Nonextraction Treatment An Atlas On Cetlin Mechanics

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Chapter 7
The removable distalizing plate

The removable distalizing plate serves to continue upper molar distalization when it is not possible to create a "super Class I" relationship with palatal bars and headgear only. It is required only in the more severe cases.

This plate is a modification of Margolis' ACCO (whose name comes from AC = acrylic , CO = cervico-occipital anchorage). Margolis has been among those clinicians who combined removable appliances and extraoral forces. The difference in his system was that a headgear was applied to the plate to increase anterior anchorage.

The plate used in our system has been designed to apply a gentle, constant force to the upper first permanent molars, with minimal reaction on the upper front teeth. Proper construction, activation and clinical management are crucial to its success. The plate should always be used after a palatal bar and initial headgear wear. This is because molars that have already been set in good transverse and sagittal position and are being moved distally offering less resistance. The plate action will be eased and any undesired reaction will be easily controlled.

Plate forces tend to incline and extrude the crowns of molars in a distal direction.

For this reason, the removable appliance should always be used in conjunction with an extraoral force. The headgear helps to control molar roots, to obtain the desired molar bodily distal movement and to maintain the vertical position of the molars.

An anterior bite plane is usually added to the removable distalizing plate. Disclusion of posterior teeth will enhance distal movement of upper molars and lip bumper action in leveling the curve of Spee, while gaining space in the lower arch. The mandible, freed from the constricting action of the upper arch, will be able to express its entire growth potential. The bite plane is necessary also in those cases where TMD signs and/or symptoms are present. The bite plane is not included if treating an open bite, clockwise skeletal facial pattern or increased lower facial height.

7.1 Characteristics and construction

The removable distalizing plate has three different components:

1. Active: two distalizing fingersprings with arms that lie against the mesial surface of the upper first permanent molars

2. Retentive: a labial arch covered by a labial screen and two Adams clasps on the first premolars, or first deciduous molars

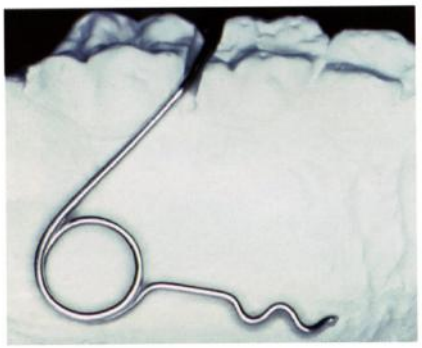
3. Bite Plane: used with an anterior bite plane to disclude posterior teeth

In the following sections, each component will be described in detail

7.1.1 The distalizing springs

The distalizing springs are made out of 0.028" (0,7 mm) 3/4 hard stainless steel wire. They have retentive bends that are embedded in the acrylic, a helical coil to store activation energy an arm to apply the force to the crown of the upper permanent molars.

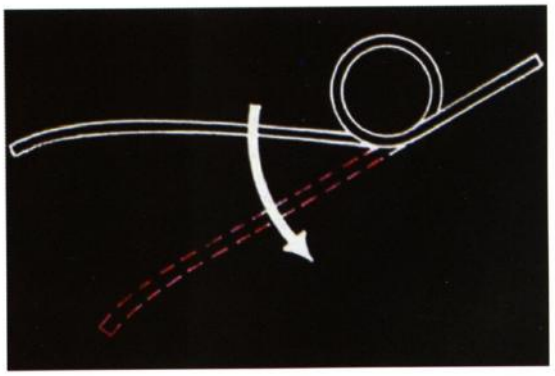
The helical coil is bent with heavy duty, bird-beak pliers or Ruhland pliers. The coil's diameter is 5 mm., and must be placed palatally just distal to the middle of the upper molar crown. The retentive bends will be on one side of the helix while the long-acting arm is on the other side.



If the second primary molar is present, the arm can be bent at a gingival level, after discing the mesial surface of the molar on the cast. When the plate is delivered, this cut is reproduced on the patient's tooth. If the second premolar is present, the arm goes above the contact point and terminates at the mesiobuccal corner of the first permanent molar.

