

## CORRECTION OF SKELETAL ANTERIOR OPEN BITE AND GROSSLY CARIOUS MOLAR EXTRACTION:AN INTERDISCIPLINARY APPROACH.

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**ABSTRACT:**In orthodontics, patients with vertical facial types are often difficult to treat with expected treatment outcome. Conventionally, fixed appliances, a headgear, posterior bite block, extraction, temporary anchorage devices, or orthognathic surgery are better approaches to treating such patients. This case report embellishes a non-surgical orthodontic treatment of 5 mm anterior open bite in a non-growing adult patient, utilizing fixed mechanotherapy, tongue rake and drag loop.

**KEYWORDS:** Anterior open bite,dentofacial,relapse.

### INTRODUCTION:

The complexity of anterior open bite is due to a combination of skeletal, dental, soft tissue, and habitual factors.<sup>1,2</sup> Multiple treatment strategies aimed at different etiologies of anterior open bite have been proposed. However, the tendency toward relapse after conventional or surgical orthodontic treatment has been indicated.<sup>3</sup> Therefore, anterior open bite is considered one of the most challenging dentofacial deformities to treat. The case report aims to analyse the causes, dentofacial morphology, treatment options, retention, and stability of anterior open bite.The diagnosis and treatment modalities varies according to the etiology.<sup>5,6</sup> Failure of tongue posture adaptation after orthodontic and/or surgical treatment might be the primary reason for relapse of anterior open bite.<sup>4,5,6</sup> Prolonged retention with fixed or removable retainer is advised and necessary in open bite treatment. The treatment of anterior open bite remains a resolute challenge to the orthodontist; meticulous diagnosis and prompt intervention with proper treatment manner and appliance selection will improve the treatment outcomes and long-term stability.

Open bite is generally classified as skeletal or dental. The dental open bite is found in the anterior region within the area of the canines and incisors and is associated with normal craniofacial pattern, proclined and infra occluded anterior teeth, and thumb or finger-sucking habits.<sup>7,8,9</sup> The skeletal open bite is often related to excessive vertical growth

of the dento-alveolar complex, especially in the posterior molar region. As anterior open bite is often the result of a combination of both factors, it makes classification of open bite as either skeletal or dental difficult.<sup>10,11</sup> Therefore, it has been proposed that the most clinically helpful classification of open bites should be based on origin. The etiology of anterior open bite malocclusions is multifactorial and numerous theories, including genetic, anatomic, and environmental factors, have been proposed.<sup>12-15</sup>

### CASE REPORT

A male patient of age 25 years visited the Department of Orthodontics at Bhojia Dental College and Hospital Budh Baddi with the chief complaint of difficulty in chewing and speaking. Extra oral examination (Figure 1) showed that he had a mesoprosopic facial form with good facial symmetry, convex profile with posterior divergence, increased lower facial height, incompetent lips, acute nasolabial angle, deep mentolabial sulcus, low mandibular plane angle, and a non-consonant smile arc. No signs/ symptoms of temporomandibular joint dysfunction. Intraoral examination (Figure 2) revealed as Class I molar relation, Canine Class I on Right side and Canine Class II on left side.The patient had a habit of tongue thrusting, and had an anterior open bite of 5mm.The 23,24 and 35 are in cross bite. The vertical relation showed open bite (5 mm,100%), overjet of 5mm, mandibular midline was deviated to left side by 1mm. Orthopantomogram (Figure 3) showed full complements of teeth were present. The maxillary and mandibular anterior teeth presented with

extrusion and the curve of spee was normal.RCT treated teeth wrt 36,46,47.

Cephalometrically (Figure 3) he had orthognathic maxilla (82.5) and Retrognathic mandible (74.5) with ANB (8), Wits (5mm) depicting a skeletal Class II jaw bases. Patient had a hyperdivergent growth pattern on account of Sn-Go-Gn (48),FMA (43) and Jaraback ratio of 56% (Table 1).



**Fig 1. Pre Treatment Extraoral Photographs showing anterior open bite**



**Fig 2. Pre treatment intraoral photographs.**



**Fig3:Pre treatment extra oral radiographs.**

### TREATMENT OBJECTIVES

To delineate tongue thrusting habit, to obtain optimum overjet and overbite, to correct open bite, to maintain class I molar and achieve Class II canine relation, obtain skeletal balance by restricting maxillary growth and promoting mandibular growth, improve the facial features by obtaining a straight profile with straight divergence, a pleasing smile arc and soft tissue esthetics.

### TREATMENT

After analysing all diagnostic records, the patient was treated without extractions. As he was in the post growth period, decompensation of the dental arches with levelling and aligning using the straight wire appliance (SWA) was done simultaneously. The maxillary and mandibular teeth were bonded and banded with PEA 0.022" slot MBT prescription brackets. A 0.9 mm tongue rake was bonded on incisors to prevent thrusting of tongue. Initial levelling and alignment of maxillary arch was done simultaneously by placement of box elastics (Figure 4) to close the open bite. Open bite was recorded in every visit.

Sufficient overjet was achieved and the arches were aligned using the following sequence of archwires; 0.014 Niti, 0.016 Niti 16 × 22 Niti, and 17 × 25 TMA arch wires. Later 18 × 25 TMA wire in upper arch, 0.019 X 0.025 TMA wire in upper and lower

arch (Figure 5) with Drag loop activation upto 4mm with alpha bend of 40 degrees and Beta bend of 10 degrees given Loop was activated in every visit. Initially patient had missed appointment due to Covid. After 29months of treatment, both the arches were levelled and aligned.

