

# A Modified ACCO for Class II Nonextraction Treatment

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This article describes a modified, second-generation Acrylic Cervical Occipital (ACCO) appliance.<sup>1</sup> The first ACCO, developed by Margolis, was a modification of the Hawley retainer, with the addition of Class I finger springs mesial to the maxillary molars<sup>2</sup> (Fig. 1). This removable appliance exerts a continuous distalizing force on the molars, with the springs' reactive forces dissipated through the acrylic button into the palate and the maxillary teeth mesial to the molars.<sup>1,3</sup> The appliance has three parts:

1. A labial bow over the incisors, embedded in an acrylic wraparound plate with Adams clasps on the first premolars.
2. Round (.028") or rectangular (.019" × .025") finger springs that are activated posteriorly to exert a light, constant force of no more than 100-125g. If the second molars have erupted, two finger springs can be inserted per side, at both the first and second molars. The springs must be placed as apically as possible to minimize distal crown tipping, and the point of force application must be as close as possible to the molar's center of resistance without risking gingival irritation.
3. An anterior biteplane placed from canine to canine to disclude the buccal segments during

molar distalization. The biteplane is contraindicated if the patient is hyperdivergent or has an open-bite tendency.

To ensure bodily molar distalization, the acrylic plate is integrated with extraoral traction applied to the maxillary first molar bands.<sup>4</sup> High-pull headgear is used in hyperdivergent patients, cervical traction in hypodivergent patients. For optimal results, the ACCO must be worn full-time except during meals, and the headgear for 12-14 hours per day.<sup>5-8</sup>

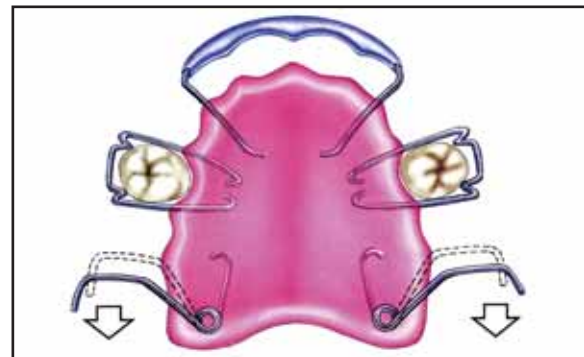


Fig. 1 Acrylic Cervical Occipital (ACCO) appliance design.

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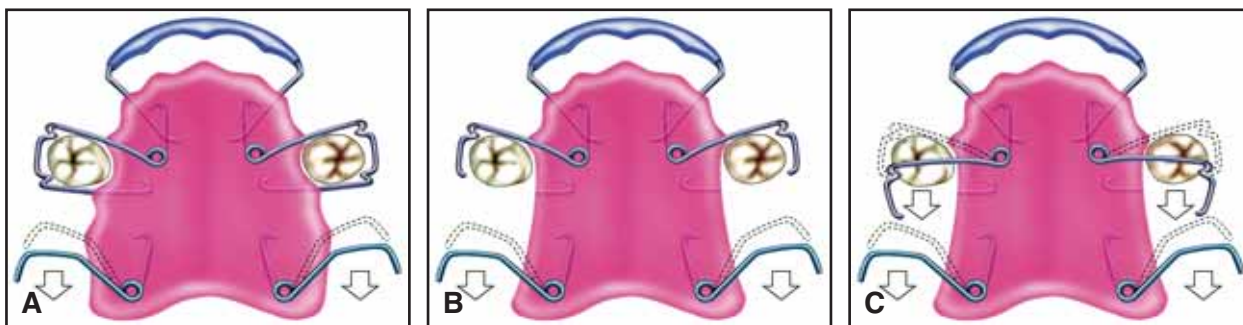


Fig. 2 A. Modified ACCO design. B. Adams clasps on first premolars converted to finger springs by cutting off distal ends. C. Activation of premolar finger springs.

