Open bite: ***Ass.Prof.Dr.Zaid AlDewachi***

Introduction:

Open bite is a malocclusion that occurs in the vertical plane, characterized by lack of vertical overlap between the maxillary and Mandibular dentition. Open bites can occur in the anterior and the posterior region and are called anterior open bite and posterior open bite respectively.

Many potential etiologic factors are implicated as causes of open bite including heredity, unfavorable growth patterns, digit-sucking habits, tongue and orofacial muscle abnormal function, orofacial functional matrices and their interaction with the skeletal components, imbalances between jaw posture, occlusal and eruptive forces and head position. A detailed understanding of its etiology and developmental process is thus essential in its management.

Epidemiology

Openbites occur less frequently than deep bites. Severe deep bite (overbite of 5 mm) is found in nearly 20% of children and 13% of adults, while open bite (negative overbite >-2 mm) occurs in less than 1%.

ANTERIOR OPEN BITE

In anterior openbite there is no vertical overlap between the upper and lower anteriors. Anterior open bites are esthetically unattractive particularly during speech when the tongue is pressed between the teeth and lips. The anterior openbites particularly skeletal open bites are called as “stigmata of malocclusion”

Causes

The etiology of anterior open bite is multifactorial. Anterior open bites can occur due to variety of hereditary and non-hereditary factors. The resultant openbite is an interaction between these factors.

The following are some of the etiologic factors responsible for anterior open bites:

1. Heredity with genetic disposition Inherited factors such as increased tongue size, and abnormal skeletal size and growth pattern of the maxilla and mandible can also be responsible for open bite malocclusion.

Habits

i. Prolonged thumb-sucking habit is one of the chief etiological factors of open bite. The posture of thumb positioning, the intensity,and the frequency of sucking, all have an influence on the nature and severity of the open bite.

ii. Tongue thrusting is also implicated for some cases of open bite. Tongue thrusting may develop as a complication of thumb sucking habit. Sometimes tongue thrusting develops as a compensatory mechanism for existing open-bite.

Skeletal:

a) An overgrowth or undergrowth of one or more alveolar segments, in anterior openbites there is undergrowth of the anterior segment with excessive growth posterior alveolar portion. In posterior openbites there is undergrowth of the posterior alveolar segment.

b) Increased anterior and decreased posterior facial height. The posterior face height (Sella - Gonion) and anterior face height (Nasion – Menton) are measured on lateral cephalogram with teeth in habitual occlusion to estimate growth directions according to Recommendations of JARABAK (1972), a ratio of less than 62 % Expresses vertical growth pattern and open bite tendency whereas a ratio of more than 65% increases the likelihood for horizontal vector and deep bite tendency.

$$\text{JARABAK RATIO} = \frac{\text{Posterior face height}}{\text{Anterior face height}} \times 100$$

c) Vertical growth pattern or backward rotation or clock wise rotation of the of the lower jaw.
d) Anticlock wise rotation of the maxillary base.
e) Divergent jaw bases
f) Short ramus with long or short body and Increased gonial angle (articulare—gonian – menton).

Dental

When there is only dental and dentoalveolar involvement, there is predominance of environmental causes such as thumb or dummy Sucking habits, mouth breathing, and tongue or lip thrusting in addition to some local factors such as tooth ankylosis and eruption disturbances that result from over eruption of the posterior teeth or under
Eruption of the anterior teeth, the periodontal breakdown of anterior teeth may also give rise to anterior openbites with flaring of teeth.

Classification of anterior open bite

Anterior open bite can be classified as:

a. Skeletal anterior open bite
b. Dental anterior open bite (unilateral,bilateral)

Features of skeletal anterior open bite

a. The patient often has a long and narrow face with marked convex profile. The esthetics is impaired. A patient with underlying skeletal class III bases may have concave profile.

b. The patient may have a short upper lip with excessive maxillary incisor exposure
c. Increase lower anterior facial height and decreased upper anterior facial height

