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Case Report **Dentistry**

Simplifying Class II Treatment with IZC-Assisted Distalization: A Clinical Case

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Abstract

Background: Class II malocclusion is one of the most common orthodontic problems and often requires comprehensive treatment strategies. Conventional correction methods typically depend on high levels of patient compliance and may involve complex mechanics or extractions. The introduction of skeletal anchorage systems, particularly infrazygomatic crest (IZC) miniscrews, has provided an effective alternative for non-compliant and non-extraction cases. ***Objective:*** This case report aims to demonstrate the effectiveness of IZC-assisted en-masse distalization in correcting a Class II malocclusion ***Case Presentation:*** A 20-year-old female presented with a skeletal Class I malocclusion, Angle Class II relationship on the right side, right posterior crossbite, maxillary midline deviation, and proclined anterior teeth. Treatment objectives included correcting the midline, establishing Class I molar and canine relationships, resolving the crossbite, and improving facial esthetics. A passive self-ligating appliance system (Genius system) was used alongside skeletal anchorage via an IZC miniscrew to achieve en-masse distalization. A sequence of NiTi and stainless-steel archwires was used for alignment and torque control. Crossbite correction was achieved using flipped brackets, bite blocks, and criss-cross elastics. En-masse distalization was carried out using an IZC miniscrew and power arms to generate controlled force vectors. Final results showed successful correction of the Class II relationship, midline alignment, ideal overjet and overbite, and improved smile esthetics. Functional occlusion with proper guidance was also achieved. ***Conclusion:*** IZC miniscrew-supported distalization provides a reliable, compliance-independent solution for Class II correction. This approach offers excellent control of tooth movement, eliminates the need for extractions in many cases, and enhances both esthetic and functional outcomes with minimal patient cooperation.

Keywords: Class II malocclusion, infrazygomatic crest, miniscrews, skeletal anchorage, en-masse distalization, crossbite correction, orthodontics, non-extraction treatment.

INTRODUCTION

Class II malocclusion is among the most frequently encountered orthodontic issues, affecting approximately 38% to 50% of individuals seeking treatment.[2] This condition is often associated with unfavorable facial and dental esthetics, [3] which can adversely impact both self-esteem and overall quality of life.

A wide range of treatment modalities is available for managing Class II malocclusion, including headgear, functional orthopedic appliances, mandibular advancement techniques, fixed appliances with interarch elastics, and approaches involving tooth extractions in conjunction with these mechanics. All of these methods have demonstrated clinical effectiveness; however, they generally require a high level of patient cooperation to achieve optimal outcomes. [4,5]

The introduction of the concept of temporary anchorage devices (TADs), specifically by placing miniscrews between the roots of posterior teeth to facilitate anterior tooth retraction reduced the reliance on patient compliance.[6] These interradicular miniscrews, however, present several limitations, including a relatively high failure rate, potential disruption to tooth movement, and the risk of contracting adjacent tooth roots**.** [7,8]

Alternatively, miniscrews inserted into the infrazygomatic crest (IZC) region of the maxilla have gained increasing attention. [14, 15]. Positioned outside the root area, these devices allow unobstructed

movement of the posterior teeth and are suitable for a variety of orthodontic procedures, such as en-masse maxillary distalization, resolution of severe crowding, and correction of asymmetries. [9,10]

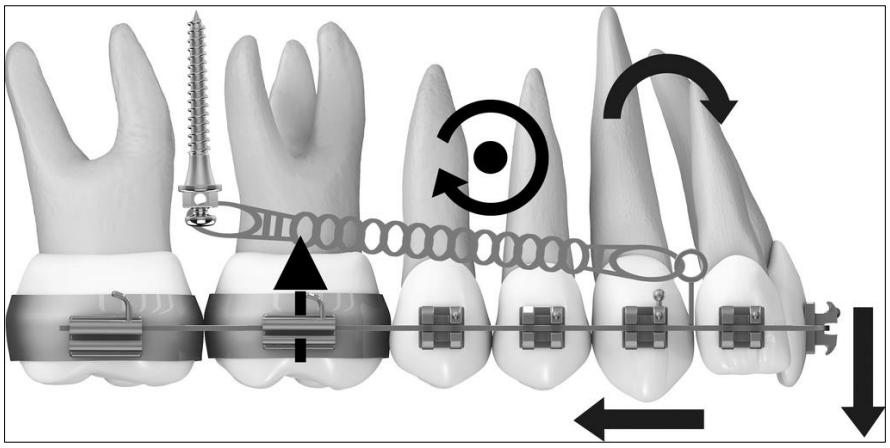

Figure 1: IZC miniscrew force system mechanics

Recent studies have sought a better understanding of the biomechanical effects of total maxillary arch distalization supported by skeletal anchorage devices. They have focused on the potential for molar distalization, the amount and direction of the incisor's tipping, occlusal plane changes and facial profile effects. [11-13]. The height of the anterior support hook and the distance from the mini screw head to the occlusal plane are crucial to designing a force system that meets occlusal and esthetic goals. **(Fig. 1)**

