# A Vestibular Rapid Palatal Expander

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Various types of rapid maxillary expanders have been introduced; while they all have their advantages and disadvantages, each is built around an expansion screw in the palatal area. This article describes a different approach to the orthopedic treatment of a maxilla with transverse bone deficiency. A vestibular expander called the Changing-P* was developed to address some of the drawbacks of traditional expanders and to optimize the disjunctive action of the appliance during its entire period of use in the oral cavity.

## Appliance Design

The Changing-P is a rapid maxillary expander with the activation system placed in the vestibule at the incisal level. An expansion screw that turns in opposing helical directions is connected to two .059" stainless steel arms, which follow the curve of the upper alveolar ridge and are welded to the gingival third of the first permanent or second deciduous molar bands (Fig. 1A). The buccal arms are covered with acrylic bumpers; these should not contact the mucosa, but will exert a significant pressure-relieving and muscle-shielding action that prevents pressure sores from developing. They also make the appliance more rigid and efficient during activation. Two acrylic shields with metal frames are extended from the palatal surfaces of the molar bands to the canine region and from the gingival margin toward the palatal raphe, with a clearance of about 3mm from the gingival margin and 10mm from the palatal raphe (Fig. 1B).

Because traditional orthodontic bands have a tendency to deform during installation and activation, we use Rollo** bands, which are more rigid and occlusally extended. This allows the palatal shields to maintain proper contact with the mucous membranes without creating gaps that would allow the accumulation of food residue, and without causing excessive pressure or irritation.

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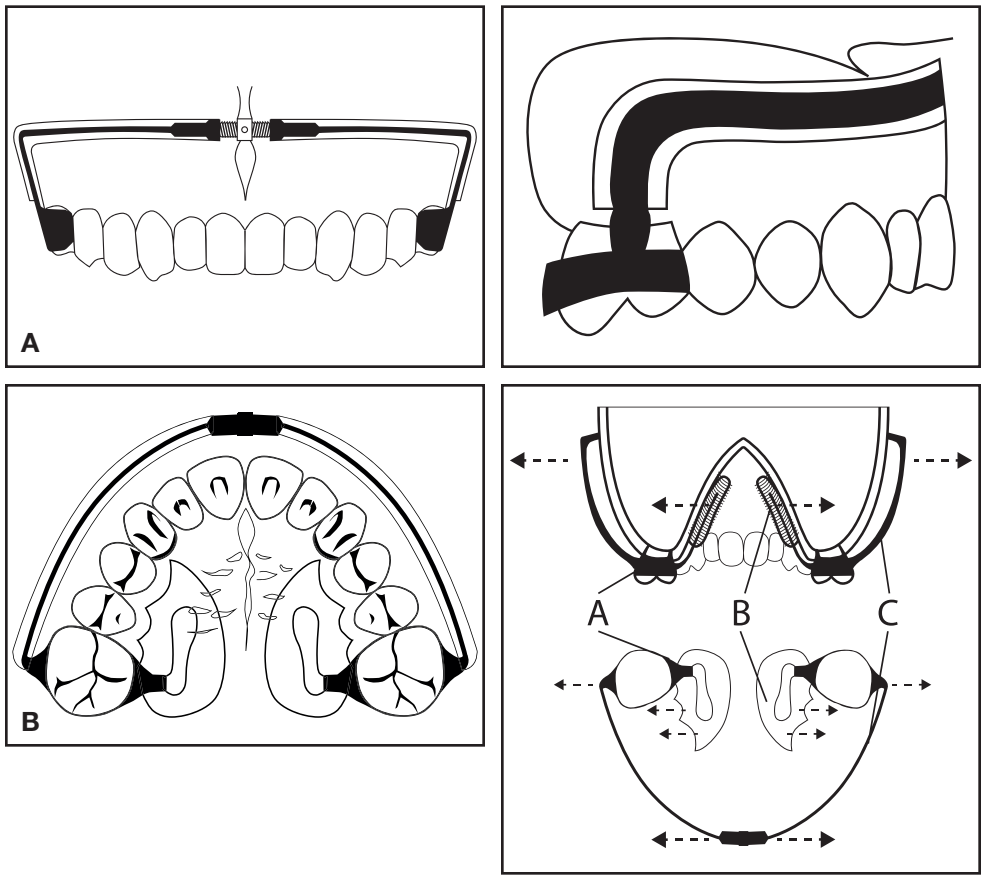


