:

Growth rotations are most obvious and have their greatest impact on the mandible (particularly in vertical dimension) while their effects on the maxilla are small.

- Mandibular growth rotations result from the interplay of many structures which determines the posterior to anterior facial heights.

The posterior facial height is affected by the followings:

- 1- The direction of the mandibular growth at the condyles.
- 2- The vertical growth at the speno-occipital synchondrosis.

The anterior facial height is affected by 1- The eruption of the teeth.

2- The vertical growth of the soft tissues including the masticatory musculature.

Types of growth rotations:

a- Forward or anterior rotation (clockwise rotation) given a negative sign. When there is more growth posteriorly than anteriorly bringing the chin forward and upward and resulted in tendency to skeletal deep bite.

b- Backward or posterior rotation (counter clockwise rotation) and given a positive direction if it lengthens anterior facial dimensions more than posterior ones, bringing the chin downward and backward and resulted in tendency to skeletal open bite.

c- Average rotation: A mild forward rotation which produces a wellbalanced facial appearance.