THE LEAF EXPANDER® FOR TRANSVERSE MAXILLARY CORRECTION IN THE ADULT PATIENT

Alvise Caburlotto
Specialist in Orthodontics
Freelancer in Venice

Maria Elena Grecolini
Specialist in Orthodontics
Freelancer in Soleto (LE)

Valentina Lanteri
Specialist in Orthodontics and Paediatric Dentistry
Freelancer in
Casale Monferrato (AL)

Giada Matacena
Specialist in Orthodontics
Freelancer in Rivoli (TO)

Cristiana Nocco
Specialist in Orthodontics
Freelancer in Soleto (LE)

INTRODUCTION

Transverse jaw discrepancy in adults is a significant factor in many malocclusions, both dental and skeletal. It has a prevalence of about 10% and is often characterised by unilateral or bilateral posterior crossbite and may occur with or without crowding of the upper jaw.
The transverse deficit is often associated with a narrow palate, lower tooth crowding, the presence of buccal corridors, as well as periodontal problems and tooth wear.
Achieving a stable skeletal and dental relationship is fundamental to achieving functional occlusion and improving smile aesthetics.
The most commonly used method of treating maxillary skeletal deficit is maxillary expansion, a procedure that aims to increase the transverse widths of the upper jaw.
It is possible to use different devices to apply forces of different magnitudes t o achieve jaw expansion (rapid jaw expansion or slow jaw expansion); however, it must be taken into account that the choice of device may influence the resulting treatment effects.
The possibility of maxillary skeletal expansion decreases with age; when skeletal disjunction is not totally or only partially feasible, dento-alveolar expansion is the only achievable result through the use of palatal appliances.
Diagnosis, as always, is the starting point for the formulation of appropriate therapy. Therefore, it is important to assess the craniofacial skeletal features in terms of transverse dimension analysis and accurately determine the need for and extent of transverse maxillary expansion. This improves the efficiency and effectiveness of treatment.
After years of research and development, the Leaf Expander® is considered an extremely useful device in the correction of transverse maxillary deficit. Current clinical evidence is increasingly leading to Leaf Expander® being considered not only suitable for orthodontic treatment in growing patients, but also in adults.
This article reports two cases demonstrating the effectiveness of the Leaf Expander® in performing a dento-alveolar expansion on an adult patient.
The following cases of adults with Class II skeletal malocclusion with mild to moderate transverse deficit and unilateral posterior crossbite were resolved by the use of this device combined with targeted orthodontic biomechanics and the use of intermaxillary elastics.

LEAF EXPANDER® SYSTEM

The structure of the expander is similar to that of the rapid maxillary expander but the characteristics of the active component and the activation protocol are different.
The screw does not act directly on the teeth but compresses nickel-titanium leaf spring components, which, in the deactivation phase, tend to recover their shape, restoring a stimulus to expansion (Figs. 1, 2).

