

Combined treatment of transverse arch deficit by synergic integration of RPE, Leaf Expander[®] and aligners

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INTRODUCTION

Transverse deficit of the upper jaw represents one of the most frequently observed clinical conditions in patients of developmental age. The literature recognizes the presence of transverse maxillary hypo-development in all skeletal classes with higher incidence in Class II and Class III. Its early interception and subsequent resolution is of essential importance in promoting the recovery of a normal skeletal growth pattern, improving not only occlusal relationships but also vertical and sagittal skeletal relationships.

The therapeutic approach to the transverse deficit of the maxilla in a developmental aged patient, based on scientific evidence, recognizes the rapid expander device as the gold standard of treatment in terms of predictable results.

However, intervention on the maxillary arch alone does not allow an equally immediate resolution of the transverse deficit of the lower arch, which is often present and consequent to the previous process of alveolus-dental adaptation in the presence of hypo-development of the antagonist arch.

Various approaches have been proposed to promote functional adaptation of the lower arch, including the use of removable devices (Schwarz-type plates, lip bumper) or fixed multi-brackets. The images in Figures 1-3 depict the typical treatment steps described above.



Fig. 1 - Crowding in the maxillary arch and absence of space for the dental permutation in the mandibular arch, resulting from transverse hypo-development of the maxillary arch, associated with dental alveolus compensation in the antagonist arch

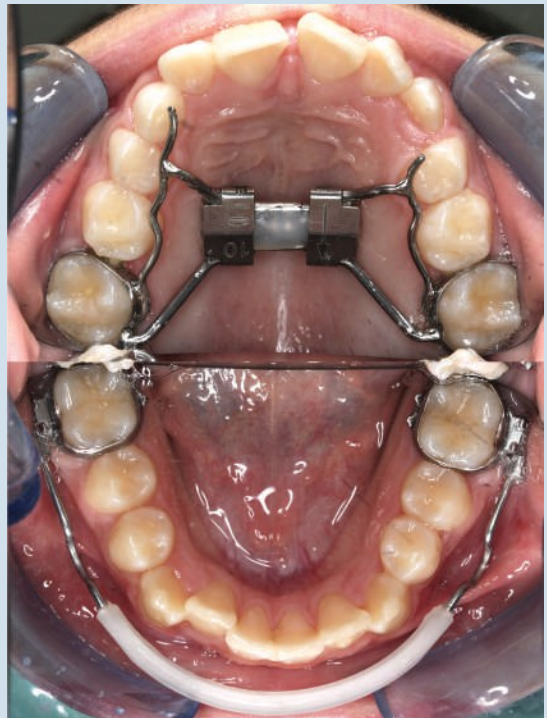


Fig. 2 - Correction of transverse deficit by means of rapid expander in the maxillary arch and lip bumper in the antagonist arch



Fig. 3 - End of dental permutation with adjustment of the size of the mandibular arch in relation to the antagonist arch

CLINICAL CASE

Patient B. L. aged 8 years and 9 months came to our observation in order to assess the dental crowding resulting from the permutation of deciduous incisors in both arches. His general and specific orthodontic history were both negative. The patient does not suffer from respiratory diseases, does not report any vicious habits affecting the oral cavity and demonstrates good extra- and intra-oral symmetry. Both dental arches show good development, however insufficient to adequately accommodate the permanent dentition. The cephalometric study shows a bi-retrusion of the maxillary and mandibular bones with SNA angles of 73.6° and SNB angles of 73.1° in reciprocal class I ratio (ANB 0.5°), accompanied by a significant decrease in the lower facial height, quantifiable at 2.1 mm.



