Nonextraction Treatment An Atlas On Cetlin Mechanics

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Part III
Space-gaining in the lower arch

Chapter 8
Introduction

Space in the lower arch is gained by the use of one appliance, the lip bumper.

The lip bumper is a lower lip and cheek screen and acts like a functional appliance. It may influence three different structural areas:

1. ARCH FORM AND DIMENSION

It seems that there is an equilibrium between centripetal forces, exerted by the muscles of the cheeks and lips, and centrifugal forces from the tongue. This equilibrium, described by Graber as the "buccinator mechanism," affects dental position. The lip bumper is able to change this mechanism and affect the neuromuscular factors that determine lower arch form and dimension. If used properly, it allows lateral dentoalveolar growth and helps relieve crowding.

2. MANDIBULAR GROWTH

Extended in the oral vestibule, the lip bumper gives support to the lip, thus improving labial competency. A good lip seal seems to be an important factor in mandibular growth. The action is comparable to the labial buttons of Frankel's Functional Regulator II.

3. MOLAR POSITION

The lip bumper is able to transmit forces from the lip to the molars, allowing their uprighting, rotation, and vertical control. During the space utilization phase, its use can be extended to anchor lower molars.

After a proper length of time, the lip bumper causes an increase of lower arch perimeter. This increase is mainly due to a modification of arch width, especially in the premolar area. Any change in arch length is to be found in molar uprighting and/or labial movement of the incisors. The labial movement of the incisors can be avoided if undesirable.

All these actions make the lip bumper a very effective appliance and fundamental in Cetlin's nonextraction approach.

Treatment objectives in the lower arch are molar rotation and uprighting, leveling of the curve of Spee, lateral dentoalveolar growth, creation of enough space to correct lower arch and to set lower incisors where desired.

Overcorrection is a key-word in the lower arch.

Chapter 9
The lip bumper

The lip bumper has to be considered an orthodontic functional appliance that works by:

1) altering the equilibrium between cheeks and lips on one side and the tongue on the other
2) transmitting forces from the perioral muscles to the molars on which it is applied

Several clinicians have described a lip bumper appliance used with different purposes:

a) Molar anchorage (Renfroe 1956, Bergersen 1972)
b) Therapy of habits (Denholtz 1963, Subtelny 1966, Graber 1984)
c) Space-gaining in the lower arch (Subtelny 1966, Sather 1971, Bjerregaard 1980, Ghafari 1985)

Different results with the use of a lip bumper found in the orthodontic literature are probably related to the fact that numerous lip bumpers are available and there are different ways to use them.

Cetlin and Ten Hoeve have described a lip bumper that is easy to use and very effective. With this appliance all three effects can be obtained when needed. If used properly, it can help gain an incredible amount of space in the lower arch with good control of both molars and incisors.

9.1 Characteristics of the lip bumper

The lip bumper has two parts, fixed and removable.

The fixed part is composed of two metal bands cemented to the first or if possible, to the second permanent molars. A 0.045" round tube is welded on these bands. The tube has a 4° mesial offset that allows easy insertion of the lip bumper, easier placement of the bumper at a sure distance from the premolars and a step out to avoid gingival impingement.

The removable part is essentially made of a 0.045" wire which runs in the lower vestibule from molar to molar, facial to the lower arch.

Cetlin has described two different lip bumpers.

The first lip bumper, used since the early days, is custom-made for each patient. It has two loops at the molar tube level that allow modifications of the appliance either at the beginning or during the therapy.

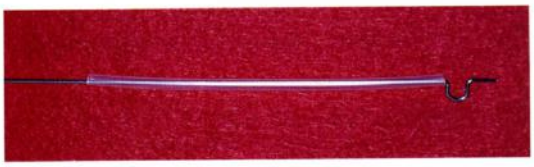
The second one is preformed and available in different sizes. It has four loops, two at the molar level and two at the canine level. These additional loops give a better shielding effect in the canine region and help to use Class III elastics in the more severe cases.

9.2 Construction of a lip bumper

The two-looped lip bumper can easily be bent from a straight 0.045" 3/4 hard wire and shrink tubing. Measurements for the bumper can be taken with a plastic millimeter ruler or from the shrink tubing on the patient's study model.

