

Incisal bite

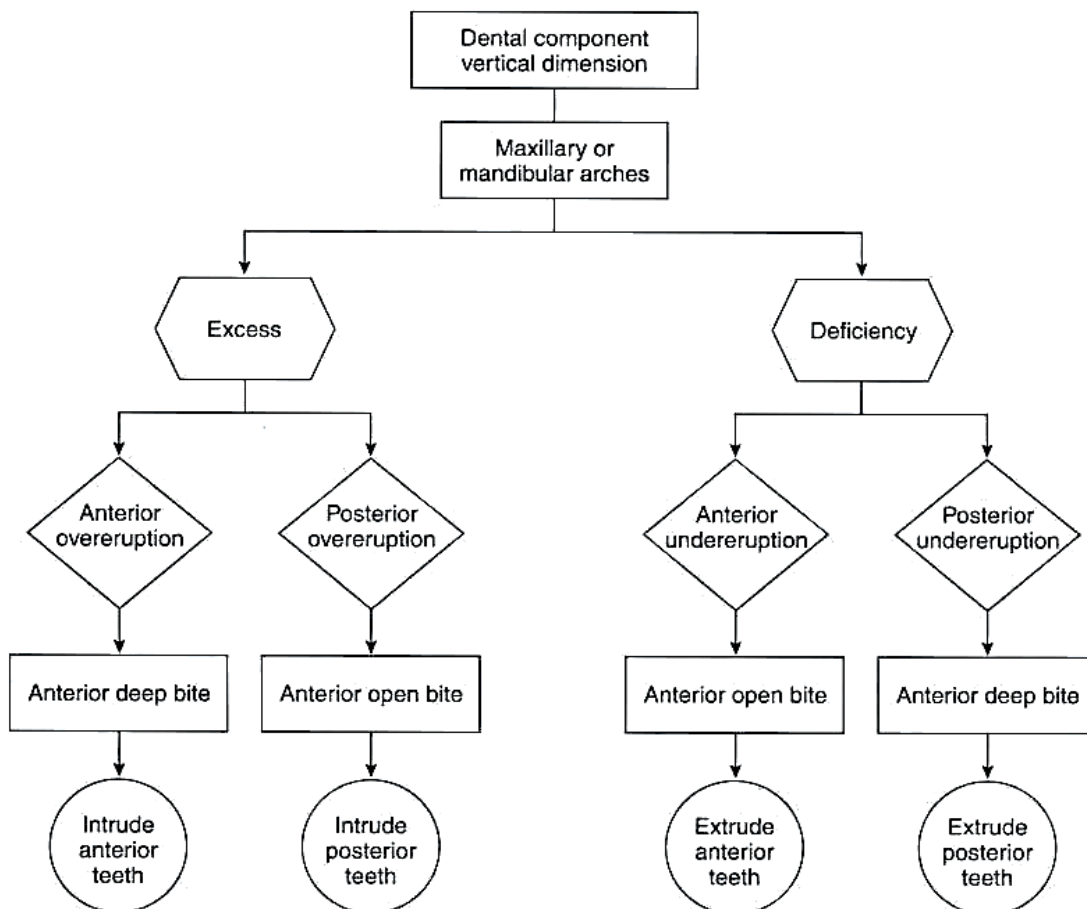
Overbite The overlap of the lower incisors by the upper incisors in the vertical plane.

