# Deep bite and dental crowding in a growing patient treated using invisalign first: a case report

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## Abstract

**Aim: the aim of this case report is to confirm that Invisalign First system is an optimal and effective therapeutic choice in growing patient with deep bite and dental crowding.**

**Keywords:** Invisalign First, deep-bite, dental crowding, growing patient.

## Materials and Methods

R.P., 7 years old, male, showed a dentoskeletal Class I relationship with dental crowding in both maxillary and mandibular arches, inadequate space for the eruption of 1.2 e 4.2, mesial rotation of 1.6 and 2.6, coincident midline and increased overbite.
The treatment plan lasted 12 months and provided an esthetic orthodontic approach using Invisalign First system to expand and restore arches form, to recover space for the 1.2 and 4.2 eruption, to obtain crowding resolution, and manage space for elements 1.3, 2.3, 3.3 and 4.3 eruption.
Pre- and post-treatment records are presented.

## Results

At the end of the active therapy, functional occlusion with Class I molar relationship was maintained, space was created for the 1.2 and 4.2 eruption and dental crowding was solved in both arches. Spaces of 0.1 millimeters mesial and distal the upper and lower deciduous canines were opened for the later eruption of the permanent canines as evident in the OPT. Good intercuspation was achieved and midlines were maintained coincident.

## Conclusion

In the presented case report Invisalign First system combined with an appropriate treatment staging is a valid strategy to solve orthodontic issues such as dental crowding, arch forms, and space loss for normal dental eruption. Furthermore, a good esthetic, proper oral hygiene and stable results were obtained using Invisalign First system.

## INTRODUCTION

### Case report

This case report describes a growing male patient with dentoskeletal class I, dental crowding and inadequate space for of 1.2 e 4.2 eruption, treated successfully with aligners.

## MATERIALS AND METHODS

### Diagnosis and etiology

A 7-year-old growing Caucasian male presented for treatment with a chief complaint of absence of 1.2 and 4.2. The general medical history was negative for illness and allergy. The patient did not receive any previous orthodontic treatment and clinical examination showed no sign of bad habits. Extra-oral photos (Fig. 1) and frontal and lateral examination revealed a facial symmetry, coincident midlines and good exposure of upper incisors. The profile had a convex aspect.
Intra-oral photos (Fig. 2) and clinical examination revealed dental class I, coincident midlines, deep- bite and dental crowding with mesial rotation of 1.6 and 2.6. Periodontal biotype and oral hygiene were good.
At intra-oral evaluation, the patient showed inadequate space for 1.2 and 4.2 eruption; uncoordinate upper and mandibular arches, a bilateral molar and canine Angle Class I relationship, increased overbite and ideal overjet (Figure 2).
Lateral cephalometric radiographs and panoramic radiography were obtained and analyzed. The panoramic radiography (Figure 3A) revealed an early mixed dentition with the absence of tooth developmental anomalies of number, size, shape and structure, a lack of bone defects, no infection, no temporomandibular joint abnormalities and inadequate space for the eruption of 1.2 and 4.2.
According to Steiner's cephalometric analysis [1], Lateral cephalometric radiograph (Fig. XX) showed skeletal Class I relationship (ANB= 3°; Wits= -2 mm) and a normodivergent growth pattern (SN^GoMe=36°; FMA=26°). Maxillary incisors were normally inclined (INC-SUP^PF=106°) and mandibular incisors had a correct inclination (IMPA=90°). Overbite was increased at the beginning of treatment (OVB= 6) and overjet had ideal values. (OVJ=4mm) as reported in Table 1.
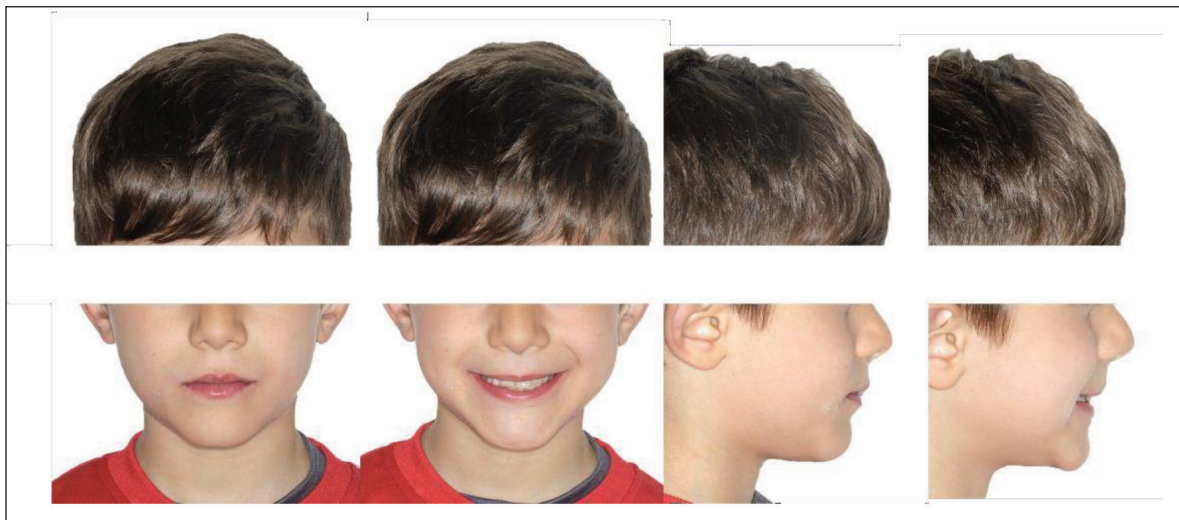
**Figure 1.** Extra-oral photos before the treatment.



