Nonextraction Treatment An Atlas On Cetlin Mechanics

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Part II

Space-gaining in the upper arch

Chapter 6
The extraoral appliance

The use of extraoral forces to correct specific malocclusions was described for the first time by N. Kingsley in 1882. Only when Kloehn showed his results in 1953, did extraoral forces began to be widely used, alone or with almost any kind of fixed and removable orthodontic appliances.

In Cetlin's nonextraction treatment approach, extraoral forces are used in most of the cases and at various phases of treatment.

During the space gaining phase, headgears are applied with PBs and eventually with the removable plate to move molars distolaterally in a bodily fashion. During the next phase, they may be used to maintain anchorage during tooth positioning.

In recent years, several appliances have been introduced as an alternative to the headgear. The peculiarities of these appliances make them still elective and the headgear irreplaceable for upper molar control and movement.

Two types of extraoral forces may be used:

a) the occipital force (high-pull headgear)

b) the cervical force (low-pull headgear)

In the following sections, characteristics, indications for their clinical use and tips for clinical management are described.

6.1 The occipital headgear

Occipital extraoral force is used in cases where molar vertical control is important.

Malocclusions with dental open-bite tendency, hyperdivergent skeletal patterns and biomechanical systems that tend to extrude upper molars are some of the most common clinical situations in which high-pull headgear may be indicated.

Occipital headgear is less effective than the cervical in distalizing upper molars, but this inefficacy can be overcome if it is combined with the removable plate.

Fig. 6-1

The high-pull is applied to upper first molars by means of a facebow, with the outer bow of the same length of the inner bow.

The inner bow is adjusted to apply forces only on molars and is constricted about 10 mm. to counteract the tendency of the occipital headgear to intrude the buccal side of the molars (where forces are applied) more than their palatal one, thus making molar palatal cusps more prominent. This constriction is not added if a PB is installed on upper first molars.

High pull headgear may be indicated with malocclusions with open bites, hyperdivergent skeletal patterns, and biomechanics that tend to extrude upper molars.

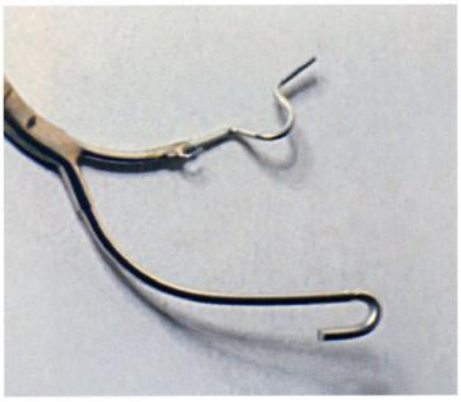


Fig. 6-2

The inner bow is passive to the molar tubes, while the outer bow is bent upward so that the point of force application and the line of force lie above the center of resistance of the upper molars. This produces a force system that tends to distally incline molar roots and intrude upper molars.

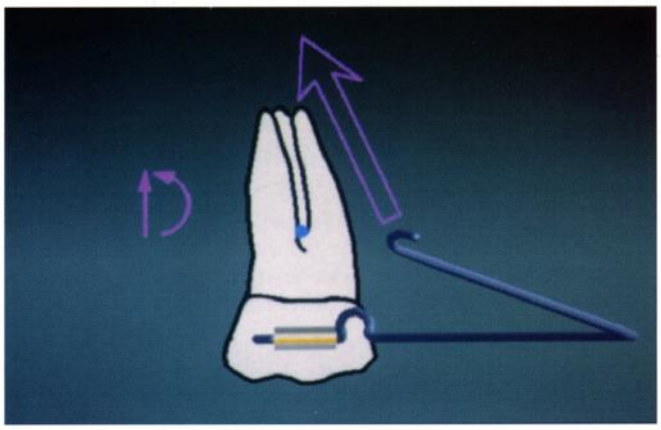
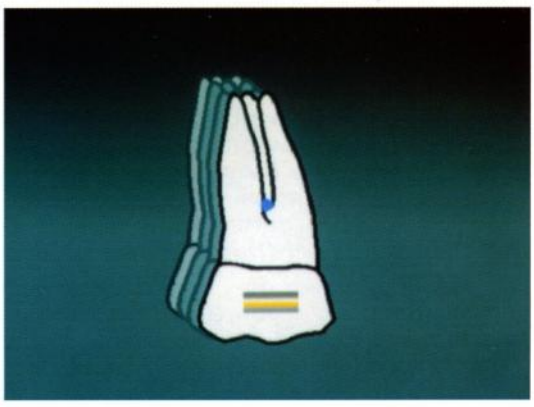


