Australian Society of Orthodontists

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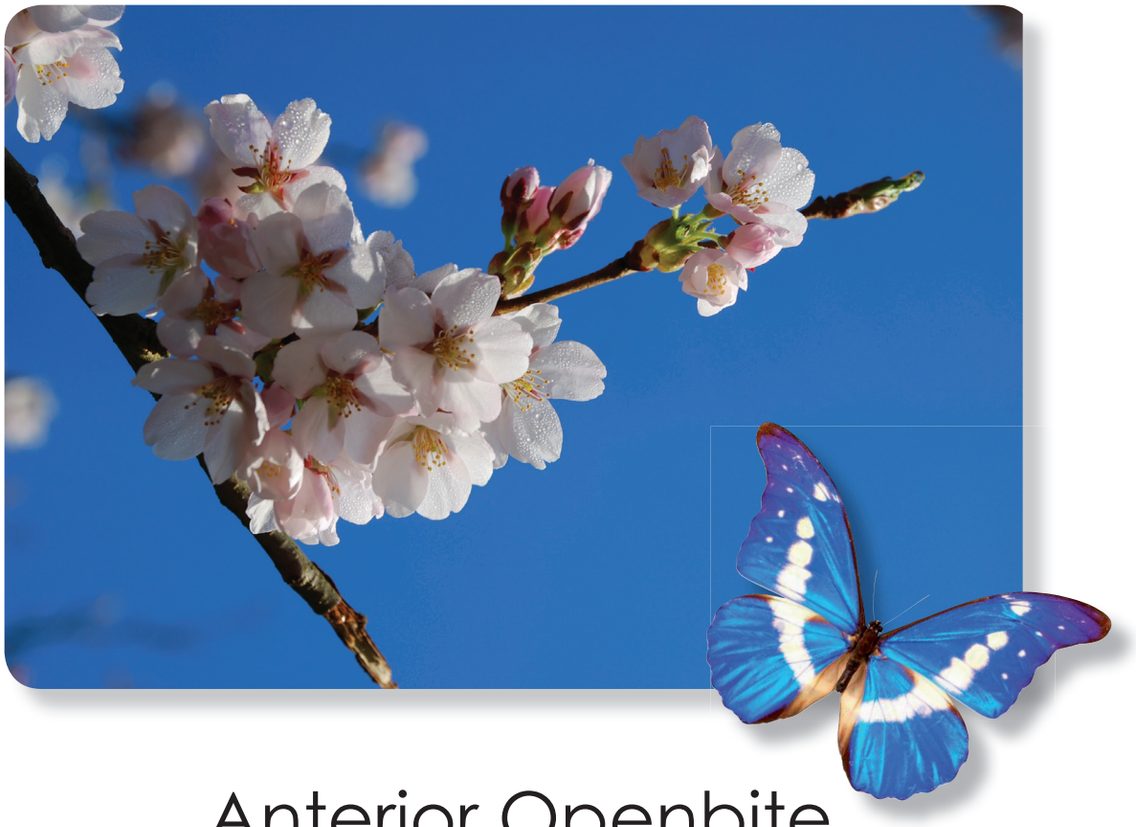

Anterior Openbite Malocclusion

Creating Brighter Futures

Anterior Openbite Malocclusions

Definition

Anterior openbite is generally defined as a condition where the upper incisor crowns fail to overlap the lower incisor crowns when the mandible is brought into full occlusion (Mizrahi 1978, Moyers 1975, Shapiro 2002, Beckman 1998). Hence an openbite could range from a mild case of 'edge-to-edge' incisor relationship to a severe skeletal openbite with only the molars in contact.

Simple openbites are usually confined to the teeth and alveolar process whereas complex openbites are based primarily on vertical skeletal dysplasias.

Openbite will occur during transition from primary to permanent dentition, and is considered to be a transient stage of normal dento-alveolar growth and development.

