

WEST AFRICAN JOURNAL OF ORTHODONTICS

ISSN 2315-9502

VOLUME 11, NUMBER 1

June 2022

**Dental appearance among
Nigerian adolescents**



**Mandibular arch forms in
Northern Nigeria**



**Bibliometric analysis of
scientific articles**



**Management of anterior
crossbite**



**Orthodontic management of
anterior open bite**

Orthodontic Management of an Adult with Anterior Open Bite, Severe Spacing, and Bimaxillary Proclination.

Esan T^b, Yemitan T^{a,b}, Oyewo O^b

Abstract

A 34-year-old female presented at the orthodontic clinic of Lagos State University Teaching Hospital with the chief complaints of spaces between her teeth and inability to bite. On intraoral examination, she had Angle's Class I malocclusion on a skeletal pattern 1 base with anterior open bite extending from canine to canine and measuring 5mm, severe spacing of the upper and lower arches, a tongue habit, and multiple rotated teeth. This treatment aimed to achieve normal overbite and overjet, close the spaces in upper and lower arches, control the tongue habit and achieve a stable occlusion and retention. Orthodontic treatment with non-extraction upper and lower fixed appliance therapy using Roth 0.022" prescription pre-adjusted edgewise appliance. After 30 months of active treatment, objectives were achieved and the patient was restored to function and aesthetics. Occlusion was retained with the use of fixed lingual and removable Hawley's retainer in the upper and lower arches, with the incorporation of tongue rake in the upper Hawley's retainer. The patient was satisfied with the treatment outcome.

Keywords: Anterior open bite, spacing, tongue tamers, Hawley retainers

Authors' affiliations:

^a Department of Child Dental Health, Lagos State University College of Medicine, Ikeja Lagos, Nigeria.

^b Department of Child Dental Health, Lagos State University Teaching Hospital, Ikeja Lagos Nigeria

Correspondence:

Dr Tolulope Esan, Department of Child Dental Health, Lagos State University Teaching Hospital, Ikeja, Lagos, Nigeria.
Phone: 08056270372, email: tolulope_esan@yahoo.com

Introduction

Anterior open bite (AOB) is defined as an absence of vertical overlap of the incisors when the buccal segment teeth are in occlusion.¹ It is caused by a combination of factors which include habits, skeletal, dental, or functional influences. Besides treatment difficulty, the long-term stability of the open-bite correction is considered challenging.² Spacing, on the other hand, is a malocclusion that results from a discrepancy in the tooth size and arch length and presents as the absence of interproximal contacts of the teeth.³ Bimaxillary proclination is a form of malocclusion characterised by a protrusion of the upper and lower jaw with associated proclination of the incisors.⁴

Prevalence of anterior open bite, maxillary, and mandibular arch spacing among Nigerians have been reported as 7.1%, 40-60%, and 30% respectively. The prevalence of bimaxillary proclination is reported to vary across different ethnic groups but is more common among African-American descents.⁵ There is a paucity of data on the prevalence in various parts of Nigeria. However, a study by daCosta,⁶ found prevalence in the northern part of Nigeria to be 3.7%. There are two broad classifications of anterior open bite with different aetiology and clinical presentations namely Dental AOB and Skeletal AOB.⁷ Over the years, other classifications of open bite have emerged such as .^{8,9} Dental AOB is usually caused by prolonged oral habits such as digit sucking and tongue thrusting and may be symmetrical or asymmetrical. While skeletal AOB is a result of jaw growth deficiencies.⁹ Spacing can be categorised as generalised if it involved both anterior and posterior teeth or localised when only a few teeth are involved.¹⁰ It can also be classified clinically based on the severity as mild, moderate and severe.¹¹ Aetiology of generalised spacing may be hereditary, acquired or

functional.¹²

The success of orthodontic treatment with fixed appliance of these malocclusions, therefore, depends on ensuring stability by providing proper retention with both removable and fixed retainers to prevent relapse and adequate follow-up of the patient.

Presenting complaint

A 34-year-old female presented at the orthodontic clinic of Lagos State University Teaching Hospital Ikeja, Lagos with complaints of inability to bite with her front teeth and spaces in between her teeth.

Medical and Dental History

No reported underlying medical condition or allergy. The patient had a history of tongue-sucking habits.

