

# Passive Mandibular Expansion: Individualizing Archform

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**T**he human dental archform, which has been studied and analyzed for decades,<sup>1-10</sup> may be the most important factor in determining the stability of orthodontic treatment. Therefore, any diagnosis should include a consideration of the effects of changes in arch width, archform, and incisor position. Can the dental arches be expanded or their form changed with any certainty of long-term stability? Can the cuspids be expanded and remain stable? Can the incisors be advanced without affecting stability, lip strain, and, consequently, facial esthetics?

There is little doubt that rapid palatal expanders, when properly used and maintained, can produce a large and relatively stable increase in maxillary arch width, and thus an improvement in arch length. The physiology of a growing patient, with an incompletely fused mid-palatal suture, makes expansion possible.

Although no such mechanism exists in the mandible, there are two possible ways to expand the lower arch. Active expansion uses the forces of an appliance to push or pull the teeth into a larger archform. These appliances include the Schwarz, the lower Quad Helix,\* the Arnold Expander, lingual arches, and brackets with successively expanded archwires. Passive devices, such as the lip bumper or the vestibular shields of

the Fränkel appliance, rely on a disturbance of the equilibrium in the muscular forces of the lips, cheeks, and tongue.<sup>11-17</sup>

## Lip Bumpers

Why would an orthodontist use a passive appliance requiring 12-18 months of treatment (Fig. 1) instead of an active appliance that could take much less time? If the stability of the expanded arches were the same, there would be no discernible advantage. Cetlin, however, has demonstrated impressive long-term stability in nonextraction cases where lip bumpers were used for mandibular expansion<sup>18</sup> (Fig. 2).

Of course, some degree of relapse may be unavoidable when dealing with human beings and their myriad of environmental and functional stresses. It should also be noted that Cetlin pays special attention to details such as torque, angulation, rotations, marginal ridges, and contact points. But other orthodontists who use the same form of passive expansion have experienced the same stability of results.

## Treatment Sequence

Gains of 4mm or more in mandibular arch length can be expected with the lip bumper,<sup>19</sup> especially in treatment of growing patients with the second deciduous molars present. In addition, there is usually some improvement in the curve of Spee. Proper adjustment of the lip bumper as treatment progresses is obviously important, but is easily accomplished. Treatment of the maxillary arch can proceed while the lip bumper is in place. Thus, the time required for full-bracketed appliances can be reduced substantially.

My nonextraction protocol originally called for nine to 18 months of lip bumper therapy, followed by indirect bonding of the mandibular

