

# Orthodontic traction of impacted upper central incisors related to mesiodens

*Tracionamento ortodôntico de incisivos centrais superiores impactados associados à presença de mesiodens*

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## ABSTRACT

*Although maxillary central incisors impaction is not a high frequent clinical condition, it is responsible for some undesirable aspects of patients smile from esthetic and functional points of view. There are some etiologic factors associated to this dental disturbance but the scientific literature is consensual on determining the importance of the early diagnosis and proper intervention. This manuscript consists on the case report of a 10 years old boy with Class I malocclusion, who showed during the mixed dentition phase, impaction of maxillary central incisors related to deciduous teeth retention and due to the presence of 2 mesiodens. The treatment proposed involved the surgical removal of the mesiodens, bonding of orthodontic accessories to the impacted incisors crowns followed by orthodontic traction with a removable orthodontic appliance. Regardless the development stage of the dentition was not ideal for this intervention, once the diagnosis should have been done as earlier as possible, favorable esthetic and functional results were attained.*

**Indexing terms:** Malocclusion. Orthodontics. Tooth impacted.

## RESUMO

A impacção de incisivos centrais superiores é uma condição clínica que embora não seja muito frequente, é um fator desagradável do ponto de vista estético e funcional. Existem diversas causas dessa alteração e a literatura é consensual quanto à necessidade da realização do diagnóstico e da intervenção o mais precocemente possível. Este trabalho traz o relato de um caso clínico de um paciente com 10 anos de idade, na fase da dentição mista, com má oclusão de Classe I, impacção de incisivos centrais superiores associado à retenção prolongada dos decíduos e a presença de dois supra-numerários na linha média. A conduta proposta foi à remoção cirúrgica dos mesiodens, colagem de dispositivos ortodônticos nos incisivos centrais impactados e, tracionamento ortodôntico com aparelho removível. Desta forma, embora a época de tratamento não fosse a ideal, pois o diagnóstico deveria ter sido estabelecido o mais precocemente possível, alcançou-se um resultado estético e funcional favorável.

**Termos de indexação:** Má oclusão. Ortodontia. Dente impactado.

## INTRODUCTION

Impaction of the upper incisors is an anomaly which requires early intervention and represents a challenge for orthodontic clinics. Of the dental elements that are affected by this condition, the upper incisors are the most easily diagnosed by parents and the children themselves, in the mixed dentition phase. Although the prevalence of impaction of the incisors is small, less than 1% according to the literature, when it does

occur, due to its anterior location it is a determining factor in the deterioration of esthetic appearance<sup>1</sup>.

A tooth may be regarded as impacted as a result of several etiological factors that determine a delay in the timing of eruption. Amongst the local conditions which most influence incisor impaction are physical obstructions. These mechanical barriers are the result of various causes, such as: hyperdontia, mucosal barrier, scar tissue and tumors. Of the above, the condition that requires special

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attention is the presence of hyperdontia which, when situated in the midline, are called mesiodens and, according to the literature, cause dental impaction in between 28% and 60% of individuals<sup>2</sup>.

According to Suri et al.<sup>2</sup>, although a variety of terms have been used to characterize teeth with delayed or retarded eruption, this condition is characterized by two situations, as follows: a) teeth that have not erupted within the prescribed chronology based on epidemiological studies, and b) teeth that have not erupted regardless of the degree of root formation. Accordingly, impacted teeth would be those with delayed eruption related to some or other physical barrier which blocks the usual eruption route.

The literature shows various options for a clinical solution to impacted upper incisors. In short, the options range from more conservative procedures, such as the extraction of deciduous teeth, to surgical procedures followed or otherwise by orthodontic traction<sup>1</sup>. On the other hand, it should be emphasized that before any radical intervention such as surgical exposure, it would be prudent to use instruments to open a sufficient space, stimulating the natural eruption of the incisors<sup>3</sup>.

As the literature is rather sparse with regard to clinical studies with an adequately dimensioned sample, that evaluate the impact of the different approaches to treatment, the publication of clinical cases is required in order to get a better understanding of the topic.