**Fig. 1 Changing-P* design. A. Buccal expansion screw turns in opposing helical directions; two .059" stainless steel arms, coated with acrylic bumpers, connect screw to upper first permanent or second deciduous molar bands. B. Acrylic shields with metal frames extend from palatal surfaces of molar bands to canine region and from gingival margin toward palatal raphe (A = Rollo** bands, B = palatal shields, C = buccal arch).**

**TABLE 1**
**TYPICAL ACTIVATIONS OF CHANGING-P APPLIANCE**

| | Morning | Night |
|---|---|---|
| First week | 2 | 2 |
| Second week | 1 | 1 |
| Third week (if necessary) | 1 | – |

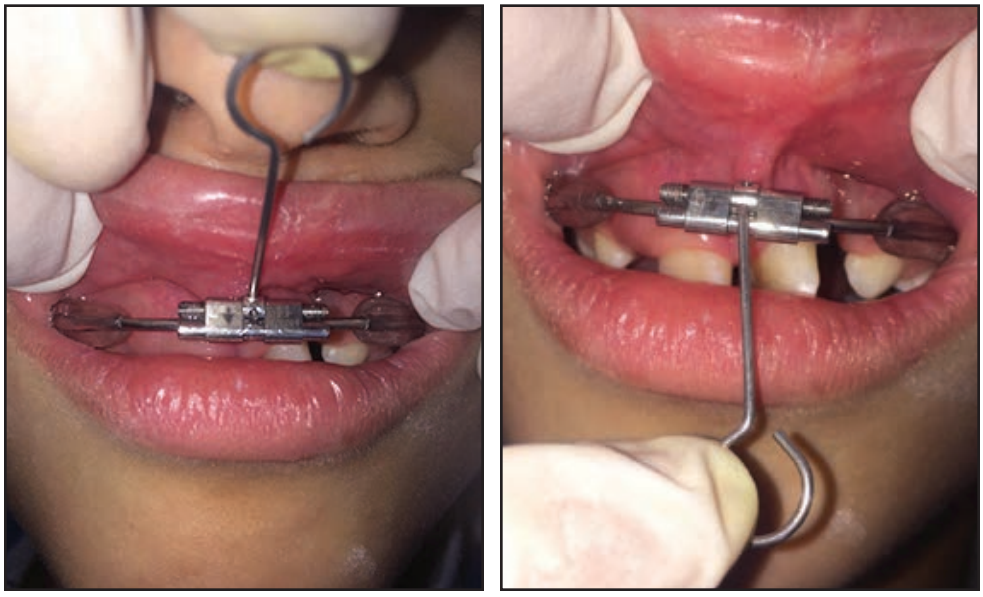

**Fig. 2 Appliance activated with mouth closed by turning down screw under upper lip.**

As with the Haas expander,[1] the palatal shields are tasked with distributing the orthopedic forces as widely as possible over the apical base, reducing direct force application on the alveolar process and avoiding root resorption and gingival recession.[2-4] Transferring the site of activation from the palate to the vestibule makes the Changing-P easier for the parent to activate and safer for the patient. In fact, it can be activated with the mouth closed by turning down the screw under the upper lip (Fig. 2). Because high-intensity forces are needed to achieve a skeletal effect through separation of the median palatine suture, however, the screw is activated more rapidly than with a conventional palatal expander (Table 1). The pattern of activation of traditional expanders would not be sufficient with the Changing-P, since its activation system—which resembles two cantilevers in terms of mechanics—is farther from the actual point of force application.

One of the most innovative aspects of the Changing-P is the addition of myofunctional activity to the skeletal action. The functional arc, which follows the buccal perimeter of the maxilla, has an effect similar to that of a lip bumper[5] on the upper lip and of the vestibular shields of the Fränkel appliance[6] on the cheeks: it removes the compressive centripetal forces induced by the orbicularis muscle, buccinator muscle, and other facial muscles against the upper jaw and the periodontium. Additionally, because it operates on the fornix, it stimulates periosteal stretching and bone apposition on

the vestibular side of the upper alveolar ridge.