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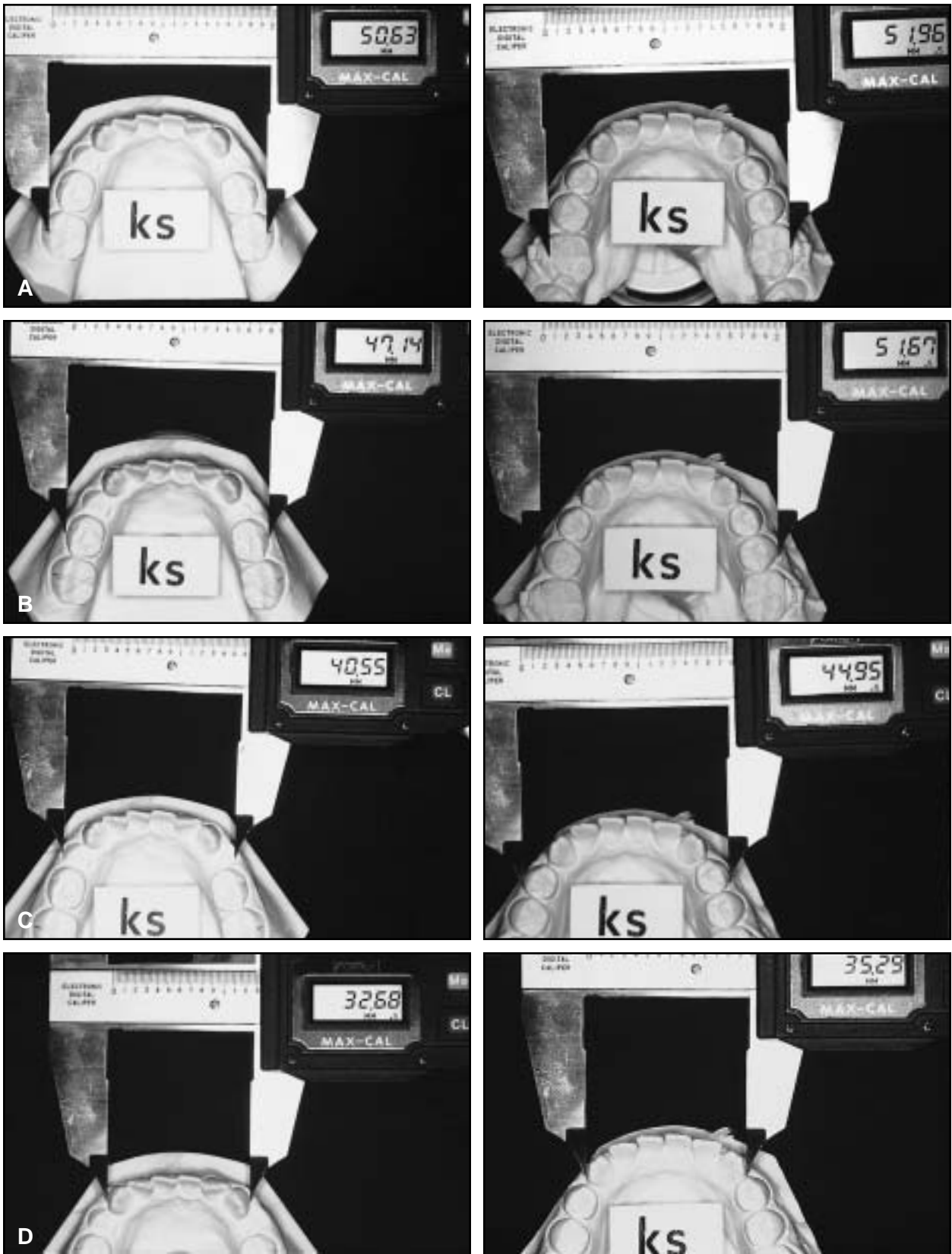


Fig. 1 Arch expansion in patient after 14½ months of lip bumper therapy. A. First molars: 1.3mm. B. Second bicuspid: 4.5mm. C. First bicuspid: 4.4mm. D. Cuspids: 2.6mm.