Complete overbite An overbite in which the lower incisors contact either the upper incisors or the palatal mucosa

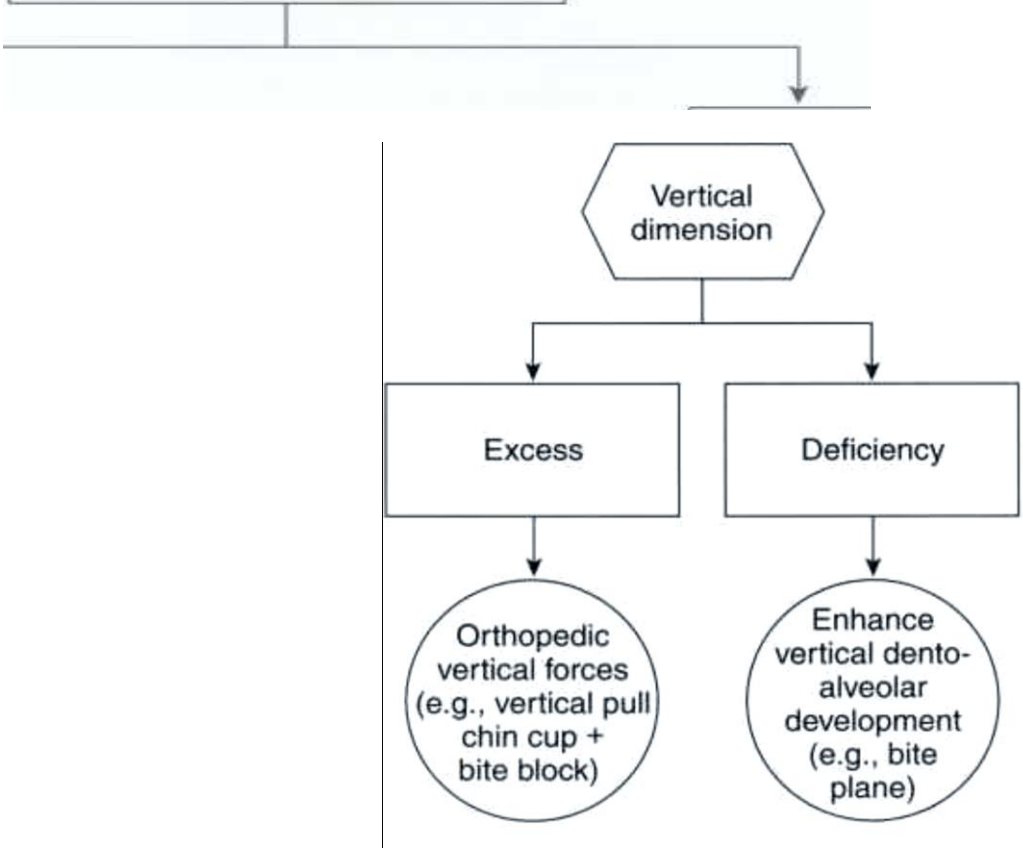
Incomplete overbite An overbite in which the lower incisors contact neither the upper incisors nor the palatal mucosa.

Anterior open bite The lower incisors are not overlapped in the vertical plane by the upper incisors and do not occlude with them.