**Figure 2.** Intra-oral photos before the treatment.

**Table 1.** Cephalometric analysis before the treatment.

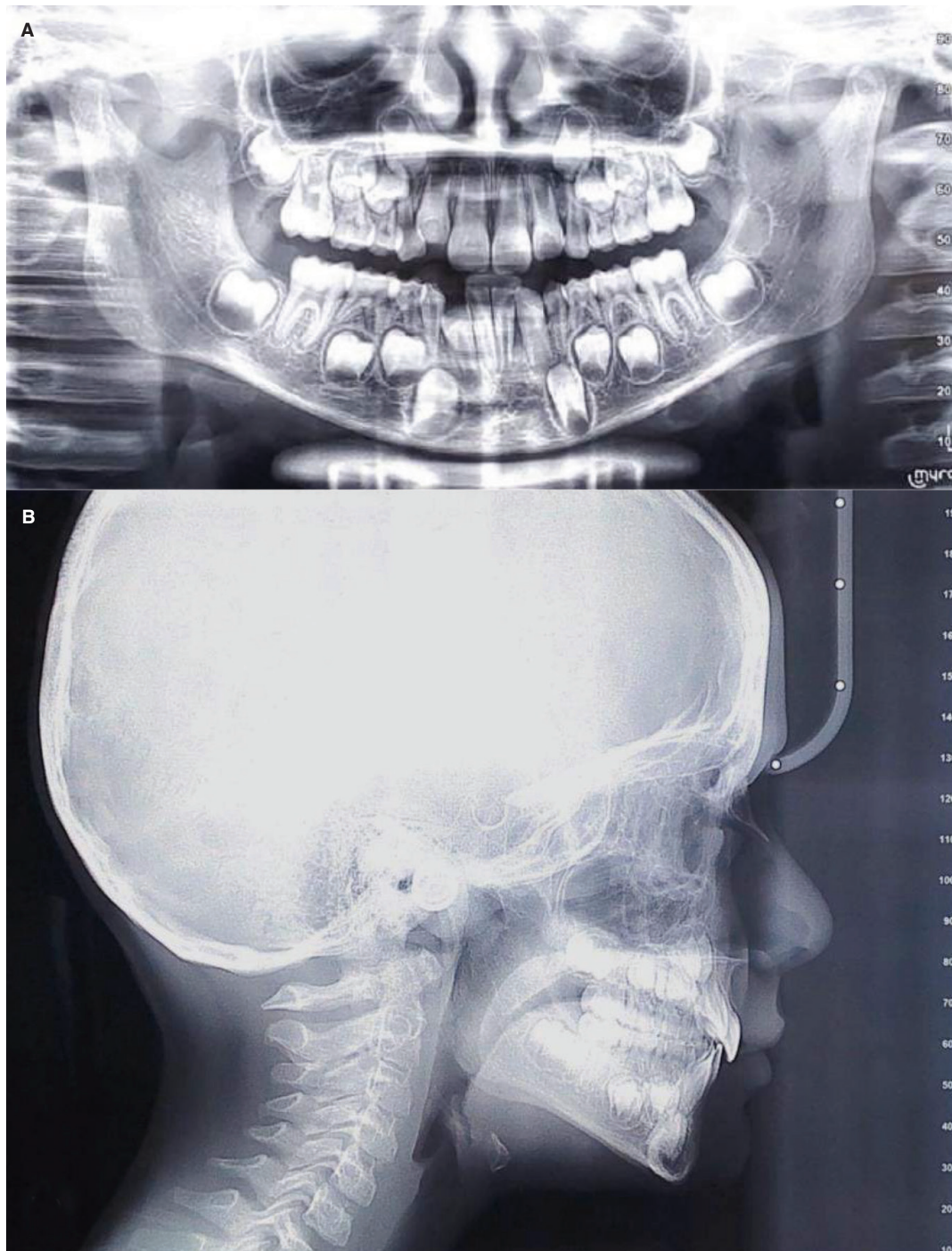| | T1 | V.N. |
|---|---|---|
| **SAGITTAL SKELETAL RELATIONSHIP** | | |
| SNA° | 77 | 82 +/- 2° |
| SNB° | 74 | 82 +/- 2° |
| ANB° | 3 | 2 +/- 2° |
| WITS | -2 | 0 +/- 2 mm |
| **VERTICAL SKELETAL RELATIONSHIP** | | |
| FMA° | 26 | 25 +/- 3° |
| SN/Go-Me° | 36 | 33 +/- 5° |
| SN/ANS-PNS° | 9 | 7 +/- 3° |
| ANS-PNS/Go-Me° | 28 | 28 +/- 6° |
| ArGoMe° | 128 | 130 +/- 7° |
| **DENTAL BASE RELATIONSHIP** | | |
| U1/PF | 106 | 105-110° |
| IMPA | 90 | 94 +/- 5° |
| L1/A-Pg | 2 | 2 +/- 2 mm |
| OVB mm | 4 | 2,5 +/- 2,5 mm |
| OVJ mm | 4 | 2,5 +/- 2,5 mm |

