

AVANTGARDE IN PAEDIATRIC DENTISTRY

Class III malocclusions in deciduous or early mixed dentition: an early orthopaedic treatment

ABSTRACT

AUTHORS

Background An early approach to Class III malocclusions is crucial. From diagnosis to treatment, the aim is to correct and harmonise maxillary and mandibular growth as quickly as possible.

Clinical report A new treatment protocol for the early treatment of Class III malocclusions to be used in children in deciduous teething and/or early mixed teething was proposed.

Ten children, 6 females and 4 males, with an overall average age of 6.5 years (6 years and 6 months) at time T0 were included in this experimental study. Twelve months orthopaedic interceptive therapy using two protraction facemasks (Delaire and Petit mask) and two types of extraoral elastic bands (8 and 16 oz) were given. Parents/guardians were involved as much as possible to increase compliance with the treatment.

Conclusion The orthopaedic-interceptive treatment for Class III malocclusion intends to provide a potential improvement of the growth response so that significant results can be achieved quickly. The motivational role of the parent can positively influence the child's treatment cooperation. The clinician should then try to make parents understand the importance of early treatment of Class III malocclusion thus obtaining a full cooperation with the parent/guardian and a good compliance from the child.

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Introduction

Class III skeletal malocclusions find their etiology in a retrognathic jaw, a prognathic mandible, or a combination of both [Proffit et al., 2003]. In the ratio of Class III maxillaries, the mandible is positioned mesially to the jaw [Ngan and Moon, 2015], while dental ratios may be characterised by reduced or reverse overjet, and with one or more incisors in cross-bite relationship [McIntyre, 2004]. Furthermore, there may be transversal and vertical problems that require attention [De Clerck et al., 2015; Ngan and Musich, 2019]. Moyers classifies Class III malocclusions into two types: true malocclusions and false malocclusions, also defined as pseudo-Class III malocclusions.[Moyers, 1988] The latter are easy to find in deciduous dentition and include dento-alveolar forms and functional forms, where the inverse ratio of the maxillaries is the result of an anterior pre-contact [Rabie and Gu, 1999; Ngan and Moon, 2015; Botzer et al., 2018; Bardellini et al., 2021, Severino et al., 2021].

The worldwide prevalence of Class III malocclusion varies from 0% to 26%, and this condition tends to be higher in East Asian populations ranging from 13% to 19%, while in European populations it is around 5% [Hardy et al., 2012; Ngan and Moon, 2015; Dehesa-Santos et al., 2021.; Lombardo et al., 2020].

The most common dilemmas regarding Class III treatment concern timing and the type of appliance to be used. The early treatment of Class III malocclusions is a topic widely discussed in the literature, due to the difficulty in the management and the less predictability of the result over time when compared to Class I and II malocclusions [McIntyre, 2004; Woon and Thiruvengkatachari, 2017; D'Apuzzo et al., 2019].

Clinical report

The treatment of Class III malocclusions is extremely challenging especially because the uncertainty of achieving a stable result over time. The choice of the right timing of treatment for the Class III malocclusions is crucial, as the



FIG. 1 One of the records collected during a patient's check-up. Even at an early age, the sagittal discrepancy is already evident



FIG. 2 A Class III profile can affect the quality of life of the young patients with negative effects on the psycho-social sphere



FIG. 3 Delaire mask and Petit mask



FIG. 4 Two types of extraoral elastic bands, 8 oz and 16 oz

goal must be to cancel or reduce skeletal discrepancies, stimulating the jaw sutures before they turn into synostosis, thus transforming that area in a bone growth site.

We want to propose a new treatment protocol for the early treatment of Class III malocclusions to be used in children in deciduous and/or early mixed dentition.

Our experimental study included 10 children, 6 females and 4 males, with an overall average age of 6.5 years (6 years and 6 months) at time T0. The average age of females was 6.4 years, while males was 6,6 years.

During the first visit, all the records required for the diagnosis (laterolateral skull telerradiography, orthopantomography, intra- and extra-oral photographs, and intraoral scanning) were collected (Figs. 1-2). All parents/guardians of children were informed about the experimental study and the therapeutic protocol to be implemented, and they signed an informed consent prior to the start of the study.

The protocol included a 12-months orthopaedic interceptive treatment. A Mcnamara or Hyrax ERP was applied to the enrolled children, depending on whether they were hyperdivergent or not. This appliance had only an anchoring function at this stage and was therefore left passive, as well as being equipped with a pair of hooks for connection to the extraoral device. Then two protraction facemasks (reverse headgear) were handed over: the Delaire mask and the Petit mask (Fig. 3). Both masks, in children's size, were adjusted according to the shape of the child's face while the central rod was adapted so that an angle of 30 degrees to the floor is created when the extraoral elastics are applied. Two types of extraoral elastic bands, 8 oz and 16 oz, were given to the parents (Fig. 4). It was explained to them that the 8 oz bands were to be used for the first month, while the 16 oz bands were to be used for the following 11 months.

Parents/guardians were told that the Delaire mask had to be worn during the day (12 hours), while the Petit mask had to be worn throughout the night. Therefore, it was explained to the parents/guardians that the masks had to be worn for a total of 24h (full time) in the first months (1+5), while for the remaining 6 months it had to be worn only the Petit mask and only during the nighttime (12 hours).

