

Early Treatment of Excessive Open Bite and Follow Up: Case Report

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Abstract

Multiple factors play role in the etiology of openbite malocclusion. For a successful orthodontic treatment the etiology of the malocclusion must be eliminated. A proper diagnosis of the malocclusion and elimination is an essential factor, especially in open bite cases.

In the present case, patient was a seven year one month old boy who had a severe open bite with class I molar relationship and tongue thrust. In the anemnesis of the patient, tonsillectomy and adenoidectomy surgery was reported at the age of four. Also, difficulty in the speach was another important finding of the patient.

The final outcome of the treatment was a great improvement in function andesthetics. The main reason this patient could be successfully treated nonsurgically was her initial compliance, and the proper therapy options used during this two-phase treatment. (*Journal of International Dental and Medical Research 2009; 2: (1), pp. 6-10*)

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Introduction

Various effects may play role in the etiology of open bite such as: intolerable growth pattern in vertical direction, genetics, sucking habits, habitual mouth breathing. These abnormal functions changes the morphology of the bony structures.^{1,2} Treatment alternatives include habit breaker, bite block, high pull headgear, vertical chin cap, vertical elastics, multilooped edge wise mechanics and surgery.^{3,4}

Malocclusion characterized with open bite is one of the most difficult anomalies to treat. Multiple factors play role in the etiology of this malocclusion. Mostly, maxillary posterior dentoalveolar segments erupt downward in an unwanted manner. Posterior intrusion becomes very difficult with increased age and mechanic treatment alternatives are limited inadult patients.⁵⁻⁷ Tongue and the importance in the etiology of open bite malocclusions is considered as a stimulating factor in the epidemiology of the anomaly.⁸ The etiological

concepts in the shape, physiology and the pressure that is exerted on the incisors while swallowing are common features in these patients.^{9,10}

Orthodontists wondered had this habitual forward pressure on the incisors disappear after the orthodontic treatment or not. If not, this exerted pressure will cause debrimental effectson incisors. For a successful orthodontic treatment the etiology of the malocclusion must be eliminated. A proper diagnosis of the malocclusion and elimination is an essential factor in orthodontic treatment.^{11,12}

Therefore, in open bite malocclusions, just closing the vertical opening by extruding or intruding the teeth is not always the true treatment alternative. Open bite generally is associated with other malocclusions like anterior-posterior, transversal and vertical anomalies.^{11,12}

CASE REPORT

History

The patient was a seven year one month old boy who had a severe open bite with class I molar relationship and tongue thrust.

In the anemnesis of the patient, tonsillectomy and adenoidectomy surgery was reported at the age of four.

Also, difficulty in the speach was another important finding of the patient (Figure 1-5).

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Fig. 1,2 Pretreatment extraoral photographs.



Fig. 3,4,5 Pretreatment intraoral photographs.

Radiographic evaluation

Cephalometric examination of the patient revealed skeletal Class III (ANB: -1°) and high angle (SN-GoGn: 45°) pattern. 9 millimeter open bite increased lower anterior face height (ANS-Me/N-Me: 59.1%) and decreased the ratio of posterior face height to anterior face height (S-Go/N-Me: 58.3%). Protrusion of the insisors (interincisal angle 125°) were also observed (Table 1 and Figure 6,7).

Cephalometric Parameter	Pre treatment	Post treatment	4 years after post treatment
SNA ($^\circ$)	71	74	75
SNB ($^\circ$)	72	73	74
ANB ($^\circ$)	-1	+1	+1
SND ($^\circ$)	70	73	74
U1-NA (mm)	7	5	5
U1-NA ($^\circ$)	29	20	19
L1-NB (mm)	5	5	6
L1-NB ($^\circ$)	25	24	25
Pg-NB (mm)	1	2	2
U1-L1 ($^\circ$)	125	135	135
Occlusal Plane-SN ($^\circ$)	22	18	19
SN-GoGn ($^\circ$)	45	36	35
ANS-Me (mm)	71	75	79
S-Go (mm)	70	75	78
N-Me (mm)	120	135	139
S-Go/N-Me (%)	58,3	55,5	56,1
ANS-Me/N-Me(%)	59,1	55,5	56,8
Soft Tissue -S Line(Upper/Lower)(mm)	-1/+3	0/+1	0/0
Ba-Ptm-Gn ($^\circ$)	77	85	84

Tab. 1 Pre-post treatment cephalometric analysis.



Fig. 6 Pretreatment cephalometric radiographs.

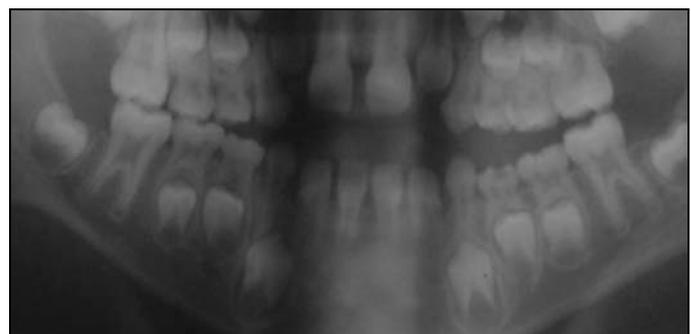


Fig. 7 Pretreatment panoramic radiographs.

Treatment Objectives

Elimination of the open bite, establishment of an ideal overjet, overbite, canine, molar relationship, in combination with a good facial esthetics are the main goals of our treatment. Correction of axial inclinations of maxillary and mandibular anterior teeth, establishment of a good functional occlusion, limitation of maxillary molar extrusion and stimulation of mandibular counter clockwise rotation, improvement of facial profile, lip closure, smile characteristics and dental esthetics were our targets.

