

**Case Report****Smile renewal through orthodontic braces and tongue cribs in adult open bite treatment - A case report****Nikita Agarwal¹, Subrat Kumar Satapathy^{1*}, Surya Kanta Das¹**¹Dept. of Orthodontics and Dentofacial Orthopedics, SCB Dental College and Hospital, Cuttack, Odisha, India**Abstract**

Skeletal open bite represents one of the most complex malocclusions for managing and sustaining correction, owing to its treatment's inherent difficulty and instability. Patients with anterior open bite exhibit a dentoalveolar component and an increased skeletal vertical dimension. This study examines the orthodontic treatment of a 22-year-old female patient presenting with Angle Class I malocclusion and anterior open bite, utilizing a combination of a fixed tongue crib and orthodontic braces. The patient expressed concerns regarding lip aesthetics and speech difficulties, which impeded word pronunciation. The anterior open bite was attributed to chronic tongue thrusting. The treatment protocol included the insertion of a fixed tongue crib to mitigate tongue thrusts and the application of orthodontic braces to realign the teeth. Over 18 months, there was a marked improvement in occlusion and facial aesthetics. The anterior open bite was successfully corrected, and functional aspects such as chewing and speech were enhanced. This case underscores the significance of integrating behavioral modification strategies with traditional orthodontic techniques in managing complex adult malocclusions.

Keywords: Anterior open bite, Tongue crib, Orthodontic braces, Behavioral modification**Received:** 08-01-2025; **Accepted:** 24-02-2025; **Available Online:** 07-03-2025

This is an Open Access (OA) journal, and articles are distributed under the terms of the [Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License](https://creativecommons.org/licenses/by-nc-sa/4.0/), which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: reprint@ipinnovative.com**1. Introduction**

Open bite, a complex dental anomaly, is defined by the lack of vertical overlap between anterior or posterior teeth when the jaws are in maximum intercuspation. Dental anterior open bite is characterized by reduced incisor dentoalveolar height, standard or diminished anterior and posterior vertical dimensions, incompetent lips, and decreased incisal display at rest and during a smile.^{1,2} The etiology of open bite is typically multifactorial, encompassing genetic, environmental, and behavioral factors.³ This condition poses distinct diagnostic and therapeutic challenges for clinicians, as the treatment of open bite is complicated by the difficulty of distinguishing among various potential dentoalveolar and skeletal etiologic factors, which depend on the patient's growth pattern.⁴ Treatment approaches range from myofunctional therapy and habit-breaking devices in younger patients to orthodontic appliances, temporary anchorage devices, and orthognathic surgery in more severe cases.⁵ This case report highlights the efficacy of integrating fixed tongue

cribs with orthodontic braces in treating adult anterior open bites.

2. Case Report*2.1. Patient information*

A 22-year-old female presented to the Department of Orthodontics and Dentofacial Orthopaedics outpatient, S.C.B Dental College and Hospital, with a chief complaint of a gap between her upper and lower front teeth. She expressed concerns about lip aesthetics and speech difficulties. The patient had no pertinent dental or medical history. Neither the patient's siblings nor parents exhibited similar malocclusion, indicating the absence of a hereditary component in the patient's malocclusion. Additionally, there was no history of respiratory issues.

2.2. Clinical findings

1. Extraoral assessment: The patient had a mesoprosopic face shape, a mesocephalic head shape with a Convex

Corresponding author: Subrat Kumar Satapathy
Email: drksatapathy2018@gmail.com

DOI: 10.18231/ijodr.2025.012

© 2025 The Author(s), Published by Innovative Publications.

facial profile, protruded upper and lower lips, and competent lips. (**Figure 1**)

- a. Intraoral assessment: She had bilaterally Class I molar relation, Class III canine relation, high frenal attachment (blanching test of gingiva positive), anterior open bite of 6 mm extending from canine-to-canine region, Maxillary incisor proclination with a midline diastema. (**Figure 2**)
2. Diagnostic Tests: The pre-treatment cephalometric analysis revealed by the lateral cephalogram and OPG confirmed skeletal Class I malocclusion. (**Figure 3**, **Figure 4**)

2.3. Treatment objectives

1. To Maintain Class I skeletal base relationship
2. To intercept tongue-thrusting habit
3. To achieve normal overjet and overbite with Class I molar relationship
4. To correct upper and lower anterior spacing
5. To improve the soft tissue profile
6. To perform Frenectomy after space consolidation

2.4. Treatment plan

“Based on clinical and cephalometric analysis, a fixed upper tongue crib was employed as reminder therapy. This was followed by the alignment and leveling of the upper and lower arches, space consolidation in the anterior regions, closure of the anterior open bite using box elastics, and final finishing and detailing.