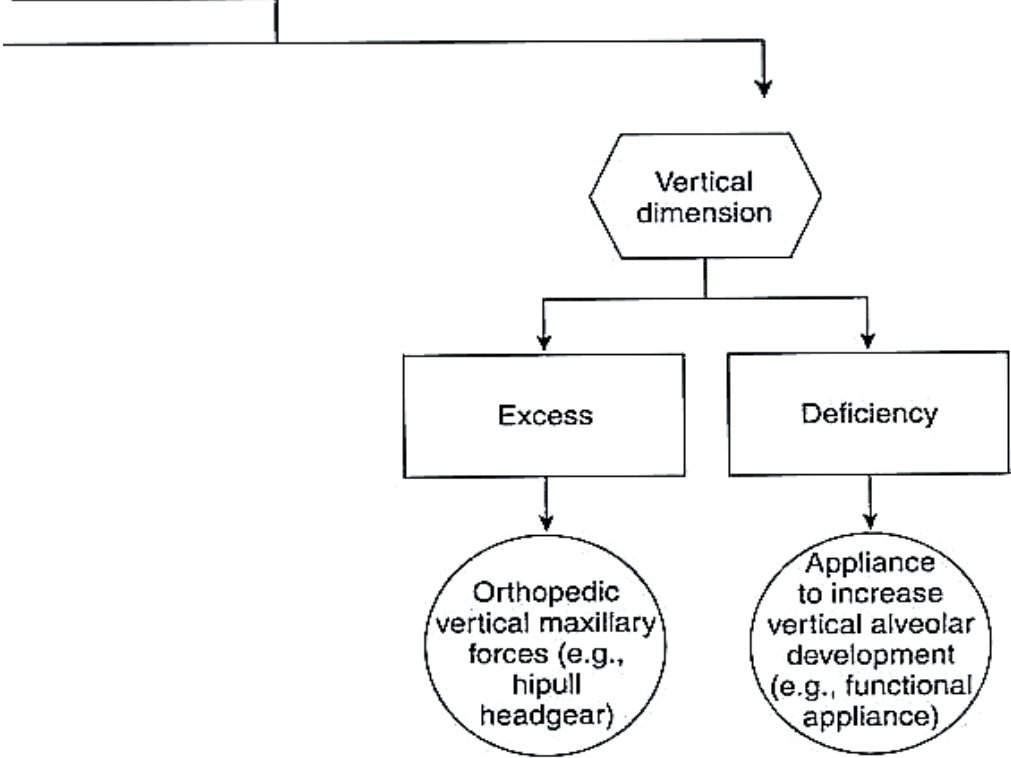
Posterior open bite (POB): when the teeth are in occlusion there is a space between the posterior teeth