Diagnosis

Clinical assessment

Extraoral examination: showed a symmetric face with a convex facial profile. Lip competence was insufficient with a Jackson score of 2/1 (Figure 1). Intraoral examination: showed Class I molar relationship bilaterally, an anterior open bite extending from canine to canine and measuring 5mm. There was severe generalised spacing in both arches measuring 13mm in the upper arch and 11mm in the lower arch, with multiple rotated teeth (Figure 2). Lispings during speech and tongue thrust while swallowing were diagnosed.

Radiographic assessment

Panoramic radiograph: This revealed full complements of teeth present with no sign of caries, root resorption or periapical pathologies.

Cephalometric radiograph: Lateral cephalometric tracing showed a skeletal Class 1 relationship. The maxilla and mandible were prognathic. Upper and lower incisors were significantly proclined. The radiographic image and tracing are presented in Figure 3, and the cephalometric measurement is in Table 1.

Treatment objectives

The treatment objectives were:

To achieve a functional and aesthetic occlusion by maintaining the Class I Molar relationship, correct rotations, anterior open bite and achieve normal overbite and overjet. Correction of tongue thrust habit.

Treatment Alternatives

Three treatment alternatives were presented to the patient.

1. Upper and lower fixed appliance therapy using pre-adjusted edgewise with 0.022" Roth prescription, non-extraction protocol, with tongue tamers as habit breakers.
2. Upper and lower fixed appliance therapy using pre-adjusted edgewise with 0.022" Roth prescription, non-extraction protocol with reinforced anchorage using TADs, and fixed tongue rake as habit breaker.
3. Self-ligating bracket prescription in upper and lower arches, non-extraction, with tongue tamers as a habit breaker.

After careful consideration of the level of invasiveness and cost, the patient chose the first option which is more conservative and cheaper.

Treatment progress

Treatment commenced with levelling and alignment of the arches with 0.014" Nickel-Titanium wires in the upper and lower arches followed by the cementation of the tongue tamers on the palatal and lingual surfaces of the upper and lower incisors respectively. This progressed to 0.016" Nickel-Titanium wires, then 0.016x0.022" Nickel-Titanium wires in the upper and lower arches. Space closure began with 0.019x0.025" Stainless Steel wires (SSW) in the upper and lower arches using an elastic chain for the closure of anterior teeth spaces and active tie back for closure of spaces distal to the canines (Figure 4). Intermaxillary elastics (4.5oz, 3/16") were used full-time as box elastics anteriorly with 0.019 x 0.025" SSW.

Treatment results

The anterior open bite had been eradicated and spaces within the upper and lower arches closed (Fig 5). The post-treatment evaluation showed that lip competence improved with a Jackson score of 3/1. Upper and lower arches were well aligned, spaces were closed successfully, posterior occlusion had good overall intercuspation and Class I molar relationship was maintained. Normal overjet and overbite were achieved. (Fig 6).

The post-treatment cephalogram and panoramic radiographs are shown in (Fig 7). The cephalometric

analysis (Table 1) shows that the skeletal antero-posterior discrepancy between the mandible and the maxilla had changed significantly. The post-treatment panoramic radiograph shows root parallelism compared to that of the pre-treatment radiograph.

The active phase of the treatment lasted for 30 months after which fixed lingual retainers were bonded from canine to canine in both arches. A Hawley retainer with an incorporated tongue rake was fabricated (Fig 8). The stability of the result as shown at the 3-month follow-up visit (Fig 9).

Figure 7, Table 1: Cephalometric Data

Measurement	Norm	Pretreatment	Post-treatment	Changes
SNA	85.5 ±3.5	96	90	-6
SNB	82.7 ±3.0	93	84	-9
ANB	2-4	3	6	3
U1-FP	119-127	135	103	-32
L1-MP	96-104	110	93	-17
IIA	108-116	86	121	15
FMA	24-26	27	38	11