2.5. Treatment progress

The patient's maxillary and mandibular arches were bonded with a 0.018" × 0.025" pre-adjusted edgewise MBT appliance, and a fixed palatal tongue crib was placed. Initial leveling and alignment were accomplished using 0.14 NiTi wires. Interproximal reduction (IPR) was performed on the lower arch, and elastomeric chains (e-chains) were utilized for space closure. The sequential application of box elastics facilitated the closure of the anterior open bite. (**Figure 5**, **Figure 6**) A frenectomy was executed. (**Figure 7**, **Figure 8**) Upon achieving ideal overjet and overbite, fixed palatal and lingual retainers were placed. (**Figure 9**) The patient's positive response to tongue exercises, coupled with the closure of the bite, led to the cessation of the tongue-thrusting habit, indicating that the patient exhibited a secondary type of tongue thrusting.

2.6. Treatment results

Post-treatment cephalometric analysis demonstrated an improved interincisal angle of 115°, reflecting reduced incisor proclination. The anterior open bite was corrected, resulting in an ideal overjet and overbite with a Class I canine relationship. Notable improvements in the soft tissue profile were observed. The treatment was completed in 15 months, followed by 3 months of finishing and detailing. Long-term

stability was ensured using fixed retainers and tongue exercises. (**Figure 9**, **Figure 10**, **Figure 11**, **Figure 12**)(**Table 1**)

Table 1: Comparison of pre-treatment and post-treatment cephalometric parameters

| Cephalometric Parameters | Pre-treatment | Post-treatment |
|--------------------------|---------------|----------------|
| SNA | 89 | 86 |
| SNB | 81 | 80 |
| ANB | 5 | 5 |
| Beta Angle | 29 | 30 |
| W Angle | 51 | 45 |
| AO to BO | 3mm | 1mm |
| FMA | 28 | 30 |
| Interincisal angle | 88 | 115 |
| Soft-tissue angle | 85 | 86 |
| Nasolabial angle | 108 | 123 |
| U1-NF | 21 | 22 |
| L1-NB | 30 | 35 |
| U6-NF | 19 | 19 |
| L6-NB | 30 | 29 |



