

## A NONSURGICAL APPROACH FOR MANAGEMENT OF CLASS II OPEN-BITE MALOCCLUSION

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### ABSTRACT

Skeletal open bite is one of the most challenging malocclusions to treat and maintain due to the difficulty and instability of correction. Although a combination of orthodontic treatment and orthognathic surgery may be the ideal approach in most cases, the complications, risks, and costs of surgery have sparked an interest in alternative treatment options that use temporary anchorage devices to achieve orthognathic-like effects. Adult patients can be treated without the need for special compliance using temporary anchorage devices such as miniscrews. During treatment of anterior open bite, incisor extrusion may compromise facial aesthetics in cases with sufficient incisor exposure at rest and smile. The intrusion of posterior teeth has the advantage of correcting vertical dimension and maintaining proper incisors show. This case report aims to demonstrate the successful utilization of temporary anchorage device (TAD) for intrusion of posterior teeth segment and extraction of upper first premolars in the treatment of an adult patient with anterior open bite (AOB).

### KEY WORDS

skeletal open bite, temporary anchorage device, anterior open bite.

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### INTRODUCTION

An anterior open bite is defined as the lack of overlap and incisal contact between anterior teeth in centric relation. The etiology<sup>1</sup> of an anterior open bite is complex and multifactorial. Several etiological factors have been associated with the anterior open bite, including digits sucking habit, lip habits, anterior posture of the tongue at rest, large tongue, nasal obstruction, mouth breathing, hypertrophic tonsils and adenoids, neurological disturbances, muscular dystrophy, temporomandibular joint internal disorder, and skeletal growth abnormalities<sup>2</sup>. The anterior open bite is one of the most challenging cases to treat in adult patients<sup>3</sup>. Several surgical and non-surgical treatment approaches have been used to manage these cases<sup>4</sup>. Surgical treatment approach involves maxillary impaction allowing forward and upward rotation of the mandible which decrease the lower anterior facial height and correct anterior open bite. Although maxillary impaction is one of the most stable orthognathic surgery, the cost and risks of this treatment approach is the major disadvantage. Nonsurgical treatment approaches<sup>5</sup> of anterior open bite usually aimed to intrude posterior teeth or/and extrude incisors. Incisor show at rest and smile are important features to consider during treatment of anterior open bite. Incisor extrusion may compromise facial aesthetics in cases with long facial height and/or sufficient incisor exposure at rest and smile. On the other hand, intrusion of posterior teeth allowing a counterclockwise rotation of the mandible to correct anterior open bite without compromising facial aesthetic and smile<sup>6</sup>. However, the best treatment approach is mainly determined by proper diagnosis and is related to the morphological pattern and characteristics of anterior open bite<sup>10</sup>. The current article presents a case report of an adult patient with anterior open bite treated by the extraction of upper first premolars bilaterally followed by intrusion of posterior maxillary teeth using temporary anchorage device.

### CASE REPORT

A 16-year-old female patient presented in the department with the chief complaint of gap between



**Fig 1: Extraoral pre treatment photographs**



**Fig 2: Intraoral pre-treatment photographs**



**Fig 3: Pre-treatment radiographs**

upper and lower front teeth. The extra-oral examination revealed a mesocephalic head form, mesoprosopic facial form, convex profile, posterior divergence, and protruded upper lip (Fig 1). The intra-oral examination revealed an anterior openbite with proclined upper incisors and Class II molar relationship overjet of 9.5mm and openbite of 3.5 mm was observed (Fig2). The cephalometric analysis revealed a class II skeletal base, a prognathic maxilla (SNA=85°) and an average mandible (SNB=80°) (Fig3).

## TREATMENT OBJECTIVES

Objectives of the treatment were

1. To correct the anterior openbite, skeletal class II relation and convex profile
2. To attain normal overjet and overbite
3. To attain class I canine relation bilaterally and correct proclined upper anteriors
4. To improve the smile and aesthetics and overall appearance

## TREATMENT PLAN

Patient was planned to be treated by combination of segmental intrusion of maxillary posteriors and retraction of anteriors, following extraction of 14 and 24 using MBT 0.022 slot bracket.

Retention protocol-Fixed bonded lingual retainer in upper and lower anterior region.

Begg's wrap around retainer in upper and lower arch.

## TREATMENT PROGRESS

TAD of 1.5X8 mm, buccally and TAD of 2X8 mm palatally, bilaterally, was used for intrusion.

TAD of 1.5X8 mm was used in the mandibular arch to hold the molars.



Fig 4: Placement of TADS for molar intrusion

## TREATMENT RESULT



Fig 5: Extraoral post treatment photographs







**Fig 6: Post treatment intraoral photographs**



**Fig 7: Post-treatment radiographs**

After 22 months of treatment, an acceptable occlusion, overbite and overjet was achieved. The patient displayed a bilateral Class I canine occlusion and molar was settled in Class II molar relationship. The arch forms were symmetrical and well aligned. The SNA angle had increased, resulting in a normal jaw relationship ( $ANB=2^\circ$ ). Normal overbite (1 mm) and overjet (2 mm) were achieved, and the midlines were centered. Harmonious occlusion was established; lateral and jaw-opening excursions were smooth and straight.