Treatment Alternatives

This case would traditionally have been treated surgically because of the severity of the problem. Waiting for patient's growth and development to finish and planning an orthodontic treatment with orthognatic surgery is an alternative to treat this patient. Because of the reason that the patient couldn't afford the treatment, patient's parents did not want any surgery. They preferred this long time treatment alternative.

Treatment Progress

A two phase orthodontic treatment was planned for the patient. In the first phase of the treatment vertical chin cap and removable appliance to the upper arch was used. This removable appliance had a screw in the transversal direction to expand the maxilla slowly. Vertical chin cap was for the limitation of mandibular vertical growth and stimulation of mandibular counter clockwise rotation. Patient left his tongue thrust habit in this treatment phase. As a result of controlled mandibular vertical growth open bite decreased to four millimeters. This treatment phase ended with mixed dentition.

In the second phase of the treatment fixed straight wire mechanics were applied to the patient. Treatment was begun with 0.016" round upper and lower nickel titanium leveling archwires. These were followed by 0.016"x 0.022" upper accentuated-curve and lower reverse-curve nickel titanium archwires; the intrusive force of the wires was counteracted with 3/16", 4oz elastics placed between each pair of opposing canines.

Results

After 16 months of active treatment, upper and lower Hawley retainers were placed. In combination with Hawley retainers patient was asked to use vertical chin cap at night. Functional dental and skeletal class I occlusion in association with an improved facial appearance was obtained. A good smile line and esthetic facial appearance satisfied patient and patient's family. Axial inclinations of the posterior teeth were corrected. The proclined upper and lower incisors were uprighted. Nine millimeters of open bite decreased

to three millimeters of over bite. Mandibular counter clockwise rotation was maintained (Ba-Ptm-Gn: 80°) (Figure 8-12).



Fig. 8,9 Posttreatment extraoral photographs.



Fig. 10 Posttreatment intraoral photographs.



Fig. 11 Posttreatment cephalometric radiographs.



Fig. 12 Posttreatment panoramic radiographs.

In open bite cases, early orthodontic treatment increase posterior facial height, decrease anterior face height and corrects the direction of condylar and mandibular growth. By controlling maxillary and mandibular teeth eruptions, ideal overjet and overbite relationship can be maintained. In the present case, all these precautions aided in correction of this malocclusion.

When the records were re-evaluated 4 years after the treatment, it was observed that the patient still had acceptable occlusion and facial esthetics (Figure 13-15).



Fig. 13,14 Extraoral photographs four years posttreatment.



Fig. 15 Intraoral photographs four years posttreatment.

Discussion

Orthodontic correction of the functional and morphological problems that affect the patient's psychology at an early stage could help eliminate a potential inferiority complex and also have a beneficial effect on general personality development.¹³ Faced with the limitations that orthodontic treatment alternatives present, most orthodontists would agree that this type of case is

ideally corrected with a combination of orthodontics and orthognathic surgery.¹⁴

The advantages of the orthognathic surgical treatment are that the overbite can be over corrected and relapse is less than with a nonsurgical option.¹⁵ Bell,¹⁶ realized that a skeletal open bite could be corrected with LeFort I osteotomy but some relapse of the open bite after surgery may occur.

In a nonsurgical plan, the orthodontist will camouflage the skeletal discrepancies to an extent that satisfies as many of the patient's esthetic and functional concerns as possible. Nonsurgical options for open bite malocclusions include anterior vertical elastics, posterior bite blocks, high-pull headgear, vertical-pull chin cup and the use of microimplants. The patient must be told that nonsurgical correction usually requires a longer treatment time and is more difficult, especially for stability and retention.¹³ In this case, the nonsurgical correction of the anterior open bite included a high-pull headgear appliance, a vertical-pull chin cup and anterior vertical elastics.

The vertical-pull chin cup was successfully used to control excessive lower anterior face height and helped to prevent extrusion of posterior teeth.¹⁷⁻¹⁹ Finally, anterior vertical elastics in combination with accentuated and reverse curve arches were used in order to intrude posterior segment and to extrude the maxillary and mandibular incisors and to close the remnant open bite.

The early treatment regimen under study led to increased condylar growth, altered direction of condylar growth, increased true forward mandibular rotation, increased posterior facial height, and decreased anterior facial height for open bite patients; it also displaced the chin anteriorly, controlled maxillary and mandibular molar eruption, increased overbite, and decreased overjet.

The final outcome of the treatment was a great improvement in function and esthetics, although the stability of the open bite closure is questionable. The main reason this patient could be successfully treated nonsurgically was her initial compliance, and the proper therapy options used during approximately six years of this two-phase treatment.

Many previous studies have indicated that if open bite correction is not stable, it is because the tongue continues to be postured anteriorly which causes the bite to reopen.^{11,12,20} The successful repositioning of the tongue from the myofunctional therapy program and the mechanics used may have collectively provided the degree of stability seen in this patient. At the end of 4 year posttreatment period, relapse occurred but this was not significant.

Conclusions

As a result of this early treatment, tongue thrust habit was left, ideal overjet and overbite relationship was established by controlling mandibular vertical growth. This early treatment resulted with a good smile and profile of the patient. Correction of this functional and morphological open bite problem at an early age could help eliminate a potential inferiority complex and also have a beneficial effect on general personality development of our patient.

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