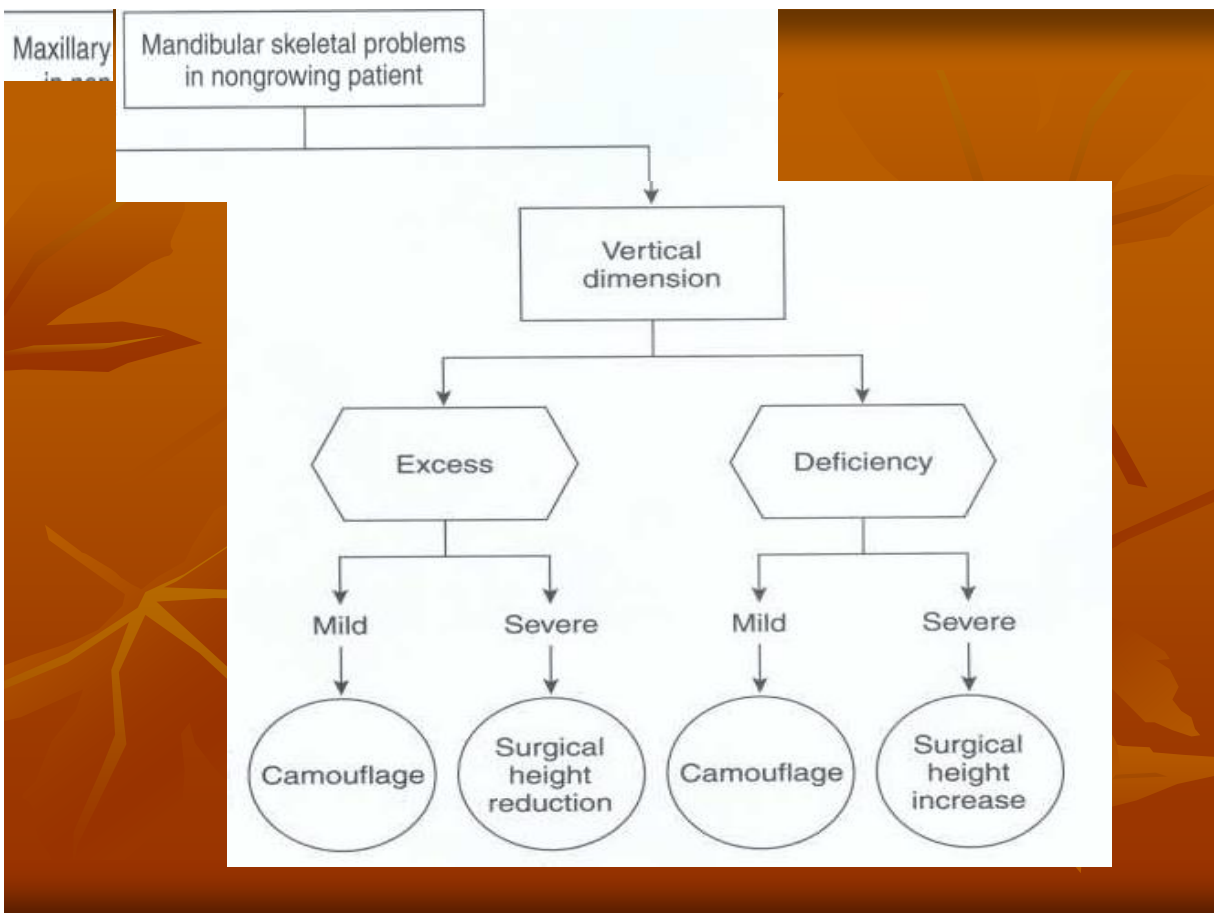


Mandibular skeletal problems in a preadolescent child



Maxillary skeletal problems in a preadolescent child





Increase in overbite

- ***Skeletal factors.*** It is often stated that a small lower facial height is associated with a deep overbite. However, this is not a constant relationship and occlusal factors (see below) must also play a part.
- ***Occlusal factors.*** Where there is no incisor contact due to a large overjet (Class II Division 1), the lower incisors will often erupt until they contact the palatal mucosa and the overbite will be deep
- Where the overjet is normal and the incisors are retroclined (Class II Division 2), so that the interincisor angle is increased, the overbite will also be increased

Causes of increased and traumatic overbite

Cause	Aetiology
Skeletal: anteroposterior and vertical	A Class II skeletal pattern in combination with a reduced lower facial height.
Growth pattern	An anterior mandibular growth rotation tends to increase overbite.
Soft tissues	Effects are via the skeletal pattern—reduced lower facial height leads to a high lower lip line that will retrocline the upper incisors, leading to overbite increase. A hyperactive high lower lip in association with a reduced lower facial height leads to bimaxillary retroclination.
Dental factors	Absence of a well-defined cingulum stop on the upper incisors leads to continued eruption of the lower incisors, increasing overbite.

Approaches to the reduction of overbite

Intrusion of the incisors

- **Actual intrusion of the incisors is difficult to achieve. Fixed appliances are necessary** and the mechanics employed pit intrusion of the incisors against extrusion of the buccal segment teeth; as it is easier to move the molars occlusally than to intrude the incisors into bone, the former tends to predominate. In practice, the effects achieved are relative intrusion, where the incisors are held still while vertical growth of the face occurs around them.

Eruption of the molars

- **Use of a flat anterior bite-plane** on an upper removable appliance to free the occlusion of the buccal segment teeth will, if worn conscientiously, limit further occlusal movement of the incisors and allow the lower molars to erupt, thus reducing the overbite. This method requires a growing patient to accommodate the increase in vertical dimension that results, otherwise the molars will reintrude under the forces of occlusion once the appliance is withdrawn

Extrusion of the molars

- As mentioned above, the major effect of attempting intrusion of the incisors is often extrusion of the molars. This may be advantageous in Class II division 2 cases as this type of malocclusion is usually associated with reduced vertical proportions. Again, vertical growth is required if the overbite reduction achieved in this way is to be stable