Incidence

Most openbites will resolve during the mixed dentition without treatment; however complex openbites that extend distal to the incisors and persist beyond the mixed dentition phase are more problematic. True anterior openbite in the British population varies from 0.4% to 3% at age 10 years, maintaining an incidence of 2% by 15 years of age (Haynes 1972, Robert and Goose 1979, Todd 1973). Wide racial variation occurs, with 16.3% of African-Americans having openbite at age 11 years (Cooke 1980). Kelly and Harvey in 1977 stated that 3.5% of Caucasian and 16.3% of African Americans have an openbite. Thirty percent of adult Class III cases have an anterior openbite (Ellis and McNamara 1984), with others suggesting that most openbites are skeletal (Subtelny and Sakuda 1964).

A relatively high 32.3% of children in special needs schools were found to have an anterior openbite malocclusion (Gershater 1972).

Aetiology

Broadly speaking, anterior openbite, like any other malo-cclusion, can be either hereditary or environmental in origin, with aetiological factors acting pre- or post-natally on the tissues of the oro-facial region. Anterior openbites are usually multi-factorial in origin, determined by a combination of many factors operating within the inherent pre-determined growth potential of each particular patient.

Aetiological factors include:

1. *Heredity*
2. *Environmental Factors*
   (a) Thumb, finger or foreign body sucking
   (b) Abnormal tongue function; however there are varying opinions with some believing it is a cause of the openbite, while others see it as adaptive (Straub 1960, Tulley 1964)
   (c) Trauma or pathology to one or both condyles
   (d) Neurologic disturbances
   (e) Iatrogenic factors, e.g. extruding molars during treatment
   (f) Airway pathology. An oral breathing pattern is generally considered to be an aetiological factor, although earlier studies have shown that only minor influences on vertical and transverse jaw dimensions occur in humans who are mouth breathers. (Linder-Aronson 1972, Harvold et al 1981).

Classification and Diagnosis

In describing a skeletal openbite, Schendel et al (1976) coined the term "long face syndrome" in which there is excessive height of the maxilla and a relatively large mandibular plane angle. Proffit characterised patients with skeletal openbite and an increased total face height manifested entirely in the lower facial third as having "long face syndrome". Due to dental compensation, patients with increased lower facial height may not necessarily have an anterior openbite.

Richardson's (1981) classification includes the extra dimension of age whereby he described the occurrence of openbites in the pre-pubertal, pubertal and post-pubertal age groups.

1. ***Transitional*** - due to incomplete growth of the dento-alveolar regions.
2. ***Habits*** - usually involves digit sucking habits with the effects limited to the dento-alveolar processes, complicated by proclination of upper and retroclination of lower incisors.
3. ***Local pathology*** - includes supernumerary teeth, cysts, ankylosis and root dilacerations.

4. ***Skeletal pathology*** - includes conditions such as cleft palate and cranio-facial dysostoses recognisable at an early age, in addition to other conditions which become apparent at the end of the growth period such as condylar hyperplasia and acromegaly.
5. ***Non pathological skeletal openbites*** - consist of three sub-groups
   I. The first sub-group tend to improve, to varying degrees, during the pre-pubertal and pubertal periods by dento-alveolar compensation and during post-pubertal period by increased mandibular prognathism associated with forward and upward rotation of the mandible.
   II. The second sub-group close in the pubertal stage and then reopen in the post-pubertal stage. The explanation is that during the pubertal stage very active dento-alveolar growth is sufficient to close the openbite, however, during the post-pubertal stage continuing unfavourable skeletal growth dominates, resulting in the openbite returning at end of the post-pubertal period.
   III. The third sub-group is where facial growth is the primary aetiological factor and the open bite develops for the first time during the middle of the pubertal growth stage.
6. ***Soft tissue abnormalities*** - abnormal tongue and lip posture have been implicated in the cause of anterior openbite.