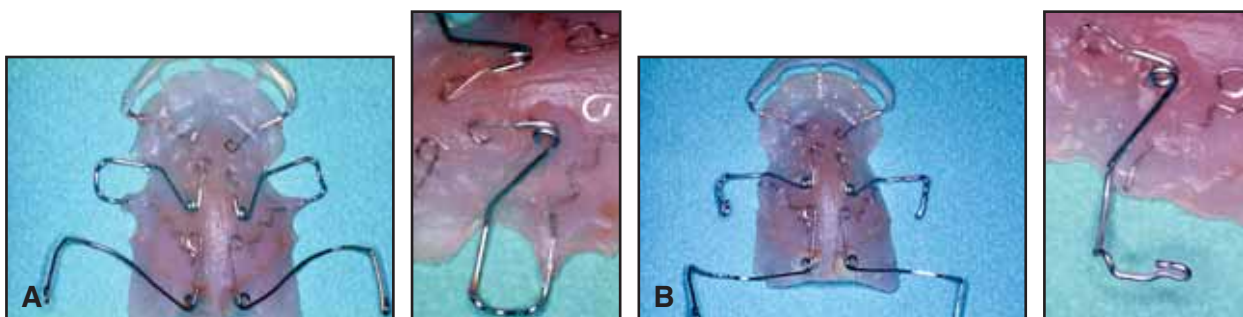


Fig. 3 A. Modified ACCO before conversion of Adams clasps on first premolars. B. Distal ends of Adams clasps cut off for conversion to finger springs.

### Modified ACCO

The second-generation ACCO has been altered to provide additional anchorage control and advantages in multibracketed treatment. The major difference is that the Adams clasp engaging each first premolar terminates in a helix embedded in the acrylic plate. When the distal end of the clasp is cut off, it becomes a finger spring used to distalize the first premolar (Fig. 2).

With the original ACCO, distalization ended when the first molar had been overcorrected into a super-Class I relationship and the second premolar had drifted distally. With the modified appliance, treatment continues until both premolars are Class I and some spontaneous canine distalization has occurred. The second-generation ACCO offers a number of other advantages over conventional mechanics:

1. Faster tooth movement, due to the elimination of friction between bracket slots and archwire.
2. Avoidance of the maxillary molar anchorage loss that is usually associated with premolar retraction. After conventional molar distalization, the first pre-

molars must be bracketed for retraction, increasing treatment time and the risk of posterior anchorage loss.

3. Limitation of Class II elastic wear to the canine and incisor retraction phases, thus reducing undesirable side effects in the mandibular arch. This is particularly significant in hyperdivergent cases, in which it is imperative to minimize the extrusive effect of elastics, often by using short elastics that do not affect the molars. The modified ACCO (without the anterior biteplane), in conjunction with high-pull headgear, ensures vertical control throughout the distalization process.

4. Resistance to counterclockwise mandibular growth in brachycephalic patients with deep bites, by means of the anterior biteplane and cervical traction.<sup>9,10</sup> In hypodivergent patients, it is advisable to obtain a super-Class I molar relationship as soon as possible, even if crown tipping occurs. During the subsequent premolar retraction, the molar roots can be uprighted by adjusting the height of the headgear facebow so that it passes above the molars' centers of resistance. Thus, during the time required for bodily distalization of the molars, the first and second premolars are also distalized.



**Fig. 4** Case 1. 12-year-old female patient with hypodivergent skeletal Class II, division 1 malocclusion before treatment.

5. Asymmetrical distalization, up to and including the first premolars, without affecting the positions of the remaining teeth.
6. Quick and simple adjustments by the clinician.

### Clinical Application

The usual procedure for molar and premolar distalization with the modified ACCO is as follows:

1. Molar distalization is achieved with finger springs mesial to the molars, using a force of 100-125g. The average rate of first molar movement is 1mm per month; if headgear is used, this will be a bodily distalization. When the first molars begin to move, acrylic is removed distal to the second premolars to encourage spontaneous drift due to stretching of the transseptal fibers.
2. Once the molars have been moved into a super-Class I relationship, the distal segments of the dual-helix Adams clasps on the first premolars are cut, and the acrylic around these teeth is reduced. The new finger springs must then be activated posteriorly in the same way as the molar springs (Fig. 3). If necessary, their stability can be enhanced by adding cleats to the labial surfaces of the first premolars. When the first premolars have been moved about 2mm, acrylic is removed distal to the canines to encourage spontaneous distal migration.