**Figure 3.** Panoramic radiography (A) and lateral cephalometric radiography (B) before the treatment.

According to the Cervical Vertebral Maturation method [2], the patient was in a prepubertal phase without completing his craniofacial growth (between CS1- CS2) (Figure 3B).

### Treatment goals

The primary objective was expansion and restoration of arch forms, space recovery for the eruption of 1.2 and 4.2, management of space for the eruption of permanent canines, resolution of crowding and obtain ideal overbite using Invisalign First system.

### Treatment progress

The Invisalign ClinCheck plan dictated 35 aligners for each arch. To achieve expansion and restoration of arch forms, the plan involved a sequential expansion with "molars move first" staging planning [3-5]. The plan also involved arches alignment and deep bite resolution. In order to achieve correct alignment and valid intercuspation, Invisalign attachments were planned, while no IPR was requested in the treatment plan. The patient was instructed to wear each aligner 22/h per day and to move on to the next one in the series after 7 days.
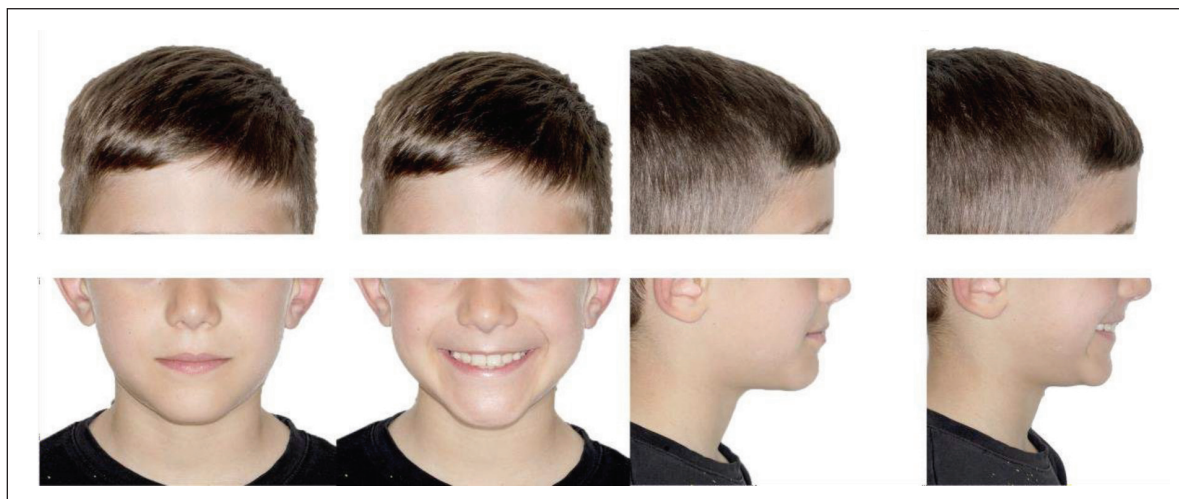
**Figure 4.** Extra-oral photos after the treatment.



