

# The Leaf Self Expander: ZERO Collaborative Jaw Expansion

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## INTRODUCTION

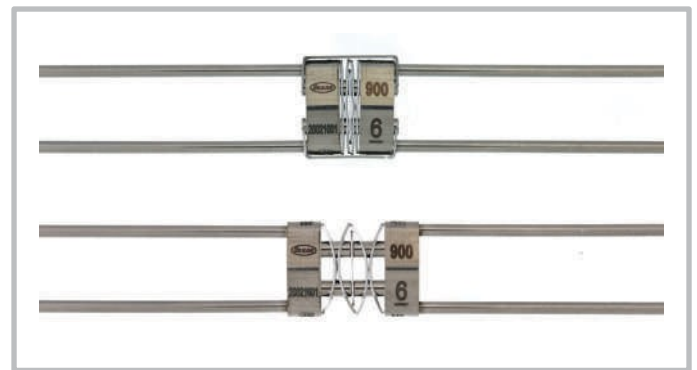
The crossbite deficit of the upper jaw is a very frequent component of malocclusions, both dental and skeletal, generally accompanied by a posterior crossbite, latero mandibular deviation and/or crowding.<sup>1-2</sup> The frequency of crossbite in the population can vary from 6 to 30%. The possibility of spontaneous self-correction of the defect occurring if aetiological factors, such as certain vicious habits, cease to exist, is rather small (0% to 9%).<sup>3-4 5</sup> On the other hand, it is well known that the possibility of achieving expansion of the maxillary bone bases decreases with increasing age. Hence, the need for an accurate early diagnostic assessment that allows patients to be classified according to the type of maxillary deficit that characterizes them and then to apply the most appropriate clinical protocols.<sup>6 7-8 9-10</sup> Many authors, over decades, have developed maxillary expansion devices, differing in technical and mechanical characteristics, in the amount of expansion that can be obtained and in the type of modification produced (orthodontic - orthopaedic - mixed). All techniques have in common the application of forces that act in a vestibular sense on the abutment teeth, capable of determining morphological reactions in the maxilla, the characteristics of which are linked mainly to three factors:

- age of the patient (developmental age or end of growth)
- type of force applied (light = orthodontic or heavy = orthopaedic)
- time of force application (continuous - discontinuous - intermittent).

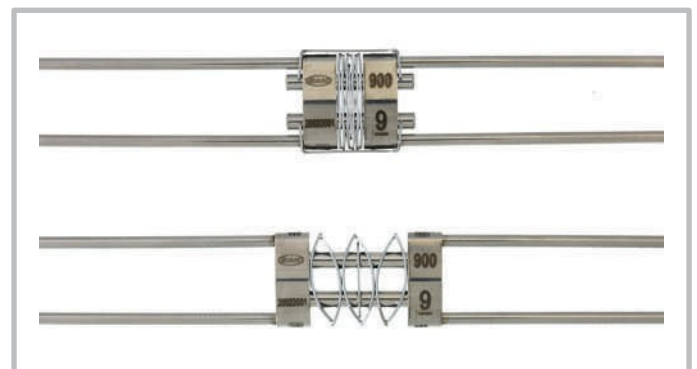
<sup>11</sup> Lately, our attention has been focused on the mode of action and clinical effectiveness of the pre-activated leaf spring expander made of nickel titanium Memoria, called *Leaf Self Expander*, born from the evolution of the concept on which the *Leaf Expander* is based.<sup>12-16 17-18</sup> The expansion capacity of the maxilla in early treatment has proven to be comparable to that obtainable with R.P.E. The new device, designed and built to individual measurements, allows expansion of the maxilla by means of dento-alveolar remodelling, with light and continuous forces, predetermined in intensity, direction, and a predictable amount of displacement. *The main innovative feature is the elimination of any need for activation, whether outpatient or at home.*

## TECHNICAL CHARACTERISTICS OF THE LEAF SELF EXPANDER

The *Leaf Self Expander* consists of a Cr-Co steel metal structure equipped with 2 pre-activated Nickel-Titanium double leaf springs (6 mm of expansion), and separated by a central stabilizer, (Figs. 1a, b) or 3 double leaf springs (9 mm of expansion) (Figs. 2a, b), whose different thicknesses determine the 450 or 900 g force. The nickel-titanium leaf spring, compressed during construction in the laboratory, recovers its dimensions during deactivation, resulting in a calibrated expansion of the upper arch. From a mechanical point of view, the Self Expander clearly differs from all the various devices in fixed orthodontics currently in use that are capable of determining slow maxillary expansion, such as the Gosgharian bar, Ricketts' Quad-Helix or the Ni- Ti Expander.



