



Case report

## **OPEN BITE WITH SKELETAL CLASS III RELATIONSHIP TREATED USING OF CLEAR ALIGNER: A CASE REPORT**

F. De Gregorio<sup>1\*</sup>, R. Napolitano<sup>1</sup>, K. Ferati<sup>2</sup>, A. Palermo<sup>3</sup>, A. Mancini<sup>4</sup>, E. Xhajanka<sup>5</sup> and A. Napolitano<sup>6</sup>

<sup>1</sup>Multidisciplinary Department of Medical-Surgical and Dental Specialties, University of Campania Luigi Vanvitelli, Naples, Italy; <sup>2</sup>Faculty of Medicine, University of Tetovo, Tetovo, Macedonia; <sup>3</sup>College of Medicine and Dentistry, Birmingham, UK; <sup>4</sup>Interdisciplinary Department of Medicine, University of Bari “Aldo Moro”, Bari, Italy; <sup>5</sup>Medical University of Tirana, Rruga e Dibrës, Tirana, Albania; <sup>6</sup>U.O.C. of Maxillo-Facial Surgery, San Sebastiano and Sant’Anna Hospital, Caserta, Italy

*\*Correspondence to:*

Franca De Gregorio, DDS  
Multidisciplinary Department of Medical-Surgical and Dental Specialties,  
University of Campania Luigi Vanvitelli, 80138 Naples, Italy  
e-mail: francamacgregorio@gmail.com

### **ABSTRACT**

This study reports the case of a female patient aged 32 affected by an open bite with skeletal class III. She had never been treated due to the fear of any surgical solution and multiple concerns about wearing fixed appliances that may negatively impact her life quality. A non-extraction treatment with clear aligner (CA) was done.

The aim of this case report was to describe this orthodontic treatment focusing on the diagnosis and the possibility of improving the biomechanics using CA.

**KEYWORDS:** *progenism, mandible, maxilla, treatment, orthodontic*

### **INTRODUCTION**

In an adult with open bite and skeletal class III, the first choice is a surgical treatment. In the reported case, orthodontic-orthognathic treatment would have been successful and provided good stability. Since the patient refused the surgical option, a non-surgical treatment was considered. Literature supports this option because both surgical and non-surgical treatments can close open bites, and the stability is above 75% with both treatments (1–5). The patient also desired an aesthetic appliance not to compromise her social relationships. Therefore, there was just one option: treatment with a clear aligner (CA). CAs could offer a more aesthetic and invisible approach.

Moreover, it is conceivable that patients treated by CAs had less psychological discomfort than those treated by other fixed appliances in the upper and lower arches at different ages (6–16). In the literature, articles are published about open bite cases treated successfully using clear aligners (17, 18). This kind of treatment represents a valuable tool for correcting open bite and mild third class after a proper diagnosis (17).

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The aim of this case report was to describe the orthodontic treatment in an adult with open bite and skeletal class III, focusing on the possibility of biomechanics using CA and deciphering the advantages and disadvantages.

## CASE REPORT

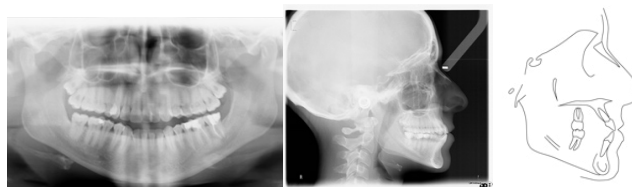
The patient, a 32-year-old woman, came to the Dental Clinic with the desire to improve her smiling aesthetic. She was in the permanent dentition status with dentoskeletal open bite and skeletal class III relationship. The intraoral examination showed an Angle class I on the left side and an Angle class II first molar relationship (1/2 unit) on the right side. The overbite was negative (Overbite: -1). Anterior and lateral overjet were reduced, and the upper midline was deviated by 1.5 mm on the left side. Lower and upper jaws have mild crowding with the dystopia of upper wisdom teeth. Extraoral examination showed a symmetrical face with an excess of the lower third of the face. The profile was straight. The examination showed a reverse smile arch, crowding, dental open bite, and midline deviation. There was a dental plaque and a thin gingival tissue biotype (Fig. 1).

The panoramic X-ray highlighted the presence of all permanent teeth except the lower wisdom teeth. The cephalometric analysis revealed a skeletal class III (AN/Pg:  $-2^\circ$ ) with a hypodivergent pattern (SN<sup>^</sup>GoGn:  $38^\circ$ ) and upper incisors proclination (I-ANS-PNS:  $126^\circ$ ) to compensate for the skeletal class III (Fig. 2).

Finally, the intraoral scans were performed, and both arches' digital casts were obtained. The patient did not receive any previous dental or orthodontic treatment. The medical history did not report any temporomandibular disorders or systemic pathologies, while she presented atypical swallowing and altered tongue position.



