Original Article

ORTHODONTIC TREATMENT OF A CLASS I MALOCCLUSION WITH AGENESIS AND IMPACTION OF THE MANDIBULAR LATERAL INCISORS

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ABSTRACT

Dento-maxillary disharmony is a very common anomaly, often presenting aesthetic, occlusal, periodontal, and functional damage. The management of severe (DMD) cases often requires extractions of premolars and/or molars; however, certain clinical situations, such as agenesis and impactions of the incisors, require other extraction decisions. The extraction of incisors for orthodontic reasons is a therapeutic option that must remain exceptional in the context of a compromise treatment because the risks are not negligible. It is often a delicate choice with significant aesthetic and occlusal consequences. We will illustrate this by the case of a young patient who presented to the dentofacial orthopedics department at the CCTD for consultation with an ectopic maxillary canine. The clinical and radiographic examination showed that it was a Class I DDM case with the inclusion of the 32 and agenesis of the 42. The orthodontic decision consisted of a multi-bracket treatment with the extraction of the 14, 24, and 32 and coronoplasty of the canines and lower premolars. The management of space and occlusion made it possible to achieve a good aesthetic and functional result.

Key words: Impacted, Agenesis, Lower incisors, Orthodontics.

Introduction

One of the most common dental anomalies observed in daily practice is agenesis [1]. It frequently makes treatment more complicated and requires treatment compromises [2].

The management of severe (DMD) cases often requires extractions of premolars and/or molars; however, certain clinical situations, such as agenesis and impactions of the incisors, require other extraction decisions.

If the diagnosis confirms that extraction is necessary, the selection of proper teeth for extraction must be based on a systematic examination of various important elements of the malocclusion [3].

For the proper treatment of patients with incisor agenesis, we must choose the best possible compromise, functional and aesthetic, while having a long-term vision. This choice relates to the opening or closing of space agenesis, and many criteria must be taken into account to help make the decision [4].

Patients with tooth agenesis can have dental anomalies such as peg-shaped incisors, taurodontism, transposed teeth, supernumerary teeth, and ectopic eruption [5-8], which can complicate the therapeutic decision.

Presentation of the case

History

A 15-year-old Female patient was presented to the dentofacial orthopedics department in Rabat, Morocco, . The main complaint is functional and aesthetic alteration due to maxillary and mandibular malocclusion. Her general health was good, and she had no medical or family history.

Assessment

Facial examination showed a proportional and symmetrical face **(Figure 1a)**; analysis of the smile showed deviation of the interincisal median 3mm from the midline sagittal plane and ectopia of the right upper canine **(Figure 1b)**. The patient had a convex profile with a slightly open nasolabial angle **(Figure 1c)**.

a) b) c)

Figure 1. Pretreatment facial image;a: Frontal extraoral view, b :Frontal smiling view demonstrating an unaesthetic smile due to ectopic eruption of the canine. c : Profile view demonstrating a slightly increased nasolabial angle.

a) b) c)

d) e)

Figure 2. Intraoral pretreatment photographs; a:Right lateral occlusal view showing a Class III molar relationship, b :Frontal view showing midline deviation, c : Left lateral occlusal view demonstrating a Class I occlusal relationship, d : Occlusal view of the maxilla demonstrating a deviation of the upper dental midline toward the right side, e : Mandibular occlusal view showing absence of the lower lateral incisors

According to the clinical assessment, the patient had good oral hygiene **(Figure 2)**

The intraoral evaluation identified ectopia of the right upper canine in the maxilla **(Figures 2a and 2b)**.

An inferior lateral incisor was missing, and diastemae were seen between the left lateral incisor and the canine, and between the right canine and the premolar in the mandibular arch **(Figure 2e)**.

The inter-arch relationships were a Class I relationship of molars and left canine, right occlusion cl III **(Figures 2a and 2c)**.