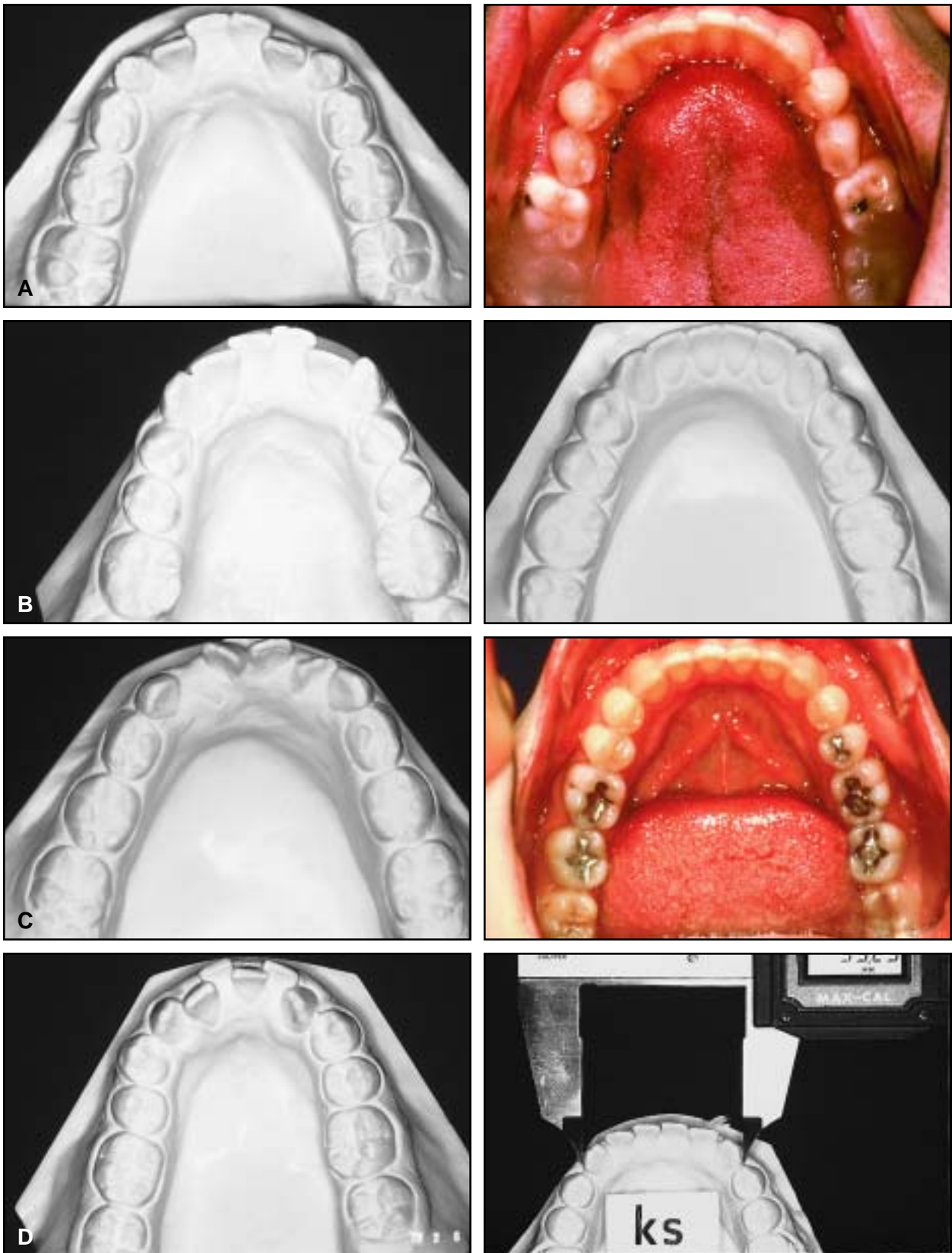
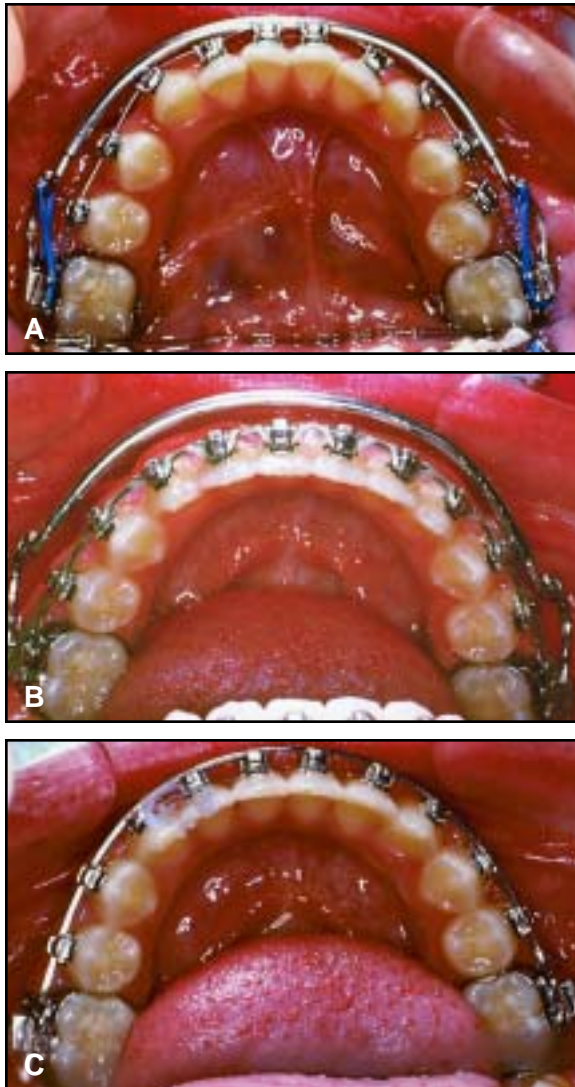


