A NEW DEVICE FOR CALIBRATED MAXILLARY EXPANSION:

THE Ni-Ti MEMORIA® LEAF SPRING ACTIVATED Expander

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The posterior crossbite is the most common transversal malocclusion and is generally accompanied by crowding of the upper arch. (Harvold et al. 1972; Bishara and Staley 1987). The devices used for this purpose, in addition to increasing transverse diameters, produce an increase in length of the arch. (Adkins et al. 1990).

Many authors have described apparatus for maxillary expansion with different requirements for technical characteristics. The effect of the expansion of the dental arch on the palatine bases decreases with increasing age, in relation to the increase of the rigidity of the facial skeleton. When implementing a treatment of orthopedic maxillary expansion, the objective is to obtain minimal dental effects with the maximum skeletal effect (Haas 1961).

It was also shown that slow maxillary expansion can have orthopedic effects in growing individuals (Cotton 1978, Hicks 1978, Bell and Le Compte 1981 Mossaz 1989). In 2013, based on the experience acquired by the operators, Leone® introduced a radical change to the spring-activated expander, which led to the elimination of the coil spring and was replaced by a new active element; The Ni-Ti Memoria Leaf Spring-Activated Expander (MLSAE).
MEMORIA® Leaf Spring Activated Expander

The structure has remained quite similar to that of an RPE expander, but in this case the screw activation compresses a double leaf spring in Ni-Ti which, during deactivation recovers its size, leading to a calibrated expansion of the upper arch (Fig. 1).

Two types of leaf springs are currently commercially available, the Light 500 gram. and Medium 800 gram. The size of the body of the screw is 11x12x4 mm., so reduced and also adaptable to critical conditions such as very narrow palates or arches with transverse deficiency.

To adapt to different clinical contingencies, there is a choice between two devices:

1. In the first type there are two leaf springs and they have an expansion of up to 6 mm. while around the central screw is 0.4 mm. As the holes are positioned at each quarter turn, each activation of the screw determines an expansion of 0.1 mm. Performing therefore 8-10 activations per month in a single solution, reaching the maximum number of activations, equal to 35 activations (Fig. 2);
2. The second type is characterized by the presence of three leaf springs that allow to obtain an expansion of 10 mm and the achievement of a maximum of 50 activations. Also in this case the forces can be expressed by 500 (Light) or 800 grams. (Medium) (Fig. 3).

<table>
<thead>
<tr>
<th>Arms (mm)</th>
<th>Body (mm)</th>
<th>Activation Turns</th>
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<tr>
<td>11</td>
<td>4</td>
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A2703-10
light spring
500 g approx

A2704-10
medium spring
800 g approx

The MLSAE can also be used for carrying out the rapid expansion of the palatine suture. In this case changing the management of activations to determine the diastase, the screw must be activated leading to full compression of the active element (leaf spring). Additional device activations involve direct action of the screw, with production of orthopedic forces. In case of failure of the suture diastasis in borderline subjects by age, the deactivation of the screw will bring back the spring in the range of action of the light forces, restoring the function of calibrated expansion.

Fig. 3 - Screw with triple leaf medium spring, Approximately 800g
CASE REPORT 1

The patient (9 years, male) was presented to our observation for the presence of right unilateral cross bite, correctly diagnosed by the pediatrician.

The usual process of clinical evaluation and documentation (Study models, photos intra and extra oral, Orthopantomography and TeleRx LL) (Fig. 4-5) led to the diagnosis of:

- skeletal and dental Class I in normofacial subject
- early mixed dentition
- right unilateral crossbite due to transverse maxillary deficiency
- right mandibular shift with secondary ipsilateral deviation of the midline
- light crowding of upper lateral incisors

Fig. 4 - Nine years, male - Initial photos
The goals of treatment are:

• expansion of the maxilla for correction of unilateral crossbite
• normalization of overjet and overbite
• alignment of the midlines
• correction of the form and function of the arches

The prognosis in similar cases is good, especially when you consider that no collaboration is required. Routinely patient compliance is good, given the absolute absence of pain. For the treatment we have chosen the new MLSAE with double leaf spring in Ni-Ti and light force of 500 grams (Fig. 6).