3. Once the first premolars have reached a Class I relationship, the entire maxillary arch is bonded. Because the finger springs tend to tip the first premolars while retracting them, light Class II elastics should be used during the alignment phase to maintain the sagittal crown positions while uprighting the roots.

### Case 1

A 12-year-old female presented with a hypodivergent skeletal Class II, division 1 malocclusion and excessive overbite and overjet (Fig. 4). There was no crowding in the lower arch,<sup>2</sup> and the upper second molars had not yet erupted. Soft tissues were well positioned relative to the "true vertical line".

Treatment involved upper molar distalization with the second-generation ACCO and cervical traction (Fig. 5). A canine-to-canine anterior biteplane was used to encourage anterior bite opening. When a super-Class I molar relationship had been achieved, the Adams clasps on the first premolars were cut distally. The premolar finger springs were activated progressively, while the molar finger springs were left passively in place to maintain the molar positions (Fig. 6). The upper canines drifted distally during the first premolar retraction.

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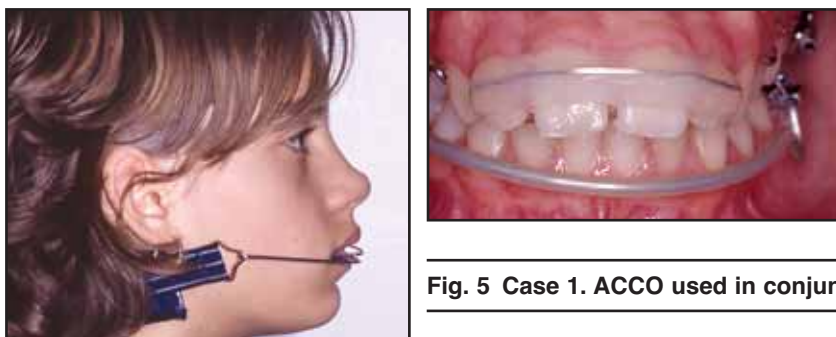


Fig. 5 Case 1. ACCO used in conjunction with cervical traction.