Even the palatal aspect of this appliance has a functional effect that is more difficult to achieve with traditional expanders. Generally speaking, there is a balance between the perioral muscles (centripetal force) and the intraoral muscles of the tongue (centrifugal force).[7] If this balance is altered in favor of the perioral muscles, the maxilla will be contracted in a transverse direction—as occurs in cases of fingersucking,[8] mouthbreathing,[1,6,9-11] or low tongue posture. Since a palatal expander does not allow the tongue to rise in the palatal direction, it affects tongue posture and swallowing, thereby promoting centripetal forces. Conversely, the Changing-P allows the tongue to contact the hard palate. This favorable effect, which persists as long as the appliance is in the mouth, tilts the balance in favor of centrifugal forces, facilitating transverse development of the maxilla.[12]

## Case 1

An 8-year-old male presented with a unilateral crossbite caused by contraction of the transverse apical base. To minimize discomfort in the vestibule, acrylic bumpers were not added to the buccal arms of the Changing-P in this case. Although the appliance still proved to be effective (Fig. 3), subsequent patients have shown greater tolerance for the vestibular shields, and we now use acrylic bumpers routinely.


**Fig. 3 Case 1. 8-year-old male patient with unilateral crossbite from contraction of transverse apical base. A. Before treatment. B. After two weeks of expansion with Changing-P. C. After seven months with Changing-P left passively in place to prevent relapse.**

### Case 2

An 8-year-old male in the mixed dentition presented with a bilateral maxillary contraction associated with bilateral crossbite. After one week of expansion with the Changing-P, the palate exhibited the characteristic interincisal diastema indicating separation of the suture (Fig. 4).

### Case 3

A 7-year-old male presented with a unilateral cleft of the hard palate on the left side and a slight contraction of the maxilla. He had numerous missing teeth and dental abnormalities, as is common in these patients. Orthopedic expansion of the upper jaw was required to address the transverse insufficiency and to facilitate a subsequent surgery for secondary bone grafting (Fig. 5).