**Fig 8: Extraoral photograph of 6 months post debonding**



**Fig 9: Intraoral photographs of 6 months post debonding**

## DISCUSSION

Extrusion of maxillary posterior teeth is a frequent cause of anterior open bite cases seen in orthodontic clinics. These cases are usually associated with increased lower facial height, steep mandibular plane, obtuse gonial angle, lip incompetency and strain, and two different occlusal planes in the arch. In the adult, a moderate anterior open bite can be treated successfully by orthognathic surgery. However, increased risk and cost of this treatment approach encourage the patients and orthodontist to attempt alternative approaches. Several non-surgical treatment modalities have been used to manage these cases such as extraction therapy, multiloop edgewise archwires, high-pull headgear, and intermaxillary elastics.<sup>6</sup> However, these non-surgical approaches not suitable for open bite correction in cases with long facial height and/or sufficient incisor exposure at rest and smile because of their extrusive mechanics which compromise the facial and smile esthetics. On the other hand, intrusion of posterior teeth using miniscrews or miniplates has the advantage of correcting vertical dimension and maintaining proper incisors show. In the current case, the patient had a full display of incisor crown and 1 mm gingival display at smiling. Therefore, the main archwire in the maxillary arch was a divided into three segments during levelling and intrusion phases to avoid unwanted incisors extrusion that would result from a continuous archwire. The intrusion of posterior teeth and avoidance of incisors extrusion resulted in a pleasing smile, straight facial profile, improved facial proportions, and minimized lip strain. The cephalometric analysis indicated clockwise rotation of the mandible with decreased lower facial height, decreased the angles of the mandibular plane to SN plane and palatal plane, and significant improvement in anteroposterior jaw relationship (ANB).

In the current case, 6-months post-treatment evaluation revealed good stability with retention of pleasing facial profile and proportions. Limited long-term data were found in the literature regarding the stability of anterior open bite correction in adults treated with maxillary posterior segment intrusion using zygomatic miniplates. Recently, Marzouk and Kassem<sup>5,17</sup> evaluated 26 anterior open-bite patients, who had maxillary posterior segment intrusion with zygomatic miniplates. They found that the intruded maxillary molars relapsed by 10.2% in the first year and by 13.37% after 4 years of treatment. Overbite relapse amounts were 8.19% and 11.18% at 1 year and 4 years post treatment, respectively. In addition, soft tissue changes appeared to be stable 4 years after treatment. Baek et al.<sup>18</sup> reported that most relapse occurred during the first year of retention. Thus, it is reasonable to conclude that the application of an appropriate retention method during this period clearly enhances the long-term stability of the treatment.

## CONCLUSION

This case report demonstrates a nonsurgical approach to treat a open-bite malocclusion with class II molar relation using temporary anchorage device for intrusion of molars along with upper first premolars extraction after an accurate initial examination and diagnosis, and after eliminating any habitual risk factors. Excellent patient compliance for retainer wear is also a critical factor for long term stability.

## REFERENCES

- 1) Gu D., Leroux B., Finkleman S., Todoki L., Greenlee G., Allareddy V., Jolley C., Vermette M., Shin K., Kau C. H., de Jesus-Vinas J., Dolce C., The National Dental PBRN Collaborative Group, and Huang G., Anterior openbite malocclusion in adults, *The Angle Orthodontist*. (2022) 92, no. 1, 27–35,
- 2) Bilgic F., Gelgor I. E., and Celebi A. A., Malocclusion prevalence and orthodontic treatment need in central Anatolian adolescents compared to European and other nations' adolescents, *Dental Press Journal of Orthodontics*. (2015) 20, no. 6, 75–81,
- 3) Stojanovic L., Etiological aspects of anterior open bite, *MedicinskiPregled*. (2007) 60, no. 3♦4, 151–155,
- 4) Cambiano A. O., Janson G., Lorenzoni D. C., Garib D. G., and Dávalos D. T., Nonsurgical treatment and stability of an adult with a severe anterior open-bite malocclusion, *Journal of Orthodontic Science*. (2018) 7, no. 1,
- 5) Kim Y. H., Anterior openbite and its treatment with multiloop edgewise archwire, *The Angle Orthodontist*. (1987) 57, no. 4, 290–321.
- 6) Erdem B. and Kucukkeles N., Three-dimensional evaluation of open-bite patients treated with anterior elastics and curved archwires, *American Journal of Orthodontics and Dentofacial Orthopedics*. (2018) 154, no. 5, 693–701,
- 7) Maia F. A., Janson G., Barros S. E., Maia N. G., Chiqueto K., and Nakamura A. Y., Long-term stability of surgical-orthodontic open-bite correction, *American Journal of Orthodontics and Dentofacial Orthopedics*. (2010) 138, no. 3, 254 e1–254 e10, discussion 254-6.
- 8) de Freitas M. R., Beltrão R. T. S., Janson G., Henriques J. F. C., and Cançado R. H., Long-term stability of anterior open bite extraction treatment in the permanent dentition, *American Journal of Orthodontics and Dentofacial Orthopedics*. (2004) 125, no. 1, 78–87,
- 9) Janson G., Valarelli F. P., Henriques J. F. C., de Freitas M. R., and Cançado R. H., Stability of anterior open bite nonextraction treatment in the permanent

