

Anterior Open Bite: Diagnosis And Etiology: A Review

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Abstract: Anterior open bite is one of the common malocclusions encountered by orthodontists in day-to-day practice. It poses both an esthetic and functional challenge for the patient. It is also tricky for the orthodontist to achieve stable results by way of extrusion of anteriors or intrusion of posteriors or a combination of both. Considering how most orthodontic mechanics are extrusive in nature, it is a clinical challenge to achieve true intrusion of posteriors because extrusion of anteriors is unstable. Various techniques have been described over the past years to correct this malocclusion and with the advent of mini-implants, the envelope of discrepancy has expanded allowing more successful non-surgical management of cases.

Keywords: Anterior open bite, molar intrusion, anterior extrusion

INTRODUCTION

Anterior open bite as a term was coined by *Caravelli* in 1842. It is defined as a condition where there is no contact and no vertical overlap of the lower incisor crowns by the upper incisor crowns when mandible is in full occlusion¹. It is also defined as deviation in vertical relationship of maxillary & mandibular dental arches by *Subtenly and Sakuda*.² In the Index of orthodontic treatment needs, it falls under the categories 4e (extreme lateral or anterior open bites > 4mm), 3e (lateral/anterior open bites 2-4mm), and 2e (lateral or anterior open bites 1-2mm) in the dental health component. Less than 4% of mixed dentition population are affected by this malocclusion³. Open bites are less common than deep bites and the demand for treatment is around 17%⁴. Prevalence of Anterior open bite malocclusion in India is 1.6% and around the globe is 4.93%. It is classified into *Dentoalveolar and skeletal anterior open bites* by *Kim* (1974) based on the appearance of the mandible. *Worms, Meskin and Isaacson* classified it into: Simple OB : from canine to canine, Compound OB: from premolar to premolar, Infantile (complex) OB : from molar to molar. *Cooke* in 1981 classified it into Skeletal open bite, Habit or dental open bite, Abnormal tongue function open bite, iatrogenic open bite, Pathological open bite. *Sassouni* classified it into skeletal and dental open bites. *Yamaguchi* in 2010 classified it into Dentoalveolar with alteration in normal eruption of anterior teeth (non-nutritive sucking habits), Skeletal (with long face) – caused by clockwise/backward rotation of the mandible, Skeletal – caused by skeletal deformities like tipping of the maxilla and diversion of the mandibular gonial angle. *Moyer's* classified it into Simple open bite – confined to teeth and alveolar process with failure of some teeth to meet the line of occlusion and Complex open bite characterized by primary vertical dysplasia frequently associated with Class-I and Class-II malocclusions and occasionally associated with Class III malocclusion. *Andrew and Richardson* classified it into Transitional open bite:- when the permanent teeth are erupting with incomplete growth of dento-alveolar region and this anterior open bite undergoes spontaneous correction. Digit sucking open bite:- Eruption of incisors impeded by digit sucking leading to Anterior open bite. Habit breaking therapy corrects this anterior open bite.

Etiology

The etiology could be:

- Genetic
- Environmental
- Habits (persisting in permanent dentition)
- Abnormal tongue function – endogenous/adaptive tongue thrust
- Trauma/pathology affecting condyle
- Pathological- ex. CLP, acromegaly, trauma
- Neurological disturbances
- Muscular dystrophy
- Iatrogenic ex. Extrusion of molars during treatment – palatal cusp hang/ 2nd molar eruption in functional therapy
- Respiration- minor influence on vertical and transverse jaw dimensions

Effects Of Sucking Habits

- Advocates of breastfeeding reduced prevalence of malocclusion with no difference on the long run with longer breastfeeding periods leading to fewer non-nutritive sucking habits. Sucking during primary and early mixed dentition may affect the alveolus but main effect- eruption of permanent dentition- **Frequency (hours/day) and duration (months/years)**⁵



• On comparing digit sucking vs pacifiers- more incidence of posterior crossbites are seen with with pacifiers especially when use>18 months. Most children have non-nutritive sucking at 24 months⁶, only 40% at 36 months (McNamara 2006). Habits decline with age- pacifier use less common when compared to sucking habits- social pressures of school. If habits stop before eruption of permanent teeth there is spontaneous resolution- except posterior crossbite.

Intervention

Non dental interventions include: straightforward discussion of consequences, reminder therapy, reward systems, and elastic bandage around elbow. Appliance therapy may also be done as a helping hand and not a punishment. Removable reminder appliance contraindicated as compliance is a real issue with the treatment effectiveness. Maxillary lingual arch with crib can be used to manage the habit and in about half of the children- thumb sucking stops, Anterior open bite closes rapidly. The crib is effective in extinguishing thumb sucking in 85-90% patients.⁷In primary dentition, treatment isn't indicated, or orthodontic dummy may be prescribed if the habit is dummy related. Parents can be reassured that the issue will resolve with habit cessation. In early mixed dentition, patient can be adviced and motivated by way of rewards. In late mixed dentition deterrent appliance may be prescribed and upper arch expansion may be indicated. In permanent dentition, spontaneous resolution of the anterior open bite is highly unlikely.

Anterior open bites may be secondary to a tongue thrust and vice-versa. The tongue thrust may be:

- Simple
 - Normal tooth contact in posterior region
 - Anterior open bite
 - Contraction of the lips, mentalis muscle and mandibular elevators
- Complex:
 - Generalised open bite
 - Absence of contraction of lip and muscle
 - Teeth contact in occlusion
- Lateral tongue thrust:
 - Tongue thrusting laterally with posterior open bite

Inadequate nasal airway creating the need for an oral airway, could be because of structural abnormalities or blockages in the nasopharynx or skeletal abnormalities.



