Non-surgical orthodontic treatment of anterior open bite in an adult patient.

Introduction

Open bite malocclusion is considered to be one of the most difficult problems to treat. The causes of the open bite are multifactorial, which can develop from genetic and/or environmental factors. Open bite is generally classified in two categories: skeletal and dental. The diagnosis is important due to different treatment approaches. Patients with open bite malocclusion can be diagnosed clinically and cephalometrically. Complex open bites that extend farther into the premolar and molar regions, and those that do not resolve by the end of the mixed dentition years may require orthodontic and/or surgical intervention. Vertical malocclusion develops as a result of the interaction of many different etiologic factors including thumb and finger sucking, lip and tongue habits, airway obstruction, and true skeletal growth abnormalities. Treatment for open bite ranges from observation or simple habit control to complex surgical procedures. Successful identification of the etiology improves the chances of treatment success.

Case report

Case history

Caucasian female, 20 years old accepted treatment in the Orthodontics department, White Clinic in February of 2008 with a chief complaint of problems in chewing food and also esthetics, and wanted orthodontic treatment. She had no relevant medical history and no previous history of orthodontic treatment. She had a tongue thrust swallowing pattern and from history taking, she used the pacifier until the age of 6.

Clinical examination

Extra-oral assessment (Figure 1). She had symmetrical dolicalfacial biotype, lips are incompetent at rest showing 70% of the upper central incisors. On smiling she shows 1-2 mm of gum, upper midline is deviated 2mm to the right. She presents a convex profile with an obtuse nasolabial angle and increased lower facial height.

Figure 1 : Pre-Treatment extra-oral photographs
Intra-oral assessment (Figure 2): She presents a good oral hygiene with healthy periodontal tissues, anterior open bite from #13-23 of 4-5mm, Class I molar relationship in the right and left, Class I end-on canine relationship in the right and Class I in the left. Upper incisors are canted descending from right to left due to pen chewing habit. Presents a negative overbite (-4mm) and 3mm of overjet.

![Figure 2: Pre–Treatment intra-oral photographs](image)

**Cast analysis:**

The maxillary arch was symmetrical ovoid while the mandibular arch form was symmetrical and tapered. Upper crowding of 1 mm and 2 mm of lower crowding. Upper canine width of 28mm and molar width of 37mm. Lower canine width of 22mm and molar width of 32mm. Upper and lower curve of Spee are inverted due to intrusion and proclined incisors.

![Figure 3: Pre–Treatmente cast photographs](image)
Radiographic exame

A panoramic radiograph showed that all teeth are present, #48 appears to be impacted against the crown of #47. There is no bone pathology and mandibular condyles, nasal floor and maxillary sinuses appeared normal. There is a temporary crown in #21 and both #16 and #26 have resin fillings (Figure 3).

Figure 4: Pre-Treatment panoramic radiograph

Figure 5: Pre-treatment cephalometric radiograph
### Cephalometric analysis:

The patient presents a Class II skeletal dolicalfacial biotype with procline upper and lower incisors. Lower facial height and mandibular plane angle are increased due to clockwise rotation of the mandible.

### Treatment objectives

- Eliminate tongue thrust habit
- Dental correction of the open bite problem
  - Retrocline the upper and lower incisors
  - Correct the cant by extruding the upper incisors
  - Achieve a proper overbite and overjet
  - Correct the midline

### Treatment plan

- Lingual frenectomy
- Halley with tongue crib + tongue exercises
- Speech therapist
- Increase upper canine width
- Upper incisors extrusion + lower incisors extrusion
  - Ricketts progressive technique in the upper arch
  - Intermaxillary elastics
- Achieve a proper overjet and overbite
- Maintain a class I molar relationship and achieve a class I canine
Treatment:

02/2008 – Lower 6-6 bonding (edgewise esthetic 0.18 slot brackets) + 0.14 Niti + deliver of Hawley with tongue crib (Figure 6).

05/2008 - Lower 0.16 SS wire with loops and step up from #43 - #33 (extrusion of lower anterior teeth). Continues use of Hawley with tongue crib. Figure 7
**Case presentation**

**Figure 7:** Intra-oral photographs 0.16 SS with step up loops.

- **07/2008** - Removed lower wire and engaged a 0.16 x 22 SS. Lower spaces are closed by using a power chain from #46 - #36

- **10/2008** - Open bite is reduced to 1mm in the central incisor area.

- **11/2008** - Bonding of superior 6-6 (edgewise esthetic 0.18 slot brackets) + engaged a 0.14 NiTi wire. Finished use of Hawley. Figure 8.