Figs. 1a, b - 6 mm Leaf Self Expander pre-activated and at the end of expansion



Figs. 2a, b - 9 mm Leaf Self Expander pre-activated and at the end of expansion

The Self Expander combines a number of features that we can consider optimal for a fixed expansion orthodontic appliance, especially in pediatric ages:

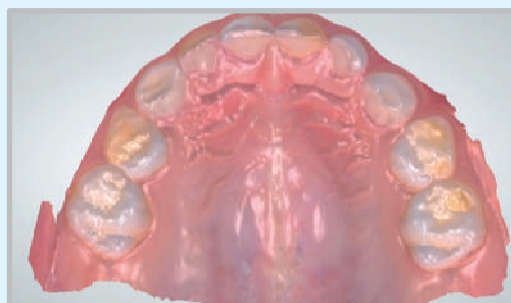
- no need for reactivation
- comfort during all expansion phases
- no risk of over-expansion.

The device is available with 4 types of screws depending on clinical needs:

- 6 mm 450 g
- 6 mm 900 g
- 9 mm 450 g
- 9 mm 900 g

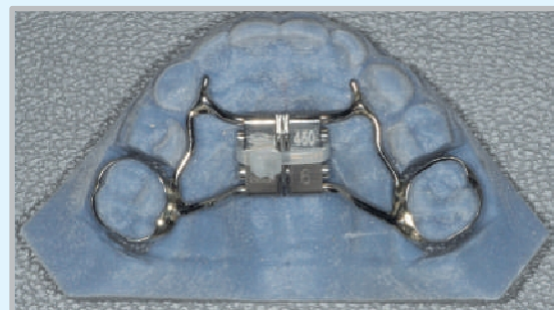
## CLINICAL EXAMPLE

A 4-year-old boy with completely deciduous teeth, characterized by enamel dysplasia in the absence of accentuated sensitivity, presented with upper jaw contraction, crossbite and left mandibular latero-deviation with functional facial asymmetry (Figs. 3).



*Figs. 3 - Extraoral, intraoral photos, virtual models and initial panoramic radiographs of the 4-year-old patient*

<sup>19-20</sup> A 6 mm, 450 g Leaf Self Expander was applied with bands on the deciduous second molars and extended rests on the milk canines (Figs. 4), custom-made in the laboratory, using the initial impressions of the dental arches taken by intraoral scanner. After 8 months expansion was complete, the crossbite was resolved, and the mandibular deviation spontaneously corrected (Figs. 5). The Self Expander was left in place for 4 more months (tot. 12) to consolidate the achieved results.



*Fig. 4 - Leaf Self Expander 6 mm 450 g pre-activated by clamping on the moulded model and applied in the oral cavity*

