


**CASE REPORT**

# Management of an Angulated Maxillary Central Incisor Impacted: A Case Report

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**ABSTRACT**

The inclusion of the maxillary incisors, although rare, poses even more difficulty to the practitioner who diagnoses it. This difficulty is increased in front of an angulated incisor in a labial position with the “policeman's sign”, the prognosis of orthodontic therapy being reserved. This article aims to describe a clinical case of retention of two maxillary central incisors with radicular angulation and in a vestibular position in an 11-year-old adolescent, referred in the Rabat dental consultation and treatment center. clinically, we can note the absence of the two maxillary central incisors on the dental arch, confirmed by the X-ray with the presence of obstacles on the path of the incisors which are in a very high position with angulated roots. The challenge was to put on the arch of the teeth and especially the aesthetic challenge. The satisfactory result obtained is only the result of the motivation of the patient as well as the dexterity of the practitioner. Despite the current treatment, we are comforted in our choice to treat. it is obvious for us that the only absolute contraindication to traction in the case of an impacted incisor remains dilaceration

**KEYWORDS:** Impacted teeth ; Central incisor ; dilaceration ; Orthodontics.

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**INTRODUCTION**

According to the French Orthodontic Society, a tooth is considered to be included when it is retained with its follicular sac without communication with the oral cavity at least 2 years after its normal eruption date. Although the inclusion of maxillary central incisors is rare, with an incidence ratio of 0.13% to 2.6% [1], it is even more difficult for the practitioner to diagnose it. Its management requires an overall plan integrating the final periodontal result. The practitioner must therefore anticipate the final result from the aesthetic point of view, which requires a collaboration with the surgeon. The difficulty of therapeutic decision is all the more important when the impacted incisor presents a strong angulation with or without anomaly of the crown structure, it is a question of "angulated" or "dilacerated" teeth. For a precise aetiological and morphological diagnosis in order to define the prognosis, the preoperative prescription of 3D imaging such as cone beam CT scan (CBCT) or CT Dentascanner, is recommended to specify the external morphology and structural defects of the impacted incisor, which certainly helps to establish an appropriate treatment plan.

The timing of the intervention takes into account the neighboring teeth to a great extent. Intervention will be indicated when the contralateral tooth has already erupted

for more than six months, in case of eruption failure of both central incisors for more than one year after eruption of the lower incisors, or when there is a deviation from the normal eruption sequence [2]. Our aim in this work is to present a case of central maxillary incisors in the angled maxillary incisors included in vestibular position that is being treated in our Dentofacial Orthopedics Department of the Dental Consultation and Treatment Center in Rabat. The concepts of "dilacerated" and "angulated" teeth When reading articles using the terms "dilacerated teeth", we felt it necessary to emphasize the difference between the notions of "dilacerated" and "angulated" teeth, notions that are quite different but often confusing. The so-called dilacerated tooth has a crown directed lingually to the root. On clinical examination, there is hypoplasia of the enamel surrounding the crown. Histological examination one observes a fracture termed the calciotraumatic line, often visible on X-rays and coinciding with a sharp angle in the dentine tubules. The angulated or 'sickle-shaped' teeth has a normal crown, the neck area shows no change. Vestibular root curvature results from a gradual change in the direction of root development: there is no calciotraumatic line. The pathognomonic sign is the orientation of the crown upwards and forwards, with the

free edge in contact with the vestibular cortex or intruding into the vestibule, with the palatal surface visible in frontal view. [3]

### ETIOLOGY OF "ANGULATED" AND "DILACERATED" TEETH

Classically, among the aetiologies of dental inclusion, we distinguish primary causes (anomaly of germ position and ankylosis) and secondary causes (obstruction of the eruption path and traumatic sequelae). In the case of "angulated" or "dilacerated" teeth, dental trauma is the most incriminating. A traumatism in temporary teeth can slow down or even completely prevent the continuation of its evolution. Thus, impacted teeth with a history of trauma in temporary dentition often present dysmorphic or ectopic localizations that complicate their management [4]. The consequences of the shock depend on the respective stages of maturation of the temporary and permanent teeth, the position of these two teeth in relation to each other and the direction of the shock [3]. Thus, the more immature the temporary tooth is, the weaker the dento-alveolar fibrillar anchorage is, and therefore, the greater the periodontal repercussion (comminution, dislocation, intrusion, extrusion).