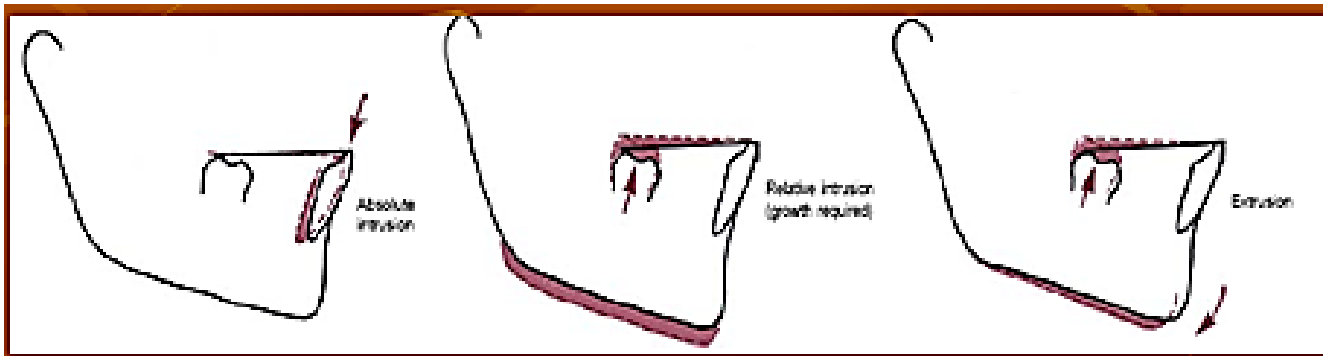
There are three possible ways to level a lower arch with an excessive curve of Spee:

(1) absolute intrusion;

(2) relative intrusion, achieved by preventing eruption of the incisors while growth provides vertical space into which the posterior teeth erupt; and

(3) extrusion of posterior teeth, which causes the mandible to rotate down and back in the absence of growth.

Note that the difference between (2) and (3) is whether the mandible rotates downward. This is determined by whether the ramus grows longer while the tooth movement is occurring



Proclination of the lower incisors

Advancement of the lower labial segment anteriorly will result in a reduction of overbite as the incisors tip labially. This approach should only be carried out by the experienced orthodontist. However, in a few cases where the lower incisors have been trapped behind the upper labial segment by an increased overbite, fitting of an upper bite-plane appliance may allow the lower labial segment to procline spontaneously

Surgery

In adults with a markedly increased overbite and those patients where the underlying skeletal pattern is more markedly Class II, a combination of orthodontics and surgery is required.

The reduction of a deep overbite will be stable only if at the end of treatment the :

- lower incisors occlude with the palatal surfaces of the upper incisors,
- the interincisor angle is within the normal range,
- and the teeth are in a position of labiolingual balance

AETIOLOGY OF ANTERIOR OPEN BITE

- *Skeletal factors*
- *Soft tissue factors*
- *Habits*
- *Mouth breathing*
- Localized failure of development