Thus the objective of this study is to report on a clinical case, in the mixed dentition phase, with Class I malocclusion and impacted upper central incisors. The treatment consisted of the surgical removal of the root cause of the problem (mesiodens) followed by orthodontic traction of the impacted teeth.

## CASE REPORT

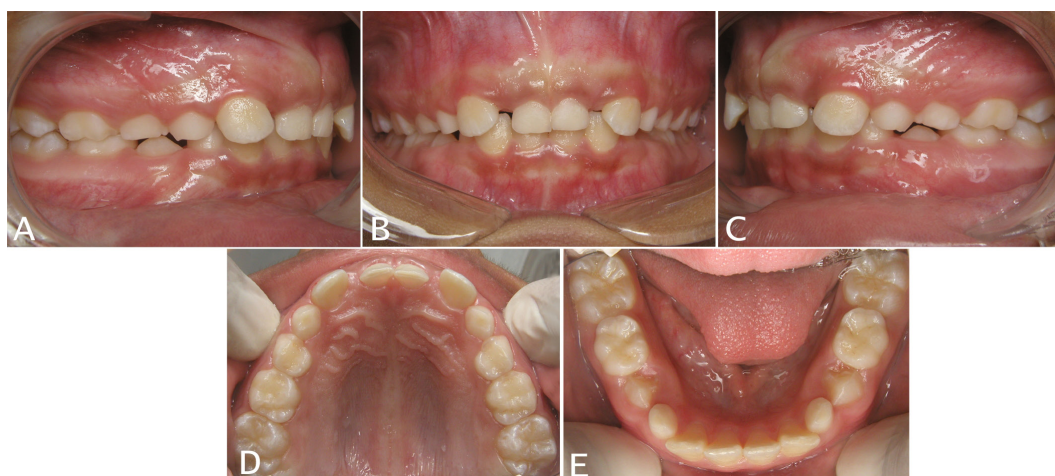
Ten year-old male patient in the mixed dentition phase complained that his "front teeth were not growing". His medical history revealed no contraindication to orthodontic treatment.

The analysis of the facial photograph of his close-up smile shows a quite unflattering appearance due to the absence of permanent central incisors and the prolonged retention of the deciduous teeth, a feature that was the reason behind seeking orthodontic treatment (Figure 1).



**Figure 1.** Initial facial photograph of the close-up smile.

In the intraoral evaluation, the patient was found to be in the mixed dentition phase, in the second transitional period. From the frontal evaluation, the clinical absence of the upper central incisors was confirmed, combined with the prolonged retention of the deciduous teeth (Figure 2A). From the side view, the molars and canines were in a Class I relationship (Figures 2B and 2C). Finally, the study of the occlusal photographs shows dental arches within normal criteria (Figures 2D and 2E).