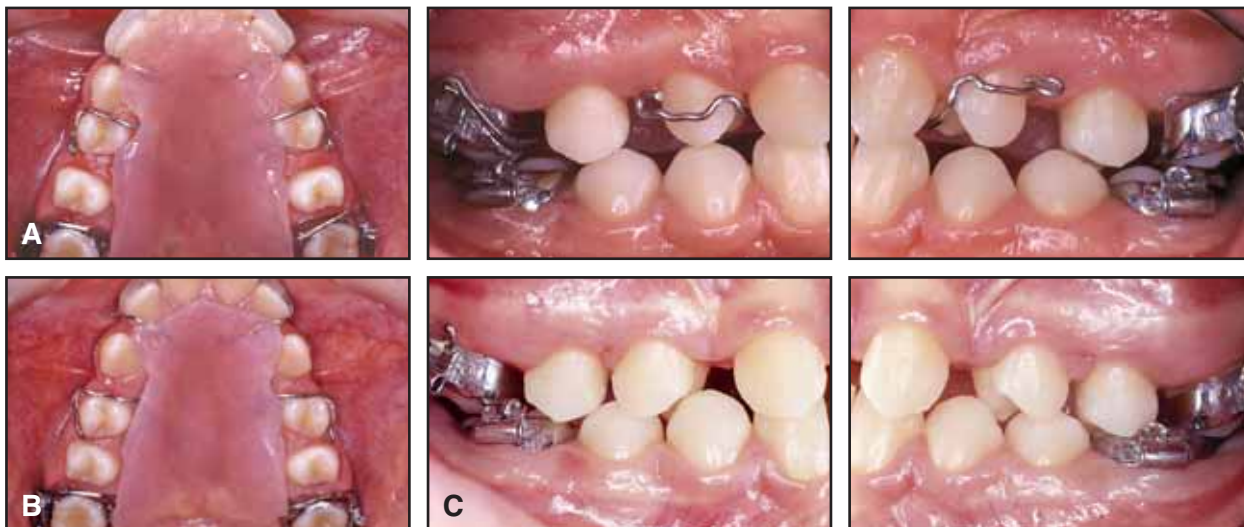


Fig. 6 Case 1. A. Activation of finger springs on first premolars; note canine-to-canine biteplane. B. Spontaneous distal migration of canines during premolar retraction. C. Completion of premolar retraction with ACCO.



Fig. 7 Case 1. Patient after 20 months of treatment.

Full fixed appliances were then placed, and the case was finished using the Bidimensional Technique. After 20 months of treatment, the patient displayed Class I molar and canine relationships, a normal overbite and overjet, and a more harmonious profile and smile due to torquing of the upper incisors (Fig. 7).

### Case 2

An 11-year-old female presented with a severely hyperdivergent skeletal Class II malocclusion and an anterior and buccal open bite (Fig. 8). The upper second molars had not yet erupted, and a lower lingual arch had been placed to preserve the leeway space. Because the upper lip was only 1mm forward of the “true vertical line”, nonextraction treatment was recommended to avoid undesirable lip retraction.<sup>11</sup>

The upper molars were distalized with the second-generation ACCO, combined with

high-pull headgear for vertical control (Fig. 9). No anterior biteplane was added. As usual in hyperdivergent cases, a super-Class I molar relationship was obtained to reduce the need for Class II elastics during the remainder of treatment. A favorable distal migration of the upper second premolars was evident during this phase (Fig. 10).

The Adams clasps on the upper first premolars were converted to finger springs for retraction. At the end of the ACCO phase, both first and second premolars were in Class I positions, the canines had spontaneously drifted distally, and the open bite had been corrected (Fig. 11). Full fixed appliances were then bonded for alignment, completion of canine distalization, and incisor retraction. No Class II elastics were needed because of the super-Class I molar and premolar relationships achieved with the modified ACCO (Fig. 12).