Fig. 6 - Expansion plan: The MLSEA is delivered from the lab already pre-activated with a metal ligature that holds the screw together. The metal ligature is removed to allow the beginning of the expansion.
At the clinical control after a month, we observed the increase of the expansion between the two leaves of the spring. We therefore performed 8 activations to allow an approximation of the same and the start of a new expansion. This operation was repeated monthly, reaching a total of 32 activations (Fig. 7).

Fig. 7 - Sequence of expansion and activation:

1 - MLSAE with ligation locking
2 - expansion after 1 month
3 - reactivation performed in the same session
4 - expansion at 3 months
5 - reactivation of the spring
6 - expansion after 4 months
At the end of the expansion an occlusal radiograph was taken which clearly shows bone remodeling, which occurred at the level of the median suture of the palate (Fig. 8).

Fig. 8

Fig. 8 – Occlusal Rx at the end of expansion. The suture diastasis has not been verified, typical of orthopedic expansion but bone remodeling is observed, which occurred at the level of the median suture of the palate, and characterizes slow expansion.
After 4 months from the start of the expansion the crossbite was corrected and we expect stabilization with the appliance in place. Waiting for a further three months allowed us to appreciate clinically the eruption of the upper lateral incisors, the centering of the midlines and the harmonization of the form and function of the arches. The achievement of objectives (Fig. 9), and the cephalometric analysis and radiographic feedback confirm the clinical results (Fig. 10).

Fig. 9 – Nine years, male - Final photos
The results prove the effectiveness, efficiency and ease of use of the calibrated expander, in the correction of a transverse maxillary deficiency in a growing patient.

The advantages of this equipment mainly consist of:

- ease of activation
- visual inspection of the activation
- safe handling
- compliance by the patient
- mainly body movement of teeth
- predetermined forces, light and constant
- predictability of results

The effects are clinically and radiographically similar to those reached by the RPE. Therefore, the Memoria Leaf Spring Activated Expander is an excellent alternative to the RPE in certain conditions. ♦
MEMORIA® LEAF SPRING ACTIVATED EXPANDER

This device is an evolution in the design of the previous spring-loaded expander, designed with technical and scientific collaboration of Dr. Claudio Lanteri and Mr. Filippo Francolini. This new expander features a small size body, and it is equipped with two Nickel Titanium MEMORIA® leaf springs allowing the release of calibrated and continuous forces to promote the dental expansion of the maxillary arch. Re-loading is needed when the two opposing leaf springs move apart: the intraoral activation will put the springs in contact again allowing the release of the chosen force.

The expander is available in two models releasing either 500 g or 800 g.

Packs of 1
Rapid Expander with Orthogonal Arms

This new Leone anatomical expander is the ideal solution for patients who need an orthopaedic maxillary expansion, as it allows the fabrication of devices with limited dimensions, high stability, comfort, and safety. The small sizes of the body and the orthogonal position of the bending arms allow an optimal positioning of the expander even in case of very narrow palates, thus promoting the biomechanical control of the expansion. The swivel key allows for an easy intraoral activation by the patient.

Packs of 1

- The orthogonal position of the arms reduces the overall size of the device
- The arms are housed within a through-hole into the body and the laser welding makes them to form an integral part of the screw, thus ensuring maximum safety and comfort for the patient.
- Two different placements are possible thanks to the marking of the arrows on both sides of the screw.
- Available in three expansion capacities for every therapeutic need.
- The ends of the guide pins are micro-machined to provide a mechanical friction throughout treatment.
- The end-stop limits the possibility of over-treatment.