**Fig. 1.** *Initial records*



**Fig. 2** *Initial X-rays*

### Objectives

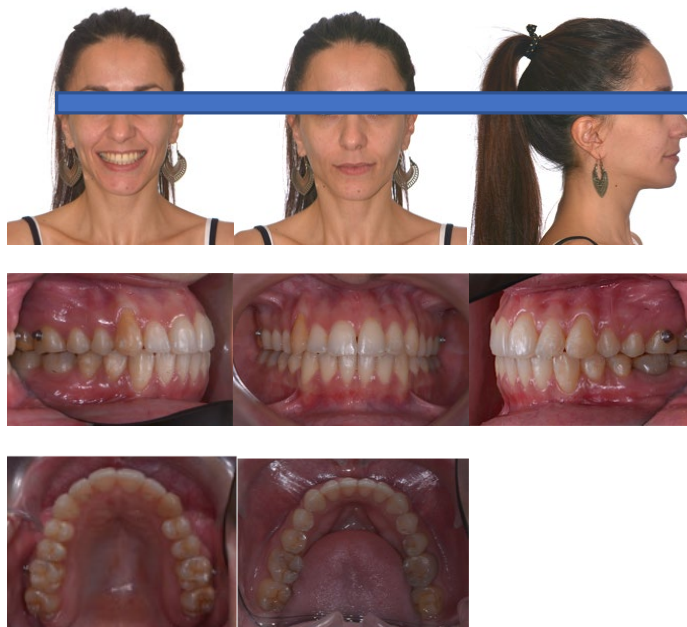
In agreement with the patient, the treatment objective was to close the open bite. In the literature, the open bite closure with CAs can be achieved thanks to a combination of maxillary and mandibular incisor extrusion and maxillary and mandibular molar intrusion, leading to mandibular rotation and reduction in anterior facial height. The closure of the open bite by performing an anterior incisors extrusion can affect the long-term results. Incisor extrusion and molar intrusion determine the mandibular counterclockwise rotation and higher stability; this is an advantage for CAs due to the thickness of the material covering the posterior teeth and the bite forces exerted by the patient. Otherwise, the fixed appliances do not obtain vertical control, or some appliances even extrude posterior teeth and determine a worsening of the facial aesthetic (19, 20).

Maxillary and mandibular incisors were significantly retracted during the treatment to achieve a good anterior intercuspation (21) the mechanism of anterior open bite closure using clear aligners (Invisalign, Align Technology, Santa Clara, CA, USA), and this movement was efficient because when CAs “push the teeth, they are not pulled simultaneously.”

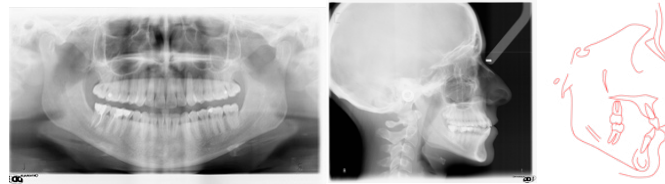
In order to improve the lateral overjet, an expansion was planned with CA, and it could be considered a slow maxillary expansion (22). We had an objective of 2 mm of upper lateral expansion on each side to improve the lateral overjet and obtain a change of arch form. Distalization to gain an Angle class I on both sides and to solve the crowding after the extraction of upper wisdom teeth was also planned. The movement of upper molars when a distalization movement of at least 1.5 mm bodily can realize by using CAs (23). Intermaxillary elastics were used to have a dentoalveolar compensation to the malocclusion of skeletal class II. During this research, all operators wore surgical masks to prevent the respiratory system virus (24) and maintain office hygiene (25).

### RESULTS

All goals were achieved, and the occlusal, functional, and esthetic results were satisfactory. The outcome was rewarding for the clinicians and appreciated by the patient. A class I relationship on both sides was obtained with a correct overjet and overbite, centered midline, and a good alignment, with good coordination of the arches. Extraoral records showed nice esthetics with a full pleasant smile with a correct smile arch. The panoramic x-ray showed good root parallelism on both arches and no root resorption. The skeletal values were corrected, with an improvement of all the values: a skeletal class I was achieved with a good upper and lower incisor inclination; the overjet and the overbite showed average values, and the gingival tissue remained stable without any recessions. The patient’s compliance with CAs and elastics was high and contributed to this outstanding achievement. Invisalign® CAs were used (Fig. 3-4).



**Fig. 3.** *Initial records*



**Fig. 4** Initial X-rays

## DISCUSSION

Cephalometric superimposition on the cranial base showed excellent final results. Specifically, the following dental movements were obtained: distal movements of posterior teeth without extrusion, extrusion and retraction of upper and lower incisors, and dentoalveolar compensation with an improvement of skeletal class III to skeletal class I. No change in vertical values was reported, as expected in adult patients (26).

Regarding the literature, several issues are controversial. The evaluation of oral and general health is recommended for potential medical problems before and during the orthodontic treatment (27-30). Methodological problems have always to be considered: small sample size, bias and confounding variables, lack of method error analysis, blinding in measurements, and deficient or missing statistical methods (1).

## CONCLUSIONS

Treatment of an adult with open bite and skeletal class III using CAS needs a good diagnosis to evaluate the severity of malocclusion properly, plan the treatment using all orthodontic tools, and discuss them with the patient to improve his/her compliance during the whole treatment.

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