Final results showed a Class I occlusion, a

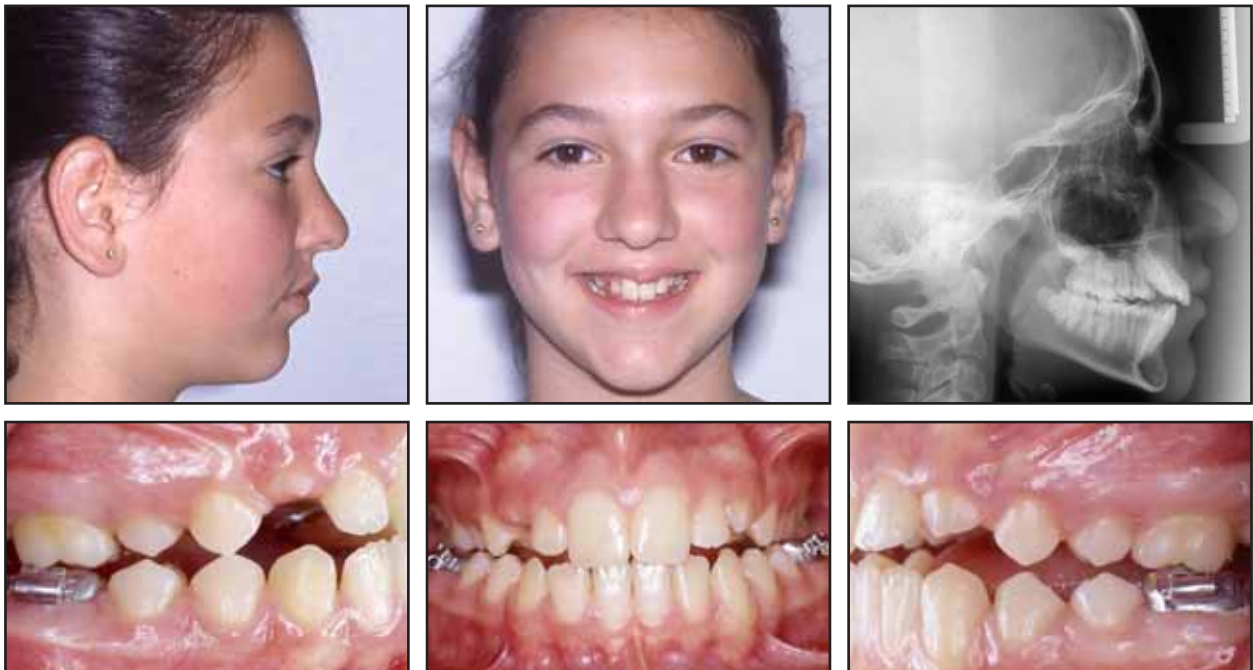


Fig. 8 Case 2. 11-year-old female patient with severely hyperdivergent skeletal Class II malocclusion before treatment.

normal overbite, and a stable skeletal pattern (Fig. 13). The patient's smile and facial appearance improved because the upper lip position was maintained, the vertical dimension was controlled, and incisor torque was optimized.

## Discussion

The second-generation ACCO not only distalizes the maxillary molars, like the original Margolis version, but also moves both the first

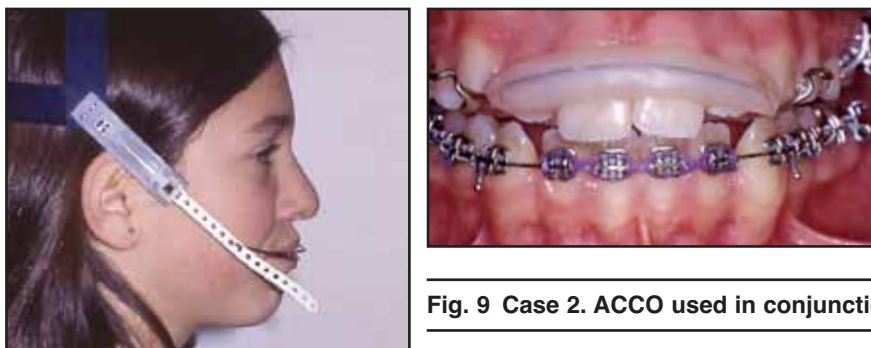


Fig. 9 Case 2. ACCO used in conjunction with high-pull headgear.



Fig. 10 Case 2. Spontaneous migration of second premolars during molar distalization.



Fig. 11 Case 2. Vertical control during retraction of first premolars.



Fig. 12 Case 2. Incisor retraction without Class II elastics, due to super-Class I molar relationship obtained with ACCO.