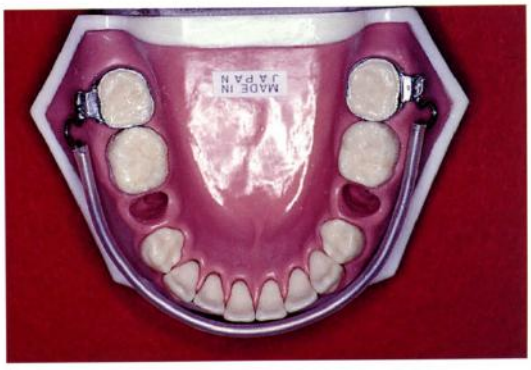
With the shrink tubing in contact with all lower teeth, measure from mesial to mesial of the first (or second) molars.

With heavy-duty bird beak pliers (Dentronix 134L) bend the first loop into a 3-4 mm diameter. Then, slip on the shrink tubing.



Bend the second loop right at the other end of the tubing.

Shape the lip bumper with a natural curvature. GAC's Ovation is closest to the desired final curvature.

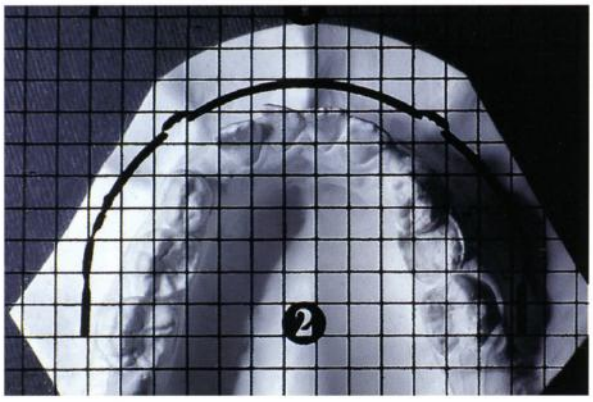


The wire for the bumper is heat-treated to make it stiffer and to obtain shrinkage and adherence of the tubing.

The ends of the wire are rounded with a bur. Terminals of the lip bumper should not be longer than the molar tubes, otherwise they may impinge upon the gingiva distal of the molars and be uncomfortable for the patient.

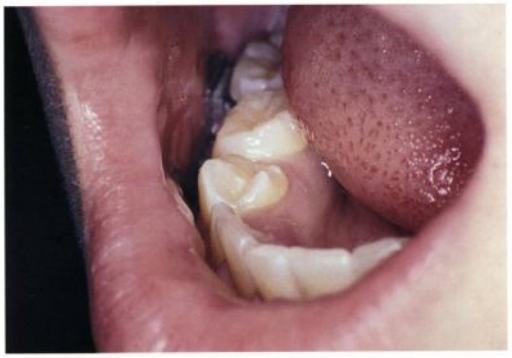
If a four-loop is desired because the use of Class III is planned, the preformed lip bumper is recommended. They are available in different sizes.

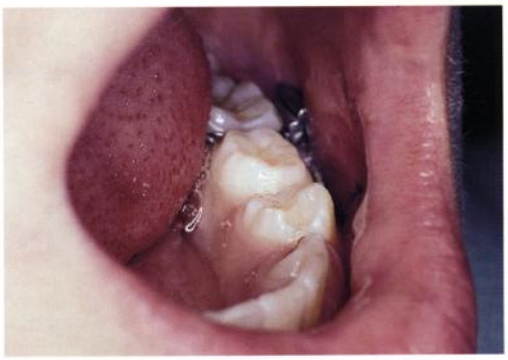
A plastic template helps to choose the right appliance. It may be superimposed on the patient's study model to help determine the needed lip bumper size.



9.3 Fitting a lip bumper

The purpose of the lip bumper is to keep cheeks and lips away from the lower dentoalveolar area. This shielding effect must be constantly verified, as shown.





Some guidelines to obtain optimal adaptation of the appliance:

1) Transverse position

The lip bumper has to be approximately 2 mm. from the lower canines and 3-4 mm. from the premolars. Protection of the canine area is critical and the four-looped bumper is definitely more effective.

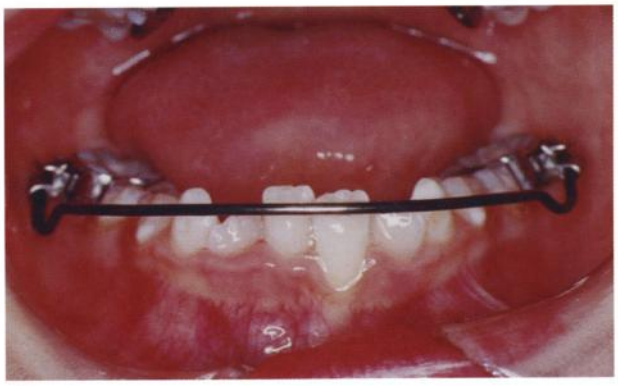
2) Sagittal position

The lip bumper should not be at more than 1.0-1.5 mm. labial to the lower incisors. This provides good support of the lower lip without rendering the appliance uncomfortable for the patient, yet still keeping good control of the incisors.