**Figure 5.** Intra-oral photos after the treatment.

## RESULTS

The overall treatment lasted 12 months and included 35 aligners. The treatment objectives had been successfully fulfilled (Figure 4 and 5), although it will be necessary to plan an Invisalign Phase II treatment for detailed finishing of the case. Follow-up panoramic radiography showed good position of 1.3, 2.3, 3.3 and 4.3 (Figure 6A).

Post-treatment lateral teleradiograph showed that the treatment guaranteed the initial skeletal and aesthetic values with and improvements of dental values (Table 2 and Figure 6B).

· **Skeletal outcomes**: cephalometric analysis confirmed the skeletal Class I relationship (ANB=3°, Wits=-2mm). The patient presented a properly sagittal position between the maxillary and mandible with the maintenance of the FMA angle at the end of treatment (FMA=26°);

· **Dental outcomes**: the dental cephalometric analysis revealed the maintenance of the inclination of the upper and lower incisors, a proper overjet (OVJ=3mm) and the overbite improvement (OVB =3mm). The mandibular incisors inclination remained stable at the end of treatment (IMPA=90°);

· **Aesthetic outcomes**: the soft tissue changes involved a good profile with the jaws proportionately positioned in the sagittal plane. On a frontal view the patient showed an ideal smile arc.

## DISCUSSION

In this clinical case, a functional occlusion with Class I molar relationship was obtained, space was created for the element 1.2 and 4.2, crowding was solved in both arches. Spaces were opened for the later eruption of the permanent canines as evident in the panoramic radiography. Good intercuspation was achieved and midlines were coincident. Good esthetic and stable results were obtained only using Invisalign First protocol.

Orthodontic developments, particularly in recent years, were accompanied by an important increase in the esthetic demands of the patients [6]. Since 1990, Invisalign® technology has become recognized throughout the world as an esthetic alternative to the fixed appliances [7]. This system uses impressions or intraoral scans which are converted through stereolithographic technology (.stl) into virtual models and then launched with the ClinCheck software: a three-dimensional modeling program that allows a virtual simulation of teeth movements. A series of aligners is then produced in order to gain the needed corrections [8]. After its launch, the system was greatly improved in several ways: new attachment designs and new materials [9].

Most recently, Invisalign First package was presented to the public, for the treatment of the malocclusions in growing patients.