A diagram of the use of the masks and the elastic bands is shown in Table 1.

Discussion and Conclusion

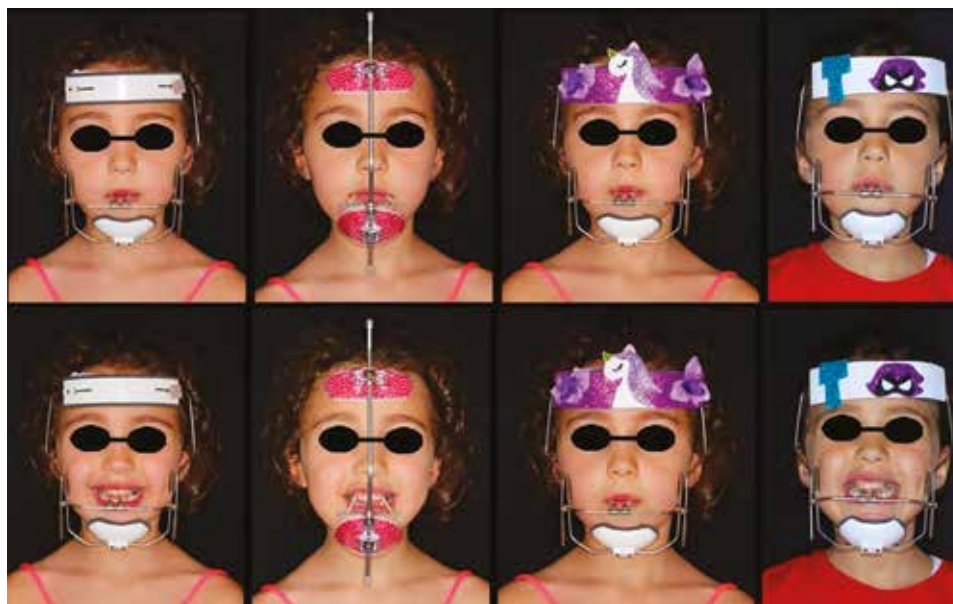
Our aim was to show to other clinicians our treatment protocol for the Class III malocclusions. The authors are now working on retrospective and prospective studies about the Class III treatment by using this new therapeutic protocol.

From an initial analysis of the raw data, it can be said that there was a significant improvement in the growth of the upper jaw, thanks to the combined use of the Delaire mask and the Petit mask. As pointed out by Baccetti et al. [1998] in the past, Class III patients treated at an early age showed more favorable skeletal changes than children who started the orthopaedic treatment in late mixed dentition, who, on the other hand, gained only dento-alveolar benefits. The timing of treatment for Class III malocclusions is a much-debated topic in the literature; however, many studies seem to agree that for treatment to be more effective, it must be carried out at a very early stage, with the aim of intercepting as soon as possible the environmental, genetic, and epigenetic factors that are usually involved in the aetiology of malocclusion [De Almeida et al., 2011; Grippaudo et al., 2020]. The clinician should try to make parents understand the importance of early treatment for a Class III malocclusion since only with a good compliance in the orthodontist-parent-child triad can excellent results be achieved. Children are unable on their own to understand the importance of the orthopaedic interceptive treatment they must submit, but their parents/guardians do. The orthodontist, therefore, must above all work alongside them to ensure that the therapy is performed correctly and carried out consistently. Studies have indeed shown how the motivational role of the parent towards Class III malocclusions therapy can positively influence the child's collaboration [Abdulhussein and Aksoy, 2022]. In our clinical practice we found that parents motivated to achieve the success in the treatment have worked to make the Delaire mask as pleasant as possible, generating an excellent interaction of the child with it (Fig. 5). The orthopaedic-interceptive therapy for the

FIG. 3 The protraction facemasks used in our protocol: their combined use maximises the orthopaedic effect

FIG. 4 The extraoral elastic bands (8 oz left and 16 oz right) provided to the patient's parents together with the masks

FIG. 5 Example of parental motivation: the customisation of Delaire's mask generated an excellent interaction of the child with it, with an increased chance of successful treatment.



	Delaire's mask	Petit's mask	8 oz extraoral elastic bands	16 oz extraoral elastic bands
First month	Day	Night	•	
2 nd to 6 th month	Day	Night		•
7 th month to 1 year		Night		•

TABLE 1 Diagram of the use of face masks and extraoral elastics. Strict adherence to this sequence is important to achieve maximum skeletal effect.

Class III malocclusion intends to provide a potential improvement of the growth response, thus leading a timely and significant improvement of the patient's profile which can be reflected in the immediate psycho-social benefits for the young patients [Sugawara et al., 2012; Fleming, 2017; Boyd et al., 2021].

Since the growth of the jaw is genetically predetermined, we are not able to know how and how much it will grow. This is important to point out to the parents during explanation of the treatment programme, especially since in Class III malocclusions there is always the possibility of a poor prognosis, even after well-performed orthopaedic treatment. However, it is important that this does not discourage parents, as through well-performed orthopaedic therapy the need for future surgery can be reduced in terms of statistical probability. Should this become necessary, once the mandibular growth is complete, the surgery to be performed would in any case be less invasive [Ngan, 2006].

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