

Maxillary Expansion Appliance: Why it's Needed

The vast majority of orthodontic patients are examined in the late mixed or early permanent dentition (11-13 years old). By this time, certain compensational changes have occurred which mask the original disorder.

While working part-time in the Oral Development Clinic of a teaching institution and nearly full-time in a private pedo-ortho practice, I was able to examine and treat many children between 5 - 8 years of age. I noticed that a lot of those children had inadequate transverse growth of the maxilla.

There is an abundance of articles discussing posterior crossbite. All crossbite cases, whether uni- or bilateral, reflect inadequate transverse growth of the maxilla without mandibular dento-alveolar adaptation. In contrast, narrowed maxillary cases without crossbite simply represent adaptation of the mandibular posterior segments through lingual tipping of the molars.

A reduction in maxillary transverse growth has been documented in epidemiologic studies [1]. Such growth changes have also been reported in clinical settings as causes for protrusion of the permanent incisors [2] and for dental crowding [3].

Airway obstructions, such as the one caused by allergic rhinitis, can lead to mouth breathing [4]. During the juvenile growth period, mouth breathing can interfere with the transverse growth of the mid-face, resulting in a narrowed maxilla. Often, the mandibular buccal segments show compensation by lingual tipping of the molars [5]. Narrowed dental arches reduce the space needed for the developing permanent teeth, resulting in dental crowding. Additional growth adaptations may occur, including but not limited to an increase in the vertical facial height, adding to the problem by making it harder for the lips to come together without straining.

To avoid such undesirable growth adaptations, any interceptive orthodontic treatment must address the transverse issue before dealing with the other aspects of malocclusion. Early expansion increases maxillary width and nasal volume which allows for more normal breathing function [6-10]. Additionally, it provides the space needed for the developing permanent teeth.

In addition to widening the maxillary suture, maxillary expansion also facilitates adaptation of the maxillary growth in other planes of space through stimulation of circum-maxillary sutures. For example, it speeds up the headgear treatment of maxillary protrusion or facemask treatment of maxillary retrusion [11,12]. Besides promoting desirable growth patterns, the maxillary expansion appliance serves as an important anchorage appliance in mixed dentition cases. It stabilizes the

molars and prevents their unintended tipping as a side-effect of the mechanics used in aligning the permanent maxillary incisors.

After expanding the maxilla, it is often necessary to expand the mandibular arch. Key reasons to expand the mandibular arch include:

1. De-compensation of lingually tipped mandibular posterior segments
2. The position of the lower molars needs to be coordinated with the expanded position of the upper molars
3. Expanding the lower arch allows additional expansion of the upper arch when extra width is needed
4. Expanding the mandibular arch creates space for the correction of crowding

At the examination appointment, the degree of lingual inclination of the mandibular molars is used to help diagnose maxillo-mandibular constrictions. Also, the extent of buccal uprighting needed to correct the angulation of mandibular molars determines the extent of maxillary expansion.

The extent of expansion for each case can vary from 5mm to 12mm (with 12mm being the maximum capacity of the expansion screws). In severely constricted cases, a second expander with an additional 12 mm expansion capacity may be required. A minimum of 25 percent over-expansion is recommended to correct the bucco-lingual torque of the maxillary molars and to account for post-expansion relapse.

References

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