3) Vertical position

In the lateral segments, the wire should generally rest at the middle third of the premolar and canine crowns. In the most severe cases, where good vertical control is necessary, the bumper can be adapted deeper in the vestibule. The cheek will override the bumper during function, producing an intrusive force on the lower molars.

In the anterior region, depending upon the overbite, the bumper can be at three different levels with respect to the incisor crowns:



a) Incisal edge

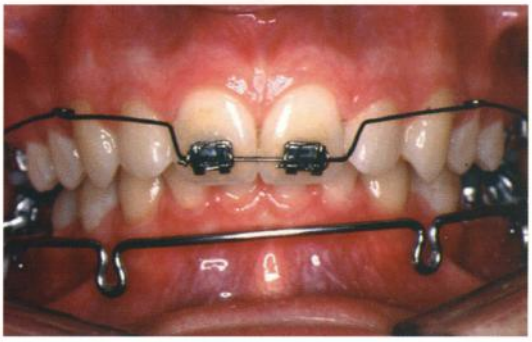
The wire is usually placed at this level during the initial phase of treatment. The lower lip tends to lift the anterior part of the bumper. The long lever creates an effective uprighting force on lower molars.

b) Middle third

This is the most frequent position. It gives a screening effect in the anterior segment. The lower lip is kept away from the incisors. Under the action of the tongue, they will slowly translate labially.

c) Gingival level

The lip bumper is placed low in the vestibule. The equilibrium between centripetal and centrifugal forces is not altered in the anterior section. The incisors are left under lower lip action and therefore maintain their position, or may move lingual once space is available for them. In this vertical position, the lip bumper must be kept very close to the anterior dentoalveolar area to avoid any screening effect.



9.4 How to make a lip bumper passive

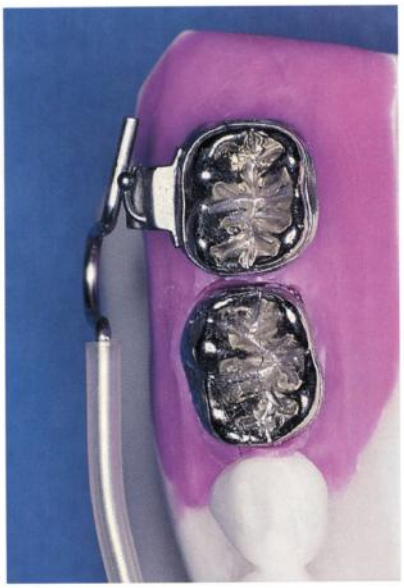
Generally, the lip bumper should not exert any force on the lower molars, especially forces of contraction or expansion. The appliance is made passive in the patient's mouth. One end of the wire is inserted in its tube and adjustments are made until the other end lies at the same vertical and transverse level of the correspondent tube.

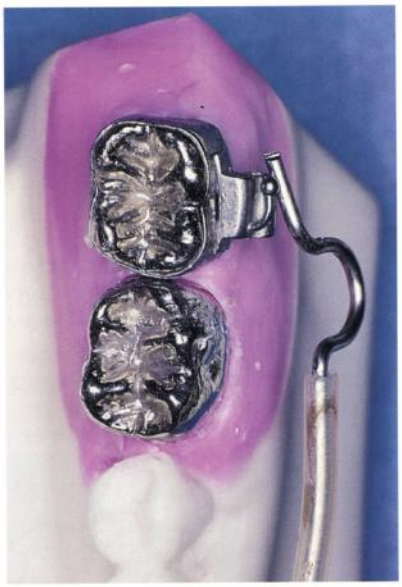
The procedure is reversed to check the other terminal. The lip bumper is delivered and the patient dismissed only when the appliance slides smoothly in both tubes and is easy to insert and remove for both the doctor and the patient.

9.5 Activation of the lip bumper

Only after space has been gained, molars uprighted, bonding of the lower arch scheduled, and if the residual rotation of the lower molars needs to be corrected, can the bumper be activated. This means that its ends must be forced in their tubes to fully insert the appliance.