Multiple techniques are available to achieve en-masse distalization of the posterior teeth. [15,16]. When selecting the appropriate approach, it is essential to evaluate the type of anchorage to be used, anatomical limitations related to distal tooth movement, and the potential impact on overjet and overbite.

In addition, careful consideration of the force vector is critical to ensure the generation of desirable tooth movements while minimizing the risk of unwanted side effects. [17,18]

This case report describes a Class II malocclusion with a crossbite. These anomalies were corrected using the torque of the Genius system and through en-masse distalization, utilizing an infrazygomatic crest (IZC) screw as skeletal anchorage. In fact, the correction of Class II malocclusion accompanied by a crossbite has always posed a significant challenge. Moreover, treating these types of anomalies typically requires a comprehensive approach that addresses not only the dentition but also the jaws and associated facial musculature.

PRESENTATION OF THE CASE

A female patient aged 20 years consulted with the Dento-Facial Orthopedics Department at Farhat Hached Hospital, Sousse, Tunisia. Her demands were both esthetical and functional. No systemic or medical abnormalities were described.

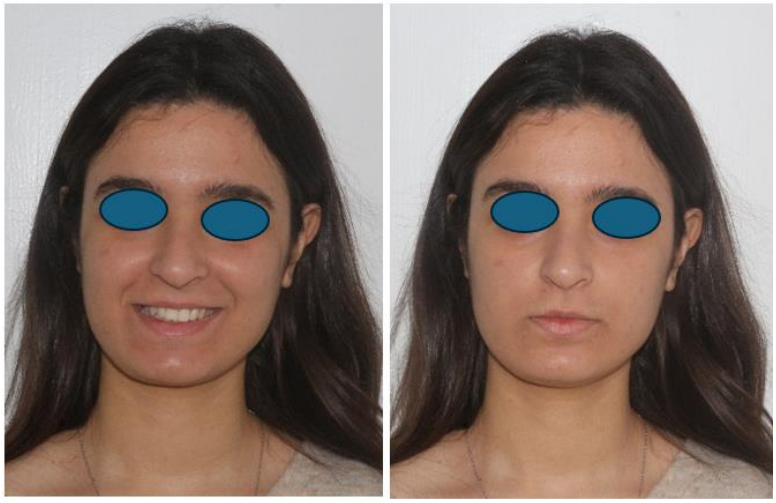

Figure 1a **Figure 1b**

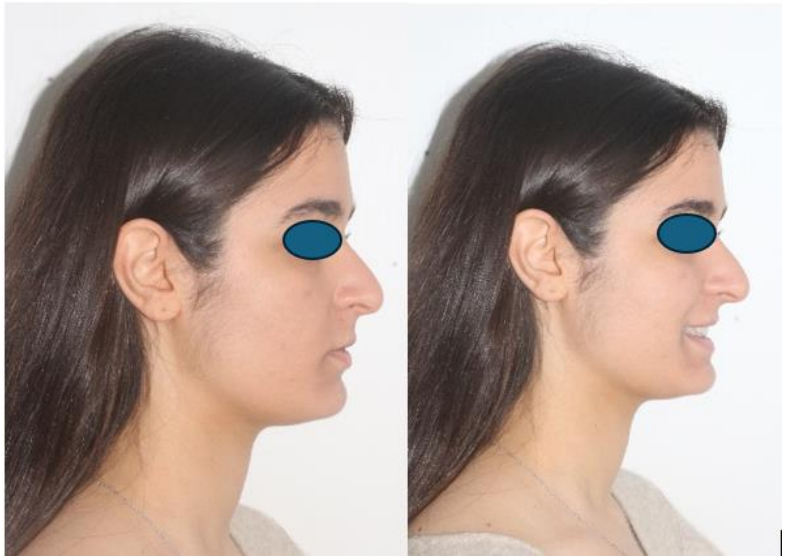

Figure 1c **Figure 1d**

The extraoral examination showed from the frontal view a symmetrical face with a parallelism at the horizontal lines of the face and a straight medial sagittal plane, a decrease in the lower third of the face, and a normal nasolabial angle. She also presented a labial occlusion as well as a narrow smile (Figure 1a and 1b).

