

Minimally invasive orthodontics: elastodontic therapy in a growing patient affected by Dentinogenesis Imperfecta

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Summary

Aim. The aim of the study was to report the use of an elastodontic therapy in a growing patient affected by Dentinogenesis Imperfecta, second class malocclusion, deep bite and lower arch crowding from the deciduous dentition to permanent one.

Case report. At first, the 5-year-old patient was treated with an elastodontic device known as "Nite-Guide". When the patient was 7 years old, during her first permanent molars and incisors eruption and after optimal house-practices, an Occlus-o-Guide Series G was placed at night and on daylight (two hours a day) performing exercises aimed to activate facial muscles and facilitate the deep bite reopening. At 9 years of age, with totally deep bite resolution, she used the Occluso-Guide only at night to hold down previous results and follow patient's dental growth. At 11 years of age, after successful teeth switching, we prescribed an Occlus-o-Guide Series N, which is functional for permanent dentition and guaranteed an eruptive guide for last dental elements.

Conclusions. This clinic case could be considered an example of approach for all those patients with systemic and/or dental diseases that do not allow adequate dental retention, which is necessary for most orthodontic appliances;

elastodontic devices do not require adequate dental retention and define a minimum intervention on the surfaces of the teeth.

Key words: dentinogenesis imperfecta, orthodontics, elastodontic device.

Introduction

Dentinogenesis Imperfecta (DI) is a disorder of tooth development. It's characterized by severe hypomineralization of dentin and altered dentine structure (1-3). In 1973, Shield determined a classification of three dentinal disorders: type I, II and III Dentinogenesis Imperfecta and two types of dentin dysplasia (1).

Dentinogenesis Imperfecta type I is the phenotype that is often related to a genetic fragile bone condition, Osteogenesis Imperfecta. This is usually caused by a defect in the two genes encoding type I collagen (1).

The type I is also related to other systemic diseases, such as Ehlers-Danlos and Goldblatt syndromes (1).

This type is characterized by opalescent brown discoloration in both dentitions, and due to reduced support of the dentin, the overlying enamel fractured easily (1). There are also several steps of progressive pulp obliteration which usually begins as soon as the eruption of the teeth occurs.

Clinically teeth are often opalescent.

The second type of Dentinogenesis Imperfecta is an autosomal dominant condition with a prevalence rate of approximately 1:8000. It's caused by a mutation of DSPP gene.

The clinical and radiographic features are similar to the first type, even though they are expressed more consistently (1).

Dentinogenesis Imperfecta type III is also caused by the same DSPP mutation as type II, but shows variable discoloration and morphology of the teeth, ranging from normal appearing teeth to shell teeth with dentin formation reduction (1, 4, 5).

This clinic condition can be related to Osteogenesis Imperfecta (6, 7).

From a radiographic point of view, teeth affected from DI are called "specter teeth" because of the emptiness appearance which makes possible to observe only the polished outlines.

In these patients with a no real retention and substance of the teeth, a good anchorage is hard to obtain; for this reason this study offers a treatment possibility in order to solve some orthodontic problems of these patients.

In order to correct second class malocclusions there are a lot of different orthodontic appliances described in literature although in the last years the elastodontic devices are the most used.

The elastodontic appliances are made with a vinyl resin that is called Elvax® which has optimal characteristics of resilience.

These appliances are removable, easy to use, comfortable, safe and simple in construction and function, and they are indicated both in primary and in secondary dentition.

They are both functional devices and positioners (8). They are realized in order to correct different orthodontic problems: mandibular crowding, deep-bite, open-bite, increased overjet, mandible retrusion.

These appliances are characterized by a preformed bite construction that allows a mandibular advancement, concurrently with a vertical opening in the anterior region to provide a greater vertical development of the posterior teeth (9).

Positioners usually achieve minor tooth movement after orthodontic treatment as a result of the elastomeric material (8).

They use the lip-bumper effect thanks to their labial and oral "shields".

Depending on the type of elastomeric device, the teeth have their recesses that guide the correct position in the mouth.

Hence elastomeric devices can solve not only the second class malocclusions through a mandibular advancement and increase in lower and anterior face height, but also determines a lot of important dental effect: lingual tipping and regression of the maxillary incisors, correction of molar relationships, decrease overjet and overbite (10).

They can solve these orthodontic problems with a minimum operation on teeth, because they don't need much anchoring. Hence they can be as well used in some cases with oral/systemic diseases (11). The aim of the study was to report the use of an elastodontic therapy in a growing patient affected by

DI, second class malocclusion, deep bite and lower arch crowding from the deciduous dentition to permanent one.

Case report

The study reports the case of a 5 years old age child (G.P.) affected by DI.

She was totally treated with elastomeric devices since five years to twelve years of age.

The extraoral exam underlined these orthodontic characteristics: long face and flat profile with a vertical asymmetry (12).