A slight lingual bend (toe-in) is placed in one terminal (or both, if necessary). Approximately 1 mm. of expansion is added to counteract the tendency of the lower molars to tip lingually.





To prevent the patient from altering the activation, the lip bumper is generally tied with an elastic chain to a hook mesial of the loop. The toe-in will render the removal of the wire difficult for the patient. The activation of the lip bumper is postponed to the end of the space-gaining phase because of the lower molar tendency to tip lingually and because patients tolerate this activation better after a few months of bumper wear.

The lip bumper can be expanded 1.0-1.5 mm in the rare case where the lower molars are lingually inclined.

9.6 Clinical management of the lip bumper

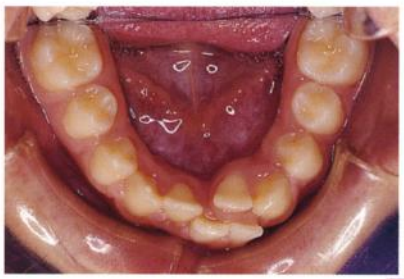
When the lip bumper is first delivered, initial adaptation may be difficult. Therefore, for the first month, the patient is asked to wear the appliance as much as possible. If problems arise, an appointment may be made to change the adjustment of its positioning. Once optimal adaptation is reached, the lip bumper has to be worn 24 hours a day and should only be removed for meals and hygiene. The two-looped lip bumper has shrink tubing that gradually discolors if the patient wears it faithfully. If cooperation becomes a problem, the lip bumper can be tied to the molar hooks with an elastic chain.

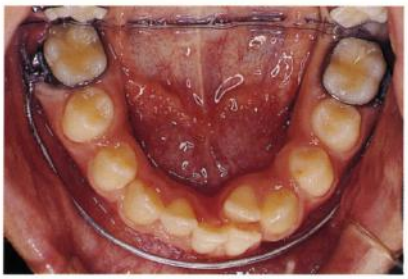
Once the appliance has been placed correctly, and the patient is cooperating, a red line can be seen on the inside of the cheeks and the lower lip where the wire runs.

If the lip bumper is too far from the teeth ulcers and sores may appear. In these cases, the appliance is removed for a week or two, mouthwash may be prescribed and, once healed, treatment is restarted, adapting the wire closer to the teeth.

At each appointment, the lip bumper must be checked to see that it is passive on the molars and no expansion or contraction has been inadvertently added by the patient when removing and inserting the appliance. A card with the position marks of the two terminals may be given to the patient. He/she is taught to check them before inserting the wire in the tubes.

Usually, the lip bumper is dismissed at the end of the space-gaining phase. If its presence is still needed for anchorage reasons, the appliance is readapted so that it does not contact the brackets and wires, and is not too procumbent.





Chapter 10
The Class III mechanics

When the upper arch has been overcorrected and the upper molars have been driven in a "Super Class I" relationship, but the lower arch still needs space for its correction, lip bumper action may be improved by the use of Class III mechanics. Inter-arch elastics from the upper first permanent molars to lip bumper's hooks are used.

The elastics are very light (3 ounces, 3/4 inches) and used 24 hours a day. In order to maintain good control of the upper molar anchorage, they are always used together with palatal bars, and even better, with an extraoral force.

If the lip bumper has been placed on first permanent molars and the second permanent molars have erupted, it is advisable to place a multibraided rectangular sectional wire between the first and second molars to avoid discrepancies between their marginal ridges.

In some instances, especially with an adult patient who won't cooperate with core lip bumper therapy, Class III mechanics may be used on a partially bonded lower arch. Brackets are placed only on the canines, premolars and molars. Once a round, heavy, stainless steel wire is inserted, Class III elastics are placed from the upper molars to the lower canines. Lateral segments are uprighted and space is created for the incisors.

Clinical case

Fig. 10-1, A,B,C,D

Class I malocclusion in permanent dentition with deep overbite, and 6 mm of overjet and crowding in the lower anterior segment.

