Case Report

Correcting Severe Scissor Bites in Second Molars with a Digital Surgical Guide for Miniscrew Placement and In-House Directly Printed Clear Aligners: A Case Report

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Abstract

Correcting scissor bites in second molars is challenging in orthodontics due to their complex anatomical location and related biomechanical demands. Recent digital advances, including guided miniscrew insertion and direct aligner printing, offer enhanced precision and efficiency. This manuscript presents a case report in which these advanced techniques were used to correct a unilateral scissor bite in the second molars. The results indicate that the treatment is effective, provides various benefits for patients, and reveals some potential drawbacks of these new methods. The treatment proved effective, provided patient-centered benefits, and revealed practical insights into both the strengths and potential limitations of adopting digitally assisted approaches.

Keywords: orthodontics, 3d printing, direct printed clear aligner, scissor bite, miniscrew

Introduction

Scissor bite[1] involving the second molars is an uncommon but challenging form of malocclusion, typically marked by the buccal positioning of the upper molars relative to the lower counterparts. This misalignment disrupts normal occlusal contact, often resulting in compromised function and esthetics. Patients may report difficulties with chewing, imbalanced occlusal force distribution, and visible facial asymmetry. Traditionally, the management of posterior scissor bites has relied on the use of fixed orthodontic appliances, inter-arch elastics, occlusal bite blocks, or, in more severe cases, orthognathic surgery. In recent years, the introduction of digital technologies has significantly changed how such cases are approached. Tools like intraoral scanners, cone beam computed tomography (CBCT) imaging, and 3D-simulation software have enabled clinicians to better visualize occlusal relationships and evaluate treatment options, with a level of precision that was not previously possible.[2] These innovations enable more accurate assessments of tooth positions, root angulations, and spatial relationships, facilitating more individualized treatment plans.[3] This manuscript explores a novel and minimally invasive approach to correcting second molar scissor bites by combining two digital innovations: the use of miniscrews guided by digital surgery templates and directly 3D-printed clear aligners. This digital planning helps place the miniscrews with high precision using guided templates, which lowers the risks and improves the overall treatment outcome.[4] Directly 3D-printed clear aligners represent another advanced application in orthodontic treatment. Instead of molding plastic over a printed model, these aligners are printed directly, ensuring they have a consistent thickness, optimized fitness, and more efficient force delivery. This manufacturing technique

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reduces production time and can be smoothly integrated with digital planning software to produce aligners, allowing for aligners that are specifically customized to each patient.

Case Report

The patient agreed and signed informed consent for publication of this case and related images. A 30-year-old female presented with a buccal tipping and scissor bite of the upper left second molar. She reported mild discomfort while chewing and expressed concerns about the aesthetic impact of her malocclusion [Figure 1a, b, and c]. Clinical examination revealed severe buccal tipping and scissor bite of the upper left second molar, crowding in the lower anterior region, and normal occlusion in other areas. Radiographic analysis using CBCT confirmed sufficient bone support for miniscrew placement and ruled out any skeletal abnormalities. The treatment plan included the use of miniscrews to address the upper second molar scissor bite and directly printed clear aligner techniques to resolve the lower anterior crowding. The