Fig. 2 Sampling of Cetlin's cases before lip bumper therapy and: A. 20 years post-retention. B. 30 years post-retention. C. 23 years post-retention. D. 20 years post-retention. (Photographs courtesy of Dr. Norman



**Fig. 3** Mandibular archwires used after lip bumper therapy. **A.** Immediately following indirect bonding: .014" nickel titanium. **B.** Gathering space after initial alignment: .016" stainless steel. **C.** Final archwire: .016" × .022" stainless steel.

arch and a succession of archwires to produce the final archform. After several years, I realized that the archform produced by the lip bumper was the proper form for that particular patient. Exceeding the bicuspid and cuspid widths achieved with the bumper would invite collapse after treatment. I now use the working casts produced for indirect

bonding after lip bumper expansion as the template for final archform. If the models are not readily available, a template can be kept in the patient's record for use with subsequent archwires.

Once the mandibular expansion has been achieved, it is important to keep the lip bumper in place while the teeth are being aligned and the remaining space is collected (Fig. 3). Any mesial movement of the mandibular molars must be prevented.

### Follow-Up Study

I recently began a random five-year post-treatment study of patients with passive mandibular expansion. The following three cases are the first with follow-up records. For comparison, the wire shown on each cast is the final archform.

#### Case 1

This 11-year-old female was treated with the lip bumper for 19 months, followed by 10 months of fixed appliances (Fig. 4, Table 1). No headgear or elastics were used. The patient wore a lower spring retainer two to three times a week during the post-treatment period.

#### Case 2

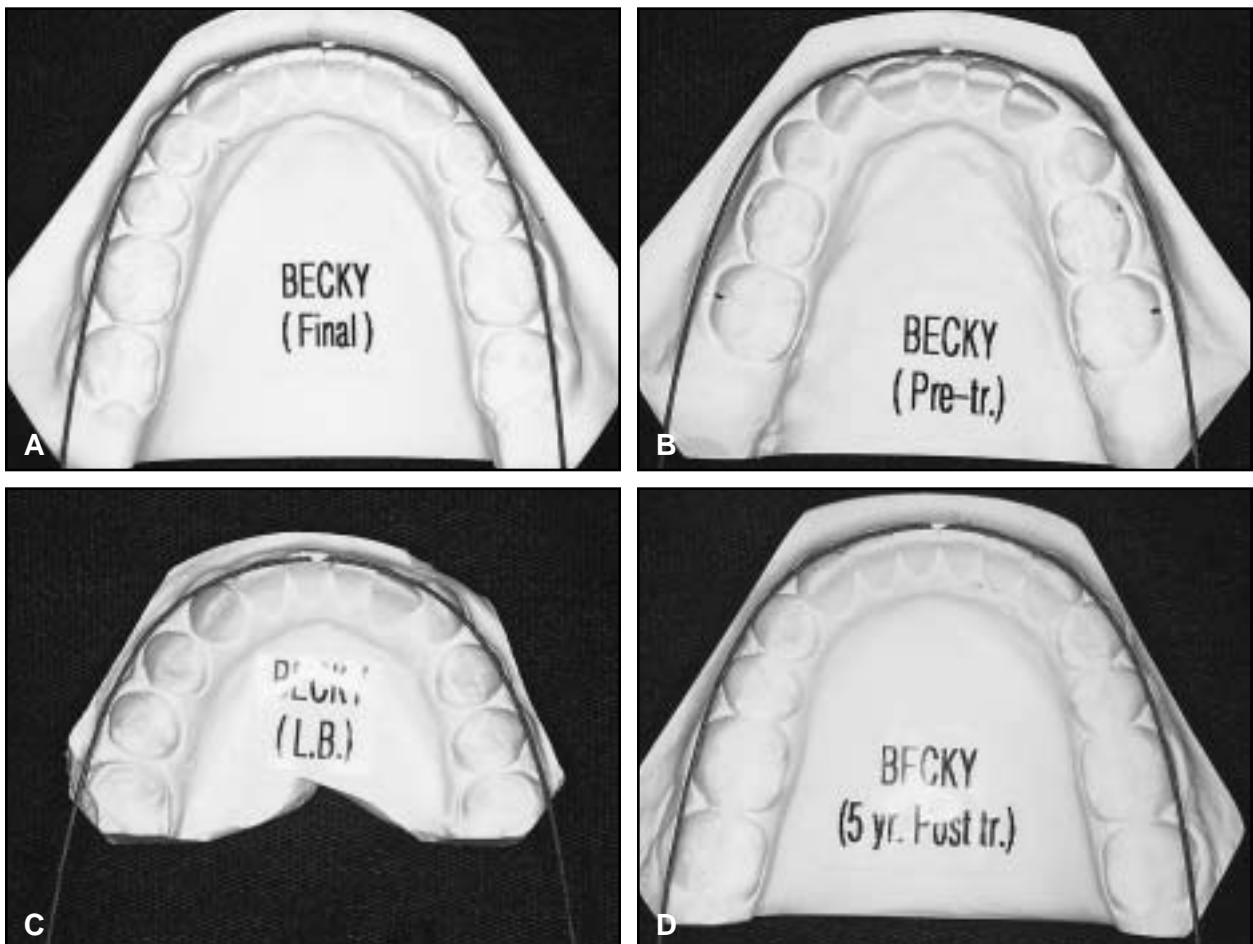
A 12½-year-old female was treated for 33 months, including 15 months with a lip bumper (Fig. 5, Table 2). A Teuscher-Stockli variable-pull headgear appliance was worn for 18 months, followed by five months of J-hook headgear, six weeks of Class II elastics, and a positioner. The patient stopped wearing her lower retainer seven months before the follow-up records were taken.