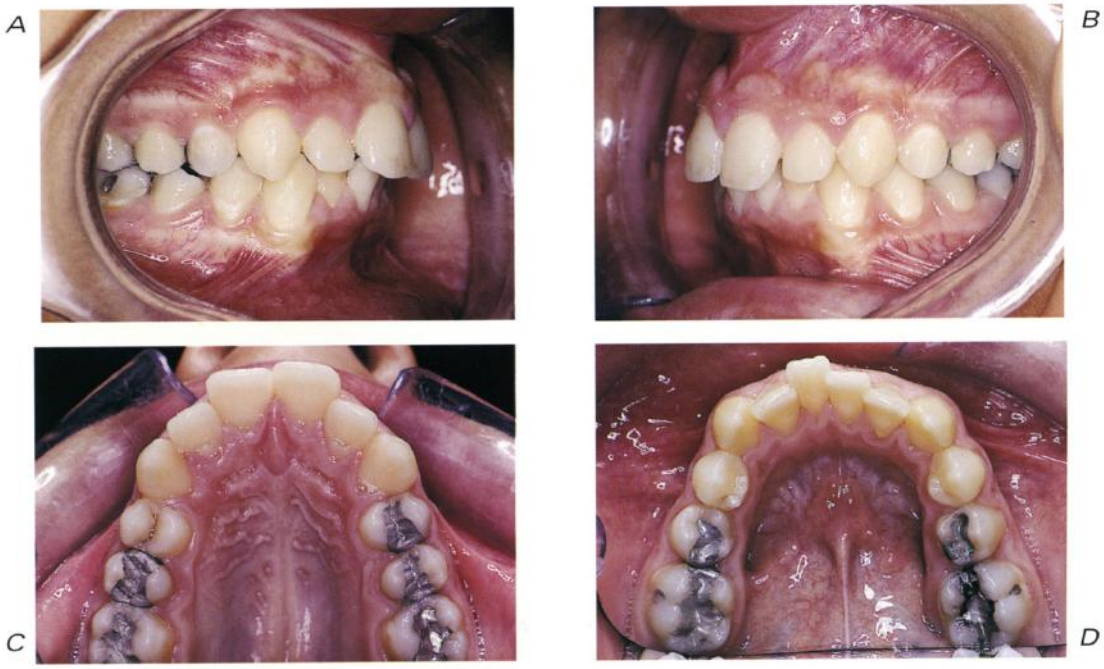


Fig. 10-2, A,B

Face and frontal intraoral view of the patient at the onset of the treatment.

A

B

Fig. 10-3

Occlusal and lateral view after eight months of treatment. In the upper arch, the palatal bar has been used, distalizing one side first and then the other side. No anchorage was lost controlling the rotational side.

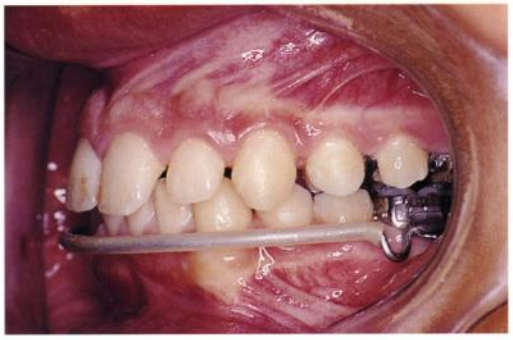


Fig. 10-4

Modifications obtained with a palatal bar and a lip bumper. The lateral dentoalveolar growth has been greater in the premolar area. Notice the change in the arch form.