Figure 1: Pre-treatment extra-oral photograph



Figure 2: Pre-treatment intra-oral photographs



Figure 3: Pre-treatment lateral cephalogram



Figure 4: Pre-treatment OPG



Figure 5: Alignment and levelling with 0.014 NiTi with palatal crib

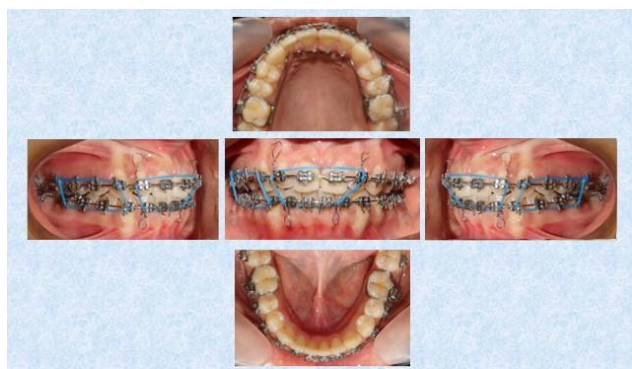


Figure 6: Arch co-ordination with 0.017*0.025 ss with box elastics

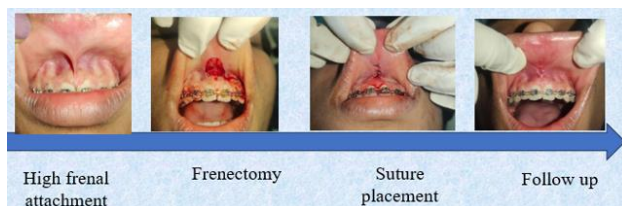


Figure 7: Frenectomy after space consolidation



Figure 8: Post-treatment intraoral photographs



Figure 9: Post-treatment extra-oral photographs



Figure 10: Comparison of pre-treatment and post-treatment intraoral photographs

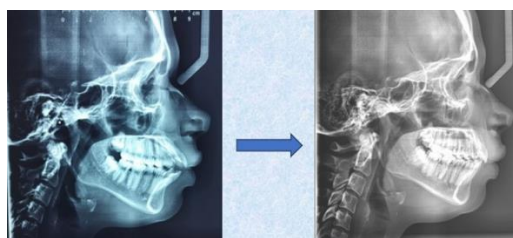


Figure 11: Comparison of pre-treatment and post-treatment cephalogram

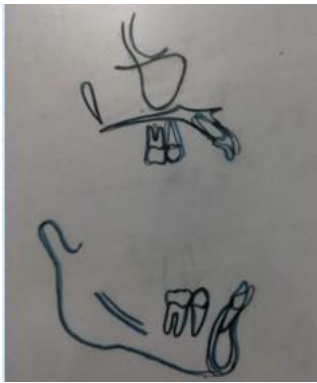


Figure 12: Superimposition of pre-treatment and post-treatment cephalogram

3. Discussion

The distinction between skeletal and dental open-bite malocclusion is a vital clinical factor, as each requires a tailored treatment strategy for optimal and lasting results. Skeletal open bites usually result from irregularities in the vertical growth patterns of the maxilla and mandible. In contrast, dental open bites are commonly linked to misaligned teeth and functional habits like tongue thrusting.⁶ Understanding these distinct etiologies is essential for formulating appropriate treatment strategies.

Tongue thrust, defined by the anterior positioning of the tongue during swallowing or at rest, plays a significant role in forming and maintaining open bites. Its manifestation varies based on the patient's age, related symptoms, and the specific type of malocclusion.⁷ For younger patients with mixed dentition, conservative treatments are frequently advised. As Rosa M et al. noted, minor anterior open bites of 1–3 mm in mixed dentition might not require immediate intervention.⁸ However, when the open bite exceeds 5 mm, as observed in this case, early intervention is essential to prevent further dental and skeletal complications.

Redirecting the tongue's resting position is a cornerstone of successful anterior open bite treatment associated with tongue thrust.⁹ This intervention targets maladaptive muscle function, a primary factor worsening the malocclusion. Palatal cribs have demonstrated high efficacy in this context. Using a tongue crib appliance can accomplish both behavioral modification and mechanical correction.¹⁰ Subtelny and Sakuda highlighted the importance of a treatment period of at least six months to retrain the tongue's resting position and reduce the risk of relapse.¹¹

Palatal cribs function both as physical barriers and reminder devices. Placed anteriorly in the oral cavity, they prevent the tongue from pressing against the front teeth, thereby reducing improper muscle activity.¹² As Shwetha G. et al. emphasized, these appliances facilitate the correct positioning of the tongue and aid in the natural development of the dental arch.¹³ Palatal cribs are designed to target habitual behaviors and growth potential. They are especially effective for younger patients, utilizing their natural

adaptability to foster balanced dental and skeletal relationships.

Lopez-Gavito et al. provided strong evidence supporting the long-term effectiveness of tongue crib therapy. Their research showed that this intervention decreased anterior open bite and improved long-term stability by addressing the tongue's impact on incisor proclination.¹⁴ Post-treatment evaluations showed notable enhancements, including increased interincisal angles and decreased proclination of upper and lower incisors, resulting in functional and aesthetically pleasing occlusion.

Early intervention with a tongue crib provides several advantages for younger patients. This method promotes growth patterns conducive to correcting open bites, thereby decreasing the risk of future complications. Additionally, the flexibility of developing dentition enables more predictable and stable results, underscoring the significance of early diagnosis and management.

Frenectomy, the surgical removal or alteration of the frenulum, is an important orthodontic procedure. It alleviates frenum tension, which can impact the stability of newly aligned teeth, addressing various oral health concerns. This procedure is especially advantageous in cases of midline diastema, where it helps prevent the gap between the teeth from relapsing.¹⁵ When combined with orthodontic treatment, frenectomy improves the predictability and durability of gap closure, ensuring long-term stability.