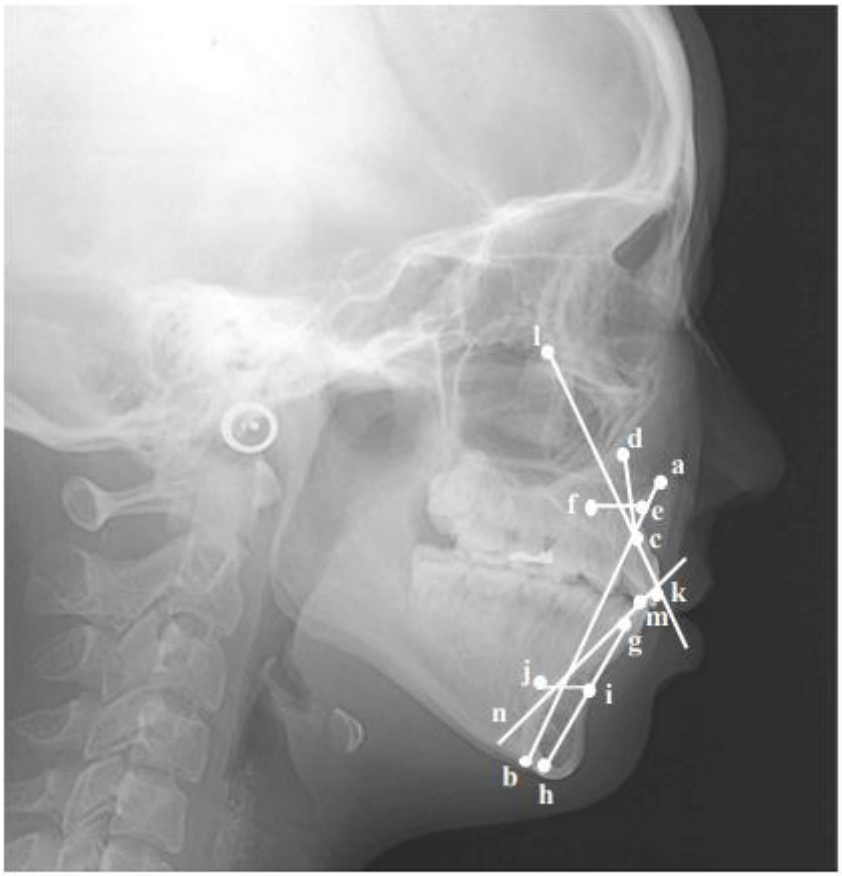


Figure (1): The lower facial height and its component parameters

a–b: Lower facial height; c–d: Maxillary anterior alveolar basal height; e–f: Maxillary anterior alveolar depth; g–h: Mandibular anterior alveolar basal height; i–j: Mandibular anterior alveolar depth; kl–mn: Interincisal angle.

d. A steep mandibular plane angle (High angle). Thus the angle FMA is increased and more than 30 degrees. There is clock wise rotation or backward rotation of the mandible with increased lower anterior facial height.
e. Small mandibular body and ramus
f. Divergent jaw bases as well as other horizontal cephalometric planes
g. There is upward rotation of maxillary jaw base (The ANS and PNS plane gives maxillary jaw base).

Features of dental anterior open bite

Dental anterior open bites do not present with the skeletal complications mentioned above. The following are the features of dental open bite:

a. Proclined upper anterior teeth.

b. The upper and lower anteriors fail to overlap each other resulting in a mild open bite.

c. The patient may have a narrow maxillary arch due to lowered tongue posture due to a habit.

d. There may be spacing between the upper and lower anteriors

Other features

Speech defects can be found with lisping of voice. There may be associated upper respiratory infections. Lispisng associated with anterior openbite and spacings.

Diagnosis:

Diagnosis should include a thorough case history pointing to critical examination towards the presence of any etiological factors like habits. Hereditary content if present should be noted. The cephalometric analysis will differentiate a dental from a skeletal component

Treatment of anterior open bite

The diagnosis and treatment of this malocclusion are still controversial. Many authors agree that the clinician should be able to distinguish an open bite of dental and dentoalveolar origin from a skeletal open bite so that treatment is directed towards the cause of the problem.

Anterior open bite in the primary dentition is the most frequent malocclusion associated with persistent digit and pacifier sucking

Removal of the etiology of Open bites that have been diagnosed as a result of habits such as thumb sucking or tongue thrusting, require Their interception using passive habit breaking appliances. The habit breaker can be either a removable or a fixed type of crib. Persistence of the cause will offer a severe limitation in the corrective procedures. Thus, to allow normal development of the **anterior** dentoalveolar region, the palatal crib may be an excellent treatment option, since it prevents thumb or dummy sucking and avoids tongue thrusting.

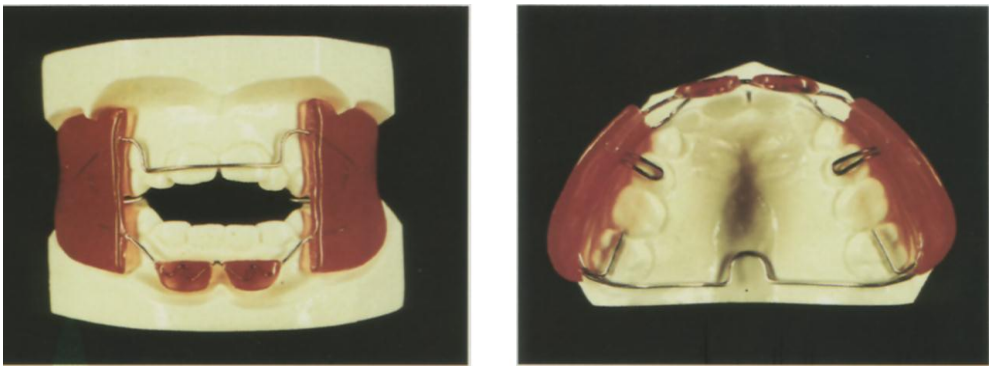
The presence of abnormal nasopharyngeal pathology should be ruled out after referring the patient to an otolaryngist. The control of those Factors should be given due importance before rushing to correct the existing open-bite.