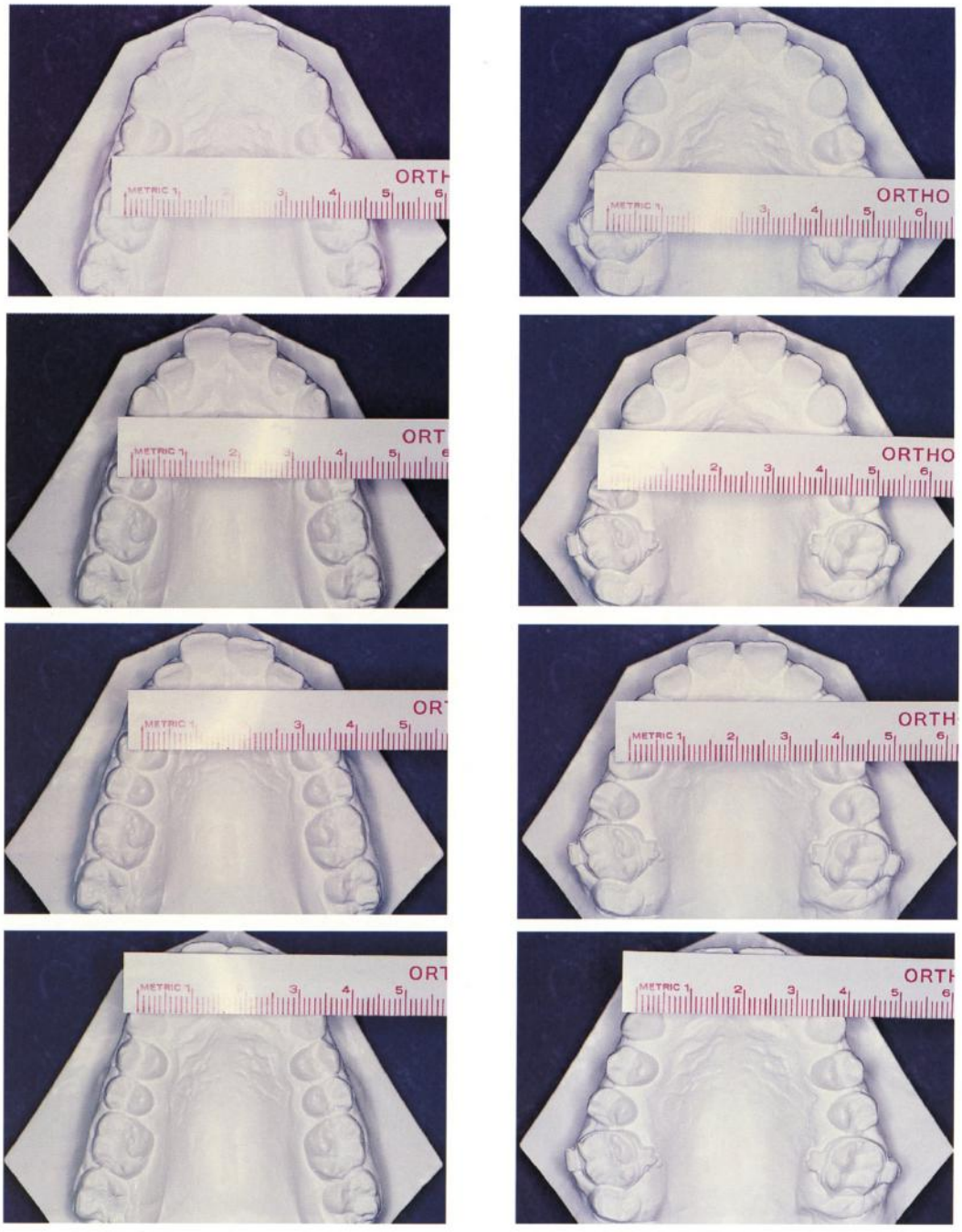


Fig. 10-5

Upper permanent molars are in an overcorrected position. Upper arch is bonded. Class III mechanics are started and control of the upper molar anchorage is maintained with a palatal bar and an extraoral appliance worn with elastics.

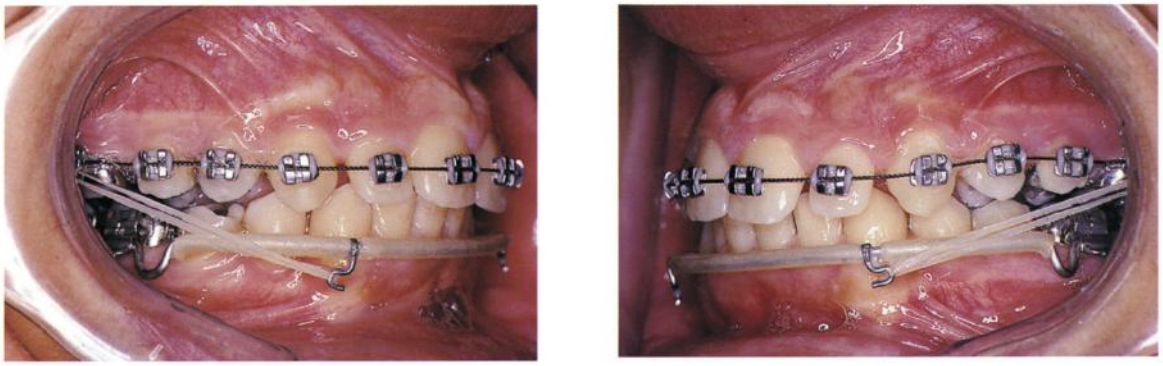


Fig. 10-6

Upper and lower arches before and after Class III mechanics. Notice the additional space in the lower premolar area. Lower incisors have spontaneously aligned themselves.