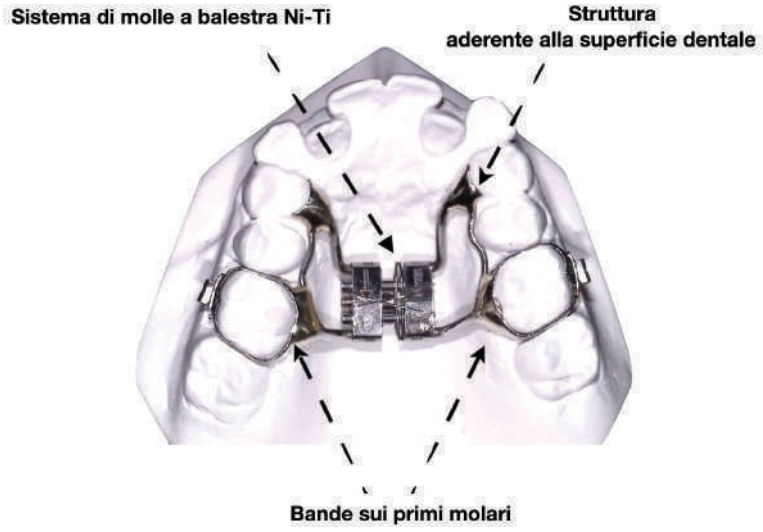


FIG. 1

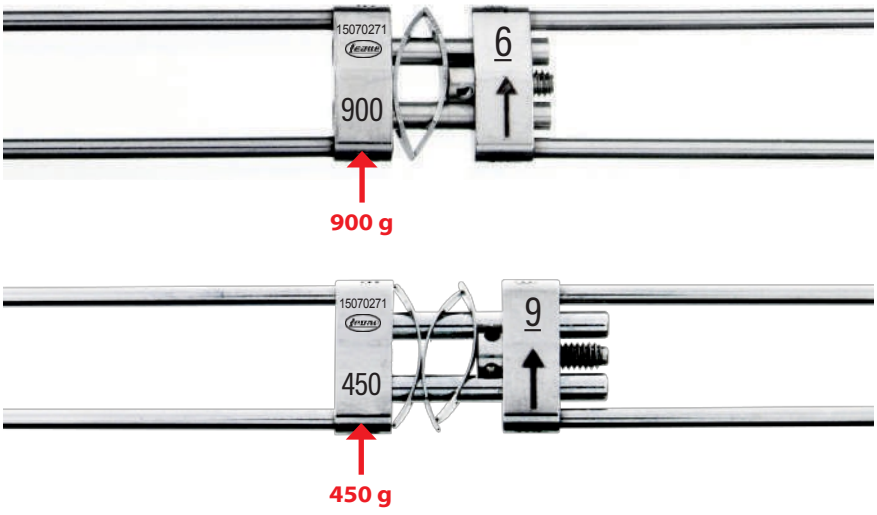


FIG. 2 - The number of leaf springs determines the maximum expansion size.
The thickness of the leaf springs determines the expansion force 450 g or 900 g.

Adult patients were selected for treatment with Leaf Expander® according to the following criteria:
- adult patients between 16 and 30 years of age,
- skeletal criteria: Class I, II with mild to moderate transverse deficit between 3-5 mm,
- endo-inclination of the posterior sectors,
- absence of periodontal problems,
- patient refusal to: surgical solutions such as SARPE or MARPE or dental extractions.

The Leaf Expander® must have a design with orthodontic bands (normal or customised) on 16-26 and extension arms up to 14-24.
On application, the device is pre-activated, which means that the clinician, by removing the latch on the expander, will allow the device to start releasing 450g/900g of force (depending on the model used) on its own without cooperation from the patient.
The subsequent reactivation of the device will be carried out according to a specific protocol so that slow dento-alveolar expansion takes place (Fig. 3).

® FIG. 3: Leaf Expander® activation protocol recommended for adult patient therapy

The orthodontist will continue the reactivation of the device in the practice according to the space required for transverse correction, taking into account that each activation generates 0.1 mm of expansion.

Bonding of the lower dental arch is usually started 1 month after fitting the Leaf Expander® to begin the decompensation phase immediately.

At the next appointment, the device is left in place and the multibracket appliance is also fitted on the upper dental arch.

The use of Class II orthodontic mechanics by means of intermaxillary elastics will favour not only the correction of the molar classes but also a spontaneous advancement of the mandible, which is freed from the occlusal forcing associated with the contracted maxilla.

CLINICAL CASE No. 1

Initial situation

- 17-year-old Caucasian girl
- Class II skeletal hyperdivergent
- Class I molar ratio
- Vestibularisation of upper incisors with OVJ 5 mm, decreased OVB
- Upper and lower middle grade crowding
- Non-coincident medians.