The profile analysis showed a concave profile, a decreased anterior facial height, and anterior facial divergence. she also presented a labio-mental fold in allonged S shape. The chin-neck line was normal (Figure 1c and 1d).

Figure 2: Intraoral photos

The intraoral examination showed a satisfactory oral hygiene, a healthy periodontal status, with no bleeding on probing. The upper dental arch was V shaped a right cross bite. The lower dental arch was U shape, exhibited a mild crowding in the incisal area and presented a normal lingual frenulum **(Figure 2).**

Moreover, the occlusal examination revealed an Angle class II relationship on the right side. The lower incisors were proclined and the maxillary midline was deviated 3 mm towards the right of the midsagittal plane. The overjet was irregular from 1 to 2 mm and the overbite was from 1 to 2 mm. **(Figure 2).**

Furthermore, no symptoms or signs of any temporo-mandibular joint (TMJ) disorder were observed, maximal opening and lateral and anterior movements were within normal limits.

The functional examination revealed a nasal ventilation with functional swallowing and normal phonation.

The analysis of plaster models showed a total dento-maxillary disharmony (DMD) of -18.4 mm according to Tweed's analysis.

Table 1: Tweed's analysis

Tweed's Analysis		
	+	-
Ant.Crow		1
IR		2.4
Mid.Crow		
C.Spee		3
Post.Crow		10
Post.Growth		
Total DMD		18.4