Fig. 1. (A – I) Pretreatment facial and intraoral photographs

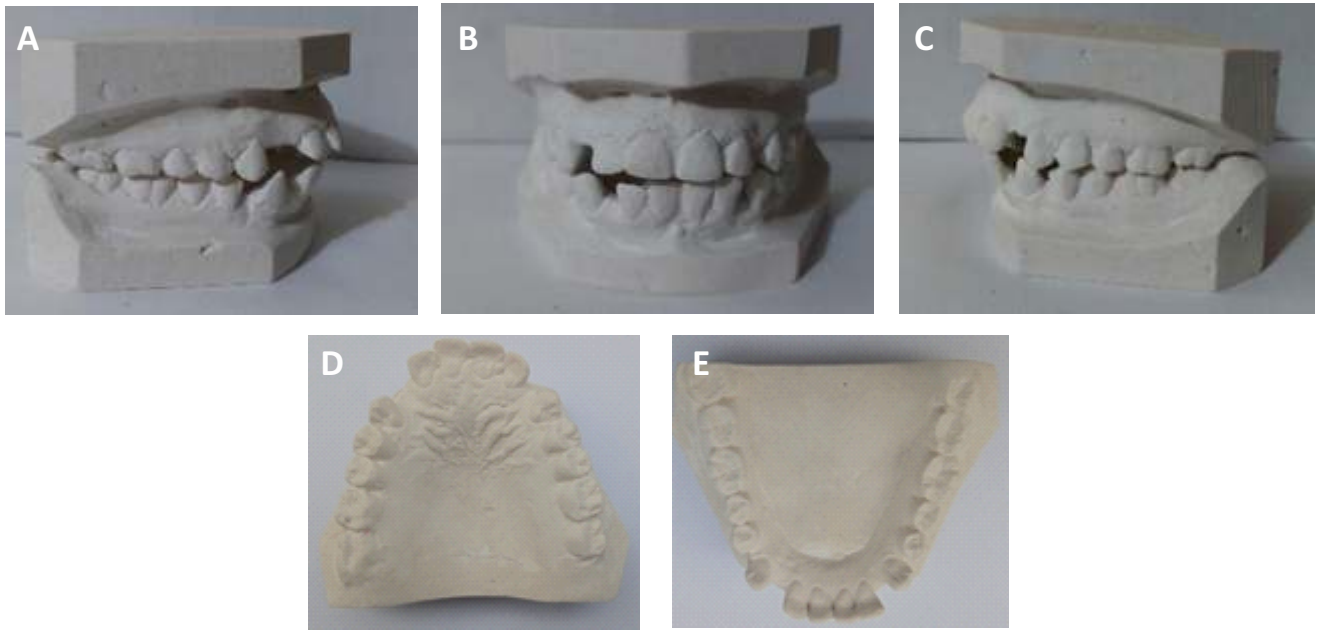


Fig. 2. (A – E) Pretreatment dental models.

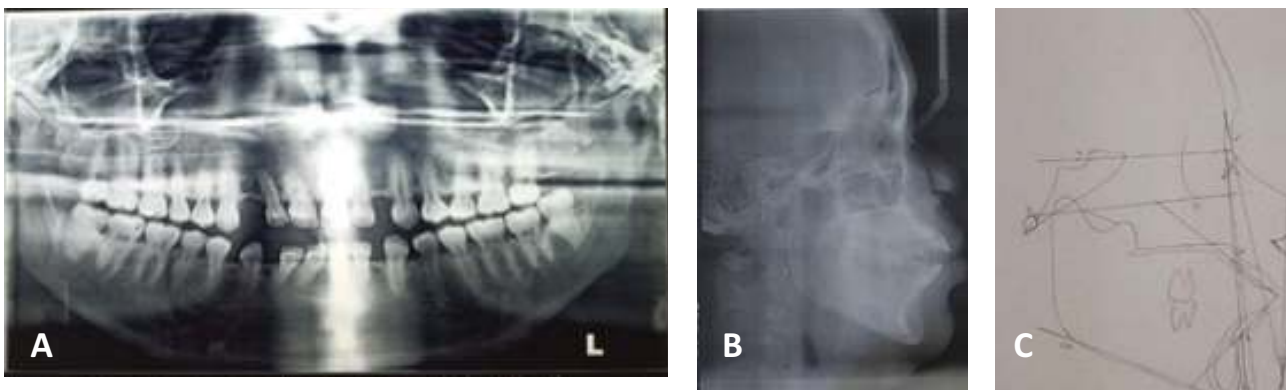


Fig. 3. (A) Initial panoramic radiograph, (B) Initial lateral cephalometric radiograph, and (C) tracing