#### Case 3

A female patient age 11 years, 9 months, wore a lip bumper for 18 months out of 23 months' total treatment time (Fig. 6, Table 3). No headgear was used, but she wore triangular elas-

**TABLE 1**  
**CASE 1 ARCH MEASUREMENTS (MM)**

	Pre-treatment	After Lip Bumper	Post-Treatment	5 Years Post-Treatment
6-6	44.0	48.7 (+4.7)	48.1 (-0.6)	47.4 (-0.7)
5-5	42.3	46.9 (+4.6)	47.4 (+0.5)	46.4 (-1.0)
4-4	37.4	40.8 (+3.4)	41.6 (+0.8)	41.0 (-0.6)
3-3	—	30.7	31.7 (+1.0)	31.3 (-0.4)



**Fig. 4** Case 1. Patient treated for 19 months with lip bumper, 29 months total. **A.** Final cast. **B.** Pretreatment cast. **C.** Cast used for indirect bonding immediately after lip bumper therapy. **D.** Five-year post-treatment cast.

**TABLE 2**  
**CASE 2 ARCH MEASUREMENTS (MM)**

	Pre-treatment	After Lip Bumper	Post-Treatment	5 Years Post-Treatment
6-6	35.1	36.8 (+1.7)	37.6 (+0.8)	37.6 (0.0)
5-5	40.2	44.6 (+4.4)	44.7 (+0.1)	44.6 (-0.1)
4-4	36.3	38.8 (+2.5)	38.8 (0.0)	38.5 (-0.3)
3-3	24.5	26.4 (+1.9)	25.1 (-1.3)	25.1 (0.0)

