

Anterior Maxillary Distraction by Tooth-Borne Palatal Distractor

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Anterior maxillary osteotomy is mainly indicated for the correction of maxillary dentoalveolar protrusion. It is commonly used to retrude and may also impact the anterior maxilla if the diagnoses include vertical maxillary excess as well. Three techniques are currently practiced to achieve the anterior maxillary osteotomy: Wassmund osteotomy,¹ Wunderer osteotomy,² and anterior maxillary downfracture osteotomy.^{3,4} The osteotomy cuts are essentially the same but vary from each other only in the incision design, access to the maxillary bone, and the direction of maxillary mobilization. Advancement of the anterior maxilla by osteotomy is technically difficult because of the tight palatal mucosa; this advancement is likely to be complicated by oronasal or oroantral fistula. Only 1 case is reported where the anterior maxilla was advanced by osteotomy, and this was in 1968 by William Bell.⁵ Bell essentially used a Wassmund osteotomy to correct anterior maxillary retrusion and Class III malocclusion. The dental alveolar gap created from the advancement of the anterior maxilla had to be bone grafted and was later fitted with a partial removable denture.

The clinical application of distraction osteogenesis to correct hypoplastic maxilla is a relatively recent development, and this procedure is mainly used to correct cleft lip and palate deformities. The gradual advancement of the maxilla is normally achieved via a cranially attached distractor⁶ or orthodontic face

mask.⁷ More recently, internal distractors have also been used.⁸ However, this procedure mostly involves movement of the whole maxilla at Le Fort I level rather than the anterior maxilla alone.

Traditionally, tooth-borne palatal distractors have been used for rapid maxillary expansion in children and surgically assisted maxillary expansion in adults.⁹ Expansion has always been in the transverse dimension, and aims to correct the collapsed buccal occlusion, particularly in cases of cleft palate.¹⁰ The use of tooth-borne palatal distractor was confirmed feasible in dogs to distract the anterior maxilla forward and generate new bone and palatal mucosa.¹¹ However, a follow-up radiographic study¹² indicated that tooth-borne distractor tended to produce greater dental movement than skeletal movement. Bone-borne palatal distractors have recently been developed, which ensure that the transverse expansion is derived from the expansion of the palatal bone rather than the buccal tilting of the posterior teeth.¹²⁻¹⁴ The use of a palatal distractor in the anteroposterior direction to advance a retruded maxilla after an alveolar osteotomy in a noncleft patient has been reported once.¹⁵ The aim of this article is to describe an alternative technique involving the distraction of the entire segment of the cleft anterior maxilla by a tooth-borne palatal distractor. This technique is illustrated with 2 cases of clinical cleft lip and palate.

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Materials and Methods

INDICATIONS

This technique is indicated for patients presenting with maxillary hypoplasia in the anteroposterior and transverse planes, particularly in the case of cleft lip and palate deformities. The dental crossbite is preferably restricted to the anterior and premolar teeth, with the molars in the normal buccal occlusion. The technique is particularly suitable for dental crowding in the anterior maxilla. As new bone is generated by the distraction, the displaced teeth can be aligned into occlusion by orthodontics following surgery.