Upper 0.017 X 0.025 NiTi wire for uprighting of molars was done. A lower 0.017 X 0.025 SS wire with open coil spring (passive) was given for stability of occlusion. This was given for 2 months. Upper 0.018 X 0.025 SS wire with 10 degrees tip back bend for molar uprighting was given, Finishing and detailing were carried out and the appliance was debonded. Fixed Bi lingual retainer was given in lower arch and Upper tongue rake was used as a retainer. After that the patient was referred to Dept. Of Prosthodontics for Prosthesis wrt 15,36 and 46. The total treatment time was 30 months



**Fig.4. Mid treatment extraoral photographs**



**Fig.5. Mid treatment intraoral photographs**



**Fig.6. Mid treatment extraoral Radiographs (Lateral Ceph and OPG).**

### TREATMENT RESULTS

There was an amazing improvement in the patient's profile and facial attractiveness as seen in the post-treatment facial photographs. Facial balance, smile attractiveness, and lip positions were improved. (Figure 7). There was intrusion and proclination of the upper and lower incisors. Class I molar and canine relationships were established. Overjet and overbite were improved to 0.5 and 2mm respectively (Figure 8). Cephalometrically the upper incisors were proclined from -4mm to 5 mm in relation to NA perpendicular to point A line and lower incisors were proclined from 70 to 114 (IMPA) (Table 2). Superimposition demonstrated the treatment changes (Figure 9). There was a significant growth of mandible, mandibular molars were extruded and mesialized and mandibular anteriors showed proclination. In the maxillary arch there was extrusion of molar but no significant distalization and the incisors were proclined. There was counterclockwise rotation of mandible, maxillary

growth reduction, and overall improvement of soft tissue profile.



**Fig7. Posttreatment Extraoral Photographs**



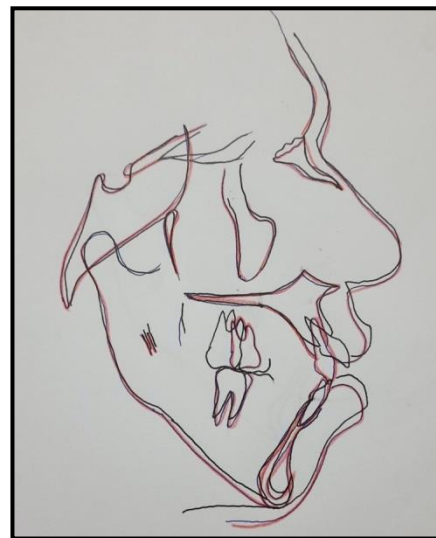
**Fig 8. Post treatment intraoral photographs**



**Fig9: Post treatment extraoral radiographs**

**TABLE I: CEPHALOMETRIC MEASUREMENTS**

PARAMETERS	PRE-TREATMENT	MID-TERM	POST-TREATMENT
SNA	82.5	83	83
SNB	74.5	75	75
ANB	8	8	8
GoGn-SN	48	48	48
UI-LI	102	111	123
FMA	43	44	48
IMPA	87	93	80
Jaraback Ratio	56%	53%	55.4%



**Fig 10: Superimposition**

**DISCUSSION**

Treatment of skeletal open bite malocclusion in adults is tough with conventional treatment options. Mild to moderate open bite cases in Class II vertical growth pattern and posteriorly placed mandible patients can be successfully treated with mini-implants. *Umemori et al.*<sup>10</sup> used mini plates for the intrusion of posterior teeth in lower arch, whereas *Erverdi et al.*<sup>11</sup> and *Sherwood et al.*<sup>12</sup> stated that the correction of an open bite by the intrusion of maxillary molars with mini-implants placed in the infrazygomatic region. A vertical facial pattern and retrognathic mandible may result from relatively small amounts of vertical condylar growth and large amounts of vertical alveolar and sutural growth, producing a backward rotation of the mandible. The vertical height of the upper molars (OP-PP) plays an important role in this backward rotation.<sup>15,16</sup>

Establishing vertical control in skeletal open bite patients with no remaining growth potential is impossible when using conventional fixed appliances. Such treatment has a minimal effect on the skeletal pattern and bite; closure is achieved mainly by extrusion and uprighting of the incisors, with no molar intrusion.<sup>17-18</sup>

In the present patient, fixed mechanotherapy along with tongue rake was used for the correction of problem by improving the vertical dimensions by closure of the open bite.<sup>19-23</sup> The inclination of the upper incisors was corrected, to allow the correction of open bite by intrusion of posterior teeth, fixed functional appliances have been shown to be very effective treatment options. The appliance produced significant skeletal and dentoalveolar changes.

Permanent retention was given in the lower arch to ensure posttreatment stability. Tongue rake along with fixed retention was used as a treatment of choice of retention in maxillary arch. Superimposition demonstrated the treatment changes which had caused significant improvements in the skeletal, dental, and soft tissue relationships of the patient.

## CONCLUSION

Treatment planning with careful biomechanical consideration for open bite hyperdivergent patients with Angle's Class I molar relationship is crucial. Vertical movements are prevented by adding occlusal attachments as bite blocks on molars, as it applies intrusive forces on the posterior teeth. With the improvements in the technology, more research is necessary to develop protocols to achieve the results predictably.

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