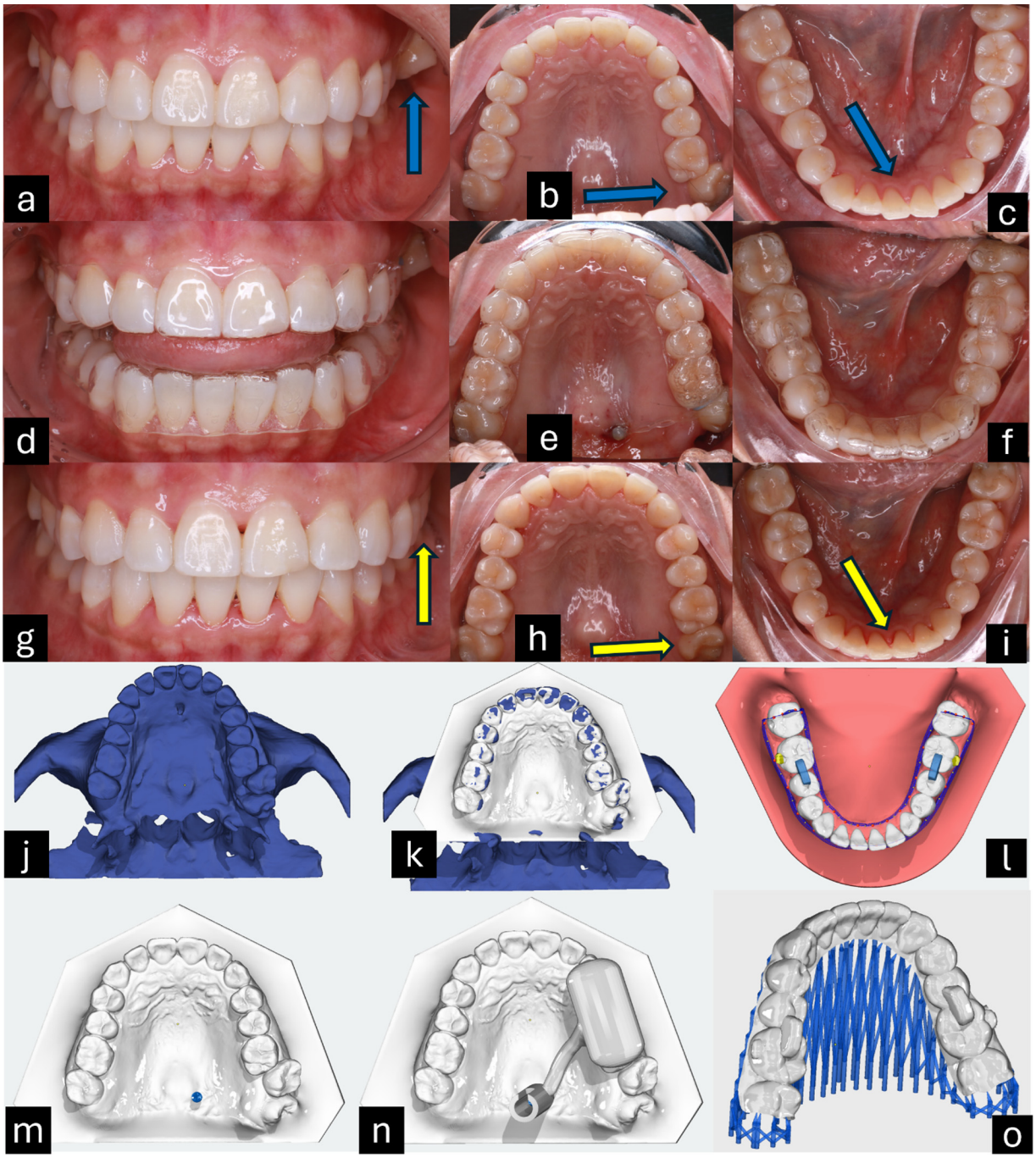

Figure 1: (a, b, c) Pretreatment. (d, e, f) Miniscrew and Direct printed aligner (DPA) installation. (g, h, i) Post-treatment. (j, k, m, n) Miniscrew guide designed using cone beam computed tomography (CBCT) combined with intraoral scan. (l, o) Direct printed aligner with bite raising to open the bite (Blue arrows: pretreatment, yellow arrow: post-treatment).

treatment plan and treatment progress included the following steps: (1) Intraoral scanning (i700, Medit, Seoul, South Korea); (2) CBCT imaging to assess bone quality and identify optimal miniscrew placement sites; (3) 3D simulation to predict the biomechanics of the treatment; (4) computer-aided design/computer-aided manufacturing (CAD/CAM) using Onyxceph software (https://onyxceph.eu/) to design the miniscrew guide and clear aligners [Figure 1 j, k, m, n, l, and o]; (5) extraction of the upper left wisdom tooth; (6) a 3D-printed surgical guide using dental 3D printer (Sonic XL 4K plus, Phrozen, Hsinchu, Taiwan) was performed for precise insertion of one miniscrew in the palatal region and miniscrew installation (Jiscop, Seoul, South Korea); (7) Direct 3D printing of a series of aligners, the treatment goes with two attachments to align the lower anterior and target movements of the second molar, with a raising bite in lower clear aligner, so it is easier to solve the scissor bite (TA28 resin, Graphy, Seoul, South Korea) [Figure 1d, e, and f]. Weekly changes of the aligners achieve gradual, controlled buccal movement of the second molar and alignment of the lower anterior teeth. The retainer was used for the upper arch to keep the position of all the other upper teeth. After 6 months of treatment, the scissor bite and lower anterior crowding were successfully corrected using hybrid orthodontic treatment. The second molar was properly aligned within the occlusal plane, improving both function and esthetics. The patient reported high satisfaction with the minimally invasive approach and the comfort experienced throughout the treatment [Figure 1g, h, and i].