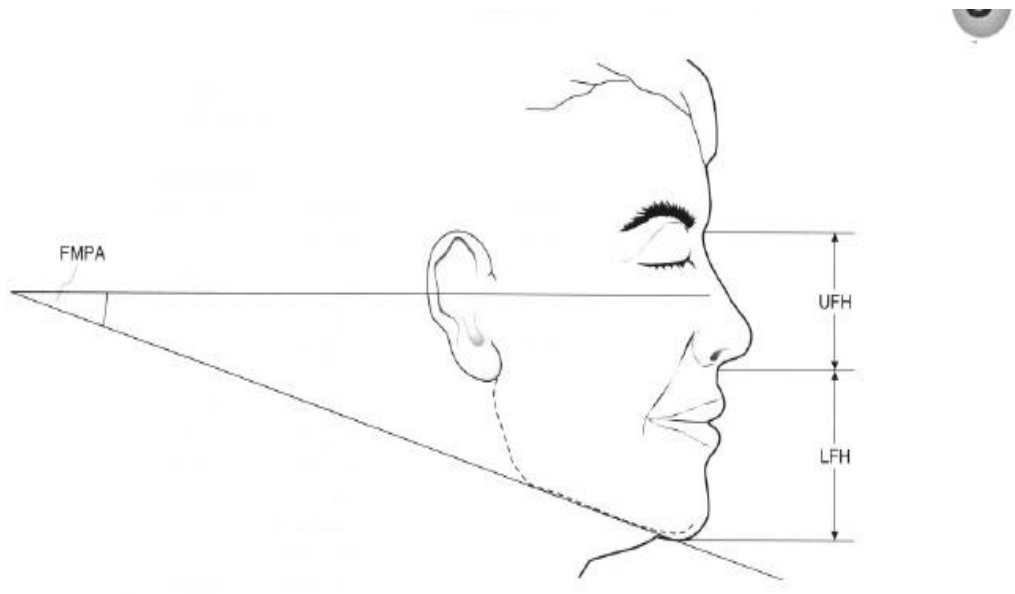
Skeletal

Individuals with a tendency to **vertical** rather than horizontal facial growth exhibit increased vertical skeletal proportions. Where the **lower face height is increased** there will be an increased inter-occlusal distance between the maxilla and mandible. Although the labial segment teeth appear to be able to compensate for this to a limited extent by further eruption, where the inter-occlusal distance exceeds this compensatory ability an **anterior open bite will result**. If the vertical, downwards, and backwards, pattern of growth continues, the anterior open bite will become more marked.

Lower facial height: the distance from the eyebrow to the base of the nose should equal the distance from the base of the nose to the lowermost point on the chin. If the latter distance is increased, the lower facial height is described as being increased, and vice versa.

- ***Frankfort mandibular planes angle*** (FMPA).: assessment of the FMPA clinically by eye comes with experience, but the neophyte orthodontist may find it helpful to assess this angle by placing one hand level with the Frankfort plane (external auditory meatus to the lower border of the orbital margin) and the other hand level with the

lower border of the mandible. Then in the 'mind's eye' extrapolate the planes and assess where they would cross. If the angle between these two planes is around the average of **28°**, then the lines would intersect approximately at the back of the head. If the FMPA is **increased** the lines would meet before the back of the head, and if it is **reduced** they would **cross beyond**.



Soft tissue pattern

In order to be able to **swallow** it is necessary to create an anterior oral seal. In younger children the lips are often incompetent and a proportion will achieve an anterior seal by positioning their tongue forward between the anterior teeth during swallowing.

Individuals with increased vertical skeletal proportions have an increased likelihood of **incompetent lips** and may continue to achieve an anterior oral seal in this manner even when the soft tissues have matured *adaptive* tongue behavior

Primary atypical tongue behaviour (endogenous tongue thrust)

- Rarely there is an inborn atypical pattern of neuromuscular activity by which the tongue tip retains a more infantile position, and comes forwards to contact the lips during swallowing (an *endogenous* tongue thrust). This can produce both an increase in overjet and a reduction in overbite

Habits

- The effects of a habit depend upon its **duration** and intensity. The persistence of pernicious habit can lead to the malocclusion acquiring a skeletal component. If a persistent digit-sucking habit continues into the mixed and permanent dentitions, this can result in an anterior open bite due to restriction of development of the incisors by the finger or thumb
- Characteristically, the anterior open bite produced is **asymmetrical** (unless the patient sucks two fingers) and it is often associated with a posterior crossbite. Constriction of the upper arch is believed to be caused by cheek pressure and a low tongue position

Mouth breathing

It has been suggested that the open-mouth posture adopted by individuals who habitually mouthbreathe, either due to nasal obstruction or habit, results in **over development of the buccal segment teeth**. This leads to an increase in the height of the lower third of the face and consequently a greater incidence of anterior open bite.