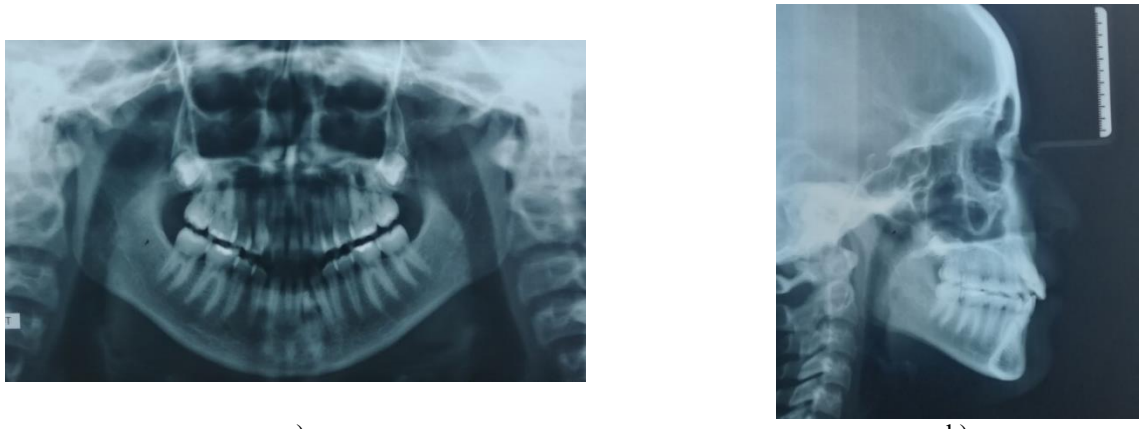
Cephalometric examination showed a skeletal Class II by maxillary prognathism, tendency towards, anda hyperdivergent skeletal pattern profile **(Table 1)**.

The panoramic radiograph **(Figure 3)** reported the impaction of the mandibular left lateral incisor and the absence of the mandibular right lateral incisor. To further evaluate the severity of impaction and the relationship of the impacted lateral incisor to the adjacent teeth, a cone beam computed tomography (CBCT) examination was performed. The cross-sectional images revealed a deeply impacted left lateral incisor located in an intermediate position with slight vestibular displacement. As shown in **(Figure 4a)**, the tooth exhibits an abnormal oblique

orientation and a deep intraosseous position. **(Figure 4b)** illustrates its intermediate location within the alveolar bone and its close relationship with adjacent teeth.

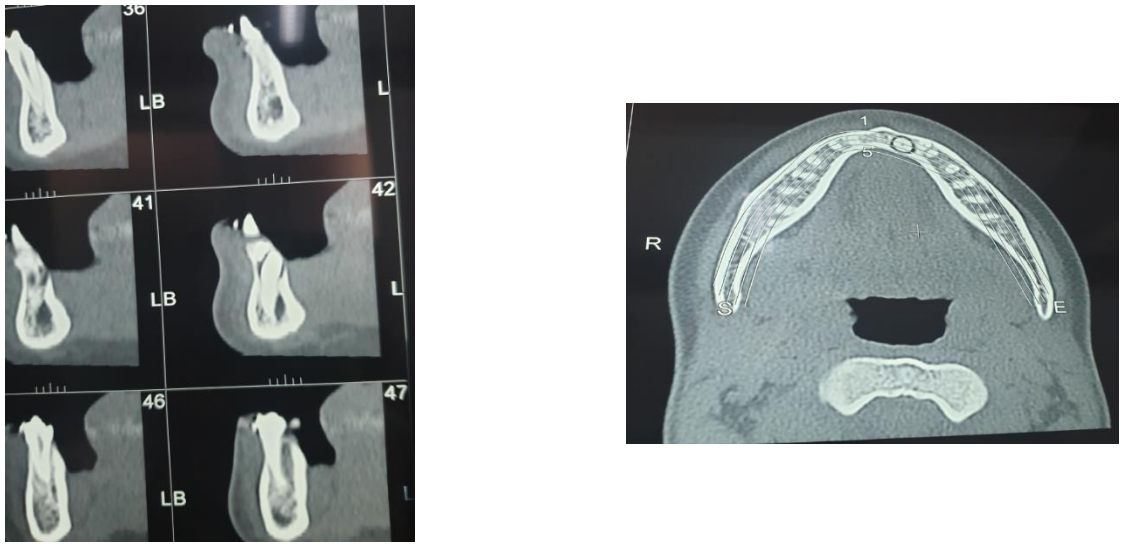
Table 1. Pretreatment and posttreatment, cephalometric measures

Cephalometric analysis	T1	T2
SNA	87°	85
SNB	82°	81°
ANB	5°	4°
AoBo	0 mm	2 mm
I/NA	22°	25°
I to NA	3 mm	2 mm
I/NB	25°	22°
I to NB	4 mm	3 mm
GoGN/SN	34°	34°
Pog to NB	0 mm	0 mm



a) b)

Figure 3. Pretreatment a) panoramic and b) cephalometric radiographs.



a) b)

Figure 4. CBCT images of the impacted mandibular left lateral incisor: (a) sagittal view showing deep impaction and oblique orientation; (b) axial view showing an intermediate position with slight vestibular displacement.

Treatment

Treatment objectives

The treatment objectives were to relieve crowding of the maxillary and mandibular teeth in the presence of agenesis of 42 and impaction of 32**,** guide the ectopic maxillary canine toward the arch, and correct the maxillary dental midline. Occlusal objectives were a stable Class I canine and molar relationship and to obtain an ideal overbite and overjet.