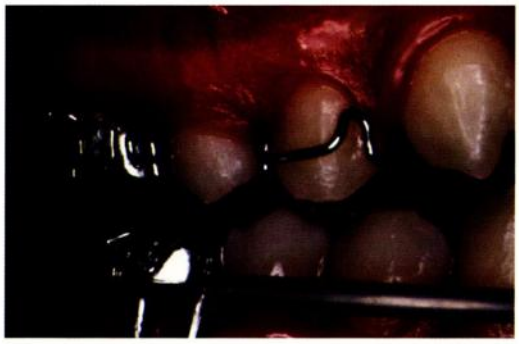
The end of the arm should never be bent around the molars, preventing spontaneous lateral movement of the molars.

The helical coil spring should always be closed for efficiency. It has to unwind when acting. The amount of activation is 3 mm. per side. This should give approximately 30 grams of distalizing force on each side.

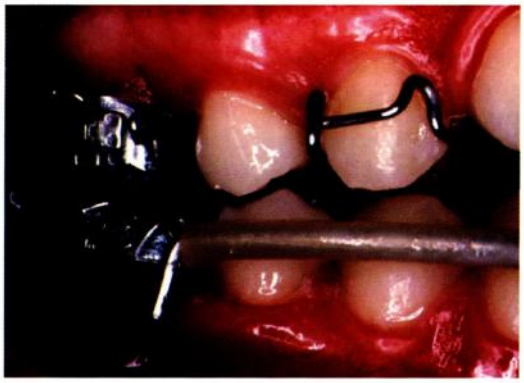


The helix and the arm of the fingerspring must incorporate as much wire as possible to reduce the load-deflection rate, creating a light and more constant force. The slightly distal position of the helix increases the springs range.

When the plate is delivered, the arm of the spring crosses (from palatal to buccal) occlusally to the molar contact point, and applies the distalizing force at the mesiobuccal corner of the molars.



Once a consistent space has been opened between the first permanent molar and the second primary molar (or second premolar), the arm of the spring can be reshaped to a more gingival position and placed flat against the mesial surface of the molar.

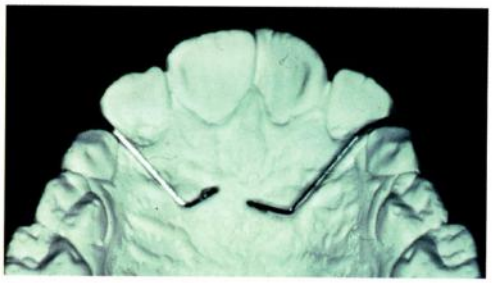


Springs should be protected by the acrylic to avoid distortion and patient discomfort.

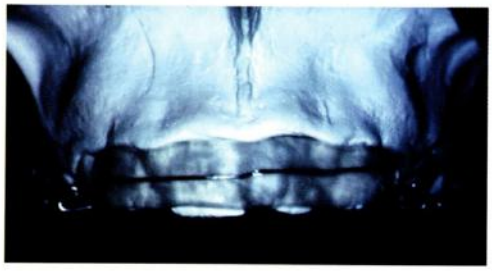
7.1.2 The labial shield

The labial shield is made of an arch embedded in acrylic. The adaptation of acrylic over the labial wire lends added stability and retention. The shield holds the plate in place and retains the front teeth so that they don't change position under the mesial-reacting force.

The labial arch is a 0.017" x 0.025" stainless steel wire bent across the labial of the incisors. Distal to the laterals, it extends palatally where it has retentions in the baseplate.



The acrylic screen covers all four incisors and represents the most important retention aspect of the plate, especially when the Adams clasps are cut off to allow distal drift of the premolars and canines.

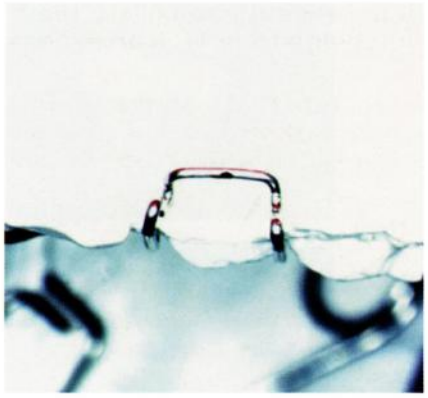


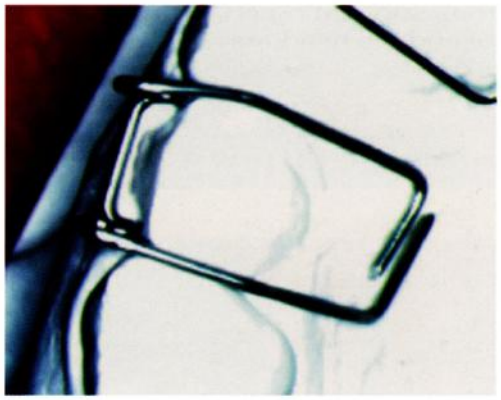
In order to increase sagittal control of the upper front teeth, a groove can be cut in the acrylic. It will engage the anterior elastic engaged from the inner bow of the headgear.