**Figure 8:** Intra-oral frontal view picture during treatment

- **12/2008** - Reverse curve of spee in the upper wire

- **30/2008** - Started Ricketts "utility" therapy in the upper arch with a 0.16 x 22 (TMA) from #16 - #26 tubes passing over #15;#14;#24;#25 (Figure 9). Started use of intermaxillar elastics from #13 to #43 and #23 to #33. (the goal is to extrude upper and lower incisors and close the bite)
05/2009 - Reactivation of Ricketts + Intermaxillar elastics from #13 to #44 - #43 and #23 to #34 - #33. (figure 10)

08/2009 - Continuous use of intermaxillary elastics. Engaged 0.16 SS superior wire and 0.17 x 25 lower TMA. Progress treatment photographs were taken. (Figures 11;12;13)
Progress pictures:

Figure 11: Progress extra-oral photographs

Figure 12:
Intra oral upper and lower progress photographs (left). Good archform achieved.

Intra oral Lateral anterior progress photograph (up). Notice a good overjet and overbite almost achieved.
Figure 13: Intra-oral frontal and lateral view progress photographs.

12/2009 - Debonding of lower 6-3 and 3-6, posterior occlusion is achieved avoiding any undesirable lower posterior movements. Power chain lower 3-3, intermaxillary #13 - #12 to #43 and #23 - #22 to #33 empala elastics. (Figure 14)

Figure 14: Intra oral frontal view

03/2010 - Debonding + lower splint 3-3 and deliver upper Hawley with tongue crib. Final records were taken (Photographs; Casts; Radiographs).
Final photographs:

Figure 15: Final extra oral photographs.

Figure 16: Intra oral final frontal and lateral photographs.
Patient presents a more competent lip posture, there was slightly increase of her gingival smile that was expected to the option of non-surgery treatment by extruding upper incisors. Notice a decrease of her lower facial high due to bite closure and rotation of the mandible. (Figure 15).

Patient achieve a class I molar and canine relationship, proper overjet and overbite despite treatment limitations and good harmonic smile. (Figure 16). Proper alignment and leveling were achieved and also a good arch forms.

Final Radiographic exams:
Figure 19: Cephalometric final radiograph.

Pre treatment and pos- treatment cephalometric measurements:

<table>
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<tr>
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<th>Pre treatment Value (º)</th>
<th>Mean (º)</th>
<th>Pos treatment value</th>
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<tbody>
<tr>
<td>Facial axis</td>
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<td>90 +/- 3</td>
<td>86</td>
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<tr>
<td>Facial depth</td>
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<td>26 +/- 4</td>
<td>35</td>
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<tr>
<td>Maxillary height</td>
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<td>53 +/- 3</td>
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<tr>
<td>Lower facial height</td>
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<td>47 +/- 4</td>
<td>50</td>
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<tr>
<td>Interincisal angle</td>
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<td>132 +/- 6</td>
<td>122.7</td>
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<tr>
<td>Lower incisor inclination(IMPA)</td>
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<td>93-95</td>
<td>96</td>
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<tr>
<td>Upper incisor inclination (UI/S.N)</td>
<td>109</td>
<td>103 - 105</td>
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Cephalometric modifications:

The only changes that can be achieved with a non-surgical open bite treatment are dental. In this case, the interincisal angle was increased due to retroinclination movement of upper and lower incisors. There was a slightly clockwise rotation of the mandible as a result of posterior intrusion.

Final Cast analysis:

Achieved a parabolic upper and lower arch form. Class I molar relationship both in molar and canine. Curve of Spee was leveled, and coincident upper and lower midlines were achieved.

Upper molar width of 38mm and canine width 30mm. Lower molar width of 33mm and canine width of 24mm.

(Figure 20: Final casts)
Before and after treatment fotos

Extra oral frontal and lateral view:
Intra oral frontal and lateral view:
There are several treatment approaches to correct the openbite problem, the most important is to detect the cause and the abnormal features, so that it leads to the proper treatment. In this case patient compliance is one important factor to achieve successful treatment, especially with the use of intermaxillary elastics.

This case shows a non-surgical approach of a openbite case treated with a bioprogressive Rickett’s technique and a good wear of elastics. Passing over a long and difficult surgical case by making a short and successful approach. There were cephalometric improvements, especially dental but we can see also a clock wise rotation of the mandible giving to the patient a better esthetic profile.

A good and esthetic smile was achieved, patient speech was improved among functionality, offering a great satisfaction to the patient. Isn’t that what we all want?