FIG. 4: Photo of the face before treatment

FIG. 5: Clinical photos before treatment

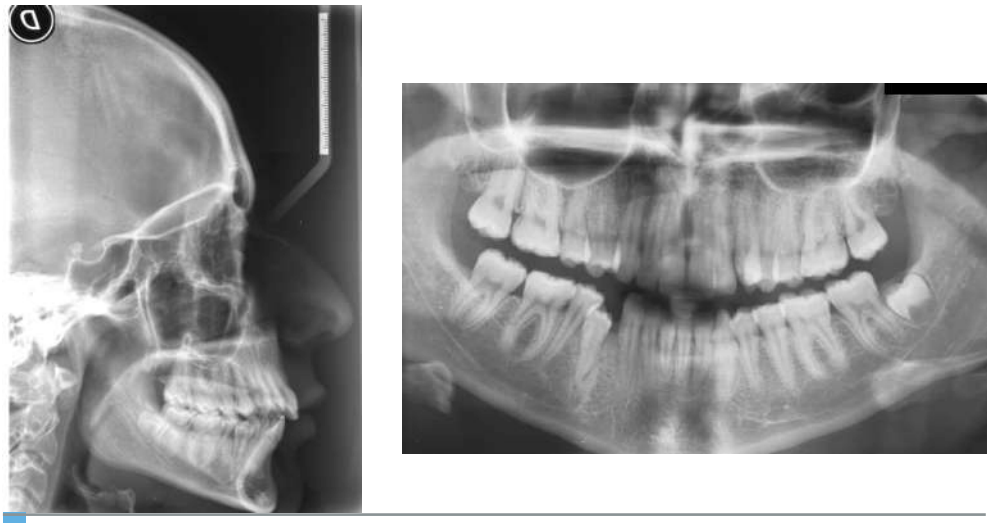


FIG. 6: X-ray before treatment

Comparison

® FIG. 7: Occlusal photos at the beginning, in the active phase of treatment with Leaf Expander® and at the end of treatment

After 24 months of treatment

- Hyperdivergent skeletal pattern
- Class I bilateral molar ratio
- Class II skeletal improvement due to mandibular ante-rotation
- OvJ 2.5 mm, OvB 2.5 mm coincident centre lines
- Normalisation of transverse discrepancy.

FIG. 8: Final situation after 24 months of treatment

CLINICAL CASE No. 2

Initial situation

- Caucasian woman aged 30 years and 6 months
- Class II skeletal hyperdivergent due to post-rotation of the mandible, Class II molar ratio
- Cross-bite relative to teeth 16 and 17
- [a] Dental Class 1 left
- Proclination of upper incisors with OVJ of 6 mm
- Severe crowding of upper and lower incisors
- Accentuated Spee curve and Wilson curve
- Non-coincidental centre line with deviation to the right
- Moderate transverse maxillary discrepancy with endoinclination of lateral and posterior teeth.