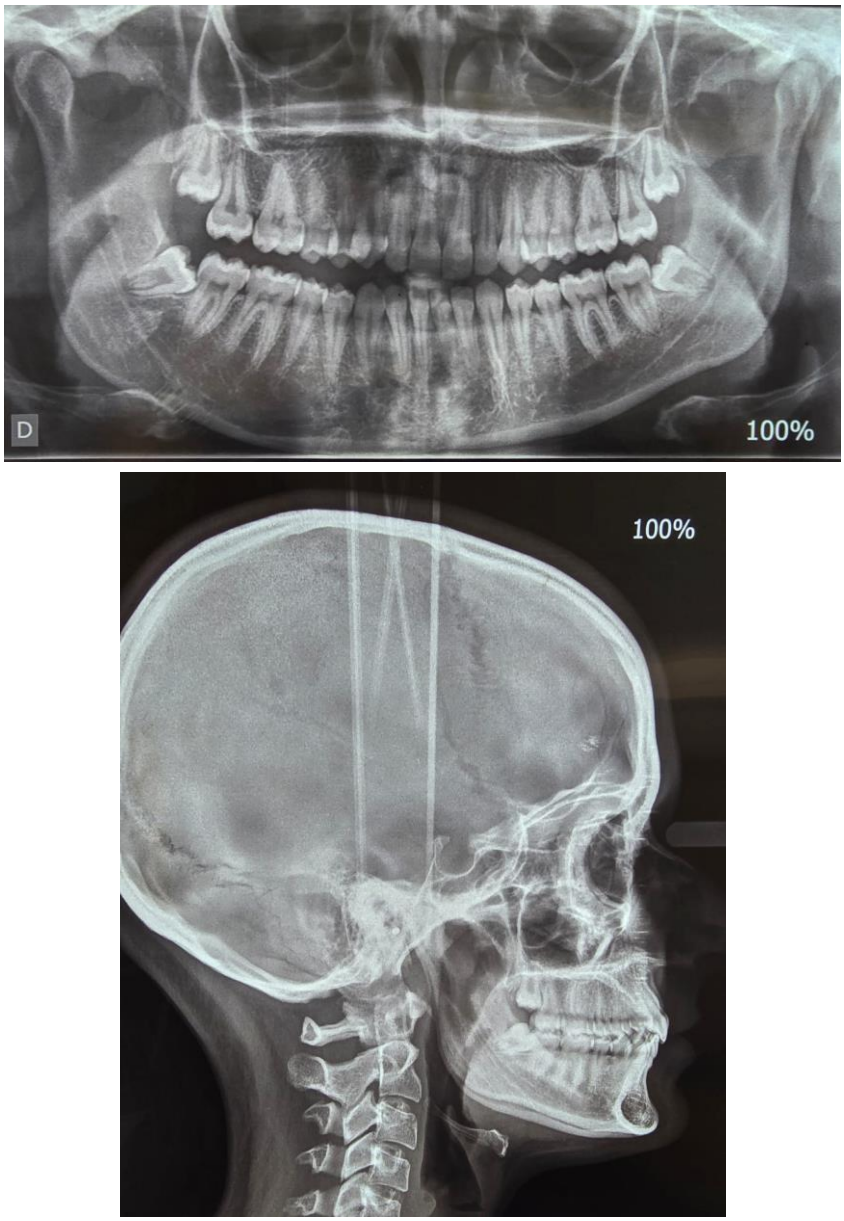

Figure 3: Cephalometric radiograph

The panoramic radiograph showed no supernumerary teeth. The crown-root ratios were normal with good alveolar bone levels, no bone pathology and no root resorption. In addition, the mandibular condyles, nasal floor and maxillary sinuses appeared normal (Figure 3).

The lateral cephalometric radiograph revealed a class I skeletal malocclusion (ANB = 2°) (AoBo = -1mm) with a normal position for the maxillary (SNA= 80°) and for the mandible (SNB = 78°) in relation to the anterior skull base. Additionally, a hypodivergent vertical skeletal pattern was noted (FMA = 15°). Furthermore, the maxillary incisors presented increased axial inclination and were protruded in relation to their alveolar base (I/F=113°) same as the mandibular incisors (IMPA=95°) (Table 2).

Table 2: Patient's cephalometric values

Angles	Patient's initial values	Average values
SNA	80°	82° ± 2°
SNB	78°	80° ± 2°
ANB	2°	0-4°
AoBo	-1 mm	[-2 mm – 2 mm]
FMIA	70°	68°
IMPA	95°	87°
FMA	15°	[22° - 28°]
I/i	138°	135°
I/F	113°	107° ± 5°

Treatment Goals: The treatment goals for this patient were as follows: (1) To correct the maxillary dental midline deviation. (2) To establish normal Class I canine and molar relationships with normal overjet and overbite. (3) To correct the inclination and position of the maxillary and mandibular anterior teeth. (4) To correct the cross bite (5) To Improve facial esthetics and smile.

Treatment decision: We used a passive self-ligation system (Genius system) to have a good expansion and a good torque control.

To correct the cross bite, we flipped the brackets for the premolars on the right side to have a positive torque and we used through the bite elastics.

To correct the class II malocclusion and midline deviation, we used en-masse distalization with an IZC as anchorage.

Treatment Progress

Figure 4: Progress photographs: brackets bonding

Following informed consent, fixed appliances were bonded in both the maxillary and mandibular arches. Notably, brackets on teeth #14 and #15 were intentionally flipped to promote positive torque expression during treatment progression.

To assist in the correction of the posterior crossbite, bite ramps were constructed on the occlusal surfaces of the maxillary molars.

Initial alignment and leveling were initiated with a 0.014" thermal nickel-titanium (NiTi) archwire in both arches. The subsequent sequence of archwires used was as follows:

- 0.018" thermal NiTi
- 0.014" x 0.025" thermal NiTi
- 0.017" x 0.025" thermal NiTi
- 0.018" x 0.025" thermal NiTi
- 0.017" x 0.025" stainless steel (SS)
- 0.018" x 0.025" stainless steel (SS)

