

Non-surgical treatment approach of the anterior open bite of an adult: An early successful treatment result: Case Report

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Abstract

Open bite is one of the most difficult malocclusion to treat because of its multiple etiological factors. This case report illustrates the successful orthodontic treatment in an adult male patient, aged 22-years with an anterior open bite, spacing, and forwardly placed incisors. Fixed orthodontic appliances (MBT) were used. Successful closure of the anterior open bite with adequate overjet, overbite, and interdigitation of the teeth was achieved. The total treatment time was 10 months and no adverse effects were observed at the end of active treatment.

Keywords: Open bite, MBT, malocclusion

Introduction

Orthodontic treatment has the ability to modify the dentofacial skeleton and affect facial esthetics. Anterior open bite (AOB) malocclusion, defined as a lack of vertical overlap or contact between the maxillary and mandibular incisors [1], is of multifactorial etiology, involving a combination of skeletal, dental, functional and habitual effects [2-5]. The potential causes can be unfavorable growth patterns [6,7], heredity [8], pernicious habits like thumb sucking [8,9] and tongue thrusting and respiratory alterations [10] (nasal airway obstruction including sleep apnea). Its prevalence varies between ethnic groups, age, and dentition, ranging from 1.5% to

11% [11]; it can be classified as a dentoalveolar or skeletal malocclusion [12]. It may cause social and psychological distress as well as functional problems in related patients [13]. The characteristic features include steep mandibular plane angle [14], obtuse gonial angle, increased lower facial height, posterior downward tipping of the palatal plane, divergent maxillary, and mandibular occlusal planes, mesial inclination of posterior dentition, over erupted maxillary molars [15] when a skeletal dysplasia is present, and a predominantly under the eruption of the incisors in dental open bites [16]. Due to its multifactorial etiology and a high tendency to relapse [17], AOB in adults is regarded as one of the most challenging malocclusion to treat [18]. To achieve a successful and stable result, however, it is essential to establish a correct diagnosis, identify the cause, locate the deformity and select an appropriate treatment method. The following case report will illustrate the treatment of a Class I malocclusion complicated by a dentoalveolar protrusion, an anterior open bite of 3mm, a steep mandibular plane angle, and a Class III skeletal pattern.

Case Report

A 22 years old male patient came to the Rama Dental College, Hospital & Research Center, Department of Orthodontics & Dentofacial Orthopedics having a chief complaint of spacing and forwardly placed front teeth. The patient had no relevant medical and dental history. His oral hygiene was satisfactory.

Clinical examination: Extraoral examination showed a convex facial profile with competent lips and acute nasolabial angle. Intraorally patient showed proclined upper and lower incisors with Angle's Class I molar relation bilaterally and Rickett's Class I canine relation bilaterally with an open bite of 3mm. There was an evident tongue thrusting habit accentuating the

bimaxillary flaring and protrusion of the incisors. (Figure 1-3)

Radiographic examination: The panoramic radiograph showed the presence of all permanent teeth with no abnormalities. (Figure 4) The cephalometric analysis showed a skeletal Class III relationship ($ANB -2^{\circ}$) with maxillary prognathism ($SNA 88^{\circ}$) and mandibular prognathism ($SNB 90^{\circ}$). The mandibular plane angle was steep, with increased mandibular body length (77mm) and ramus height (55mm). The upper and lower incisors were labially inclined ($U1/FH 128.2^{\circ}$, $L1/MP 103^{\circ}$) and the molar relationship was in Class I on both sides. (Table 1)

Diagnosis: It's a case of skeletal Class III jaw base relationship with prognathic maxilla and more prognathic mandible, horizontal growth pattern and Angle's Class I malocclusion, proclined upper and lower anterior with anterior open bite, spacing wrt upper and lower anterior.

Treatment Objectives: The treatment goals were: To obtain pleasing and harmonious profile; to eliminate the tongue thrusting habit; reduction of the bimaxillary protrusion; closure of the anterior open bite; teeth alignment and leveling, achieving good axial inclinations and closure of all spaces; symmetry of maxillary and mandibular dental arches; achieve ideal overjet and overbite and maintain the Class I canine and molar relationship.

Treatment Plan: The suggested treatment plan involved conventional orthodontic treatment with pre-adjusted fixed appliances (MBT) to align the upper and lower teeth, habit breaking appliance, closure of anterior space, retract the proclined incisors and close the anterior open bite.

Treatment progress: The treatment was started with placing the fixed tongue crib in the upper arch to eliminate the tongue thrusting habit. After 45 days bonding with standard 0.022-inch slot, MBT metal brackets, and initial leveling and alignment was done using following archwire

sequences 0.014” to 0.020”. After leveling and alignment with nickel-titanium archwires, 0.019”x0.025” SS archwire was placed and space closure was done. Full time box elastics were used for settling the bite. The total treatment period was only 10 months.