4. Conclusion

Successful management of anterior open bites in adults requires a combination of functional habit correction and orthodontic alignment. Patient compliance and long-term retention play pivotal roles in achieving and maintaining effective results.

5. Abbreviations

OPG: Orthopantomogram, IPR: Interproximal Reduction, MBT: McLaughlin, Bennett, Trevisi Appliance, NiTi: Nickel Titanium, ANB: A Point-Nasion-B Point Angle, SNA: Sella-Nasion-A Point Angle

6. Informed Consent

Written informed consent was obtained from the patient.

7. Conflict of Interest

The author declares that there is no conflict of interest.

8. Source of Funding

None.

References

- Islam ZUI, Shaikh AJ, Fida M. Dentoalveolar heights in vertical and sagittal Facial Patterns. *J Col IPhysicians Surg Pak*. 2016;26(9):753–7.
- Ritik Kashwani, et al. Controversies around Orthodontic Treatment and TMD Etiologies. *Dent Dent Pract J*. 2024;6(2):180092.
- Sharma A, Upadhyay S, Pallavi K, Kumari A. Restoring Smile with Ceramic Veneers for a Patient with Fractured Anterior Teeth: A Case Report. *Oral Sphere J Dent Health Sci*. 2025;1(1):29–34. <https://doi.org/10.5281/zenodo.14278682>
- Siddhartha R, Sudhakar SS, Rai K, Rai S, Rai S. Innovative Technique for Correction of Open Bite - A Case Report. *Contemp Clin Dent*. 2023;14(1):87–90
- Miller JR. Treatment of a twice-relapsed anterior open bite using temporary anchorage devices, myofunctional therapy, and fixed passive self-ligating appliances. *Am J Orthod Dentofacial Orthop*. 2020;157(6):832–42.
- Lone IM, Zohud O, Midlej K, Paddenberg E, Krohn S, Kirschneck C et al. Anterior Open Bite Malocclusion: From Clinical Treatment Strategies towards the Dissection of the Genetic Bases of the Disease Using Human and Collaborative Cross Mice Cohorts. *J Pers Med*. 2023;13(11):1617.
- Shinde M, Daigavane P, Kamble R, Agarwal N, Suchak D, Surendran A et al. From an Open Bite to a Harmonious Smile: Orthodontic Intervention with Bluegrass Appliance and Tongue Thrust Resolution. *Cureus*. 2024;16(5):e61024
- Rosa M, Quinzi V, Marzo G. Part 1: Anterior open bite in the mixed dentition. *Eur J Paediatr Dent*. 2019;20(1):80–2.
- Shetty S, Shaikh N. An effective and simple method for treatment of tongue thrusting in adult patient. *IP J Surg Allied Sci*. 2021;3(4):116–9.
- Manzoor Z, Wadhawan A, Nagar S, Kumar A, Singh M. A Modified Tongue Crib Appliance for Correction of Tongue Thrusting. *Cureus*. 2023;15(6):e40518.
- Subtelny JD, Sakuda M. Open bite diagnosis and treatment. *Am J Orthod*. 1964;50(5):337–58.
- Leite JS, Matiussi LB, Salem AC, Provenzano MG, Ramos AL. Effects of palatal crib and bonded spurs in early treatment of anterior open bite: A prospective randomized clinical study. *Angle Orthod*. 2016;86(5):734–9.
- Natsuko Hichijo1*, Tadahide Noguchi2 and Yoshiyuki Mori. Effects of Tongue Cribs for the Early Treatment of Anterior Open Bite: A Case Report. *Inter Ped Dent Open Acc J*. 2022;8(1):613–7.
- Lopez-Gavito G, Wallen TR, Little RM, Joondeph DR. Anterior open-bite malocclusion: A longitudinal 10-year postretention evaluation of orthodontically treated patients. *Am J Orthod*. 2085;87(3):175–86.
- Devishree, Gujjari SK, Shubhashini PV. Frenectomy: a review with the reports of surgical techniques. *J Clin Diagn Res*. 2012 Nov;6(9):1587-92.

Cite this article: Agarwal N, Satapathy SK, Das SK. Smile renewal through orthodontic braces and tongue cribs in adult open bite treatment - A case report. *IP Indian J Orthod Dentofacial Res*. 2025;11(1):70-74.