Fig. 4. Treatment progress: (A) space closure with active tie back on the right buccal side (B) frontal view (C) left buccal view



Fig. 5. (A – I) Post-treatment facial and intraoral photographs

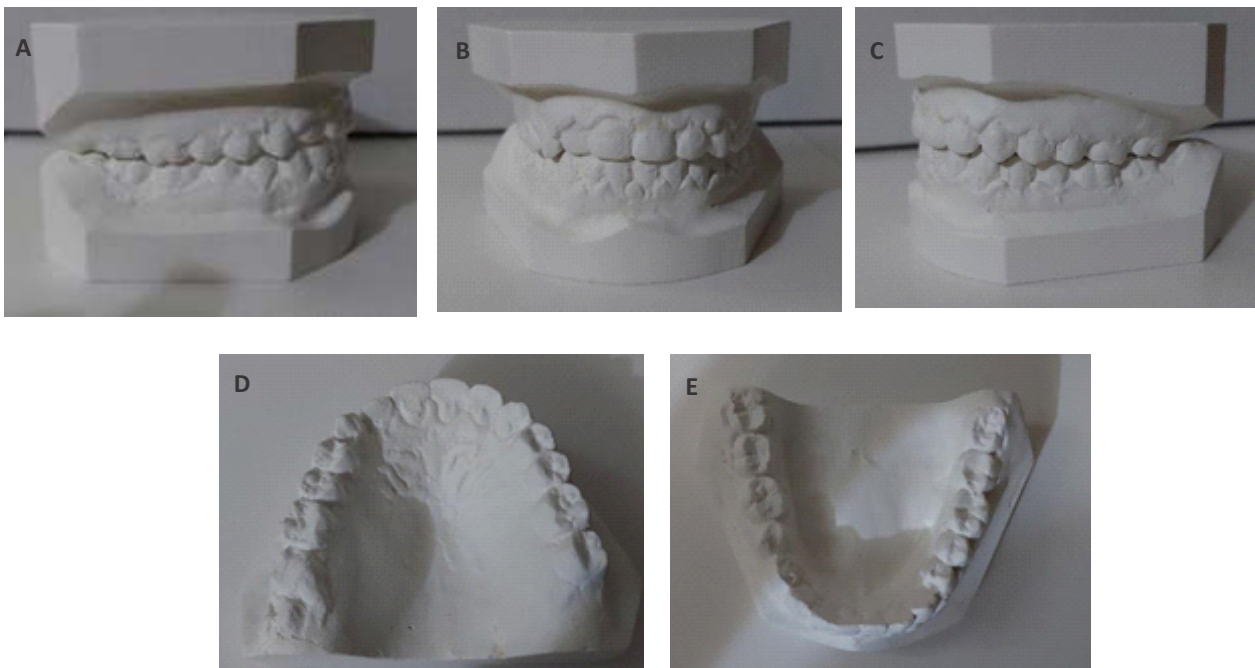


Fig. 6. (A – E) Post-treatment dental models.

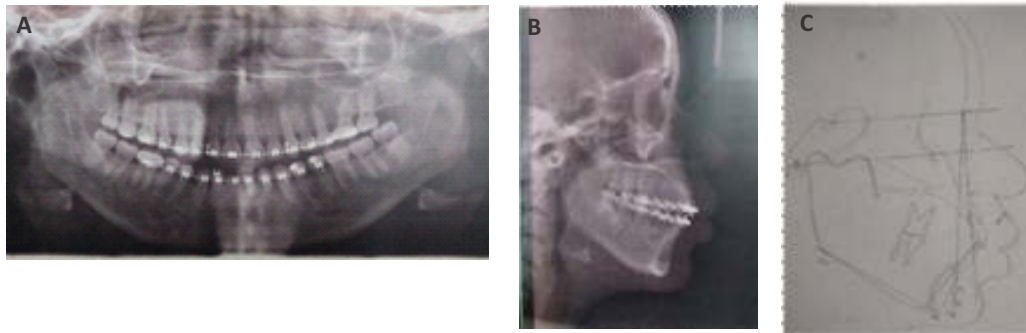


Fig. 7. (A) Post-treatment panoramic radiograph; (B) cephalogram; and (C) Tracing