7.1.3 The Adams clasps

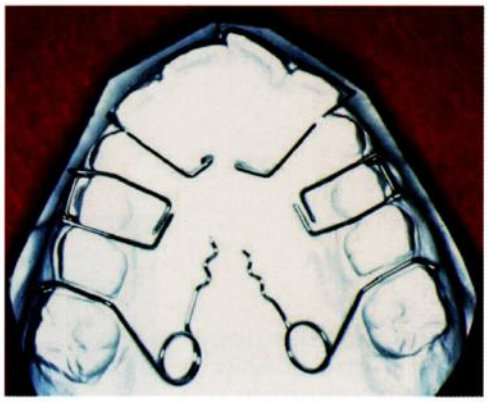
Two Adams clasps are added on first primary molars or, if present, on first premolars to increase retention of the active plate. These clasps provide the strongest possible anchorage.

Since primary molars do not usually provide good retention, additional retentions are excavated on the cast mesially and distally, and then reproduced in patient's mouth when the plate is delivered.





Bending the wire on the plate before pouring the acrylic.



7.1.4 The bite plate

The bite plate provides support for the wires while providing stability and resistance against mesial active forces from the fingersprings. It should be extended to a point just distal of the first permanent molars. This will help cover and protect the springs and prevent rocking and displacement in any direction. The acrylic is cut away from the lingual surface of the first permanent molars and second premolars to permit springs to distalize molars and allow transeptal fibers to pull premolars.

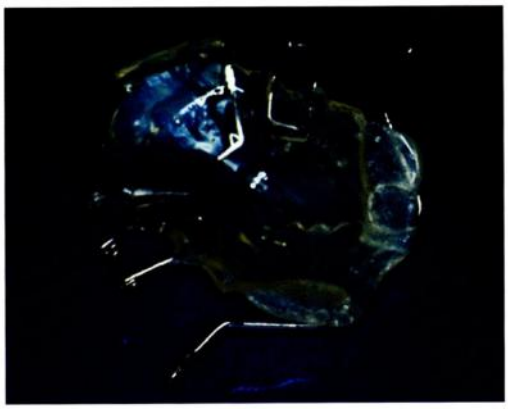
An anterior bite plane is added most of the time. It discludes the upper and lower posterior teeth, thus stimulating eruption of mandibular teeth while the maxillary teeth are held by the plate and the headgear. This differential eruption helps to reduce an excessive curve of Spee and, if needed, open the bite.

The bite plane provides assessment of the true mandibular position. Any shift of the mandible can be registered and sagittal correction easily detected. It is also a useful tool in the relaxation of masticatory muscles in those patients with TMJ problems.

The anterior bite plane must be articulated with as many lower front teeth as possible and provide a small disengagement of posterior teeth. The area of contact points should be left flat and rough. It has to be checked at each appointment as teeth move and change their spacial relationship.

The bite plane should not be present in those cases where vertical control is crucial (i.e. open bite tendencies or hyperdivergent patterns).

The finished plate. Notice how the fingersprings are protected by the baseplate acrylic.



7. 2 Clinical management of the distalizing removable plate

As stated previously, the plate follows the use of a palatal bar and an initial use of headgear. When delivered, the plate is activated to give a distal thrust to molar crowns. The selected headgear is adjusted to control molar roots, vertical dimension and anterior anchorage. The plate has to be worn 24 hours a day and removed only for meals and hygiene.

The distalizing springs are activated (usually bilaterally, but can be activated unilaterally and alternated) very lightly. An activation of 2-3 mm should give approximately 30 grams of distal force on each tooth. Greater activations tend to realize greater tipping of molar crowns and greater risk of anchorage loss.