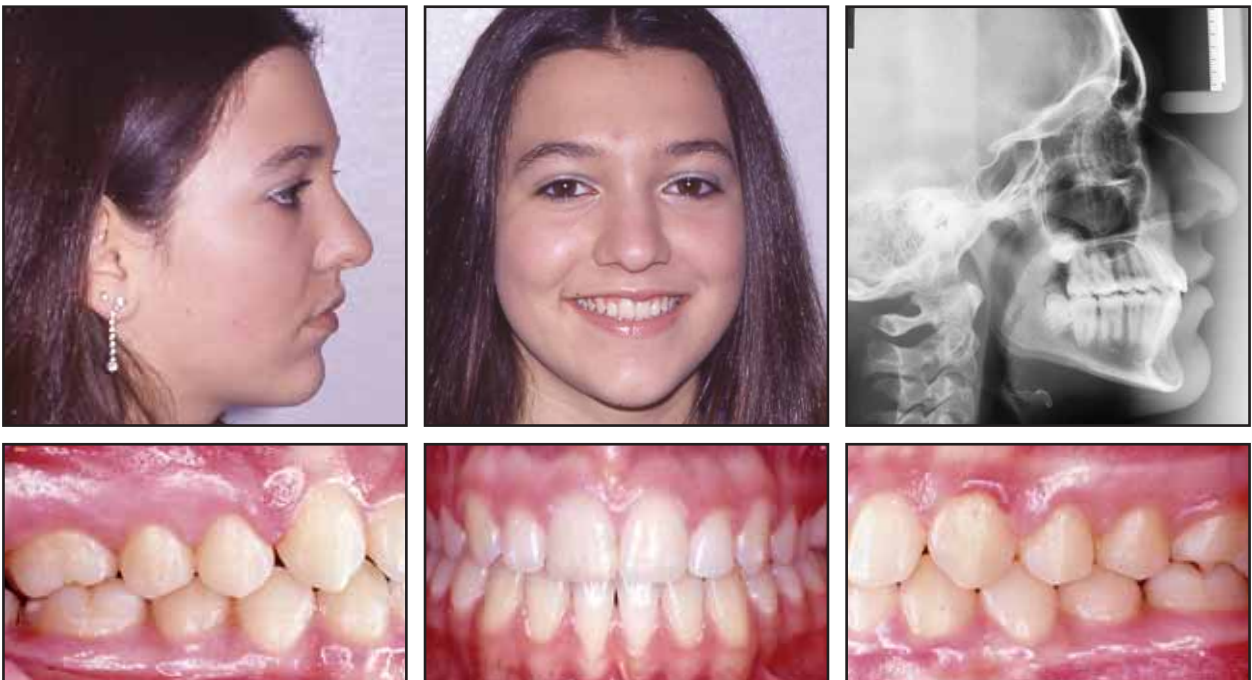
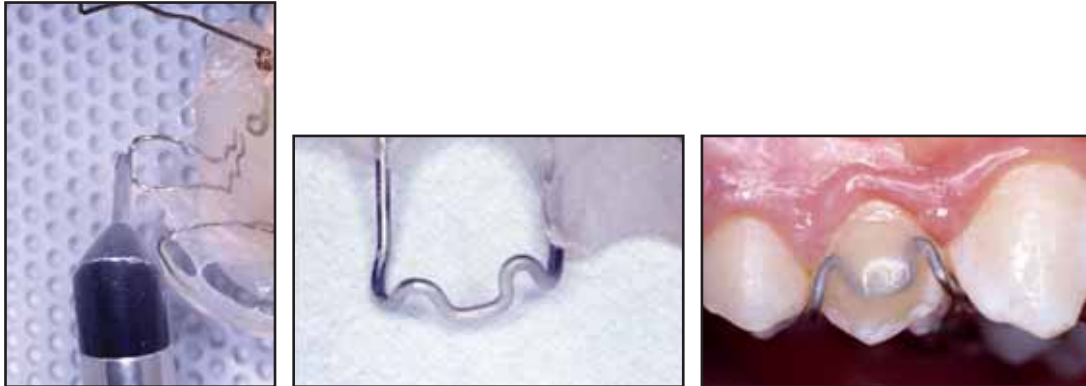


Fig. 13 Case 1. Patient after 20 months of treatment.

and second premolars into Class I relationships and encourages partial distal migration of the canines. Thus, it reduces the time needed for multibracketed treatment and the risk of posterior anchorage loss. Moreover, the appliance can be used for asymmetrical distalization of molars or premolars as needed. In patients with poor cooperation, the ACCO can be bonded to the labial surfaces of the first premolars (Fig. 14).

In hyperdivergent patients, where the extended use of Class II elastics could exacerbate the open bite and promote clockwise rotation of the mandible, the modified ACCO, in conjunction with high-pull headgear, controls the vertical dimension and minimizes the need for elastic wear. The ease of clinical management of the second-generation ACCO further distinguishes it from other distalizing appliances used for Class II nonextraction treatment.



**Fig. 14** Adams clasp sandblasted and bonded to labial surface of upper premolar in patient with poor cooperation.

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