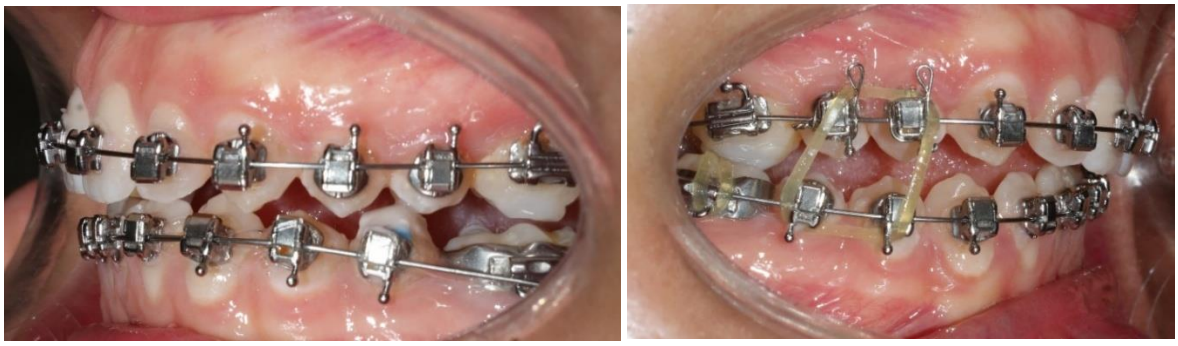

Figure 5: Progress photographs: use of criss cross elastics on the right side

Figure 6: Progress photographs: use of criss cross elastics on the right side

A couple of force system was applied to achieve derotation of tooth #35. On the right side, the patient was instructed to wear double cross-elastics in a criss-cross configuration to facilitate correction of the buccal crossbite.

Figure 7: Progress photographs: Distalization using IZC mini screw

With the 0.18*0.25 SS archwire, we begin the distalization using an IZC miniscrew with a power chain to the upper canine to obtain a force vector that allows distalisation and helps the correction of the cross bite.

Figure 8: Progress photographs: Distalization using IZC mini screw

Once we corrected the cross bite, we used a power arm to be at the center of resistance and to have a pure translation.

Figure 9: Progress photographs: Closing spaces using the IZC mini screw

After obtaining a class I occlusion, we began space closing to center the maxillar midline using the IZC and a power arm. We also used vertical elastics to maintain the occlusion stable.

Treatment Results:

All the predefined objectives were fulfilled; the correction of dental problems allowed the occlusal, functional, and esthetic goals to be achieved. **(Figure 10 and 11).**

Her smile esthetics were improved. Intraorally, an Angle class I bilateral canine and molar relationship was achieved with occlusion and an adequate overjet and overbite were achieved. The upper and lower dental midline coincidence was obtained. Additionally, functional dynamic occlusion was procured with lateral movement guided by the canines and protrusive movement by the incisors. **(Figure 10 and 11).**