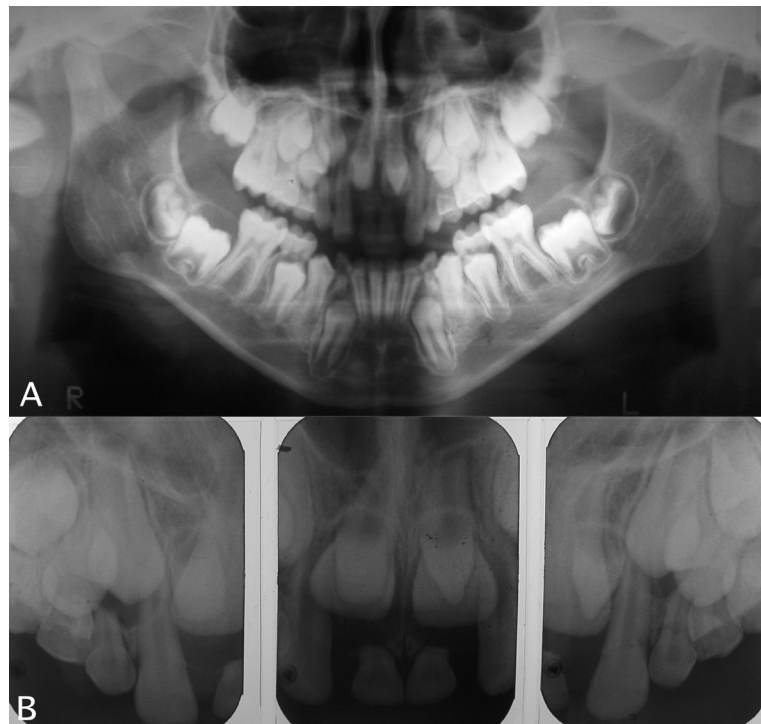


**Figure 2.** Initial intraoral photographs. A) right side; B) frontal; C) left side; D) upper occlusal; E) lower occlusal.

The x-ray evaluation corroborated the clinically obtained data and identified two supernumerary teeth in the midline region (Figure 3).

The aim of the interceptive treatment was to

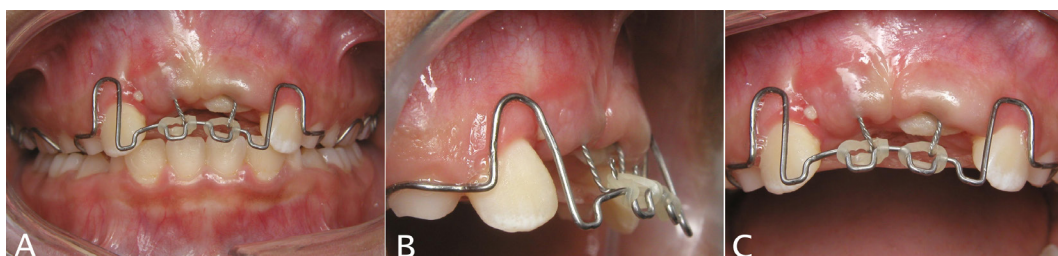
surgically remove the deciduous teeth in prolonged retention and the supernumerary teeth. In addition, at the same time as the surgery, orthodontic appliances were glued to the central incisors in order to commence the orthodontic treatment.



**Figure 3.** A) initial panoramic x-ray; B) initial periapical location.

A removable orthodontic appliance was used by the patient who was duly instructed to use it throughout the day, only removing it for meals and when engaged in sporting activity. In the anterior region of the appliance, retainers were fabricated so the patient could place 1/8" rubber bands of the ligature hooks fastened to the orthodontic buttons for these types of structure (Figure 4).

After a period of four months, the incisors had erupted in the oral cavity, at which time the traction was halted and the orthodontic buttons removed. The periodic checks of the patient began and after two months the incisors regained their normal eruptive pattern and, after ten months, they were in a quite favorable position (Figure 5). In this phase, a positive outcome could be seen of the technique carried out with adequate tooth position and good periodontal condition.



**Figure 4.** Intraoral photographs with the orthodontic traction device. A) front view; B) close-up side view; C) close-up front view.





**Figure 5.** Clinical outcome of the traction. A) after 4 months; B) after 6 months; C) after 16 months.

An analysis of the facial photograph of the close-up smile showed a beneficial change in the appearance of the smile, helping the patient from a psychological perspective to regain his self-esteem (Figure 6).



**Figure 6.** Final facial photograph of the close-up smile.

The patient's guardian was directed on the need to sign the Free and Informed Consent Agreement for the use of the procedures and results obtained in the technical/scientific work, with the child's identity being protected. The guardian provided consent and signed the form.

## DISCUSSION

The frequency with which upper incisors become impacted is low, ranging from 0.06% to 0.2%<sup>4</sup>. However, when it does occur, it is quite disturbing, from an esthetic and functional point of view.

