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Case report: Non-surgical Correction of Skeletal Anterior Open-bite.

Orthodontic Management of an Adult Patient



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Non-surgical Correction of Skeletal Anterior Open-bite.: A Case report

Njokanma A., Otuyemi OD

Abstract

This case report presents the successful treatment of an adult patient with an anterior open bite. A 23-year-old female, who presented with the chief complaint of being unable to put her front teeth together. She had an Angle's class III molar relationship on a class 3 skeletal base, an anterior open bite of 8 mm and occlusal contacts only on the 2nd premolar and molar areas. The malocclusion was treated by a 4 unit extraction and the use of upper and lower fixed appliance, with a fixed tongue rake. A functional and aesthetic occlusion was achieved at the completion of treatment.

Key words: Anterior open bite, malocclusion, severe anterior open bite

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Introduction

Anterior open bite (AOB) is one of the most challenging malocclusions to treat in the orthodontic clinic and its aetiology is multifactorial. Oral habits and or vertical skeletal growth disturbances are the leading causes of anterior open bite.[1,2]

The prevalence of anterior open bite varies worldwide and across different age groups. It is said to be more common among Africans and Afro Carribeans[3,4]. A study among pre-school children in a Nigerian population[5] reported a prevalence of 2.8%, while the prevalence among orthodontic patients attending the Lagos University Teaching Hospital was 11.2%.[6]

In a normal occlusion, the upper and lower incisors overlap, with the incisal edges of the lower teeth being in contact with the incisal and middle thirds of the palatal surface of the upper incisors, slightly below the cingulum.[7] Where an anterior open bite exists, this vertical overlap does not occur, and there is no incisal contact.

Anterior open bite may be classified as dental or skeletal. Dental AOBs are usually caused by oral habits such as digit sucking , they are asymmetrical, and are limited to the upper incisors, while severe skeletal AOB is caused by growth or functional disturbances, are symmetrical, and may extend beyond the incisors[8].

In cases of severe AOB, the treatment option of choice is surgical correction, but often, patients are not willing to undergo orthognathic surgery. Other treatment options include myofunctional therapy with the use of a bite block, orthodontic treatment with fixed or removable orthodontic appliance to achieve molar intrusion and extrusion of anterior teeth, or a combination of the above mentioned.[1,9,10]

This article presents a clinical case of a non-growing female patient with severe anterior open bite treated by non-surgical means.

Case report

A female patient, 23 years old, presented at the Orthodontic Unit of the Obafemi Awolowo University Teaching Hospital (Ile-Ife, Osun state) with a complaint of inability to put her front teeth together.

Clinical examination revealed the following:

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Medical and dental history

There was history of previous orthodontic treatment with a spring loaded bite block about 4 years prior to the current presentation. Patient was unable to continue the treatment due to difficulty adjusting to the appliance.

There were no known allergies and the patient had no underlying medical conditions.

Extra oral findings

- Convex facial profile.
- Moderate smile line
- Increased lower facial height.
- Incompetent lips

Intra oral findings

- Moderate upper labial segment crowding
- An AOB of 8mm, extending to the 1st premolars bilaterally
- Palatal displacement of tooth no 12
- Moderately proclined upper incisors
- Upper mid-line shift to the right by 2mm
- Buccally displaced 13.
- 90 degree rotation of tooth no 15
- Lower arch fairly well aligned
- Angle's Class III molar relationship bilaterally.

The aetiology of the AOB in this patient was uncertain. A tongue thrust habit was present but it was unclear if this habit was the cause of,[11] or a consequence of[12] the AOB.



Figure 1: Initial presentation of the patient.



Figure 2. : Initial study models of the patient



Figure 3: Lateral cephalometric radiograph of the patient at presentation

Table 1: Cephalometric values

	Measurement	Pre-treatment Values
SNA	90°	Increased
SNB	89°	Increased
ANB	1°	Decreased
UI-FP	132°	Increased
LI-MP	95°	Decreased
IIA	100°	Decreased
FMA	42°	Increased
MMA	38°	Increased
TFH	110mm	
LFH	64mm	
LFHP	58%	Upper limit of normal

Orthodontic summary

- 23 year old female, Angle's class I malocclusion on a class 3 skeletal base complicated by
- AOB of 8mm from tooth 14 to 25
- Moderate upper anterior segment crowding
- 90° rotation of tooth 15
- A persistent tongue thrust habit.

Investigations

A lateral cephalometric radiograph was taken.

Treatment objectives:

1. Correct the open bite.
2. Relieve the upper anterior crowding.
3. De-rotate and align all teeth.
4. Break the tongue thrust habit.
5. Eliminate the midline shift.
6. Obtain a functional and stable occlusion.

Treatment options

1. Orthodontic fixed appliance therapy with orthognathic surgery to correct the skeletal open bite.

2. An upper and lower fixed appliance with a 4 unit extraction, fixed tongue rake and intra oral elastics.

Treatment plan.

The second treatment option, upper and lower fixed appliances with a 4 unit extraction was decided on because the patient declined surgery.

Treatment progress

The fixed appliance of choice was a pre-adjusted MBT prescription (3M, Unitek). Treatment commenced with extraction of the upper 2nd premolars and the lower 1st premolars.

A tongue rake was welded to the molar bands in order to break the tongue thrust habit and to re-train the tongue, and the upper and lower fixed appliances were set up. Alignment and leveling began with 0.014" Nickel-Titanium wires in both arches and progressed to 0.016". An 0.018" Nickel-Titanium wire with preformed reverse curve of spee was placed in the upper arch, and a 0.016 stainless steel wire placed in the lower arch. This progressed to upper 0.016 and lower 0.018 stainless steel wires. Upper and lower 0.17 x 0.25 stainless steel wire with reversed curve of spee was placed in the upper arch.