Treatment results: Post-treatment evaluation of the patient revealed good preservation of the internal papillae with no gingival recession. Post-treatment OPG shows good parallelism of the roots, no dental caries, no significant reduction in the radiographic height of the crestal bone and no evidence of any significant apical root resorption. Treatment objectives were achieved and the teeth are in good interdigitation with an adequate overbite (Figure 5,6). Final lateral cephalometric radiograph’s analysis showed an acceptable dental compensation achieved for the underlying skeletal Class III discrepancy. (Figure 7,8)

Discussion

Open bite is a complex and difficult malocclusion to correct. Different treatment modalities were used in the treatment of open bite according to the etiology and the severity of the case, however, no one single procedure is suitable for all types [19]. The treatment may start from self-correction, removable, functional and fixed appliances to surgical intervention in severe skeletal cases. Anterior open bite is often accompanied with the placement of tongue anteriorly between the separated anterior teeth as a maneuver to close off the mouth and form an anterior seal. However, a forward resting posture of the tongue for prolonged duration could affect tooth position and causes anterior open bite [20]. Stability is the main concern with any open bite malocclusion. It is important to maintain the treatment results with fixed or removable retainers, especially to prevent labial flaring of the anterior. If tongue posture and aberrant function were the causes of the open bite, they may also contribute to

post-treatment relapse. Use of lingual spurs or tongue crib during or after treatment may, therefore, improve stability [21].

Conclusion

1. A simple and effective technique was used for the treatment of a difficult malocclusion case was described.
2. Successful and stable results were obtained.
3. The treatment brought about several dental improvements.
4. Patient cooperation was one of the key success of the treatment.

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Legends of figures



Figure 1A-1D: Pre treatment Extra-oral photograph- A) Frontal view; B) Frontal view with smile; C) Profile view; D) Oblique view

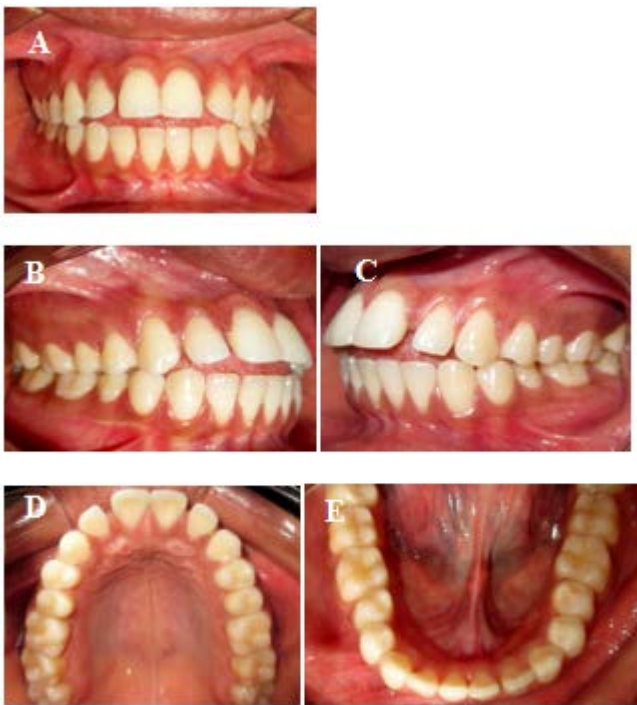


Figure 2A-2E: Pre treatment Intra-oral photograph- A) Frontal view; B) Lateral view-right; C) Lateral view-left; D) Occlusal view- maxillary arch; E) Occlusal view-mandibular arch.



Figure 3: Pre treatment Lateral cephalogram showing skeletal and dental characteristics of the patient.



Figure 4: Pre treatment panoramic radiograph showing the dental characteristics of the patient.