■ **Localized failure of development**

This is seen in patients with a cleft of the lip and alveolus, although rarely it may occur for no apparent reason

Features of dental anterior open bites

❖ Intraoral features:

1. Open bite limited to the anterior segment, often asymmetrical.
2. Proclined maxillary and/or mandibular incisors.
3. Spacing between maxillary and/or mandibular anteriors.
4. Narrow maxillary arch is a possibility.
5. "Fish mouth" appearance.

❖ Extraoral features:

No unusual features.

Features of skeletal anterior open bites

❖ Extraoral features:

1. Long face due to increased lower anterior face height
2. Incompetent lips
3. An increased mandibular plane angle
4. An increased gonial angle
5. Marked antegonial notch
6. A short mandible is a possibility
7. Maxillary base may be more inferiorly placed (vertical maxillary excess)
8. The angle formed by the mandibular and maxillary planes is also increased

❖ **Intraoral features:**

- 1. Mild crowding with upright incisors**
- 2. Gingival hypertrophy**
- 3. Maxillary, occlusal and palatal planes tilt upwards**
- 4. Mandibular occlusal plane canted downwards**

Management of an anterior open bite due to purely a digit-sucking habit can be straightforward, but where the skeletal pattern, growth, and/or soft tissue environment are unfavourable, correction without resort to orthognathic surgery may not be possible.

- In the mixed dentition, a digit-sucking habit that has resulted in an anterior open bite should be gently discouraged. If a child is keen to stop, a removable appliance can be fitted to act as a reminder. However, if the child derives support from his habit, forcing him to wear an appliance to discourage it is unlikely to be successful.
- Although a number of barbaric designs have been described (involving wire projections for example), a simple plate with a long labial bow for anterior retention will usually suffice if a habit-breaker is indicated.

- After fitting, the acrylic behind the upper incisors should be trimmed to allow any spontaneous alignment.
- A period of observation may be helpful in the management of patients with an anterior open bite which is not associated with a digit-sucking habit.
- In some cases an anterior open bite may reduce spontaneously, *possibly because of* maturation of the soft tissues and improved lip competence, or favourable growth

Approaches to the management of anterior open bite

There are three possible approaches to management

1-Acceptance of the anterior open bite

2-Orthodontic correction of the anterior open bite.

3-Surgery

Acceptance of the anterior open bite

This approach can be considered in the following situations (particularly if the AOB does not present a problem to the patient):

- mild cases;
- where the soft tissue environment is not favourable, for example where the lips are markedly incompetent and/or an endogenous tongue thrust is suspected;
- in more marked malocclusions where the patient is not motivated towards surgery.

Orthodontic correction of the anterior open bite

- If growth and the soft tissue environment are favourable, an orthodontic solution to the anterior open bite can be considered.

A careful assessment should be carried out, including

- the anteroposterior and vertical skeletal pattern,
- the feasibility of the tooth movements required,
- and post-treatment stability

Extrusion of the incisors to close an anterior open bite is inadvisable, as the condition will relapse once the appliances are removed. Rather,

treatment should aim to try and intrude the molars, or at least control their vertical development.

Intrusion of the molars can be attempted with high-pull headgear and/or by using buccal capping on a removable appliance

- A chin cup with a vertical pull head cap may be used for the correction of anterior open bites in the pre-adolescent age group.
- In the milder malocclusions the use of high-pull headgear during conventional treatment may suffice.

In cases with a more marked anterior open bite associated with a Class II skeletal pattern, a removable appliance or a **functional appliance incorporating buccal blocks and high-pull headgear** can be used to try to restrain vertical maxillary growth. In order to achieve true growth modification it is necessary to apply an intrusive force to the maxilla for **at least 14–16 hours** per day during the pubertal growth spurt, **continuing until growth is complete**

Surgery

- This option can be considered **once growth is complete** for severe problems with a skeletal aetiology and/or where dental compensation will not give an aesthetic or stable result. In some patients an anterior open bite is associated with a **'gummy' smile** which can be difficult to reduce by orthodontics alone necessitating a **surgical approach**