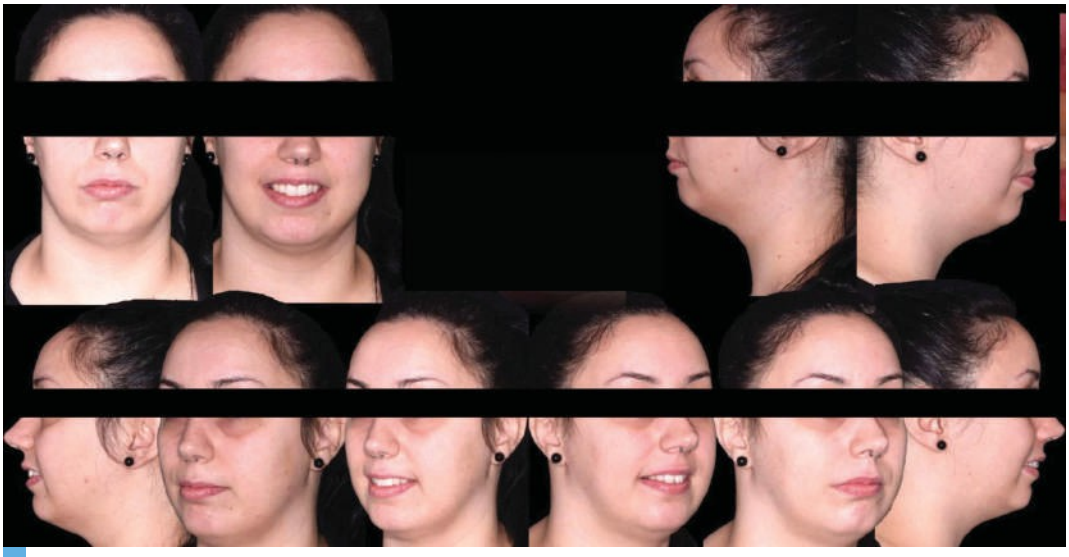
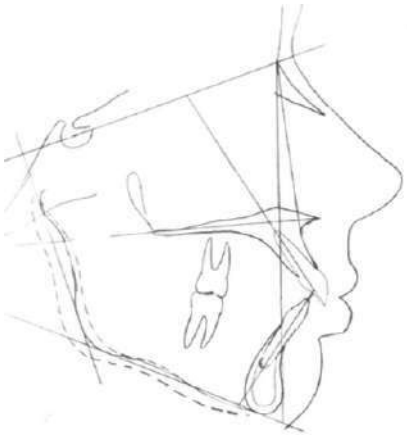
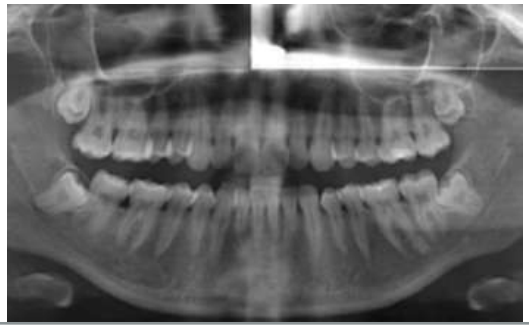


FIG. 9: Photo of the face before treatment

FIG. 10: Clinical photos before treatment





	Pretreatment	Mean SD
Sagittal Skeletal Relations		
Maxillary Position S-N-A	78°	82°± 3.5°
Mandibular Position S-N-Pg	71,5°	80°± 3.5°
Sagittal Jaw Relation A-N-Pg	8,5°	2°± 2.5°
Vertical Skeletal Relations		
Maxillary Inclination S-N / ANS-PNS	15°	8°± 3.0°
Mandibular Inclination S-N7 Go-Gn	42°	33°± 2.5°
Vertical Jaw Relation ANS-PNS / Go-Gn	27°	25°± 6.0°
Dento-Basal Relations		
Maxillary Incisor Inclination 1 - ANS-PNS	120°	110°± 6.0°
Mandibular Incisor Inclination 1 - Go-Gn	101°	94°± 7.0°
Mandibular Incisor Compensation 1 - A-Pg (mm)	+3,5mm	2± 2.0
Dental Relations		
Overjet (mm)	6 mm	3.5± 2.5
Overbite (mm)	1,5 mm	2± 2.5
Interincisal Angle 1 / 1	115°	132°± 6.0°

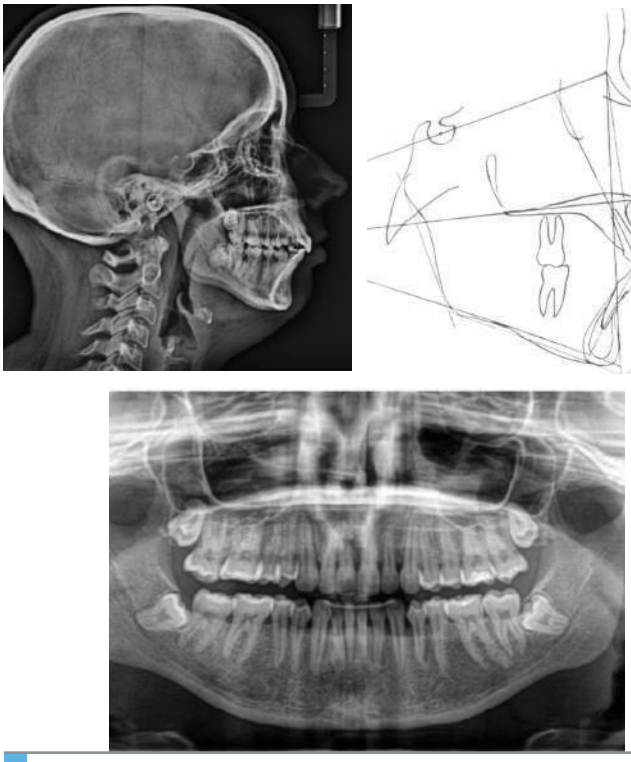
FIG. 11: X-ray and cephalometric data before treatment