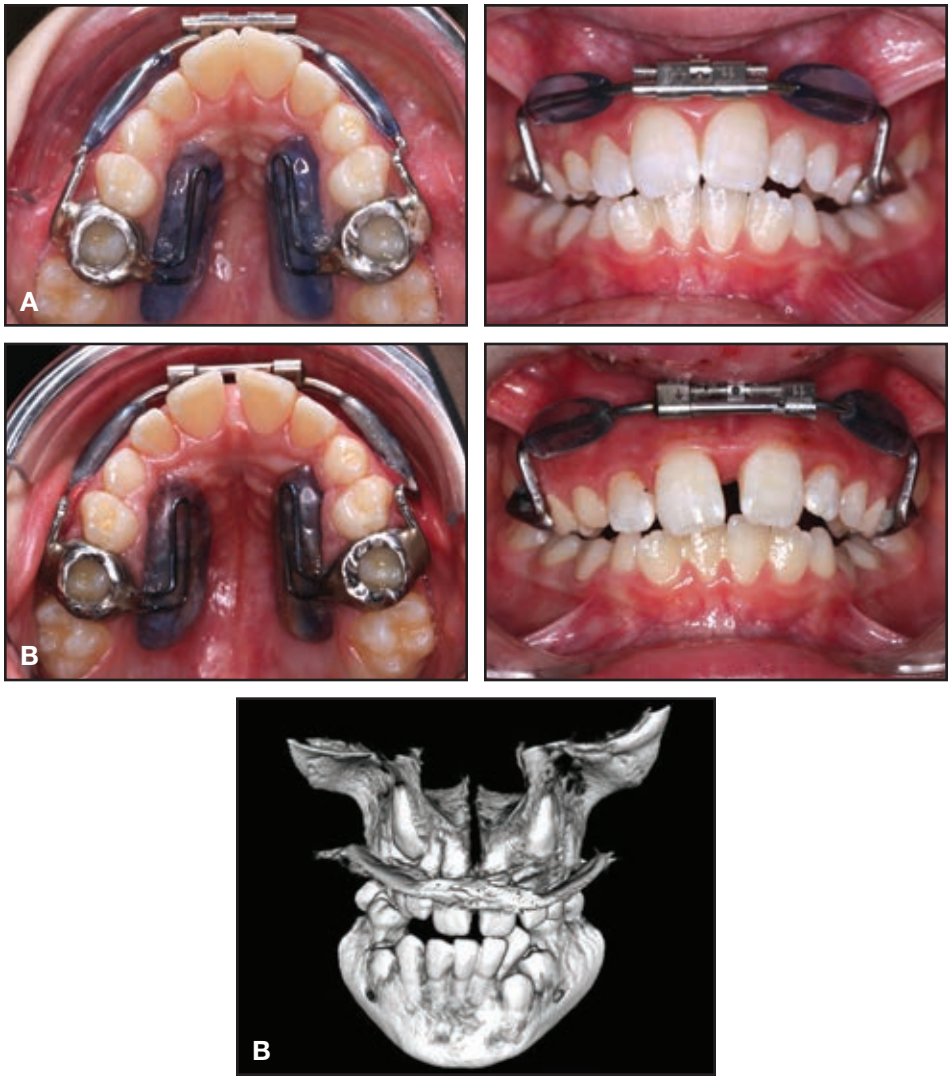


**Fig. 4 Case 2. 8-year-old male patient in mixed dentition with bilateral maxillary contraction associated with bilateral crossbite. A. At start of treatment with Changing-P. B. Separation of suture after one week of expansion.**