- When the trauma is very early, between one and three years, the repercussion at the level of the enamel leads either to an enamel hypoplasia or to a bursting of the embryonic structures, at the origin of multiple odontomas, or even, a little later in the maturation of the permanent germ, to a plication of the dental tissues in formation [5].

- Between two and four years of age, intrusion is the most common displacement of the temporary incisor. At this stage, with the enamel organ being formed, traumatic intrusion of the temporary incisor will cause the germ to rotate in its crypt. The germ continues to build up its roots, and the adaptation of the Hertwig sheath to the surrounding structures is manifested by the formation of a root curvature, which leads to corono-radicular angulation [5].

In view of all this, a precise diagnosis of such a structure cannot be made on conventional two-dimensional radiographs, especially in the vestibulo-lingual plane, which is an inherent limitation of radiography. To overcome these limitations, three-dimensional radiography is recommended to assist in preoperative diagnosis and optimal treatment planning [6,7]

### CASE PRESENTATION

B O, an 11-year-old Moroccan boy, was referred to the dentofacial orthopedic service of the Dental Consultation and Care Center (CCDT) linked to Mohammed V University in Rabat, Morocco. His reason for consultation is essentially aesthetic due to the absence of the two permanent central incisors. Medically, the patient's history revealed a good general health. The patient's parents described a trauma at his young age. At the endobuccal examination, an anterior diastema between the two upper lateral incisors could be noted due to the absence of the maxillary permanent central incisors. The patient had permanent teeth in class I right and left molar and class II canine teeth in the occlusal plane with a transverse deficit of the endo-alveolar type.

The dento-maxillary dysharmony resulted in a fracture of the arch shape at the mandibular level with a significant

spee curve. The incisors are in vestibular version causing an infraclusion at the level of the incisors. The mandibular wisdom teeth are blocked at the neck of the second molars [Fig. 3]. The panoramic radiograph confirmed the inclusion of both incisors due to the presence of two supernumerary teeth [Figs. 4 A and B].

The position of the maxillary central incisors is very high below the nasal floor. Lateral cephalometric radiograph [Fig 5], showing a horizontally displaced tooth, with its crown turned into a vestibular shape, and its incisal tip just below the floor of the nose. In contrast to the Crown, root limits and cephalometric cannot be defined on the radiograph. Routine cephalometric analysis confirmed a Class I skeletal base with posterior rotation of the mandible.

As prescribed in the literature, it is obvious that a 3D radiograph would have allowed a more precise diagnosis of the incisor situation in order to facilitate the choice of the best therapeutic means. However, the economic situation of the patient being precarious and faced with the psychological compromise, we had to abandon the idea. Nevertheless, the patient was informed of the risks involved and committed to not pursuing the procedure in case of any failure.

### ALTERNATIVES AND TREATMENT OBJECTIVES

The following treatment options have been considered.

1. Surgical removal of both included incisors and restoration with prosthesis or implant after opening the orthodontic space when growth has stopped.
2. Opening of the orthodontic space, uncovering the tooth using the closed surgical technique and orthodontic traction of the tooth in correct alignment.

The treatment options were explained to the parents and it was decided to try to bring the tooth into alignment.

### PURPOSE OF TREATMENT

The objectives of the treatment are:

- Removal of the obstacles that are the supernumerary teeth
- Surgical exposure of the two permanent central incisors;
- orthodontically aligning the two incisors in the occlusal plane;
- establishment of a Class I incisor and canine relationship;
- maintenance of the coincidence of the upper and lower incisal midlines.