During treatment, stability and proper activation must be verified at each appointment. A stable plate is more comfortable for the patient and will give better control of tooth movement. If greater retention is needed, Adams clasps are tightened and the labial shield relined with cold cure acrylic. If the patient dislodges the plate with the tongue, a hole in the center of the baseplate will impede the sucking force.

If the patient wears the plate as recommended, the imprint on the palatal mucosa will be visible. The type of tooth movement will also be a proof of cooperation: if crown tipping prevails, patient is not wearing the headgear; if root tipping prevails, the patient is not wearing the plate.

Once the first permanent molars are in a "Super Class I" relationship, the Adams clasps are removed and all acrylic palatal to the canines and first premolars is trimmed back. This allows the transeptal fibers to spontaneously distalize these teeth.

The patient must continue to wear the plate. Molars are held by passive springs, or if these have been removed, by a palatal bar and headgear. The plate is retained by the labial shield which must be frequently relined.

The bite plane will ensure disclusion until premolars and canines reach a better position. If distalization of these teeth is attempted with mechanotherapy, anchorage can be jeopardized.

Clinical case

Fig. 7-1

Class II, division 1 malocclusion with severe crowding in both upper and lower arch.

Fig. 7-2

After rotation of the palatal bar, upper molars have been bodily distalized with the removable plate and the extraoral force. Notice that no anchorage has been lost in both the premolar and frontal area. Second premolars are following molars toward the distal.

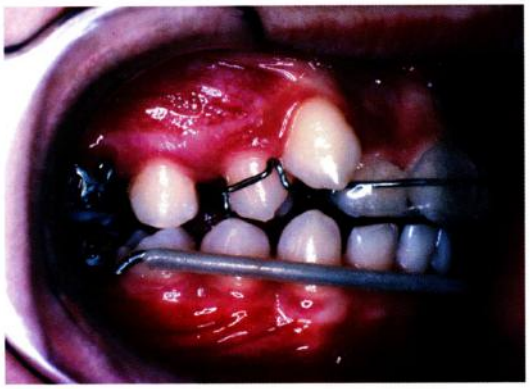


Fig. 7-3

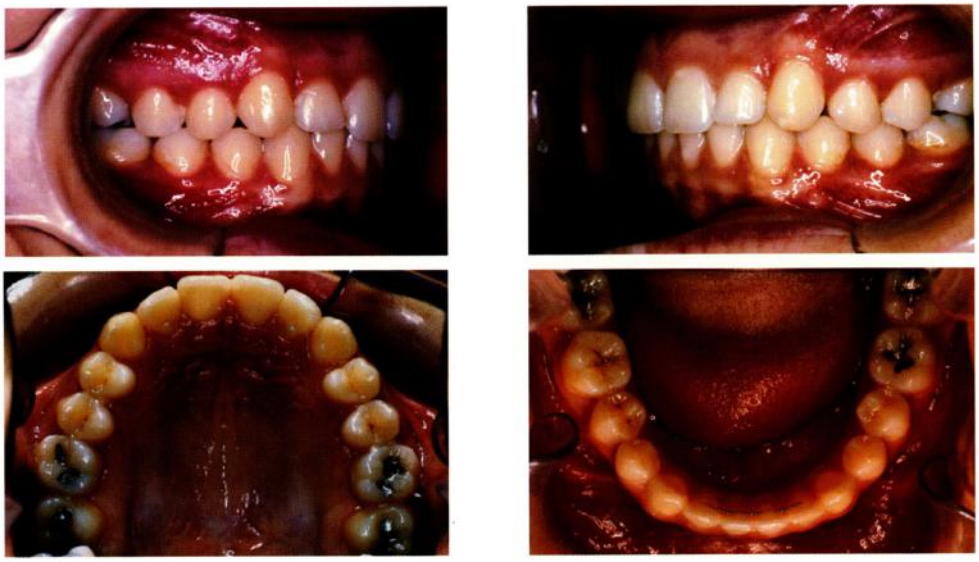
Once upper molars and second premolars have moved to the desired position, Adams clasps are removed to allow spontaneous distal drift of first premolars and canines.

Fig. 7-4

In this case, brackets were placed only in the lower arch.

Fig. 7-5

The case at the end of treatment. Patient refused brackets on the upper arch. Detailing of the occlusion was accomplished with a removable positioner.



Clinical case

Fig. 7-6

Class II, division 2 malocclusion with severe crowding in both upper and lower arch. Very low hygiene and high caries and gingival indices.