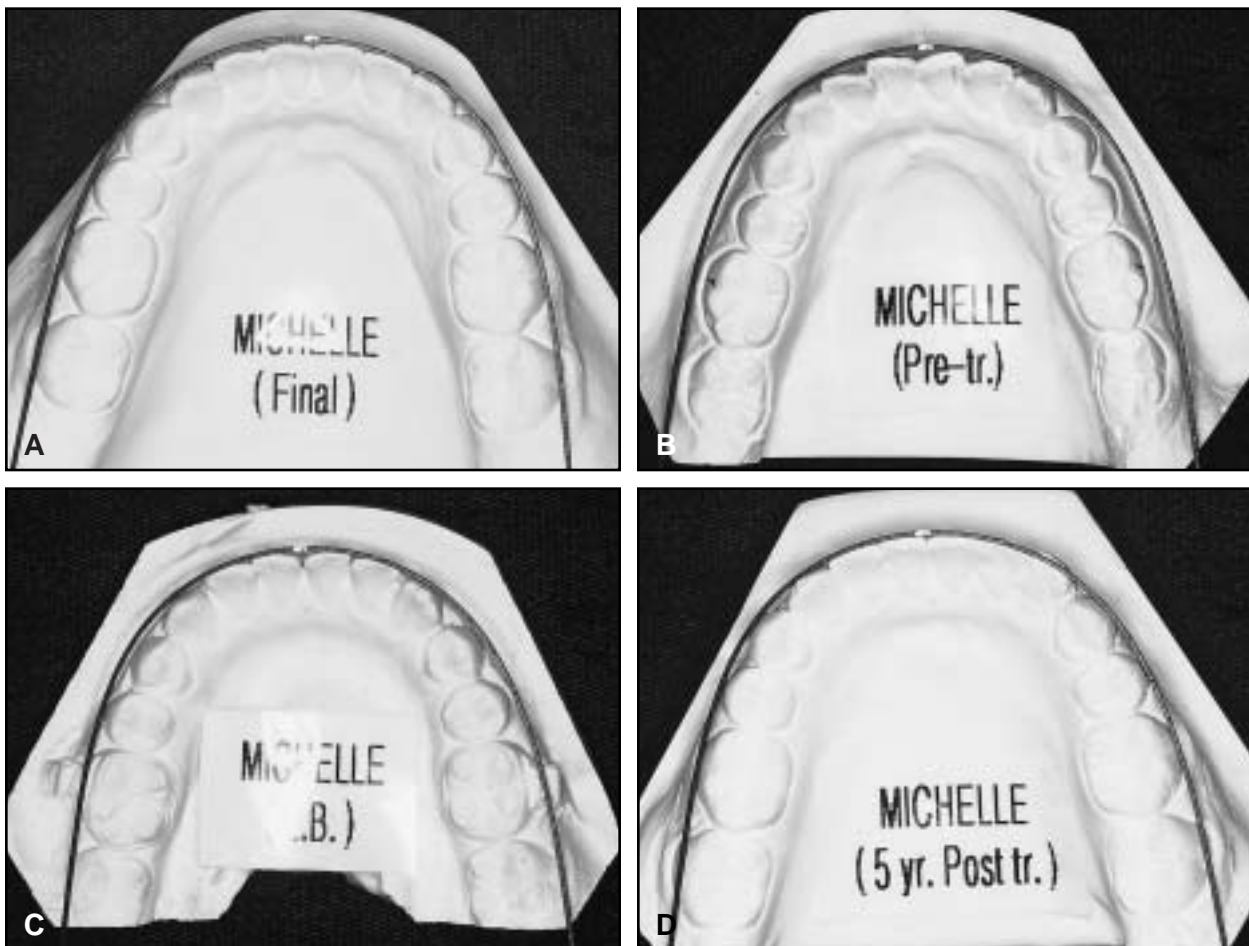
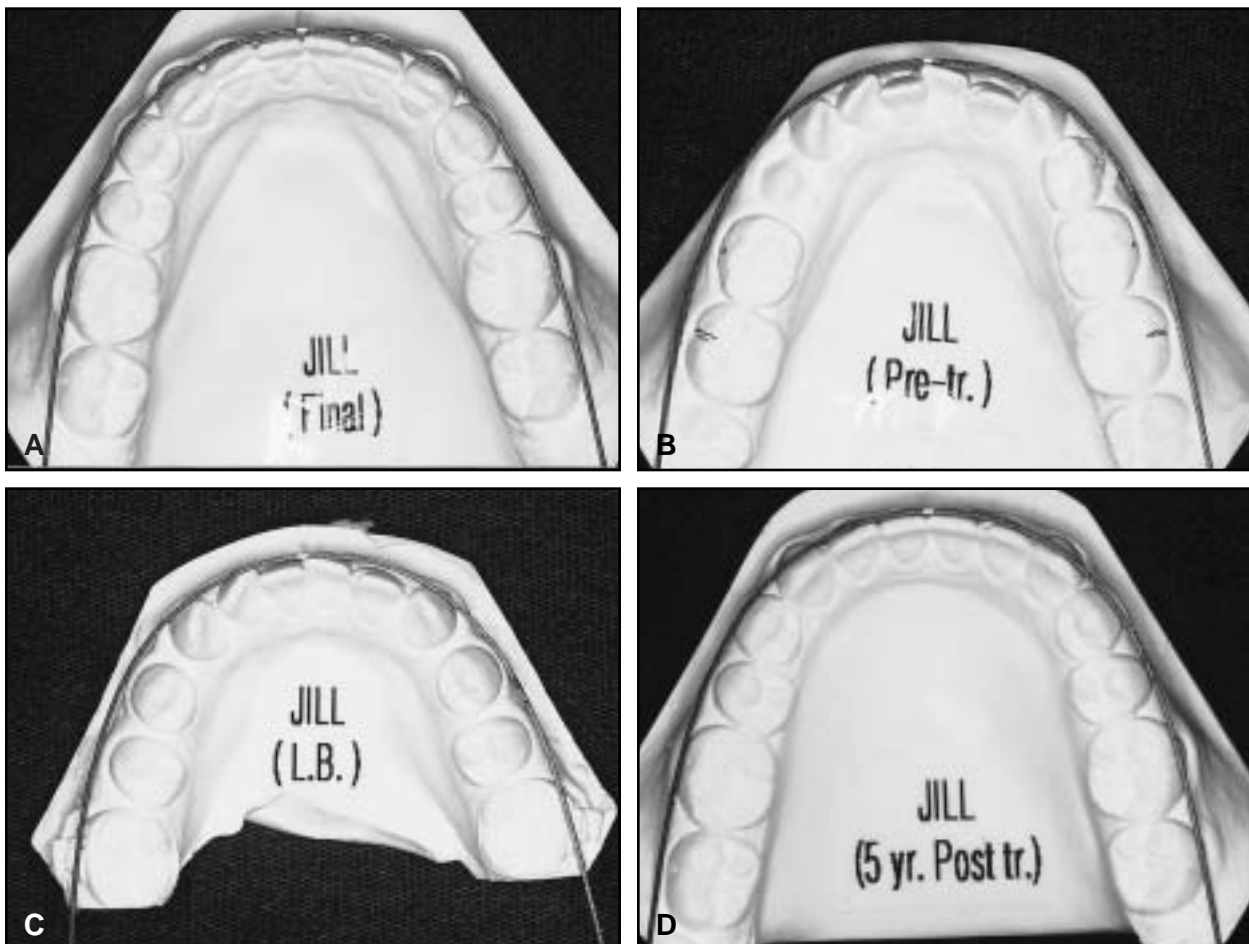