After 24 months of treatment

FIG.12 - Photo of the face after 24 months of treatment

- Hyperdivergent skeletal pattern
- Improvement of the second skeletal class through rotation of the mandible
- Class I teeth on the right, Class I teeth on the left
- OVJ of 3 mm
- Good tooth alignment
- Flattened Spee curve and Wilson curve
- Coincidental centre lines
- Normal transverse maxillary dimension.

FIG. 13- Clinical photos after 24 months of treatment



	Pretreatment	Posttreatment	Mean SD
Sagittal Skeletal Relations			
Maxillary Position S-N-A	78°	78°	82°± 3.5°
Mandibular Position S-N-Pg	71,5°	73,5°	80°± 3.5°
Sagittal Jaw Relation A-N-Pg	8,5°	4,5°	2°± 2.5°
Vertical Skeletal Relations			
Maxillary Inclination S-N / ANS-PNS	15°	14°	8°± 3.0°
Mandibular Inclination S-N / Go-Gn	42°	39,5°	33°± 2.5°
Vertical Jaw Relation ANS-PNS / Go-Gn	27°	25,5°	25°± 6.0°
Dento-Basal Relations			
Maxillary Incisor Inclination 1 - ANS-PNS	120°	110°	110°± 6.0°
Mandibular Incisor Inclination 1 - Go-Gn	101°	96°	94°± 7.0°
Mandibular Incisor Compensation 1 - A-Pg (mm)	+3,5mm	2 mm	2± 2.0
Dental Relations			
Overjet (mm)	6 mm	3 mm	3.5± 2.5
Overbite (mm)	1,5 mm	2,5 mm	2± 2.5
Interincisal Angle 1 / 1	115°	128°	132°± 6.0°