Fig. 7-7, A,B

After periodontal preparation and restorative therapy, orthodontic treatment was started with a palatal bar and a lip bumper.

A

B

Fig. 7-8

Upper molars have been rotated and slightly expanded, while the lower arch begins to unravel under the lip bumper's shield.

Fig. 7-9

Space-gaining has progressed by using the upper removable distalizing plate and an appropriate headgear. Notice how upper molars have been bodily moved to the distal. At this time, Adams clasps have been removed, the labial shield has been relined to increase retention and the springs have been adjusted to be passive against the upper first permanent molars. The patients wear the plate until premolars and canines completely drift to the distal. The bite plane of the plate helps to disclude upper and lower arches and increase the potential results from the lip bumper.

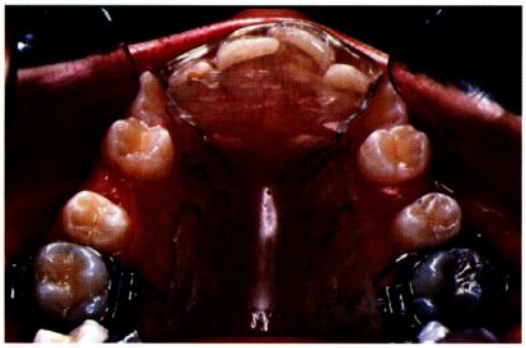


Fig. 7-10, A,B,C,D

The upper arch has been bonded and a low palatal bar has been placed to control molar anchorage in all three dimensions. Notice the alignment of the lower arch only by the use of a lip bumper.