Fig. 6-3

The occipital cap should be provided with break-away traction units for patient's safety.

Fig. 6-4

When used together with the removable distalizing plate, the high-pull headgear allows bodily molar movement both backward and upward.



6.2 The cervical headgear

Cervical extraoral force is used in cases with dental deep bite, skeletal hypodivergent pattern and generally, in those cases where vertical control of upper molars is not critical. It is more effective than the occipital headgear in the sagittal plane and allows dramatic changes in the molar relationship.

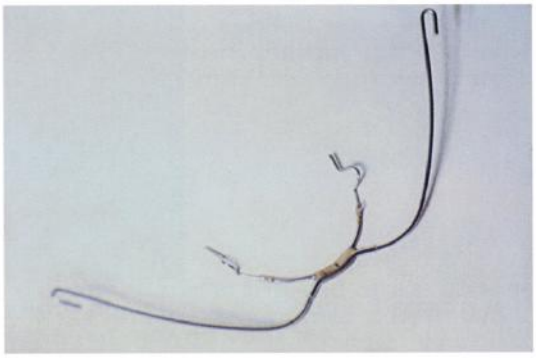


Fig. 6-5

The appliance consists of a facebow with the outer bow longer than the inner bow. The inner bow is expanded about 10 mm. before insertion to counteract the tendency of the molars to roll-in. This compensation is not added if a PB is in place.

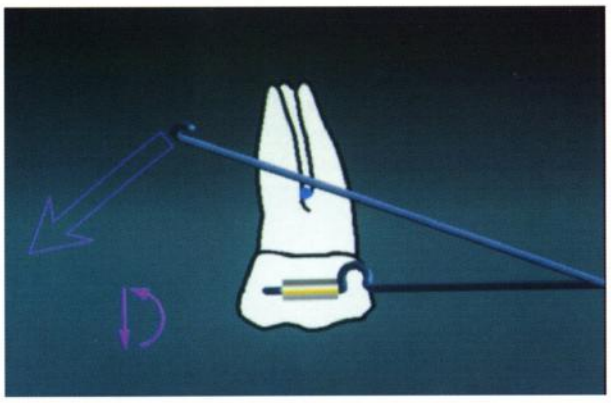


Fig. 6-6

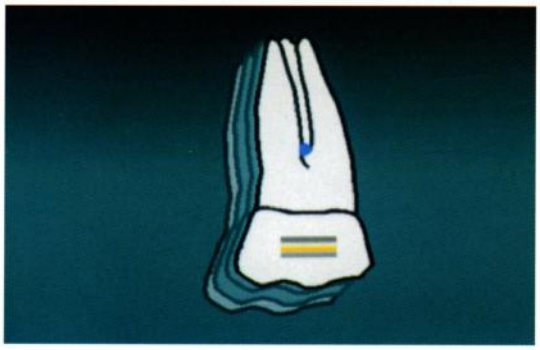
The inner bow is bent upward so that both the point of force application and the line of force lie above the center of resistance of the upper molars. Adjusted in this way, the appliance will produce a force system that tends to distally incline molar roots and extrude upper molars.

Fig. 6-7

Forces are applied at the hooks of the facebow by break-away traction springs placed on a neck pad. The patient is taught to insert the units at the determined numbered hole.