Fig. 4 - Pre-treatment extra-oral photographs



Fig. 5 - Pre-treatment intra-oral photographs

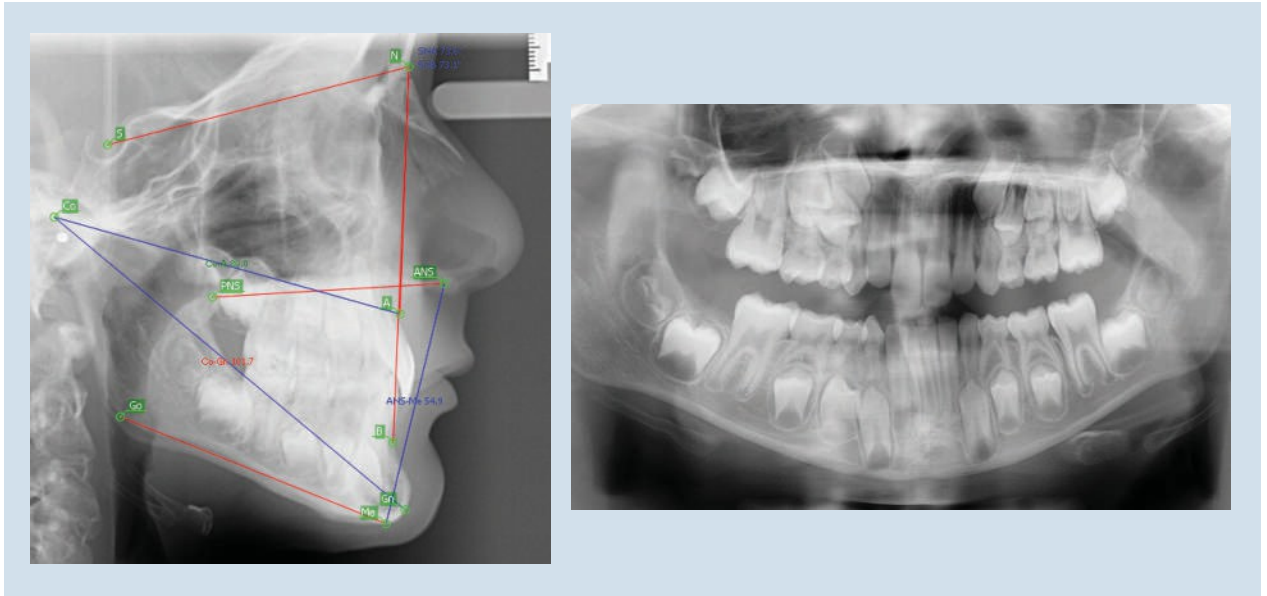


Fig. 6 - Pre-treatment radiological examinations

The interceptive treatment plan in the current state of mixed dentition involves the initial correction of the transverse deficit present in the maxillary arch, in order to increase the space available for the permanent elements already present and the subsequent adaptation of the mandibular arch to the new shape of the antagonist arch. Subsequently, the normalization of the reduced vertical dimension of the lower third of the jaw and the monitoring of the permutation of deciduous teeth will be carried out.

A transverse dimension increase in the maxillary arch of 2 mm on each side, to be realized using a Leaf Expander® 450 mg 6 mm device, was planned simultaneously to resolve tooth crowding and adjusting the shape of the mandibular arch. The activation of the Leaf Expander® was consistent with the protocol described in literature. To simplify the clinical procedures for cementing the device, customized bands were digitally fabricated.

With regard to the management of the mandibular arch, the use of Alleo® aligners was preferred to the lip bumper or Schwarz plate, due to the possibility of simultaneously managing both the transverse discrepancy and tooth crowding in less time.

To ensure greater precision in this second treatment phase, a digital setup was preferred at the end of the expansion phase in the antagonist arch.

The digital treatment plan involved the use of 14 aligners with weekly changes.