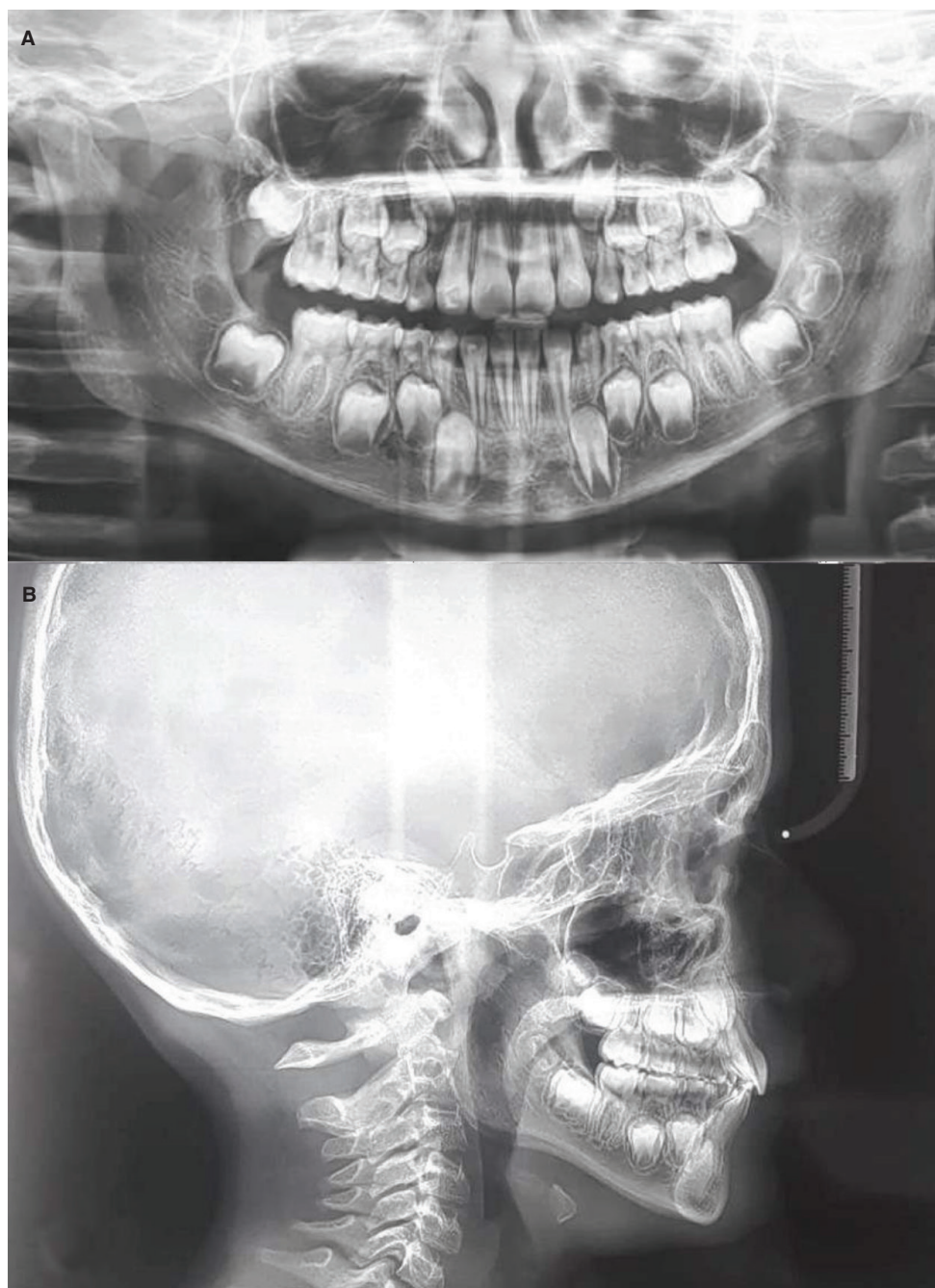Early orthodontic treatment in mixed dentition is recom-

**Figure 6.** Panoramic radiography (A) and lateral cephalometric radiography (B) after the treatment.

mended to reduce or even eliminate the need for further orthodontic treatment, preventing problems or functional anomalies [10-12].

Orthodontic clinicians are frequently challenged to promptly identify and handle early signs of malocclusion that, if left untreated, could lead to the development of a more severe malocclusion with skeletal compromise and temporomandibular symptoms [10].

Nowadays, the employment of clear aligners (CA) is increasingly being considered over other treatment strategies as aesthetics, comfort and oral hygiene are greater than that of conventional fixed appliances [13-14].

In fact, as concerns the patient's experience, it is believed that the impact of clear aligners treatment (CAT) on daily activities (oral symptoms, functional limitations) is less than that of a multi-bracket treatment, especially in the first 6 months of therapy [15]. This innovative treatment enables young patients to attend all their school and social activities with no aesthetic limitations. In addition, CA is a removable device which allows optimal oral hygiene along with meticulous oral care. CAT prevents the deterioration of periodontal status, tooth decalcification during orthodontic treatment and speech disorders due to the bulkiness of the removable appliance [16].

## CONCLUSIONS

This case report confirms that Invisalign First system is an optimal and effective therapeutic choice in growing patient with deep bite and dental crowding.

**Table 2.** Cephalometric analysis after the treatment

| | T1 | V.N. |
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| **SAGITTAL SKELETAL RELATIONSHIP** | | |
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| OVJ mm | 3 | 2,5 +/- 2,5 mm |

The treatment objectives had been successfully fulfilled maintaining esthetics and proper oral hygiene although it will be necessary to evaluate if II phase treatment in order to detail finishing of the case.

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