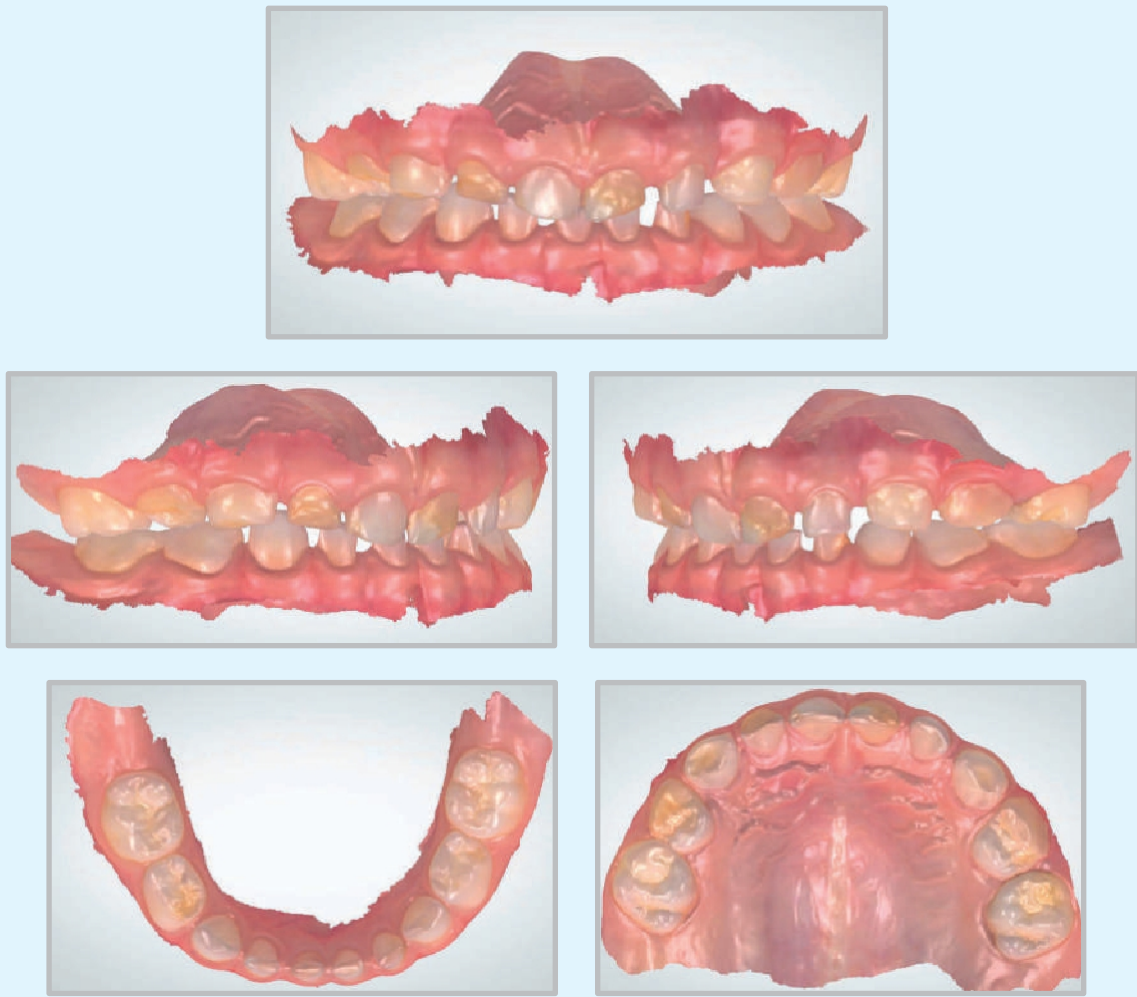


*Fig. 5 - End of active expansion, correction of crossbite and latero-deviation after 8 months*

As the screw is not locked in any way, its flexibility can facilitate the best possible adaptation of the mandibular arch (Fig. 6). At each follow-up appointment, scheduled every 6 weeks, re-mineralising treatments of the dysplastic deciduous teeth were simply carried out and intraoral photographs taken. The results remained perfectly stable 6 months after removal of the Self Expander (Figs. 7).



*Figs. 6 - Extraoral, intraoral photos, virtual models and overlays of the upper arches at the end of treatment after 12 months*



*Fig. 7 - Follow-up with virtual models 6 months after the end of treatment*

## **CONCLUSIONS**

Many studies have shown significant changes in maxillary transverse diameters and orthopedic effects when acting early, with light forces, on still active sutures. The clinical results obtained prove the effectiveness, efficiency and ease of use of the Leaf Self Expander in the correction of maxillary transverse deficits in the growing patient, in a manner that does not require the patient's cooperation, under conditions of maximum comfort, and with features that can maximize clinical ergonomics, especially in the management of small patients.

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