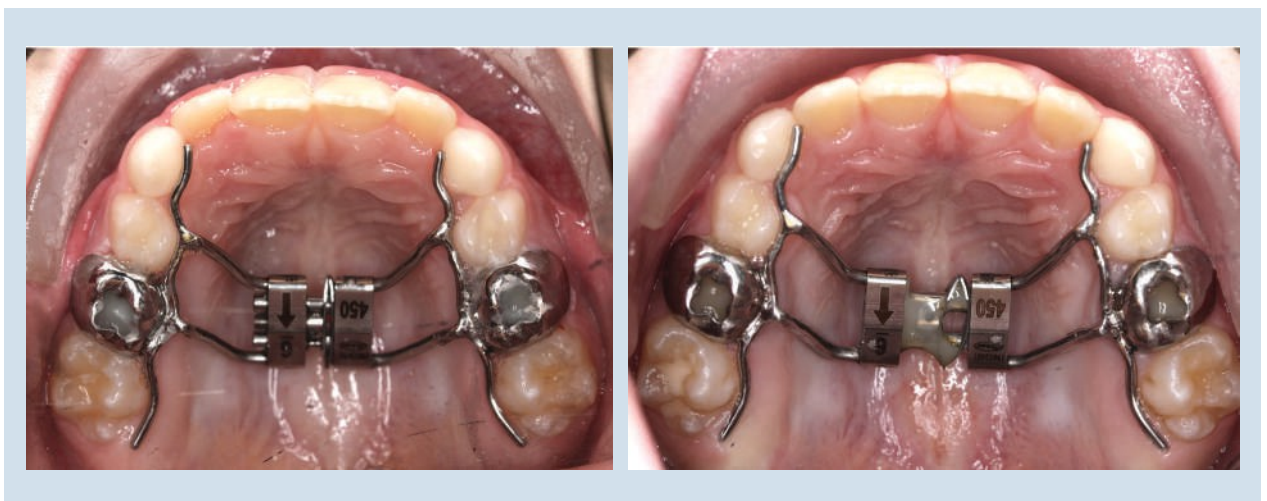


Fig. 7 - Correction of the transverse deficit in the maxillary arch and subsequent improvement of the present tooth crowding



Fig. 8 - Planned correction of the mandibular arch shape and planned resolution of tooth crowding through 14 aligners

Overall, the active treatment phase lasted approximately three months for both jaws. At the end of a stabilization phase of six months, it was possible to proceed with the removal of the present devices and the subsequent correction phase of the deep bite.



Fig. 9 - End of the correction phase in the upper jaw and start of correction in the lower jaw

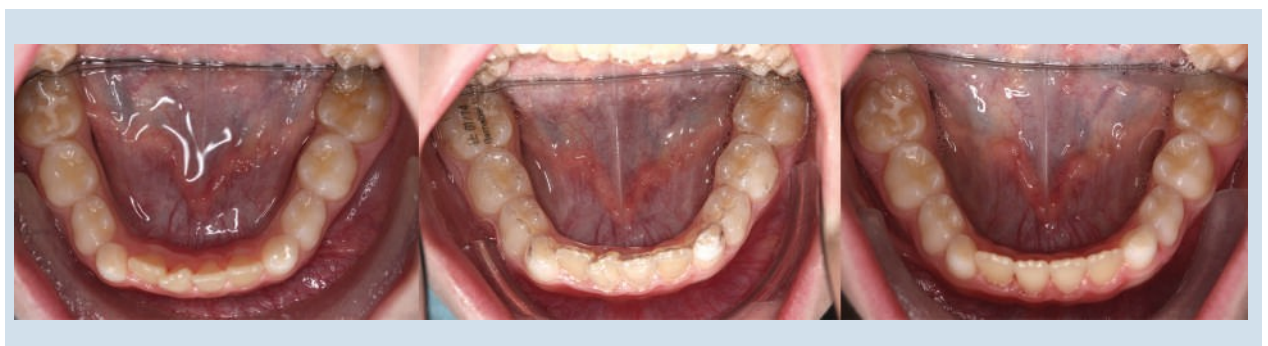


Fig. 10 - Simultaneous correction of tooth crowding and arch form using Alleo® aligners



Fig. 11 - End of active treatment phase before removal of devices

CONCLUSIONS

The use of aligners in the mandibular arch, as a replacement for removable devices such as the lip bumper or Schwarz plate, has proved particularly advantageous in the adaptation of the lower jaw to the new post-expansion jaw shape. Patient comfort is clearly superior to other devices by virtue of the smaller intra-oral dimensions, facilitating compliance, and use for a greater number of hours, than other mobile devices.

The possibility of being able to simultaneously manage the entire arch form and the resolution of any tooth crowding is the strong point of this choice. Treatment times are considerably reduced compared to the use of a multi-brackets system and, in addition, the incidence of device breakage is zero, especially in unfavourable conditions such as deep bite.

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