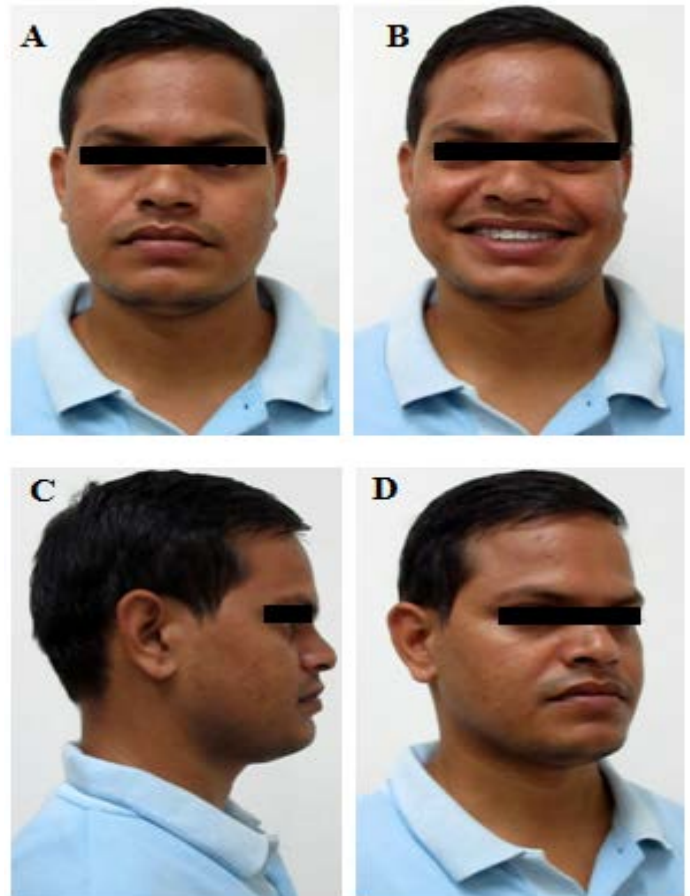


Figure 5A-5D: Post treatment Extra-oral photograph- A) Frontal view; B) Frontal view with smile; C) Profile view; D) Oblique view

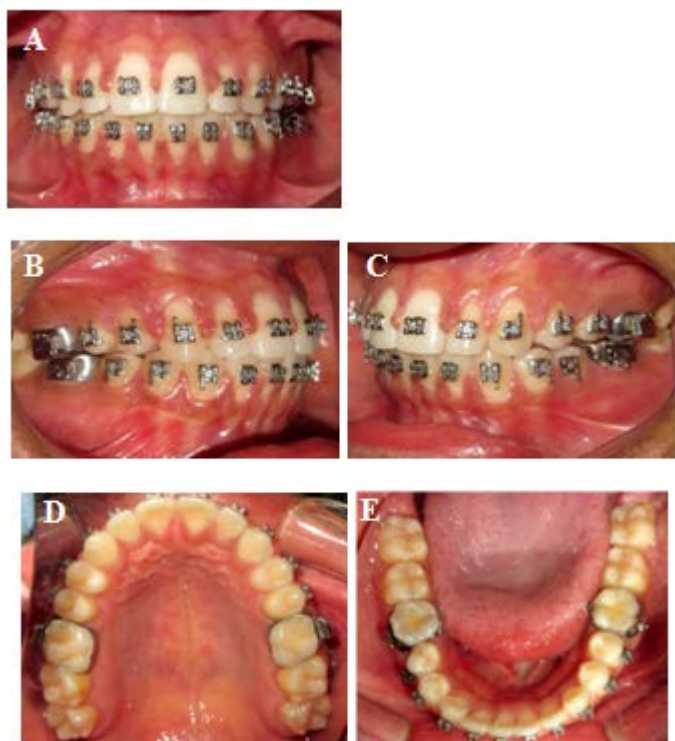


Figure 6A-6E: Pre treatment Intra-oral photograph- A) Frontal view; B) Lateral view-right; C) Lateral view-left; D) Occlusal view- maxillary arch; E) Occlusal view- mandibular arch



Figure 7: Post treatment Lateral cephalogram showing skeletal and dental changes after treatment



Figure 8: Post treatment panoramic radiograph showing the dental changes after treatment

Table 1: Cephalometric measurements

Variables	Mean values	Pre-treatment values	Post-treatment values
SNA	82 ⁰	88 ⁰	87 ⁰
SNB	80 ⁰	90 ⁰	90 ⁰
ANB	2 ⁰	-2 ⁰	-2 ⁰
SN-GoGn	32 ⁰	16 ⁰	19 ⁰
FMA	25 ⁰	24 ⁰	25 ⁰
Gonial angle	137+7 ⁰	128 ⁰	125 ⁰
Beta angle	28 ⁰ -32 ⁰	42 ⁰	38 ⁰
U1-FH	112.3 ⁰	150 ⁰	120 ⁰
L1-MP(angular)	93.4 ⁰	103 ⁰	100 ⁰
U1-NA (angular)	25 ⁰	54 ⁰	35 ⁰
L1-NB (angular)	28 ⁰	32 ⁰	30 ⁰
U1-NA (linear)	4mm	13mm	9mm
L1-NB (linear)	6mm	6mm	6mm

Interincisal angle	131 ⁰	95 ⁰	114 ⁰
Anterior cranial base (S-N)	71 ± 3mm	73 mm	68mm
Posterior cranial base (S-Ar)	32 ± 3mm	31 mm	30mm
Body length (Go-Me)	71 ± 3mm	77 mm	74 mm
Ramus length (Ar-Go)	44 ± 5mm	55 mm	51 mm
Nasolabial angle	90-110 ⁰	88 ⁰	90 ⁰