Discussion

Correcting a scissor bite is always challenging, especially with simple mechanics and comfort for the patient. Thus, the hybrid approach to orthodontic treatment, which combines in-house directly printed aligners with miniscrews placed using a digital surgical guide, represents a significant advancement in dental treatment in the digital era,[5] and the result was shown in this case report to correct severe scissor bite of upper second molar. One of the primary advantages of this method is its high level of precision. Digital guidance systems allow for the accurate placement of miniscrews, reducing risks and potential complications. Moreover, the ability to rapidly fabricate these aligners and initiate their use without delay significantly improves treatment efficiency. Esthetic factors also play a crucial role in enhancing patient satisfaction and compliance. Clear aligners offer a nearly invisible alternative to traditional braces, which is particularly appealing to adult patients or those concerned about the appearance of orthodontic appliances. Their discreet design, along with their removability, allows for better oral hygiene maintenance and easier integration into daily routines. The hybrid approach further benefits from its minimally invasive nature. Miniscrews, employed for anchorage, are small and can typically be inserted with minimal discomfort. Meanwhile, clear aligners reduce the soft tissue irritation and bulk often associated with brackets and archwires, leading to a more pleasant overall treatment experience. Despite these advantages, however, the hybrid technique still presents several challenges that must be addressed to facilitate broader clinical adoption. A significant limitation is the high initial investment required for digital equipment, software licenses, and 3D printing systems. For smaller clinics or practices with limited resources, the financial burden of acquiring digital equipment, software licenses, and 3D printing systems can be significant, often limiting access to these advanced treatment modalities. In addition to the initial investment, clinicians must also develop new competencies in digital workflows.[6] This includes interpreting 3D imaging data, operating CAD/CAM software, and managing digital manufacturing processes. For practitioners without prior experience in these areas, the learning curve can be considerable and may require substantial time and training. Material selection for aligners presents another ongoing challenge. The ideal aligner material must strike a balance between flexibility and rigidity, maintain biocompatibility, resist staining and wear, and preserve its mechanical properties over the course of treatment. Recent developments in directly printed aligner materials have shown promising improvements in both mechanical behavior and clinical effectiveness, though further research and long-term evaluations remain necessary. This case report places special emphasis on evaluating the innovation and feasibility of the digital hybrid approach.[7,8]

References

1. Baik UB, Kim Y, Sugawara J, Hong C, Park JH. Correcting severe scissor bite in an adult. Am J Orthod Dentofacial Orthop 2019;156:113–24.
2. Cong NT, Nam PH, Viet H, Marya A. Digitally planned surgical crown lengthening: a novel bone reduction strategy to correct a gummy smile. J Surg Case Rep 2024;4: rjae 202.
3. Hoang Viet, Marya A, d'Apuzzo F, Nucci L. The clinical applications and outcomes of digital MARPE in orthodontics: a scoping review. Semin Orthod 2025;31:299–309.
4. Jung MH. Treatment of severe scissor bite in a middle-aged adult patient with orthodontic mini-implants. Am J Orthod Dentofacial Orthop 2011;139:S154–65.
5. Hoang V, Dang TT, Nguyen MK, Tran PH. Accelerated and hybrid orthodontic treatment using a combination of 2D lingual appliance and in-house aligner: an anterior cross-bite and TMD case report after 1-year follow-up. APOS Trends Orthod Article in press. doi:10.25259/APOS_22_2024
6. Krymovskyy KG, Zhehulovych ZE, Storozhenko KV, Babaskin YI. Nowadays and the future of the 3D digital technologies in modern orthodontics. Wiad Lek 2024;77:2047–56.
7. Tartaglia GM, Mapelli A, Maspero C, *et al.* Direct 3D printing of clear orthodontic aligners: current state and future possibilities. Materials (Basel) 2021;14:1799.
8. Bichu YM, Alwafi A, *et al.* Advances in orthodontic clear aligner materials. Bioact Mater 2022;22:384–403.