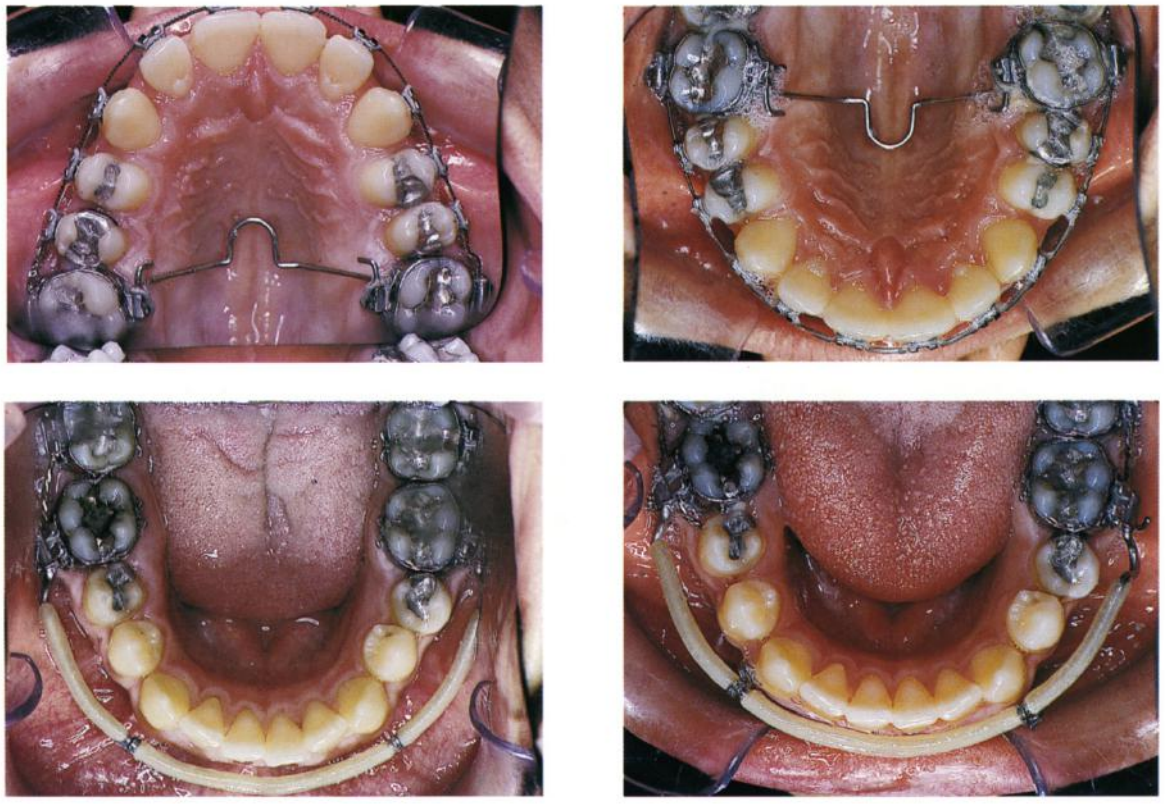


Fig. 10-7
The occlusal and lateral view at the end of treatment.