Plan

Several types of options were assessed in an attempt to achieve all therapeutic goals.

Non-EXTRACTION treatment was not considered due to the severe upper and lower crowding and the question of long-term stability.

Considering the impaction of the 32 and the agenesis of the 42. The extraction therapy includes the extraction of the 14, 24, and 32, with A coronoplasty of (33, 43) and (34, 44).

Progress

The treatment was initiated by bonding all teeth. Nickel-titanium archwires (14, 16, 16x 22, and 17x25) were positioned for initial alignment and leveling.

An open coil spring was employed in order to make more space for the upper right canine.

After activation of the coil spring, the upper right canine was bonded, and a Nickel-titanium archwire sectional was used between the lateral incisor and the premolar for traction of the canine. Two force vectors were added for extrusion and distalization **(Figure 5a)**, in parallel with class II elastics on the left side for the correction of the canine class II relationship.

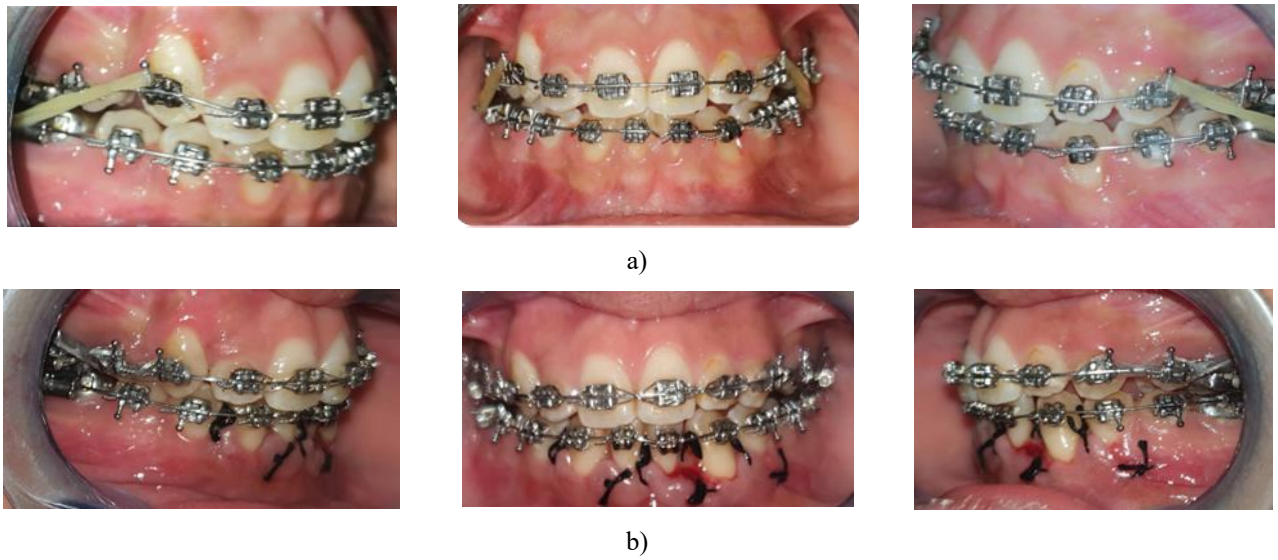
Once the upper right canine is in place, the retreat of the upper left canine is initiated by an elastic chain on a steel arch [9-17]. In parallel, the extraction of the impacted lower lateral incisor was scheduled after closure of the diastemas in the lower anterior region **(Figure 5b)**.

To correct the deviation of the upper interincisal median, the patient was instructed to wear a class I elastic on the right side and a class II on the left side associated with an anterior elastic.

After correction of the deviation of the upper interincisal median, an 18 x 25 stainless steel loop arch wire was then employed to retract the maxillary incisors, accompanied by the wearing of elastics for the correction of residual class II on the left side.

On the left side, there remained a canine class II relationship even though the patient showed good compliance with Class II elastic use.

Post-treatment panoramic radiographs demonstrated adequate root parallelism and showed no evidence of root resorption or other radiographic complications **(Figure 6a)**.



a)

b)

Figure 5. Intraoral photographs showing treatment Progress, a: Views showing the upper right canine's extrusion progress using a class II elastic, b: Progress of treatment after the extraction of 32 (impacted teeth).

a) b)

Figure 6. Progress radiograph and a: Panoramic radiograph illustrating adequate root parallelism with no signs of root resorption; b: Lateral cephalometric radiograph illustrating an adequat interincisal angle

Treatment results

The goals of treatment were accomplished with significant esthetic and functional results **(Figures 7a and 7b)**, due to beneficial growth and high patient compliance with elastic wear.

The patient's chief complaint was addressed by bringing the ectopically erupting upper left canine into occlusion and closure of the lower diastemas after extraction of the impacted lower incisor.