Fig 8. A. Upper fixed lingual retainer and upper Hawley retainer with incorporated tongue rake. B. Lower fixed lingual retainer and Hawley retainer. C. Both retainers in occlusion



Fig 9 (A-I) Facial and intra-oral photographs after 3months in retention

Discussion

Correction of bimaxillary protrusion and localised spacing have been known to help prevent gum problems, improper functioning of the teeth, and unattractive smiles.^{13,14,15}

The goal of orthodontic treatment for this patient was to achieve control of the tongue habit, correction of the anterior open bite, bimaxillary proclination, and closure of spaces. Proposed guidelines for the correction of AOB by extraction and retraction of teeth include the presence of proclined upper and lower incisors, minimal or no gingival display on smiling a normal craniofacial pattern, and no more than 2-3mm of upper-incisor exposure at rest.^{16,17} The patient treated satisfied these criteria, however, she did not require extractions due to the presence of severe spacing in both arches.

Tongue posture and aberrant function may have been a possible cause of the open bite in this patient, as active tongue thrusting was observed during intraoral examination. Previous studies^{9,18,19} have shown that tongue habits may contribute to post-treatment relapse if the habit is not well controlled. Use of a tongue crib or lingual spurs during or after treatment may improve stability.^{18,1} In this case, tongue tamers were bonded on the maxillary and mandibular incisors during treatment, and a tongue rake was

incorporated in the maxillary Hawley retainer.

Pre-adjusted fixed orthodontic appliances commonly utilise sliding mechanics for space closure with force delivery systems such as elastomeric chains, nickel-titanium coil springs, elastomeric modules attached to wire ligatures, or intra-oral elastics.²⁰

Conclusion

Although correction of an open bite tends to relapse, careful case selection and adherence to basic orthodontic principles can produce a result that is acceptable with long-term stability.

Treatment of bimaxillary protrusion and localised spacing, in this case, was by the retraction and retroclination of maxillary and mandibular incisors resulting in a decrease in soft tissue procumbency and convexity.

The goals set in the pre-treatment plan were achieved to a large extent and the patient was satisfied with the treatment outcome.

Contribution to authorship: All authors contributed substantially to the concept, data collection, analysis and write up

Funding: Funded by the authors

Conflict of Interest: None to declare

References

1. Artese A, Drummond S, Nascimento JM, Artese F. Criteria for diagnosing and treating anterior open bite with stability. *Dental Press J Orthod.* 2011;16:136–161.
2. Cambiano AO, Janson G, Lorenzoni DC, Garib DG, Dávalos DT. Nonsurgical treatment and stability of an adult with a severe anterior open-bite malocclusion. *J Orthod Sci.* 2018;7:2.
3. Gkantidis, Nikolaos & Simeon, Psomiadis & Topouzelis, Nikolaos. (2007). Teeth spacing: aetiology and treatment. *Hellenic Orthodontic Review.* 10:75-92.
4. Aikins EA, Onyiaso CO. Prevalence of malocclusion and occlusal traits among adolescents and young adults in Rivers State, Nigeria. *Odonto-Stomatologie Tropicale.* 2014; 37(145):5-12
5. Hoyte, T., Ali, A. and Bearn, D. (2021) Prevalence of Bimaxillary Protrusion: Systematic Review. *Open Journal of Epidemiology,* 11, 37-46.
6. Dacosta OO. The prevalence of malocclusion among a population of northern Nigeria school children. *West Afr J Med.* 1999;18(2):91-6. PMID: 10504863.
7. Sassouni V: A classification of skeletal facial types. *Amer J Orthodont* 1969 55:109-23,
8. Worms FW, Meskin LH, Isaacson RJ. Open-bite. *Am J Orthod.* 1971;59:589–595

9. Yamaguchi K. Etiological and Therapeutic Considerations with Open Bite. In *Current Therapy in Orthodontics 2010* (pp. 159-170). Mosby
10. Spaced Dentition Corrected by Fixed Orthodontic Treatment: A Case Series August 2017 *International Medical Journal* (1994) 24(4):345-348