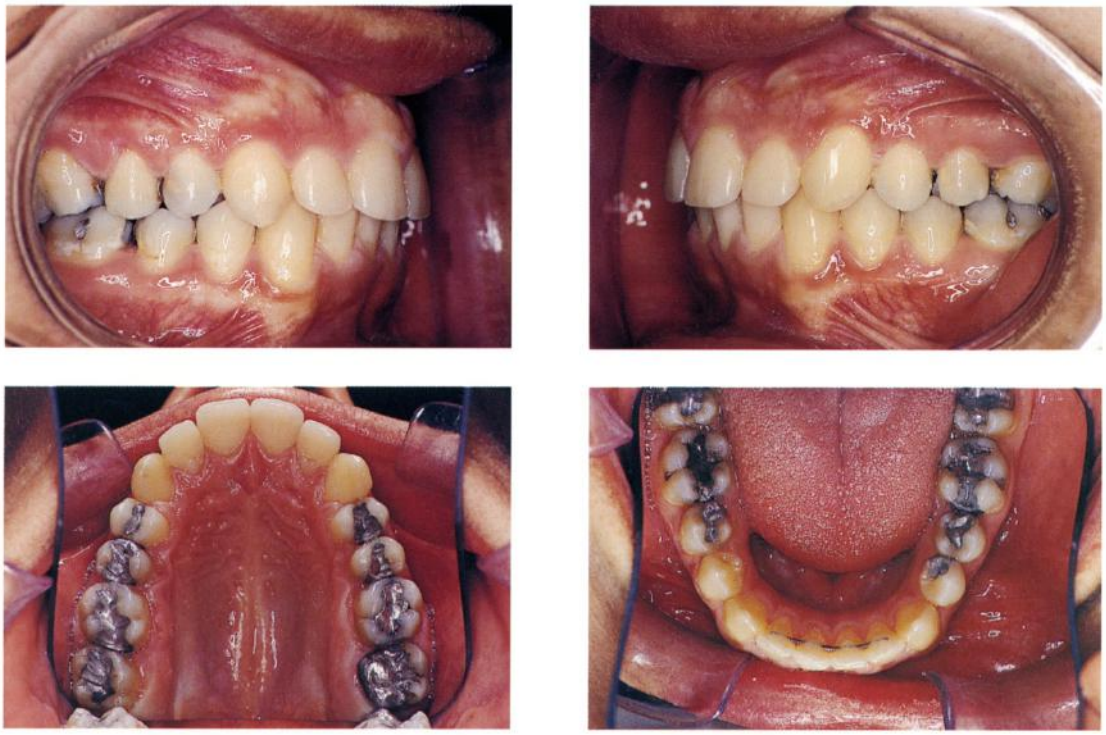


Fig. 10-8, A,B
Patient's smile and frontal intraoral view.

A

B

Fig. 10-8

The patient's occlusion and arches six years after the end of treatment. Third molars are coming in.

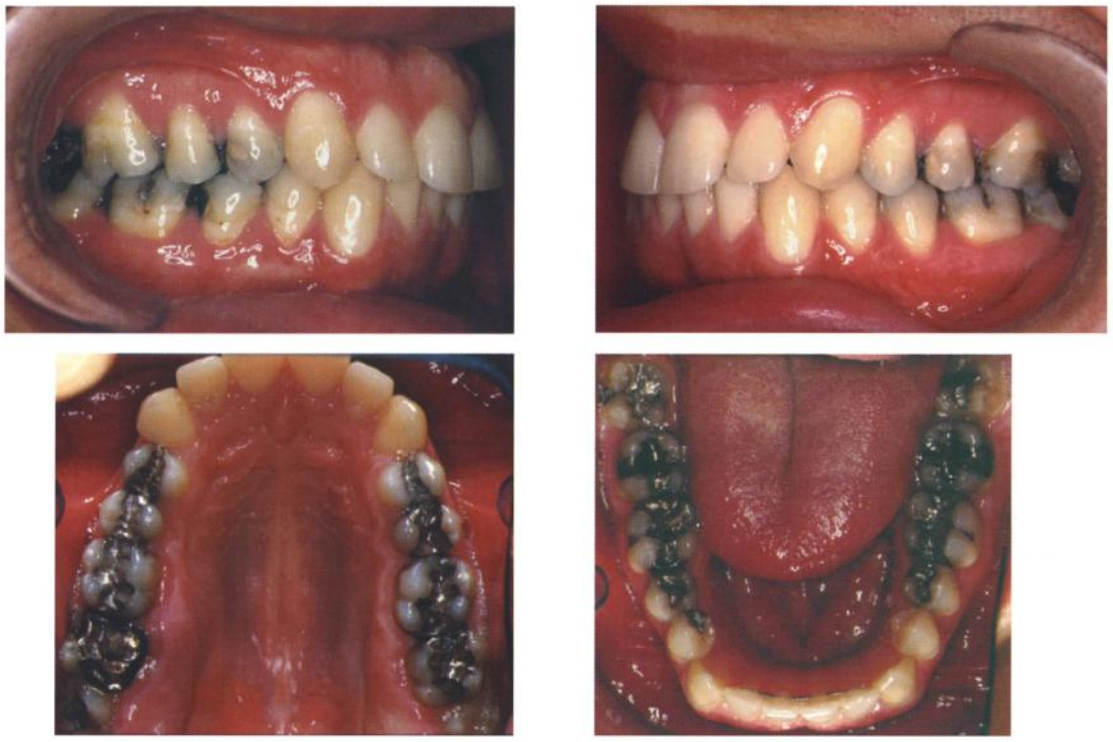


Fig. 10-9, A,B,C

Patient's profile at the beginning of treatment, at the end of treatment and six years post treatment. Notice the improvement of the convexity and chin position. A good equilibrium between nose, chin and lips has been reached.