dentition, *American Journal of Orthodontics and Dentofacial Orthopedics*. (2003) 124, no. 3, 265–276, quiz 340

10) Baek M. S., Choi Y. J., Yu H. S., Lee K. J., Kwak J., and Park Y. C., Long-term stability of anterior open-bite treatment by intrusion of maxillary posterior teeth, *American Journal of Orthodontics and Dentofacial Orthopedics*. (2010) 138, no. 4, 396.e1–396.e9,

11) Deguchi T., Kurosaka H., Oikawa H., Kuroda S., Takahashi I., Yamashiro T., and Takano-Yamamoto T., Comparison of orthodontic treatment outcomes in adults with skeletal open bite between conventional edgewise treatment and implant-anchored orthodontics, *American Journal of Orthodontics and Dentofacial Orthopedics*. (2011) 139, no. 4, S60–S68,

12) Hart T. R., Cousley R. R. J., Fishman L. S., and Tallents R. H., Dentoskeletal changes following mini-implant molar intrusion in anterior open bite patients, *The Angle Orthodontist*. (2015) 85, no. 6, 941–948,

13) Ribeiro G. L., Regis S. Jr., da Cunha T. M. A., Sabatoski M. A., Guariza-Filho O., and Tanaka O. M., Multiloop edgewise archwire in the treatment of a patient with an anterior open bite and a long face, *American Journal of Orthodontics and Dentofacial Orthopedics*. (2010) 138, no. 1, 89–95

14) Sugawara J., Aymach Z., Nagasaka H., Kawamura H., and Nanda R., Non-surgical correction of skeletal open bite: a goal-oriented approach evaluated by CBCT, *Journal of Clinical Orthodontics*. (2011) 45, no. 3, 145–155,

15) Xun C., Zeng X., and Wang X., Microscrew anchorage in skeletal anterior open-bite treatment, *The Angle Orthodontist*. (2007) 77, no. 1, 47–56,

16) Kravitz N. D. and Kusnoto B., Risks and complications of orthodontic miniscrews, *American Journal of Orthodontics and Dentofacial Orthopedics*. (2007) 131, no. 4, S43–S51,

17) Alogaibi Y. A., Afify A. R., Al-Fraidi A. A., and Hassan A. A., Nonsurgical treatment of class III malocclusion with both anterior and posterior Crossbites combined with impacted and congenitally

missed teeth, *Case Reports in Dentistry*. (2020) 2020.

18) Montasser M. A. and Scribante A., Root injury during interradicular insertion is the most common complication associated with orthodontic miniscrews, *The Journal of Evidence-Based Dental Practice*. (2022) 22, no. 1, article 101688,

19) Greenlee G. M., Huang G. J., Chen S. S. H., Chen J., Koepsell T., and Hujoel P., Stability of treatment for anterior open-bite malocclusion: a meta-analysis, *American Journal of Orthodontics and Dentofacial Orthopedics*. (2011) 139, no. 2, 154–169

20) Kim Y. H., Han U. K., Lim D. D., and Serrao M. L. P., Stability of anterior openbite correction with multiloop edgewise archwire therapy: a cephalometric follow-up study, *American Journal of Orthodontics and Dentofacial Orthopedics*. (2000) 118, no. 1, 43–54,

21) Zuroff J. P., Chen S. H., Shapiro P. A., Little R. M., Joondeph D. R., and Huang G. J., Orthodontic treatment of anterior open-bite malocclusion: stability 10 years postretention, *American Journal of Orthodontics and Dentofacial Orthopedics*. (2010) 137, no. 3, 302 e1–302 e8, discussion 302-3.

22) Remmers D., van'tHullenaar R., Bronkhorst E. M., Bergé S. J., and Katsaros C., Treatment results and long-term stability of anterior open bite malocclusion, *Orthodontics & Craniofacial Research*. (2008) 11, no. 1, 32–42,

23) Beckmann S. H. and Segner D., Changes in alveolar morphology during open bite treatment and prediction of treatment result, *European Journal of Orthodontics*. (2002) 24, no. 4, 391–406,

24) Dung D. J. and Smith R. J., Cephalometric and clinical diagnoses of open bite tendency, *American Journal of Orthodontics and Dentofacial Orthopedics*. (1988) 94, no. 6, 484–490,

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