Clinical Presentation

There is great variation in the dental and skeletal morphology in patients with openbites (Cangialosi 1984)

Skeletal Openbite

Extra-oral features of patients with a skeletal openbite often include a long face, lip incompetence, an anterior openbite, steep mandibular plane angle, marked antegonial notching, increased anterior facial height and decreased posterior facial height. These cases may also present with a Class II malocclusion and mandibular deficiency due to posterior and downward rotation of the mandible. Intra-oral features include dental crowding with upright lower incisors, maxillary constriction with buccal segment crossbites, occlusion confined to molar contact and gingival hypertrophy in the anterior segments due to mouth breathing.

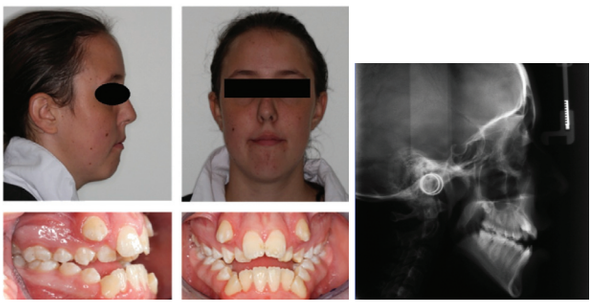

Fig 1. Patient exhibits 'typical' skeletal openbite features including an increased lower facial height, lip strain, anterior openbite, steep mandibular plane angle, antegonial notching and decreased ramal height.

Dental Openbite

These patients generally exhibit normal facial features with only intra-oral abnormalities related to the aetiology, eg. Thumb sucking, tongue function/posture. The openbite is generally confined to the incisor region and maybe asymmetric. In cases of digit sucking the maxillary arch may also be narrow with proclination of the upper incisors and retroclination of the lower incisors. In patients with a forward tongue posture proclination and spacing of the upper and lower incisors is often seen.

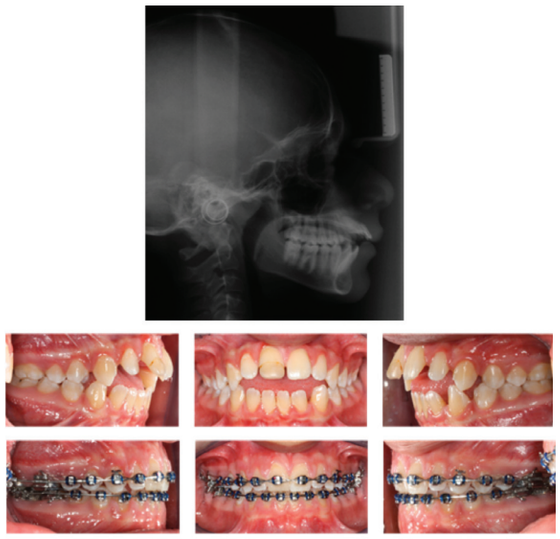

Fig 2. Dental openbite from a tongue thrust and a possible thumb sucking habit before and during treatment where the openbite has been closed.

Both skeletal and dental anterior openbites will usually have an adaptive tongue thrust swallow to form a lip seal.

Treatment Options

1. No active treatment

Clinicians may wait for self correction, particularly during the mixed dentition where skeletal growth appears normal and where no obvious habits are present. About 40-80% of mixed dentition openbites will self-correct in the teenage years (Kantowicz and Korhaus 1929, Anderson 1963, Worms 1971).

2. Habit control

Passive management can include education, motivation and passive appliance treatment such as tongue cribs (Fig. 3) or tongue spurs.

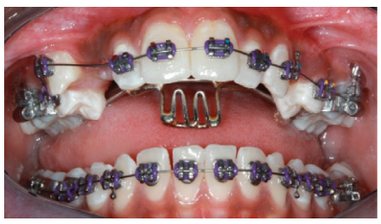

Fig 3. Tongue crib

3. Growth modification and active orthodontic treatment

The aim of active treatment is often a combination of impeding posterior tooth eruption, reducing/redirecting vertical growth and extrusion of the anterior teeth. Appliances such as bite blocks, high pull headgear, chin cups and appliances employing magnets have been used. Fixed appliances must be managed carefully to avoid iatrogenic molar extrusion. Segmental arch wire techniques can be used for differential vertical control. More recently, mini-screws and skeletal anchorage plates (Fig. 4) have been used for molar intrusion.