Fig. 6-8

When the cervical headgear is combined with the removable plate, molars are moved bodily backward and downward. Growth will compensate for this extrusion.



If a marked distal movement, as well as good vertical control of the molars is desired, a cervical headgear may be used in association with a low palatal bar.

6.3 Clinical management of headgears

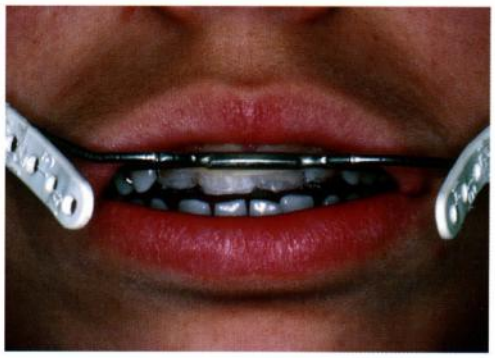
Extraoral forces are applied to upper first molars once the molars have rotated and facebows can be easily inserted in molar tubes.

As previously described, when headgears are used together with palatal bars their inner bows must be passive to the molar tubes. When they are used alone, the inner bows of a high-pull should be slightly constricted, while those of a low-pull should be expanded to prevent rolling out or in of the upper molars.

Fig. 6-9

The ends of the facebows must be adjusted so that when inserted in the molar tubes the facebow lies on the lower lip. In this way, when the traction is applied, thanks to the outer bows being bent upward, the facebow will lie right at the level of the labial rim. The headgear will be comfortable and will not alter lip rest position and competence.

Cetlin's facebows have two canine hooks on the inner bows. The hooks are used to hold a light elastic (3 ounces,3/4") which fits on either the labial screen of the distalizing removable plate to increase anterior anchorage, or on the incisor brackets to increase their retraction, with little or no posterior anchorage usage.



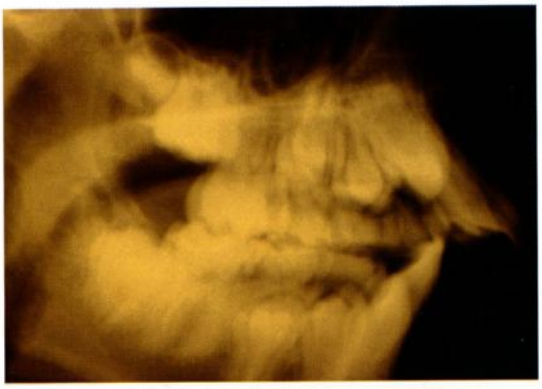
Extraoral forces should be applied in the range of 150 grams per side, in order to have orthodontic and not orthopedic effects. No attempt is ever made to control or reduce maxillary growth.

The headgear must be worn at least 12 to 14 hours a day. The patient and parents are informed not to wear the headgear during meals, sports or when not in a quiet and calm environment.

At each appointment, the headgear must be checked to see if the applied force system is correct. The facebow must be at a safe distance from the upper front teeth and the screen of the plate. If desired and possible, the applied force system may be more accurately evaluated with a headplate taken while the appliance is in place.

Fig. 6-10

Headfilms of the same patient taken at the onset of treatment and at the end of the space-gaining phase. In the upper arch, a PB, followed by a cervical headgear and a removable distalizing plate was used. A lip bumper was applied in the lower arch. The bodily distal movement of the upper molars and the second premolars is evident, thanks to the transeptal fibers, the leveling of the curve of Spee and the space gained in both arches. Molar relationship has improved due to upper molar distal movement and mandibular growth. At this time, the Adams clasps of the plate placed on first premolars are removed to allow spontaneous distal drift of the first premolars and canines.