In many situations, incisor impaction is spotted by the patients' parents in the mixed dentition phase and, subsequently, the contact with the general or pediatric dental clinician enables early diagnosis of this alteration in eruption pattern<sup>5</sup>. However, the case in question does not support this notion, as the central incisors should have erupted in the oral cavity at an average chronological age of 7.27 years<sup>6</sup> and the patient was already 10 years old. If the diagnosis had been made early, the treatment would have been made easier, evidencing the importance

of making clinicians and pediatric dentists aware of the importance of early diagnosis of malocclusion.

The clinical case presented here, in addition to the delay in incisor eruption, also presented prolonged retention of the deciduous central incisors. Moreover, the confirmation of impaction was made in the x-ray examination with the presence of two mesiodens in the midline region, acting in combination with the deciduous teeth as a physical barrier, thus preventing the eruption of the central teeth.

In this regard, Kuroi<sup>7</sup> stressed that supervision of the development of the dentition and of early diagnosis of eruption deviations are essential for intervention at the ideal moment and for catching the problem. Batra et al.<sup>8</sup>, for example, suggest that periodic x-rays be taken for all patients presenting with any abnormality in the chronological pattern of eruption.

As regards the treatment, Lin<sup>9</sup> described three options for the handling of patients with impacted incisors: a) extraction of the impacted tooth and rehabilitation with a prosthetic device or implant procedure when the growth has stopped; b) extraction of the impacted tooth and closure of the space, replacing the central incisors with the lateral ones, and c) surgical exposure followed by orthodontic traction.

On the other hand, Becker<sup>3</sup> commented that, although the options for treatment are many, the initial approach which is the most logical and conservative should be the orthodontic opening of space to encourage the natural eruption of the incisors. As previously mentioned, this approach would have been ideal had an early diagnosis been made.

The literature describes a number of clinical cases of spontaneous eruption of impacted incisors after the orthodontic creation of space<sup>1,10-11</sup>. This raises the question whether, in the case in question, eruption would or would not occur spontaneously after the removal of the physical barriers. On the other hand, as the patient was subjected to surgery for the removal of supernumerary teeth, at the same time as the surgery, orthodontic devices were glued to

enable orthodontic traction to be carried out, as performed by other authors<sup>5,8-9,12-22</sup>. Thus, if spontaneous eruption of the impacted incisors had not occurred spontaneously, further surgery would not be required.

With this approach, a modicum of care has to be taken during surgery and traction in order to ensure a final esthetic outcome<sup>23-24</sup>. Sandler<sup>16</sup> suggested that an excellent option for traction would be the use of magnets and that the periodontal response would be greatly improved due to the type of force applied.

In order to carry out the traction, the impacted tooth may be supported on removable appliances or on the arch of the fixed orthodontic appliances. In these situations there are disadvantages which sometimes limit the results obtained, such as the need for patient cooperation and the presence of side effects with the orthodontic arch, respectively. On the other hand, patient cooperation with regard to the usage of the appliance and the changing of the rubber bands were satisfactory, having a positive influence on the outcome.

The esthetic outcome found determines the success of the treatment. This finding agrees to Sarver & Ackerman<sup>25</sup> when they stated that the upper incisors are the key to esthetic success in orthodontic treatment.

The analysis of the smile obtained demonstrates the improvement in the appearance of the smile obtained

through treatment. Moreover, as observed by Crawford<sup>14</sup>, this type of therapeutic approach, in addition to giving back the patient a more pleasant, sociable smile, was able to restore his confidence, vanity and self-esteem, which is an important factor even at this early age.

## CONCLUSION

Among the majority of upper incisor impactions, when the diagnosis is established early, the possibility of achieving more satisfactory results is increased, as well as the ease of applying treatment.

The use of the traction technique for impacted incisors, when well-planned and executed, gives acceptable success rates, significantly favoring esthetic appearance, which in the majority of cases contributes to improving the psychological state of the patient.

## Collaborators

AW MACHADO was responsible for the diagnosis and orthodontic planning of the case as well as the composition of the article. LGM MAIA was responsible for the review of the literature and the composition of the article. AP VIANNA took part in the composition of the article. LG GANDINI JÚNIOR took part in the composition of the article.

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