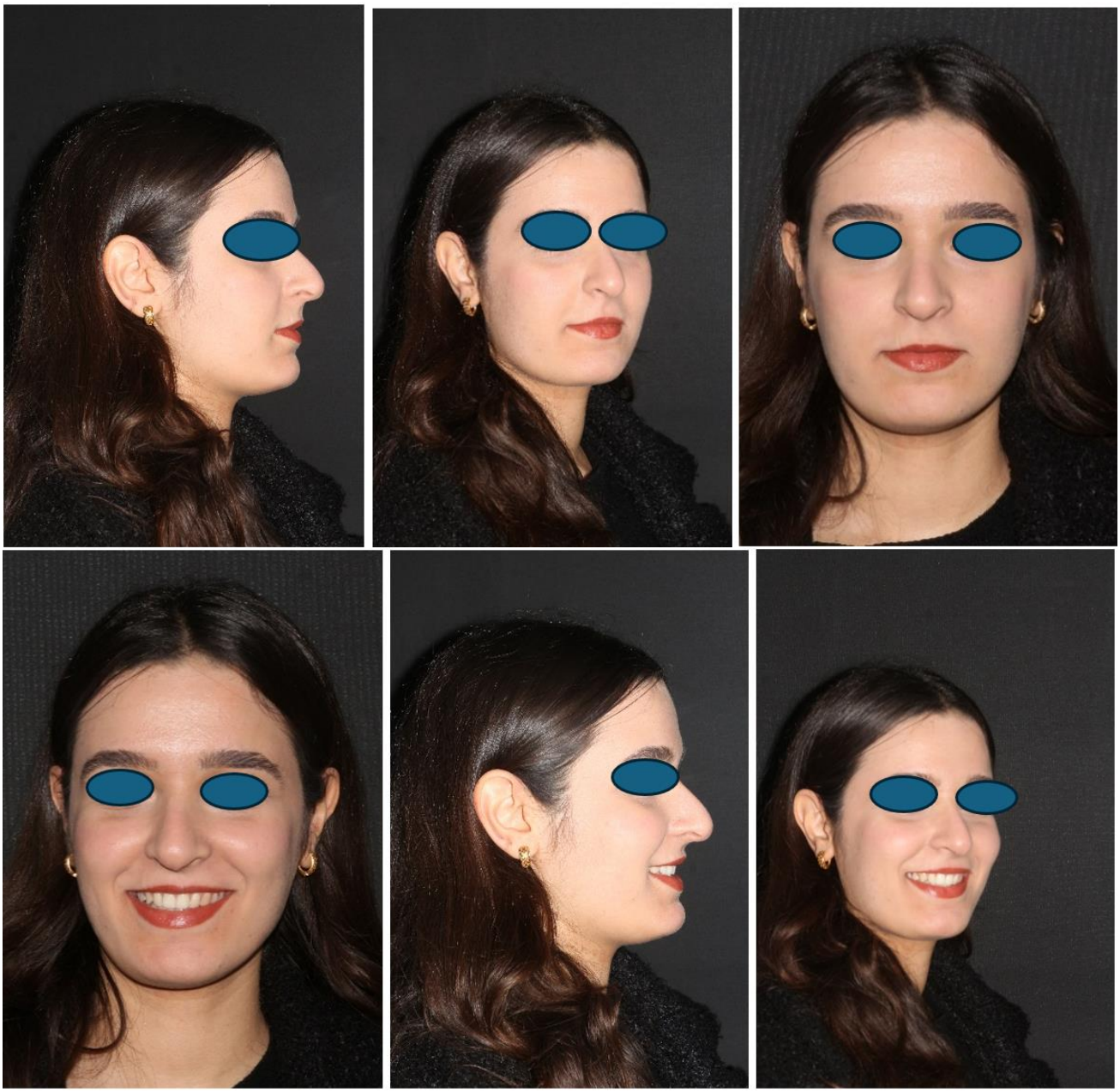

Figure 10: Post-treatment photographs: extra-oral photographs

Figure 11: Post-treatment photographs: intra-oral photographs

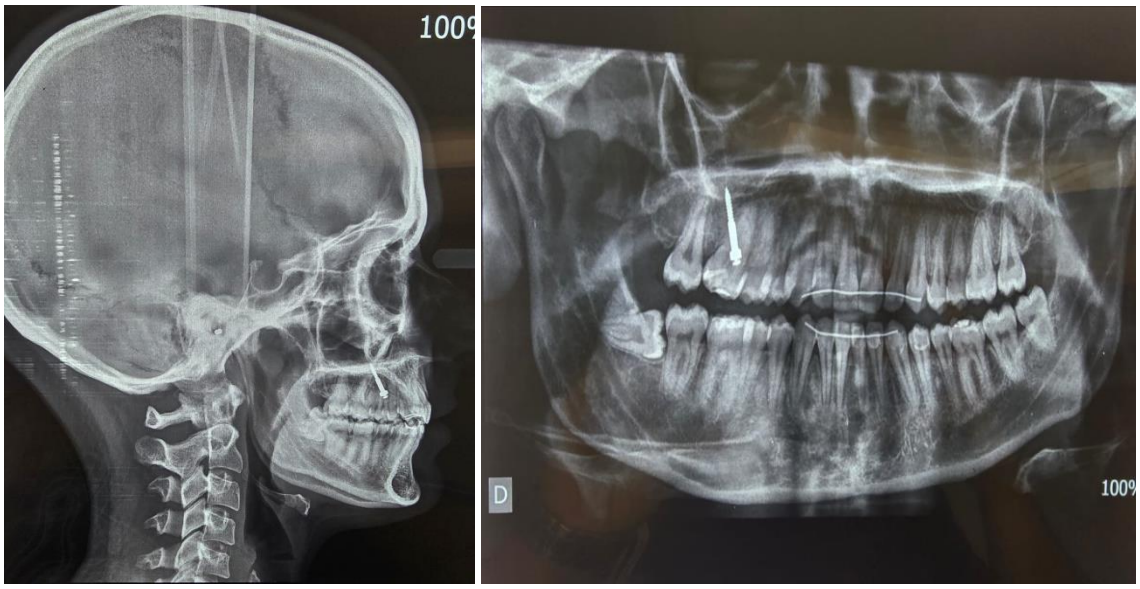

Figure 12: Post-treatment cephalometric radiograph

CONCLUSION

Distalization using IZC mini screws offers a reliable and efficient tool for achieving molar distal movement without relying on patient compliance. This skeletal anchorage technique provides excellent control over tooth movement, minimizes unwanted reciprocal forces, and expands treatment possibilities in cases requiring significant distalization. With proper case selection, precise placement, and careful biomechanical planning, IZC mini screws can significantly enhance orthodontic outcomes, especially in non-extraction and Class II correction cases.