Muscular dystrophy may also have a secondary presentation of mouth breathing. Condylar resorption due to traumatic injuries or systemic reasons may also be a contributing factor in the etiology leading to a sudden open-bite due to bilateral condylar resorption. Excessive growth of maxilla in those with CI II malocclusion- more downward than forward movement of maxilla prevents mandibular anterior growth. In some- tendency self corrects without intervention, in some others continues through adolescence and post adolescent years - even successful treatment must be retained into late teens early 20s. Efforts must be made to stop/decrease maxillary posterior vertical growth and facilitate upward and forward rotation of mandible. Cangialosi 1984 presented a Great variability in dental and skeletal morphology in patients with open bites. They have a tongue thrust type of swallow to establish lip seal.⁸

Types

Skeletal anterior open bite

- Extra-oral features of
- Long face
- Lip incompetence

- Steep FMA
- Marked antegonial notch
- ↑AFH, ↓PFH; reduced UFH:LFH
- IntraOral features of
- Mild crowding, upright incisors
- If severe may occlude only on 7s
- Gingival hypertrophy due to mouth breathing
- Maxillary, occlusal and palatal planes tilt upward, mandibular occlusal plane canted downward

Dental Anterior Open-bite

This is caused mainly due to digit-sucking or other nonnutritive sucking habits. It has the following intra-oral features:

- Arches have features related to the etiology- eg. Thumb sucking: proclined upper incisors, depressed retro lined lower incisors
- Open bite limited to incisor region- asymmetrical
- Narrow maxillary arch with cross bites
- Tilting of maxillary plane and anterior displacement
- 'Fish-mouth' appearance
- Severity depends on age, intensity, frequency and duration (↑6hrs)^{9,10,11,12.}

Cephalometric features

- Normal maxillary palatal plane with a canted occlusal plane, decreased dent alveolar height anteriorly, increased posteriorly.¹³

DISCUSSION

Several studies have related the morphologic aspects of malocclusion to mandibular dysfunction in children. Williamson surveyed 304 pre-orthodontic patients (aged 6-16) and found that 72% of those with pain dysfunction symptoms had either open bite or deep bite¹⁴ They also found that functional malocclusion due to occlusal interferences was more important than morphologic malocclusion in the etiology of mandibular dysfunction but that morphological malocclusion such as crossbite and anterior open bite might be a potential risk factor. In a larger longitudinal study with 7337 Japanese children, the prevalence of open bite was found to be 12.2%¹⁵.

CONCLUSION

As mentioned by Mirzahi, 1978, '*The greater the skeletal elements contribute to the aetiology, the poorer the prognosis for treatment.*'¹⁴ There are four mainstays to correcting an anterior open-bite, viz., Habit cessation, Orthodontic treatment, Orthognathic approach and a combination therapy.¹⁵

CONFLICT OF INTEREST

Conflict of interest declared none.

FUNDING SOURCE: Nil

REFERENCES

1. Houston WJB, Stephens CD, Tulley WJ. Class I malocclusions. In: A Textbook of Orthodontics, 2nded. Oxford: Wright, 1996; p.216.
2. Subtelny JD. Examination of current philosophies associated with swallowing behaviour Am J Orthod 1965; 51: 16-182.
3. Proffit WR, Fields HW. Contemporary Orthodontics. St Louis: C.V. Mosby, 2000
4. Proffit WR. Equilibrium theory revisited: Factors influencing the position of the teeth. Angle Orthod 1978; 48: 175-186
5. Brenchley ML. Is digit sucking of significance? Br Dent J 1991; 171: 357-362.
6. Larsson E. Dummy- and finger-sucking habits with special attention to their significance for facial growth and occlusion. Swed Dent J 1978; 2: 23-33.
7. Greenlee GM, Huang GJ, Chen SS, Chen J, Koepsell T, Hujuel P. Stability of treatment for anterior open-bite malocclusion: a meta-analysis. Am J Orthod Dentofacial Orthop. 2011 Feb;139(2):154-69.
8. Cangialosi TJ. Skeletal morphologic features of anterior open bite. Am J Orthod. 1984 Jan;85(1):28-36.
9. Bowden BD. The effects of digital and dummy sucking on arch widths, overbite, and overjet: A longitudinal study. Aust Dent J 1966; 11: 396-404.
10. Larsson E. The effect of finger-sucking on the occlusion: a review. Eur J Orthod 1987; 9: 279-282.
11. Larsson E. Dummy and finger-sucking habits with special attention to their significance for facial growth and occlusion. I. Incidence study. Sven Tandlak Tidskr 1971; 64: 667-672.
12. Guidelines for Dummy and Digit-Sucking Habits. London: British Orthodontic Society, 2001.

13. Dung DJ, Smith RJ. Cephalometric and clinical diagnoses of open bite tendency. *Am J Orthod Dentofac Orthop* 1988; 94: 484–490.
14. Mizrahi E. A Review of Anterior Open Bite. *British Journal of Orthodontics*. 1978;5(1):21-27.
15. Lawry DM, Heggie AAC, Crawford EC, Ruljancich MK. A review of the management of anterior open bite malocclusion. *Aust Orthod J* 1990; 11: 147–160.