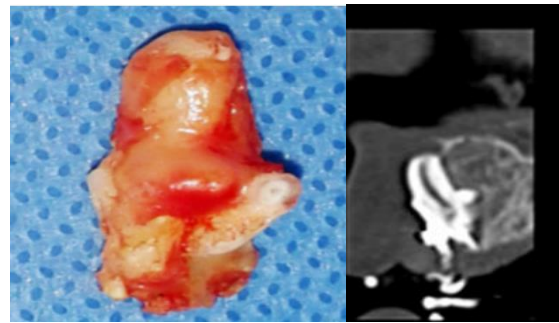
### TREATMENT PLAN

After discussing the possible treatment alternatives, we agreed with the parents to opt for placing the included incisors on the arch of the incisors. The treatment plan consisted of

- Removal of the obstacles of supernumerary teeth. The surgeon performed a closed surgery to remove the obstacles and put the traction buttons on the arch of the two permanent incisors.
- Extraction of the first four premolars for correction of occlusal crowding and ratios
- An orthodontic treatment that allowed the teeth to be aligned and a functional occlusion to be established. Aesthetic results were immediate.



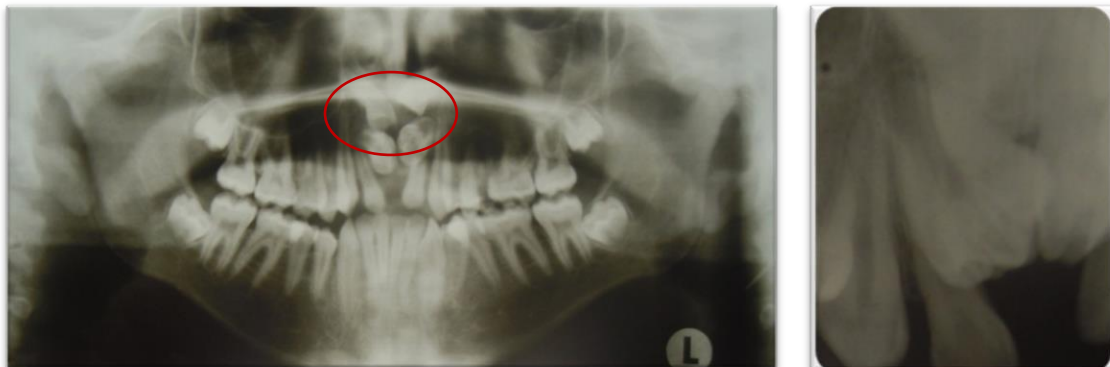
**Figure 1 :** Central incisor « angulated »



**Figure 2 :** Central incisor dilacerated» [8]



**Figure 3:** Preoperative clinical view



**Figures 4 A and B :** Panoramic and retro alveolar radiograph showing the inclusion of the central incisors as well as the presence of supernumerary teeth.



**Figure 5 :** Profil cephalometric telerradiograph



**Figure 6:** Space opening with an open NiTi spring and traction of the incisors.



**Figure 7:** Alignment and leveling of the incisors with a 0.014 NiTi arc





**Figure 8:** Continuation of the alignment and levelling of the incisors with an arc 018/25



**Figure 9 :** Realization of torque breaker and installation of class 2 elastics

### TREATMENT PROGRESS

We proceeded from the beginning by removing obstacles. The surgeon made a raised flap to remove the supernumerary teeth but also to expose the two impacted incisors. Then a traction button around which a metal ligature with knots was tied was glued to the crown of each incisor. The device is necessary to be used for subsequent traction of the teeth. One week after surgery the brackets were glued and the alignment of the teeth was started with a NiTi 014 arch. All qrc sequences were respected. After alignment and levelling with an open NiTi spring on an o,16 steel arch, the space was opened to avoid any fracture of the arch form [fig. 6]. The traction of the

incisors was achieved by means of an elastic module connected to the node of the metal ligature and the bow. Once the permanent incisors had erupted, a bracket was glued to the crown and attached to a double archwire (0.014-in nickel-titanium), alignment and levelling was achieved with a sequence of 0.014 and 0.018 nickel-titanium arches [fig 7], later replaced by 018/25 rectangular nickel-titanium arches [fig 8].