FIG. 14: X-ray and cephalometric data comparison after 24 months of treatment

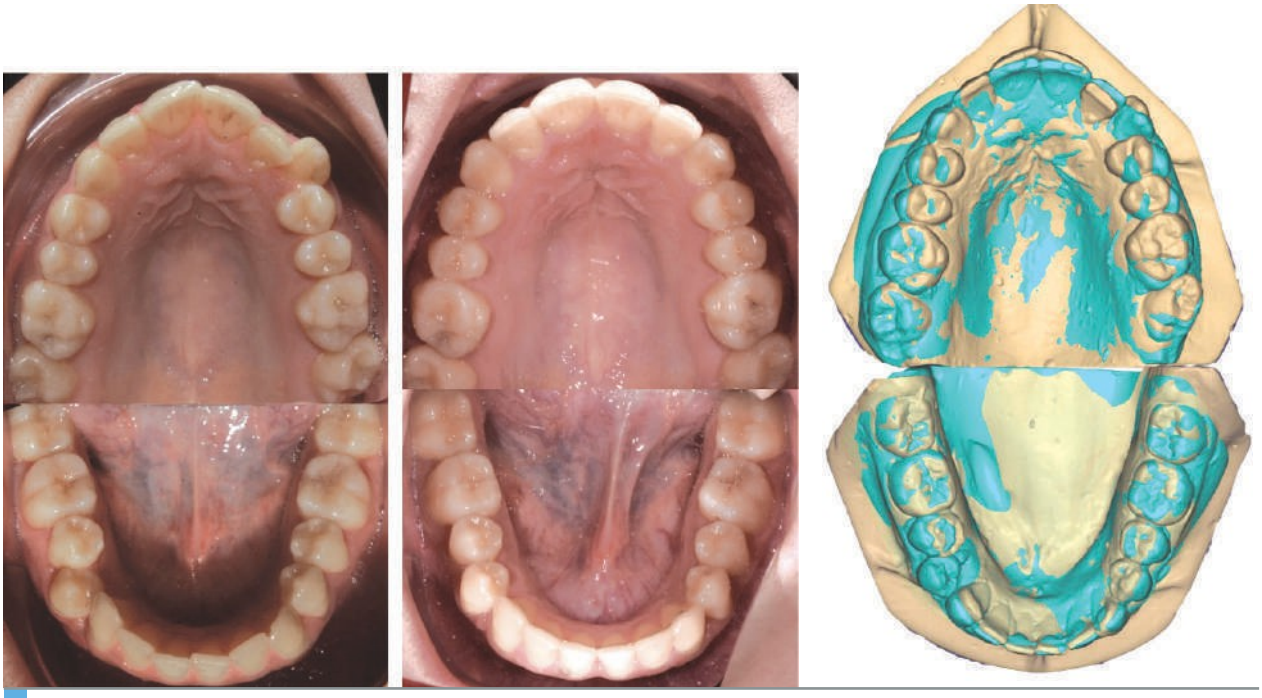


FIG. 15: Overlay photo clinical case no. 1

FIG. 16: Overlay photo clinical case no. 2

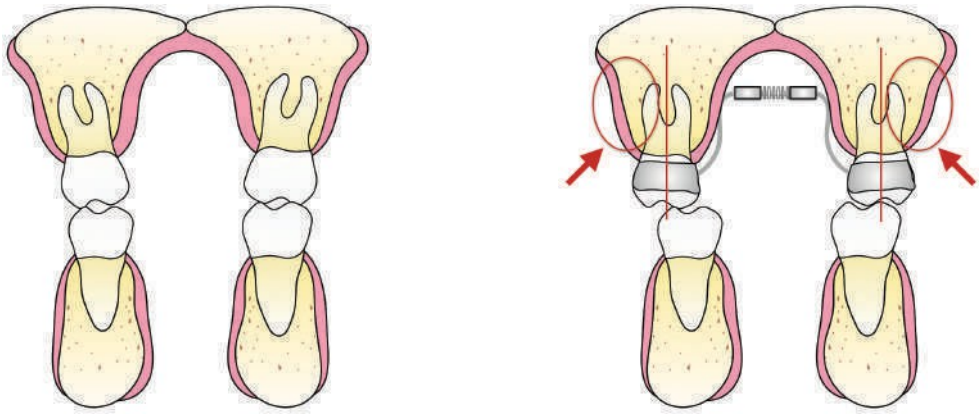


FIG. 17: Leaf Expander® action diagram®

CONCLUSIONS

The Leaf Expander® is the ideal device for achieving orthodontic maxillary expansion through the use of calibrated and continuous forces. This device creates a correct maxillary dento-alveolar expansion by means of body movements of the teeth; in addition, the controlled movements of the lateral and posterior maxillary sectors avoid the phenomenon of coronal flaring. The advantages of using this type of device are many: easy activation through visual control, safety of use, no need for patient collaboration, predictability of results.

The expansive action of the Leaf Expander® is a useful therapeutic choice for the resolution of moderate maxillary transverse discrepancies in Class I, II or III skeletal malocclusions.

The use of the Leaf Expander® in adult patients is comparable to devices such as the rapid maxillary expander, the Quad helix appliance, or expansion with multi brackets but differs in its many advantages and safety.

In the cases presented, the use of this device was fundamental to the success of the treatment, as it allowed the decompensation of the dental arches. After maxillary expansion and the resolution of the endo-icline of the posterior teeth, carried out through appropriate orthodontic biomechanics, it is also possible to appreciate an anterotation of the mandible; a movement that, as can be seen from the clinical evidence, contributes to the resolution of Class II skeletal malocclusions.

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