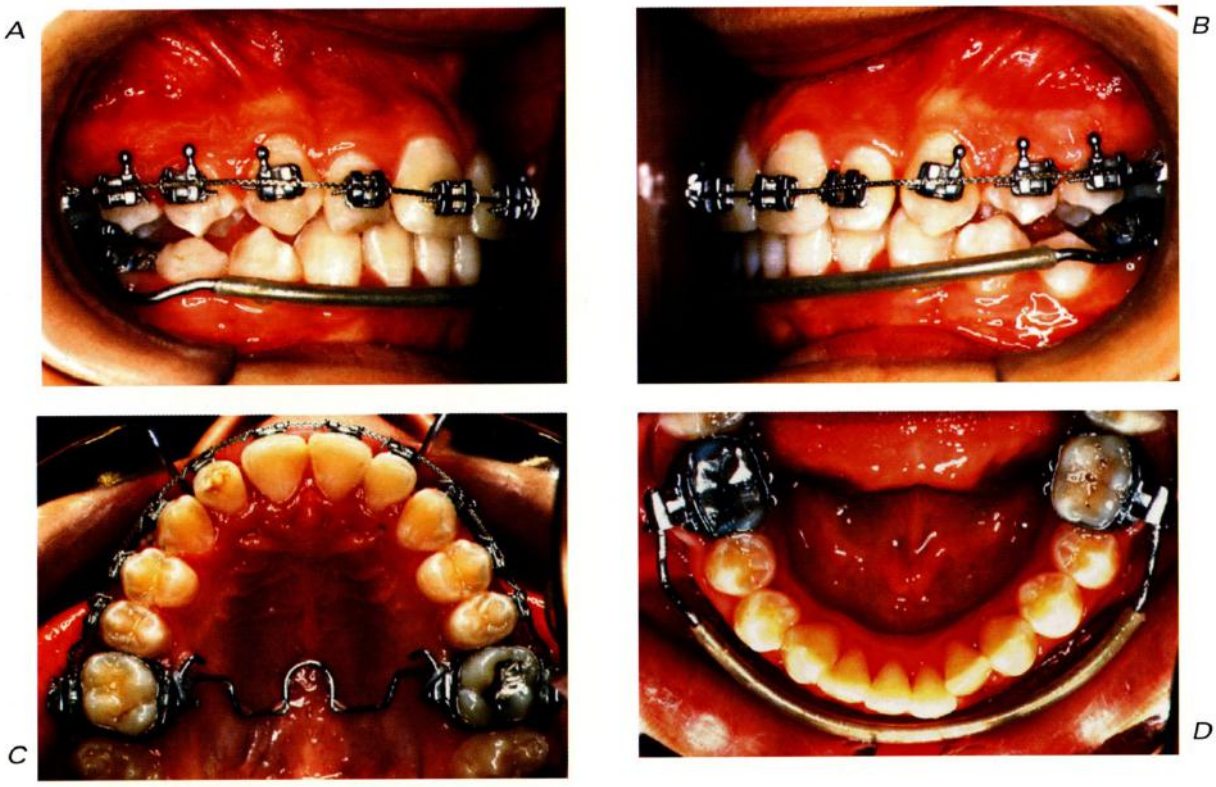


Fig. 7-11, A,B

Profiles of the patient at the beginning and at the end of treatment

Fig. 7-12, A,B

Lateral cephalograms at the beginning of treatment, and just before completely debonding the case.

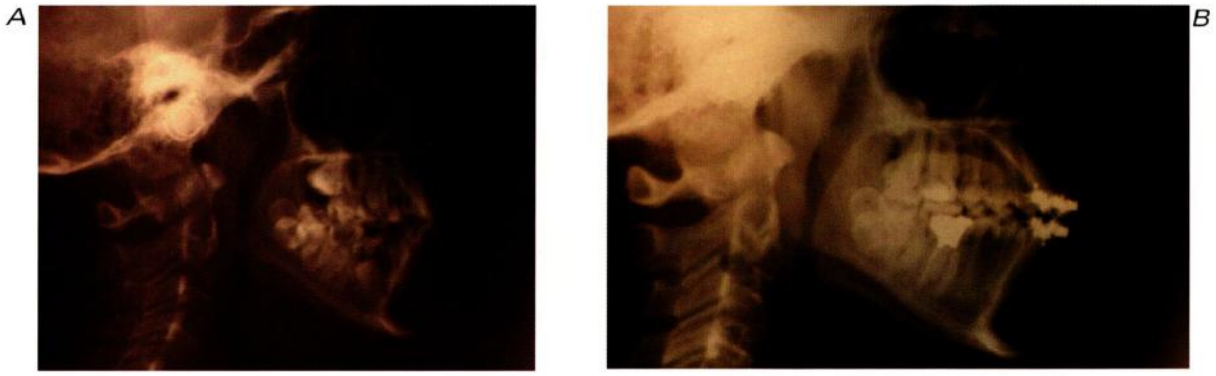


Fig. 7-13, A,B

Superimposition of tracings before and after treatment on the SN line in Sella point and Ricketts' five areas of superimposition

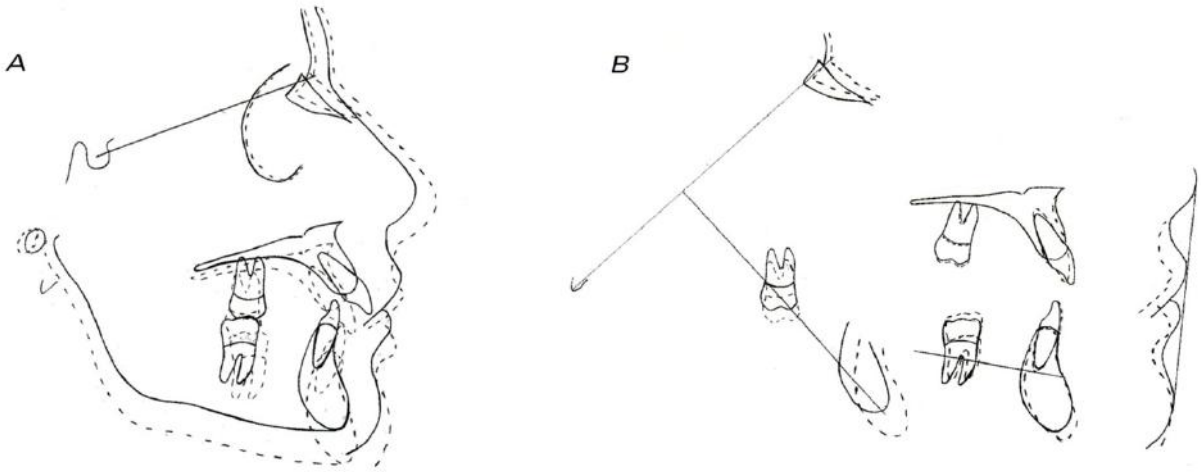


Fig. 7-14

Transverse dimensional changes in the upper arch before and after treatment. As expected, greater changes have been obtained in the premolar area.