The class 2 malocclusion will then be adjusted using class 2 elastics and the periodontal defect will be managed by a radiculo-palatal torque. A torque breaker was necessary to better manage the torque of the 21 [fig 9].

Overall, the alignment of the two incisors ensured a graceful smile. the periodontal defect was better controlled by playing on the torque. the patient was already satisfied with the results achieved.

### DISCUSSION

The difference between the dilated tooth and the angled tooth is often not clinically evident, but histologically a clear difference is made [3]. Clinically, only the structural abnormality allows the practitioner to make the diagnosis, hence the importance of X-rays to look for the characteristic signs of dilaceration. Conventional radiography being rather limited, 3D imaging is the best indicated preoperatively for a reliable diagnosis [6], [7].

The case described presents two angled maxillary incisors impacted with the presence of odontomas. The prescription of 3D imaging would have allowed a diagnosis of the state of the teeth structure. However, due to lack of means, the orthodontic treatment was successful and both incisors presented a normal structure. Regardless of the situation of the tooth included, the therapeutic solution recommended in our center remains orthodontic-surgical traction after a first traction test, which must be positive except in the case of a dilated incisor. The therapeutic solution recommended in the literature for dilated incisors remains surgical extraction [9].

The difficulty of managing angulated teeth is related to the high probability of ankylosis and root resorption [10]. The tip of the curved root may perforate the cortical or touch the adjacent root during tooth movement. In severe cases, the root apex may even be exposed in the oral cavity, so endodontic surgery, endodontic treatment and apicoectomy are indicated [11]. For this patient, although the radiograph showed acute angulation of the tooth, the root apex was not palpable after the tooth was straightened, suggesting that dilaceration was less pronounced. Our concern, therefore, was the blockage that could be caused by the curvature of the root during traction.

The major challenge in the management of the angulated incisor remains the often unfavorable esthetics, which can occur as a result of soft tissue complications. Traction of the angulated incisor results in eruption of the tooth in an often inappropriate position. In the case described, there was a clinical neck level differential. Management required good torque control on a full size 019/25 stainless steel archwire. Also the treatment approach for impacted jaw teeth requires a close cooperation of dental specialties such as orthodontics, oral surgery. According to numerous studies, the amount of bone removed during surgical exposure influences the degree of bone loss after orthodontic treatment [12].

The duration of traction in this case has been shown to correlate with the position of the tooth. According to Chandradev et al, many factors influence this duration. These factors include age, tooth position, dilaceration, but also external factors such as missing appointments and detachment of attachments [13]. The average traction time was  $11.28 \pm 3.08$  months. In addition to the above-mentioned factors, the practitioner's dexterity is a determining factor in the successful management of impacted teeth in general and angulated impacted incisors in particular. The esthetic factor being a determining factor, the practitioner will have to carry out various deformations to achieve an acceptable result for the patient.

## CONCLUSION

The case described is rare and is a challenge for any practitioner both from a diagnostic point of view and in terms of therapeutic choice. The importance of 3D imaging is strongly described in the literature because it is more indicated to avoid any diagnostic error that could contribute to the failure of the chosen therapy [8]. Its success depends on a number of parameters including the patient's dexterity but also the patient's motivation. In our

case, the patient's motivation was a major asset in the success and speed observed during the treatment.

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## AUTHORS' CONTRIBUTIONS

The participation of each author corresponds to the criteria of authorship and contributorship emphasized in the [Recommendations for the Conduct, Reporting, Editing, and Publication of Scholarly work in Medical Journals of the International Committee of Medical Journal Editors](#). Indeed, all the authors have actively participated in the redaction, the revision of the manuscript, and provided approval for this final revised version.

## COMPETING INTERESTS

The authors declare no competing interests with this case.

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## PATIENT CONSENT

Written informed consents were obtained from the patient for the publication of this case report.

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