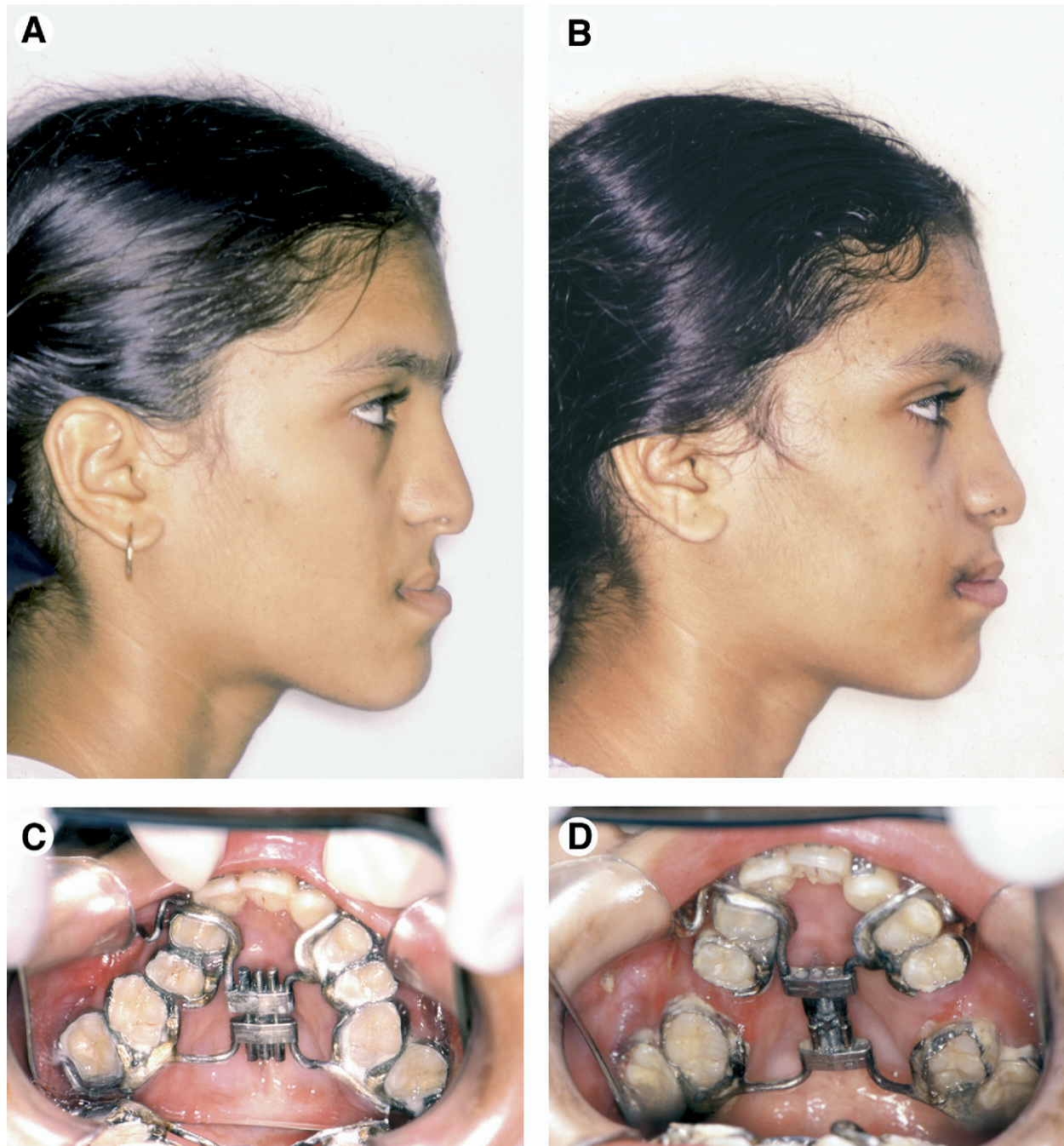


FIGURE 1. A 24-year-old patient with unilateral cleft lip and palate with maxillary retrusion. *A*, Preoperative profile showing retruded maxilla and paranasal deficiency. *B*, Postoperative profile after distraction showing upper lip advancement and restoration of the paranasal prominence. *C*, Intraoral palatal view of hyrax appliance cemented to first and second molars posteriorly and premolars anteriorly. Appliance not yet activated. *D*, Intraoral view at completion of distraction. New soft tissue formation can be seen in alveolar crest and palatal region. Distraction has opened up space between molar and premolar teeth.

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TECHNIQUE

A Hyrax orthodontic appliance (Hyrax expansion screw; Dentaaurum, Pforzheim, Germany) is prepared beforehand on a maxillary dental model. The appliance is oriented so that its activation will produce anteroposterior movement rather than the

traditional transverse expansion. It normally has 4 arms. The 2 anterior arms can be soldered to the orthodontic bands of the canines or first premolars of each side, and the 2 posterior arms can be soldered to either the first or second molars, or both. The appliance should be tried on for passive

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