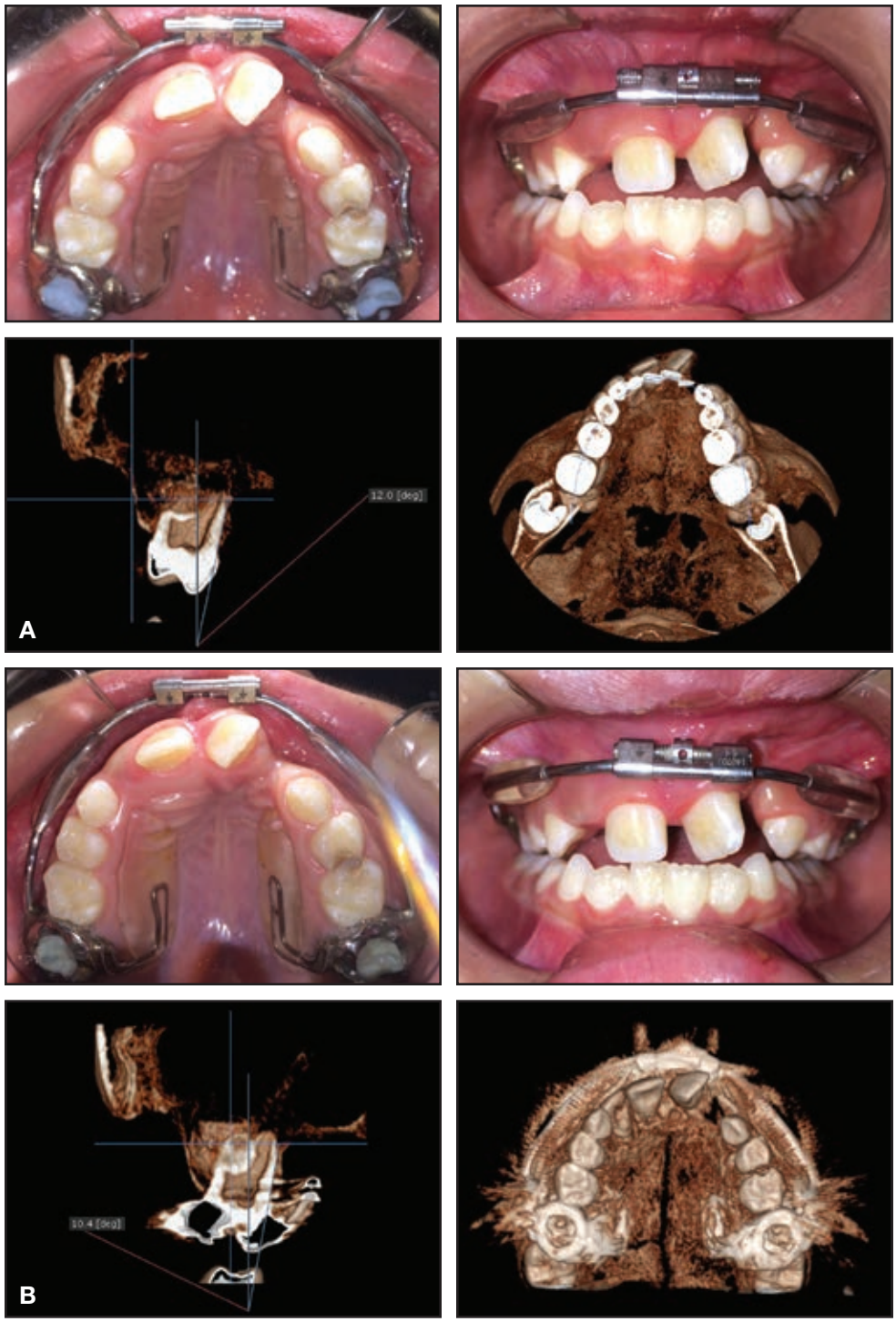


**Fig. 5 Case 3. 7-year-old male patient with unilateral cleft of hard palate and slight maxillary contraction. A. At start of treatment with Changing-P. B. After one week of expansion.**

**TABLE 2**
**CASE 3 MOLAR ANGULATIONS BEFORE AND AFTER ORTHOPEDIC EXPANSION**

| | Before | After |
|---|---|---|
| *Permanent Teeth* | | |
| Upper right first molar | 12.0° | 10.4° |
| Upper left first molar | 11.1° | 11.6° |
| *Deciduous Teeth* | | |
| Upper right first molar | 21.1° | 19.0° |
| Upper left first molar | 17.0° | 17.0° |
| Upper right second molar | 19.7° | 16.6° |
| Upper left second molar | 15.3° | 15.8° |

After one week of expansion with the Changing-P and consequent opening of the median palatine suture, we saw no buccal molar tipping (Table 2). A slight palatal tipping was recorded, similar to that observed with the use of rapid palatal expanders anchored by miniscrews.[13-15]

## Discussion

Every patient we have treated with the Changing-P (ages 5-12) has shown a good response in terms of the recovery of maxillary transverse dimensions. Radiographs taken two weeks after the start of expansion have confirmed the clinical efficacy of the appliance in opening the median palatine suture. None of the patients' parents have reported difficulties with activation, and oral hygiene has been easy to maintain because of the accessibility of the appliance. We advise against using the device in patients with narrow vestibules, such as those with short frenula or small upper lips, because the expansion system will not be adequately covered by the upper lip and hence may cause pressure sores to develop.

Even in cases of severe transverse insufficiency, it is possible to install a large vestibular expansion screw, eliminating the need to replace the screw as is sometimes required with palatal expanders. Overcorrection is unnecessary because the superior maxilla is expanded without tipping, thus avoiding any palatal relapse. The slight palatal tipping that occurs with the Changing-P is likely due to its limited dental support—in contrast to the marked buccal tipping caused by devices such as the Hyrax*** or acrylic-splint expander,[10,13,16] whose major effects at the dentoalveolar level may increase the risk of complications at the periodontal level.[4,7,8,12-14,16-18]

Traditional expanders also interfere with speech and swallowing, as is usually evident immediately after placement. Although speech may recover after a few weeks, the presence of the palatal expander does not allow the patient to proceed with myofunctional therapy that may be needed to retrain the tongue. With the Changing-P, even patients with cleft lip and palate can simultaneously undergo myofunctional speech therapy.[7,12,17,18] The tongue will spontaneously change its posture as its space in the palate is freed, normalizing the swallowing function and improving breathing capacity due to the increase in volume of the nasal cavity.

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