Myofunctional and orthopedic therapy:

The open-bites can be intercepted by growth modulation. The aim is to achieve counterclockwise mandibular rotation for closure of an open bite, especially if there is remaining growth of the mandibular ramus, in order to control the increase in **anterior** face height and achieve improved occlusal outcomes and a balanced profile. Treatment approach is directed at vertical control of facial growth and/**or 'real' or relative intrusion of the posterior teeth**

The maxillary posterior segment can be intruded by an occipital headgear which rotates the maxilla in clock wise direction thereby closing the open bite. The Skeletal anterior open bites can be treated during growth using functional appliances such as F.R-IV or a modified activator. These appliances incorporate bite blocks interposed between the posterior teeth, that have an intrusive action on the upper and lower posterior teeth. Patients exhibiting a downward and backward rotation of the mandible with increased vertical growth, benefit from therapy

Using a vertical pull head gear with chin cup if treated during the mixed dentition period. Vertical chin cup inhibits the vertical growth in the Mandibular posterior dento-alveolar region, It decreases mandibular plane angle and helps in closure of gonial angle indicating **anterior** rotation of the mandible.



(FR-4)

Orthodontic corrective therapy:

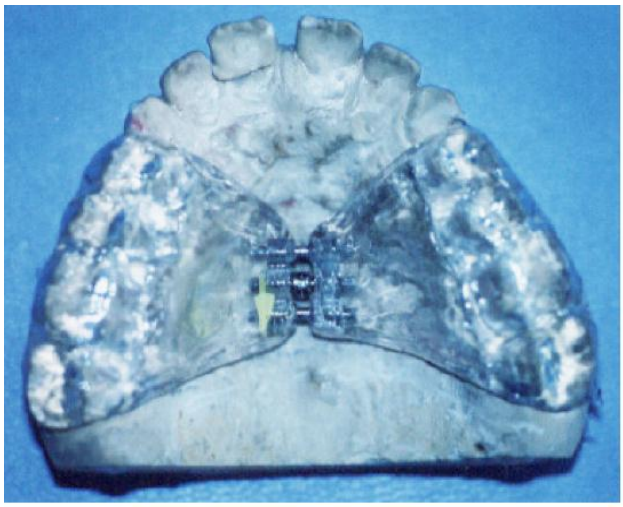
Mild to moderate dental open bites can be successfully managed using fixed mechanical appliances in conjunction with box elastics. This form of elastic application consists of elastic that is stretched to extend between the upper and lower anteriors. This brings about extrusion of the upper and lower anteriors. This form of therapy may not give Favorable results in severe skeletal open bites.

Surgical correction:

Skeletal open bites in adults are best treated by surgical procedures involving the maxilla and the mandible. This includes step down of maxilla and setup of mandible. The surgical treatment depends upon the other factors like anteriorposterior relationship of maxilla and mandible

Retention:-

The persistence of the etiological agents is the main cause of relapse in open bite cases. Second factor the continous growth at the molar region to a little extent and the intrusive effect of etiological factors on the incisors is cited to be another reason for relapse. Use of open bite type Of activator or bionator with posterior bite blocks is indicated for long term retention. High pull head gear with standard retainer may also be used but is not practically possible.



(Bite Block)

II. POSTERIOR OPEN BITE

Posterior open bite is a condition characterized by lack of contact between the posteriors when the teeth are in centric occlusion. It mostly occurs in a segment of the posterior teeth.

Causes of posterior open bite

There are two possible causes of posterior open bite:

1. Mechanical interference with eruption, either before or after the tooth emerges from the alveolar bone, or

2. Failure of the eruptive mechanism of the tooth so that the expected amount of eruption does not occur.

Mechanical interference with eruption may be caused by ankylosis of the tooth to the alveolar bone, which can occur spontaneously or as a result of trauma, or by obstacles in the path of the erupting tooth. Examples of such obstructions prior to emergence are supernumerary teeth and non - resorbing deciduous tooth roots or alveolar bone.

After the tooth emerges from the bone, pressure form soft tissues interposed (cheek, tongue, finger) can be obstacles to eruption Ankylosed teeth are usually in infraocclussion and are said to be submerged. The most commonly submerged tooth is retained lower decidous second molar.

Treatment

The primary aim of treatment should be to remove the cause. Lateral tongue spikes are a valuable aid in control of lateral tongue thrust. Once the habit is intercepted, a spontaneous improvement often follows. The posteriors can be forcefully extruded.

In cases of posterior open bite due to infraocclusion of ankylosed teeth, it is best treated by crowns on posteriors to restore normal occlusal Level.