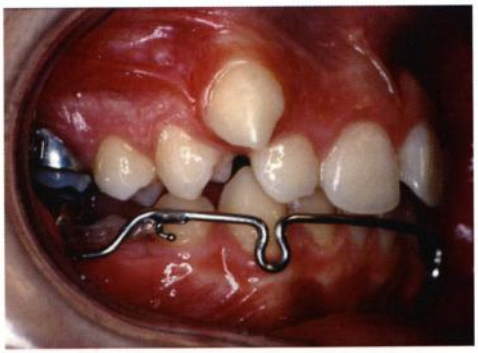
Clinical case

Fig. 6-11

The patient has a Class II, division 1 malocclusion with permanent dentition. The upper right canine is blocked out of the arch and the upper midline is shifted toward the right side.

Fig. 6-12

Treatment has started with an upper PB and a lower lip bumper. The PB has rotated and expanded the upper molars. Notice how space is already gained in both the upper and lower arch. The overjet is reducing, thanks to several factors: a) lower incisors are uprighting, b) upper incisors have reduced their procumbency, c) the mandible has moved forward by growth and counterclockwise rotation.



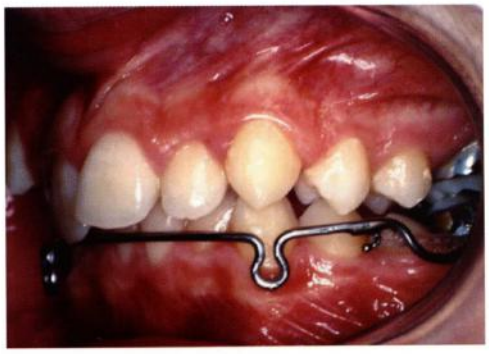
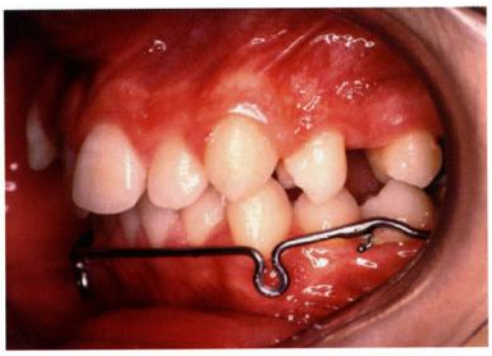
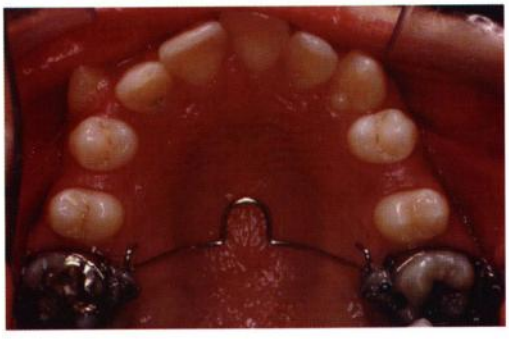


Fig. 6-13

As soon as it was possible, the patient used a cervical headgear to continue distalization of the molars. Notice the amount of space he was able to create in 6 months. Movement was facilitated by the rotation of upper molars with a PB before starting to drive them backward with the headgear. This brings the roots of the molars in marrow bone and the resulting changes may be faster and more dramatic. The PB was kept in place during headgear wear to control vertical position of the molars.





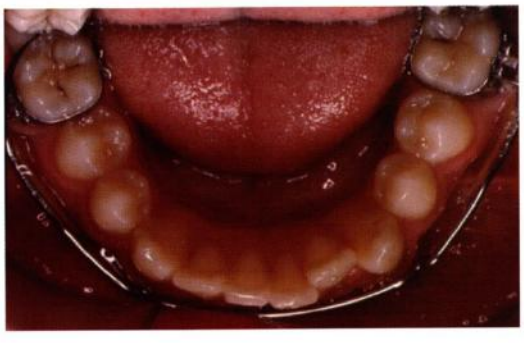


Fig. 6-14

Close-up views of right and left upper sides. (Notice the amount of space. The Atherton's triangles mesial to the premolars account for the premolars distal movement together with the first molars.)

This is an important feature of the headgear: either the patient cooperates and wears the appliance as required, or he doesn't. No anchorage is lost anteriorly. There is no risk of increased overjet, and no risk of facing a malocclusion worse than the initial case.