Intermaxillary elastics (3/16" – medium force) were used full time as box elastics anterior (with 0.019 x 0.025" SSW) in the lower arch, and 0.016 Niti- wire in the upper arch after alignment and levelling in the posterior arch. The elastics were attached to the upper and lower molar hooks posteriorly and the canine hooks anteriorly, to close the bite and improve inter cuspation. The midline was corrected using asymmetric elastics.

The active phase of the treatment lasted for 26 months after which fixed lingual retainers were bonded from canine to canine in both arches, a Hawley type retainer was also fabricated.



Figure 4: Patient at the commencement of treatment (4a) with a tongue rake in place(4b)

Treatment results

- Facial aesthetics was greatly improved.
- An overbite of 2mm was achieved.
- Overjet of 2mm
- Class I canine relationship
- Crowding in the upper and lower labial segment was resolved
- Tongue thrust habit was broken
- Masticatory functions were restored
- High smile line
- However , the midline and molar relationship corrections were not completely achieved due to the patient's impromptu relocation to study abroad. There was an upper midline shift of 0.5mm to the right.
- Class III molar relationship not resolved.

Results achieved were maintained with the use of a Hawley's type retainer and a bonded lingual retainer in the upper and lower arches.



Figure 5. Post-treatment photograph



Figure 6: Post-treatment study models



Figure 7: Hawley's type retainers for retention



Figure 8: Comparison of pre and post treatment results.

Discussion

As with a number of malocclusions, the treatment of AOB must be considered in terms of the treatment objectives and stability of the results. In order to achieve this, orthopaedic and or orthodontic measures can be employed. Orthognathic surgery may also be carried out to correct skeletal problems. Surgical correction is routinely indicated for non-growing patients with skeletal problems. The treatment consists basically of maxillary intrusion, with counter clockwise rotation of the mandible. Treatment of AOB with surgical procedures offers the advantage of better post treatment stability in comparison to orthodontic treatment alone.[13]

The treatment proposed for this patient was orthodontic therapy in addition to orthognathic surgery. However, the patient was unwilling to undergo surgery. A second option was to use upper and lower fixed appliances with a 4-unit extraction of the upper 2nd premolars and the lower 1st premolars . Non-surgical treatment of AOB is aimed at camouflaging the skeletal discrepancy by intruding the maxillary molars and extrusion of the incisors. This approach is, however , more complicated and requires a longer treatment period. An approach to non surgical treatment of AOB by Sarver and Weissman[14], for adult patients with no growth potential involved extraction and retraction of the upper incisors. Patients in which this approach would be suitable should have proclined upper or lower incisors, little or no gingival display on smiling, no more than 2-3mm of upper incisor show at rest, and a normal craniofacial pattern[14]. The patient in question met most of the above criteria.

The stability of treatment results is also an area of concern. Treatments involving extractions have been reported to be more stable than non-extraction treatments.[15] several authors have reported high relapse rates, however, most of these cases have been in growing patients.[16,17]

The use of fixed and or removable retainers also ensures stability of treatment results.

Tongue position and activity have been implicated in difficulty to achieve long term treatment stability of AOB.[16, 17] We therefore ensured that there were no residual oral habits, as the patient had a tongue rake in place for the greater part of her treatment period. This will further serve to improve treatment stability as reported in literature.[16,18,19]

Conclusion

The majority of orthodontists are conversant with the fact that the treatment of AOB is one of the most difficult malocclusions to treat, and perhaps one with the largest percentage of relapse. This case presented shows a successful treatment using the nonsurgical approach to treatment of a severe AOB, which yielded a result that was a great improvement on the aesthetics and function of the patient.

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Acknowledgements

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Explanatory matters are placed in footnotes, not in the heading. In footnotes all nonstandard abbreviations that are used in each table should be explained adequately.
Statistical measures of variations should be identified such as standard deviation and standard error of the mean.
Be sure that each table is cited in the text. If data are used from another published or unpublished source, it is necessary to obtain permission and acknowledge them fully.

Figures and Instructions

Figures should be professionally drawn and photographed; freehand or typewritten lettering is unacceptable. Instead of original drawings, X-ray films, and other material, sharp, glossy, black-andwhite photographic prints of high quality are necessary, usually 127x 173 mm (5x7 in) but no larger than 203x254 mm (8x10 in) For color illustrations negatives or positive transparencies are provided, along with color prints. It is preferable to have the photograph in portrait form rather than in landscape form to fit easily into one column.
Letters, numbers and symbols in photographs should be clearly legible.
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Units of Measurement

Measurements of length, height, weight, and volume should be reported in metric units, i.e., meter(m), gram(g), or liter(l) or their decimal multiples.
Milliliter or deciliter should be expressed as ml or dl.
Red and white blood cell counts are to be expressed as 63 x10 /mc l and x10/ mc respectively. Temperatures should be given in degrees Celsius and blood pressures in millimeters of mercury (mmHg). All hematological and clinical chemistry measurements should be reported in the conventional system or in terms of the International System of Units (SI).

Abbreviations and symbols

Only standard abbreviations are used in the text while avoiding abbreviations in the title and abstract.
The full term for which an abbreviation stands should precede its first use in the text unless it is a standard unit of measurement. Year, month, day, hour, minute and second should be abbreviated as yr, mon, d, h, mm, and s in tables respectively.

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Appendix 1:

Declaration of Originality and Transfer of Copyright

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