Following the placement of both upper and lower fixed appliances, the conventional mechanical technique for space closure in the mandibular arch was performed, with a slight lingual root torque applied to teeth (33, 43, 34, 44) to correct the dental axis. The inferior canines have been cosmetically masked as the incisors with restorative dentistry procedures.

Our decision to use the space closure treatment considered the improvement of orthodontic results by combining properly detailed orthodontic treatment with techniques from esthetic dentistry. Despite this, the treatment remains a compromise treatment.

Class II elastics were not enough to completely correct the residual Class II dental relationship because it is due to the DDD Bolton disparity difference between the MD diameter.

a)

b)

Figure 7. Posttreatment extraoral and intraoral photographs. a: Extraoral photographs demonstrating a harmonious smile with a noticeable improvement in the facial profile after treatment. b: Intraoral photographs demonstrating optimal coordination of the dental arches with a stable and functional occlusion.

Results and Discussion

In orthodontics, the extraction of mandibular incisors is often considered a compromise treatment for the correction of specific malocclusions [18, 19]. In certain cases, lower incisor extraction may be necessary for the treatment of Class I malocclusions without Bolton disparity, particularly in cases presenting with congenital absence of mandibular incisors, severe caries, and trauma. The most basic plan of treatment for these patients would be to extract the damaged tooth or accept the congenitally missing incisor and find an alternative suitable replacement. This is the least expensive and the most conservative alternative approach [20]. Mandibular incisor extraction has been regarded as a compromise solution due to its potential adverse effects, which may include excessive overbite and overjet [18, 21], reopening of extraction spaces, suboptimal posterior occlusion, loss of interdental papillae in the anterior mandibular region, recurrence of crowding, mesial tipping of canines, lingual inclination of the remaining incisors, and insufficient alleviation of anterior crowding [12-16, 22]. While some studies suggest that mandibular incisor extraction may compromise esthetics due to maxillary–mandibular midline discrepancies [23], other reports indicate that acceptable esthetic outcomes can still be achieved despite minor midline deviations [24, 25]. Multiple studies have documented highly favorable treatment outcomes following mandibular incisor extraction when cases are carefully selected, highlighting the efficacy and predictability of this approach under appropriate clinical conditions.

In the present case, the congenital absence of one mandibular incisor combined with the impaction of the other created a clinical situation that favored a mandibular incisor extraction approach. The early mesial migration of the canines, resulting from the agenesis, allowed the alveolar bone to adapt and reorganize favorably. This adaptation overcame one of the commonly reported challenges in canine substitution, namely the limited alveolar width, which may otherwise compromise periodontal health when canines are placed in the incisor region. Regarding canine function, radiographic analysis demonstrated that the mandibular first premolars' roots were approximately the same size as the canines' roots, with enough alveolar bone and good periodontal tissues around the root. In addition, the mandibular premolar crown had a favorable shape that allowed for the acquisition of an acceptable guide for lateral excursive movements after the end of treatment [9, 17, 26-30].

When paired with the proper malocclusion, mandibular incisor extraction can be a successful therapeutic option. But before deciding on a plan of treatment, several factors must be carefully evaluated [20]. The wax-up allowed the orthodontist to confirm the predicted effectiveness of the proposed mechanics. several. In complex cases, CBCT is especially useful for guiding therapeutic decision-making and minimizing the risk of iatrogenic complications [10].

Accordingly, mandibular incisor extraction is generally considered an unconventional approach, reserved for situations where it is unavoidable or when alternative treatments are too expensive [11]. Careful case selection and diagnostic planning are therefore crucial to minimize complications and maximize treatment success.

Therefore, unless it was unavoidable or the alternatives were too expensive, this would be seen as an unconventional treatment [10].

Finally, consideration of tooth-size discrepancies is essential,, treatment with the extraction of two maxillary premolars and one mandibular incisor with the congenital missing of another incisor in an occlusal class I context can lead to certain problems because a tooth size difference higher than 1,6 mm (difference in diameters between the premolars and the mandibular incisors), it might seriously compromise obtaining the correct overjet, overbite, and Class I occlusal relationship [10]. This can explain the persistence of a slight class II malocclusion on the left side in the patient at the maxillary arch at the end of treatment.

Conclusion

In the present report, the case was treated successfully with

orthodontic space closure and transformation of the canines into lateral incisors, after extraction of the impacted lower lateral incisor

At the end of treatment, there was the correction of the lower incisor position and an improvement in chin projection. The patient was satisfied with the ultimate esthetic outcome, as was her mother. Good patient cooperation made the treatment successful.

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Ethics statement: Written informed consent was obtained from the patient for publication of this case report and the accompanying images.

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