The intra-oral exam showed: deep-bite, distal step on the right and on the left, deep dental wear (Fig. 1). The cephalometric analysis underlined increased overjet (3, 7), increased overbite, normal divergence (FMA=23), SNA=73.2, SNB=72, Jarabak polygon=400 (Figs. 2, 3).

At first, the patient was treated with an elastodontic device known as "Nite-Guide", which is only for primary dentition from 5 to 7 years old kids. It guides the eruption of primary mandibular incisors and defines a first class of malocclusion and corrects overjet and overbite (13).

She carried the Nite-Guide device both at night and on daylight (two hours a day) performing exercises aimed to activate facial muscles and facilitate the deep bite reopening (Fig. 4). Waiting for mandibular permanent incisors eruption, overjet and overbite were corrected. Because of the lower crowding we extracted the deciduous mandibular incisors.

At a later stage, when the patient was 7 years old, during her first permanent molars and incisors eruption and after optimal house-practices, an Occlus-o-Guide Series G was placed.

This kind of Occlus-o-Guide is used in mixed dentition in order to: correct second class of malocclusion and guide the permanent teeth in the right position in the arch as well as to decrease the overjet and overbite.



Figure 1. Clinical case at 5 years of age.



Figure 2. Initial Orthopantomograms.

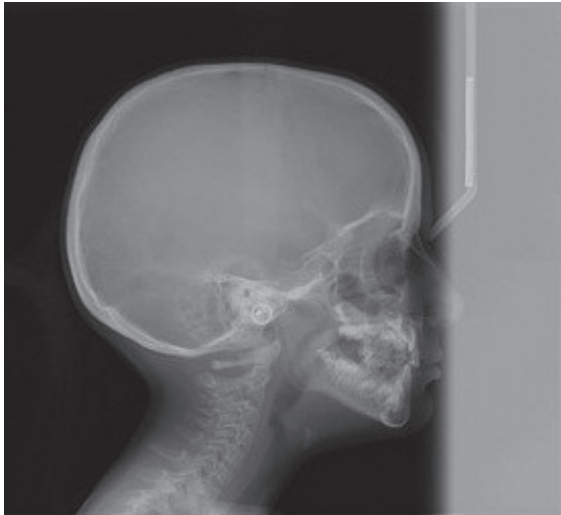


Figure 3. Initial cephalometric skull.

The recesses are for all teeth except first molars in order to have an extrusion of these teeth and an additional decrease of the overbite.

G.P. used Occlus-o-Guide all night long and 2-4 hours in the afternoon at home and she did the exercises to activate the muscle (Fig. 5).

At 9 years of age, with totally deep bite resolution, she used the Occlus-o-Guide only at night to hold down previous results and follow patient's dental growth.

At 11 years of age, after successful teeth switching, we prescribed an Occlus-o-Guide Series N, which is functional for permanent dentition and guaranteed an eruptive guide for last dental elements.

In these series the recesses are also for first and second molars in order to preserve and define the overbite and the correction of second class of malocclusion.

She carried the device just at night in order to preserve the correct overbite and improve the molar relationship (Figs. 6-8).

Discussion and Conclusions

Dentinogenesis imperfecta (DI) is a genetic disorder affecting the structural integrity of the dentin and resulting in weakened dentin. The posterior teeth often need to be extracted due to severe wear or fracture. This frequently yields a loss of posterior occlusion and occlusal vertical dimension. This case shows as the patient optimally corrected her second class malocclusion, deep bite and dental misalignment without a severe intervention on surfaces of the teeth.

The elastodontic devices allowed a proper eruptive guide for all teeth in different steps of dentition. G.P. used all these appliances with comfort and facility and only few hours a day.

Very early, she carried the devices only at night because the deep-bite was corrected in the initial steps of therapy.

On Literature there are no case report about orthodontic rehabilitation of patients affected by DI in mixed dentition. Bencharit et al. (14) demonstrated that restoring functional occlusion and esthetics for adult patient with DI can be completed successfully



Figure 4. Intraoral photos with Nite-Guide at 7 years of age and correction of deepbite.



Figure 5. Intraoral photos with Occluso-Guide series G at 9 years of age.



Figure 6. Intraoral photos with Occluso-Guide series N at 11 years of age.

using implant therapy and adhesive dentistry. Row et al. (15) proposed a multidisciplinary approach for a seventeen-year old patient through adhesive dentistry, periodontal surgery, implant-supported prostheses, orthodontic treatment and orthognathic surgery. Huth (16) proposed restoration of the primary teeth with stainless steel crowns and composite crowns in a 4-year-old child. Ubaldini et al. (17) described an esthetic solution through composite resin restorations

as a transitional treatment step for the anterior teeth of an eight-year old boy with DI. This clinic case could be considered an example of approach for all those patients with systemic and/or dental diseases that do not allow adequate dental retention, which is necessary for most orthodontic appliances; elastodontic devices do not require adequate dental retention and define a minimum intervention on the surfaces of the teeth (18).



Figure 7. Orthopantomograms at 11 years of age.



Figure 8. Cephalometric skull at 11 years of age.

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