Fig. 5 Case 2. Patient treated for 15 months with lip bumper, 33 months total. A. Final cast. B. Pretreatment cast. C. Cast used for indirect bonding immediately after lip bumper therapy. D. Five-year post-treatment cast.

**TABLE 3**  
**CASE 3 ARCH MEASUREMENTS (MM)**

	Pre-treatment	After Lip Bumper	Post-Treatment	5 Years Post-Treatment
6-6	46.3	49.7 (+3.4)	49.2 (-0.5)	47.8 (-1.4)
5-5	44.7	46.2 (+1.5)	46.6 (+0.4)	45.4 (-1.2)
4-4	36.7	40.3 (+3.6)	41.0 (+0.7)	40.3 (-0.7)
3-3	24.1	25.7 (+1.6)	26.2 (+0.5)	26.2 (0.0)



**Fig. 6** Case 3. Patient treated for 18 months with lip bumper, 23 months total. A. Final cast. B. Pretreatment cast. C. Cast used for indirect bonding immediately after lip bumper therapy. D. Five-year post-treatment cast.

tics for one month full-time and another month at night only. A lower spring retainer was worn two to three times a week during the year and a half before post-treatment records.

## Conclusion

Archform is of utmost importance if the orthodontist is to deliver the best possible service to the patient. An arbitrary mandibular archform, whether produced with a preformed arch or by "eyeballing" the dentition, may not be consistent with what the muscular trough of the individual patient will allow.

The cases shown here, as well as the long-term results produced by Cetlin and others, give ample evidence of the stability of passive mandibular expansion produced by lip bumper therapy.

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