Unfortunately, relapse is usually a major concern in the treatment of anterior openbites. For example Lopez-Gavito (1985) in a sample of 41 patients with an original openbite of 3mm or more reported, 10 years post retention, 36% relapse of openbites. No single parameter of dentofacial form was reliable in predicting stability.

It should be stressed that relapse following conventional orthodontic therapy of skeletal openbites can be considerable. This highlights the need for accurate diagnosis, prudent treatment planning and adequate explanation to patients in such cases.

BRIGHTER FUTURES

Australian Society of Orthodontists

Brighter Futures is published by the Australian Society of Orthodontists (NSW Branch) Inc. in conjunction with the Orthodontic Discipline at the University of Sydney.

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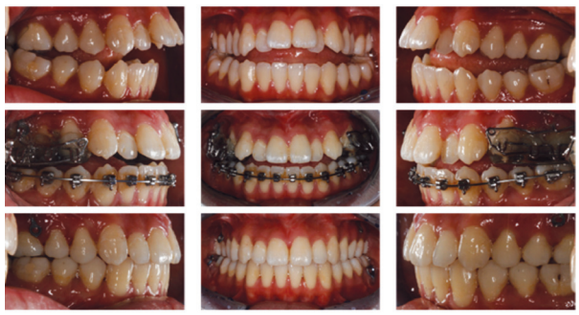

Fig 4. Patient with skeletal anchorage for molar intrusion before, during and after treatment

4. Surgical Management

Surgical treatment is generally undertaken after active growth is complete to minimise relapse. This may involve measures as simple as extraction of posterior teeth, however in more severe cases posterior impaction of the maxilla is indicated. Maxillary impaction allows forward and upward rotation of the mandible, thereby decreasing the lower anterior facial height and providing closure of the anterior openbite. Other surgical movements of the maxilla and/or mandible can also be planned as required as part of the surgical treatment plan. A common surgical combination is a LeFort I osteotomy of the maxilla with a bilateral sagittal split osteotomy (BSSO) of the mandible.

Hoppenreijs et al (1996), in a study of 6 year post operative results, found 20% relapse in 267 patients treated using LeFort I intrusion with or without BSSO. McCance et al (1992), in a study of 1 year post operative results of surgically corrected Class II and III openbite cases using LeFort I and BSSO procedures, reported stable results in Class II cases and a 23% relapse in Class III cases.

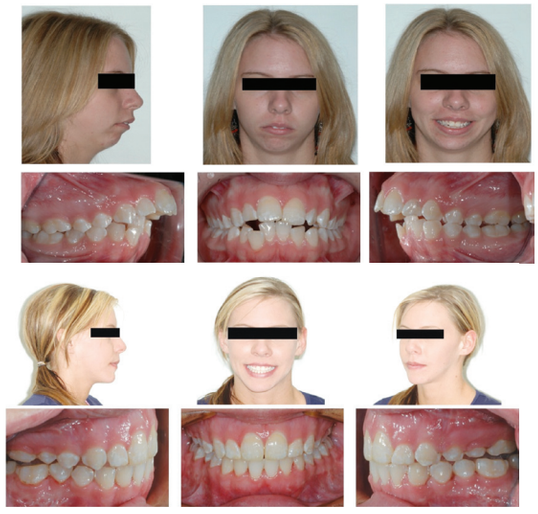

Fig 5. Patient with complex surgical treatment, including surgically assisted rapid maxillary expansion, surgical intrusion plates, bilateral sagital split osteotomy and genioplasty. (Note over intrusion of posterior teeth to allow for some relapse).

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Conclusion

Openbite patients can often be the most challenging cases to manage effectively. The importance of appropriate diagnosis and treatment planning cannot be over-emphasised if a pleasing, stable and acceptable long term result is to be achieved. It is also important that the clinician understand dento-facial growth and development in addition to the effects of the appliances and mechanics that are to be employed to avoid unwanted iatrogenic side-effects.

REFERENCES AVAILABLE ON REQUEST