Conflict of Interest: The author declares that he has no conflict of interest concerning the data published in this article.

REFERENCES

1. Alharbi F, Almuzian M, Beam D. Miniscrews failure rate in orthodontics: a systematic review. *Eur J Orthod*. 2018; 50: 519– 530.
2. Almeida MR. Extra-alveolar miniscrews in the treatment of asymmetries in orthodontics. *Rev Clin Orthod Dental Press*. 2018; 17(3): 79– 92.
3. Wilson GNR and coll. Total arch maxillary distalization using infrazygomatic crest miniscrews in the treatment of Class II malocclusion: a prospective study. The Angle Orthodontist (2022)
4. Jing Z, Wu Y, Jiang W, *et al.,* Factors affecting the clinical success rate of miniscrew implants for orthodontic treatment. *Int J Oral Maxillofac Implants*. 2016; 31: 835– 841.
5. Mohamed RN, Basha S, Al-Thomali Y. Maxillary molar distalization with miniscrew-supported appliances in Class II malocclusion: a systematic review. *Angle Orthod*. 2018; 88: 494– 502.

6. Papadopoulos MA. *Orthodontic Treatment for the Class II Noncompliant Patient: Current Principles and Techniques*. Edinburgh, Scotland: Elsevier-Mosby;2006.
7. Graber TM. *Current Orthodontic Concepts and Techniques*. Philadelphia: W. B. Saunders; 1969: 482–483, 527– 584.Kanomi R. Mini-implant for orthodontic anchorage. *J Clin. Orthod*. 1997; 31: 763– 767.
8. Watanabe H, Deguchi T, Hasegawa M, Ito M, Kim S, Takano-Yamamoto T. Orthodontic miniscrew failure rate and root proximity, insertion angle, bone contact length, and bone density. *Orthod Craniofacial Res*. 2013; 16: 44– 55.
9. Lima A Jr, Domingos RG, Cunha Ribeiro AN, Rino Neto J, de Paiva JB. Safe sites for orthodontic miniscrew insertion in the infrazygomatic crest area in different facial types: a tomographic study. *Am J Orthod Dentofacial Orthop*. 2022; 161(1): 37– 45.
10. Park JH, Kook Y, Kim Y, Ham LK, Lee N. Improved facial profile with nonextraction treatment of severe protrusion using TSADs. Semin Orthod. 2022;28(3):157–63.
11. Rosa WGN, Almeida-Pedrin RR, Oltramari PVP, Conti ACFC, Poleti TMFF, Shroff B, et al. Total arch maxillary distalization using infrazygomatic crest miniscrews in the treatment of class II malocclusion: a prospective study. Angle Orthod. 2023;93(1):41–8.
12. Matias M, Flores-Mir C, Almeida MR, Vieira B, Freitas K, Nunes D, et al. Miniscrew insertion sites of infrazygomatic crest and mandibular buccal shelf in different vertical craniofacial patterns: a cone-beam computed tomography study. Korean J Orthod. 2021;51(6):387–96.
13. Zhang L, Guo R, Xu B, Wang Y, Li W. Three-dimensional evaluation of maxillary tooth movement in extraction patients with three different miniscrew anchorage systems: a randomized controlled trial. Prog Orthod. 2022;23(1):46.
14. Oh YH, Park HS, Kwon TG. Treatment effects of microimplant- aided sliding mechanics on distal retreaction of posterior teeth. *Am J Orthod Dentofacial Orthop*. 2011; 139: 470– 481.
15. Bechtold TE, Kim JW, Choi TH, Park YC, Lee KJ. Distalization pattern of the maxillary arch depending on the number of orthodontic miniscrews. *Angle Orthod*. 2013; 83: 266– 273.
16. Lee SA, Chang CCH, Roberts WE. Severe unilateral scissors-bite with a constricted mandibular arch: bite turbos and extra-alveolar bone screws in the infrazygomatic crests and mandibular buccal shelf. *Am J Orthod Dentofacial Orthop*. 2018; 154(4): 554– 569.
17. Park HS, Lee SK, Kwon OW. Group distal movement of teeth using microscrew implant anchorage. *Angle Orthod*. 2005; 75: 602– 609.
18. Alessandro S , Renata R. Biomechanical analysis of total arch maxillary distalization using infrazygomatic crest miniscrews: a finite element analysis study. Progress in Orthodontics , 2024.