Key included in the package

<table>
<thead>
<tr>
<th>6 mm</th>
<th>4.5 mm</th>
<th>ø 1.5 mm</th>
<th>Activation Turns</th>
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<tbody>
<tr>
<td>arms</td>
<td>body</td>
<td>for maximum expansion limit</td>
<td></td>
</tr>
<tr>
<td>A0630-08</td>
<td>12 mm</td>
<td>8 mm</td>
<td>0.8 mm</td>
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<tr>
<td>A0630-10</td>
<td>14 mm</td>
<td>10 mm</td>
<td>0.8 mm</td>
</tr>
<tr>
<td>A0630-12</td>
<td>16 mm</td>
<td>12 mm</td>
<td>0.8 mm</td>
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SIMPLICITY OF CONSTRUCTION AND APPLICATION

The orthodontic treatment requires more and more practical solutions to therapeutic problems. The orthodontist can make use of this screw range, designed with the assistance of the long-lasting clinical experience of Prof. Nicola Veltri, to have any biomechanical movements be induced like DISTALIZATION, MESIALIZATION, EXPANSION and MONO OR BILATERAL ROTATIONS.

BABY R.P.E. EXPANSION SCREWS

Rapid palatal expanders with 2 or 4 arms. Both screws feature one guide only and expansion capacity up to 11 mm. Packs of 1 Key with safety leash included.
MULTIFUNCTIONAL SCREWS
(Patented)

Intended for unilateral distalization of upper molars only. Available with 3 or 4 arms. Featuring one guide only and expansion capacity up to 11 mm.
Packs of 1
Key with safety ring leash included.
Form-fits-function, introducing the new Leone mini-expansor screw. The new Stealth™ Slender Expansor® Screw is very compact with design innovations that make it ideal for smaller palates where application size and versatility are top priorities. Competing products simply do not measure up; they tend to be larger with more cumbersome mechanics and inferior construction techniques that become plaque traps. The Stealth™ Slender Expansor® Screw is a superior product with these many advanced features:

• Very compact and strong mechanism, body bulk is minimized
• No external weld marks, will not be a plaque collector.
• Arms are internally attached to resist stress point breakage.
• Internal mechanism absolutely reliable for stability and precision
• Available in two sizes, one size does not fit all.
• Extra long arms to easily form appliances without soldered extensions.
• Packaged with the new Leone Swivel Smart Key™.
• Superior Leone materials and workmanship.
• Dual Directional Arrows for optimum placement.

* U.S. Trademark of American Tooth Industries

Available in 2 Sizes:
8 & 11 MM

8 MM  8 MM  11 MM  11 MM
1.5 MM  1.5 MM  1.5 MM  1.5 MM
8 MM  11 MM  12.5 MM  16 MM
8 MM  11 MM  12.5 MM  16 MM
68 MM  68 MM  68 MM  68 MM
50 MM  35 MM  35 MM  50 MM

The included Smart Key™ features activation detection. Once the proper revolution of the key has been completed, the gentle clicking movement indicates the turn is complete. It’s so simple even parents can do it.

818-A0558-00 - Swivel Endoral Key
A0557-00 Straight Key - for initial Activation in the lab

GROUP/ITEM #  DESCRIPTION
818/A0621-08  1pk Stealth Expansor® Screw 8mm-with Swivel Key and Lab Activation Key
818/A0621-11  1pk Stealth Expansor® Screw 11mm-with Swivel Key and Lab Activation Key
M3052-00
MINI LIP BUMPER - PROFESSOR NICOLA VELTRI

Designed by Prof. Nicola Veltri: this device is intended for use on patients with deciduous or mixed dentition with lack of space and / or small jaw with either sagittal or transversal dimension. The early application on deciduous molars positively stimulates the development of the mandible. The mini lip bumper is made with a special inclination of the archwire so as the anterior shield is positioned in the area where the lip is highly pushed forward and has a stop adjustable screw that makes a precise activation possible without the need of bending the wire. The adjustment of the stop requires the screwdriver P1520-00.

Pack of 5
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