Occlus-o-guide: An orthodontic preformed functional device. Clinical protocol and features

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Abstract

Occlus-o-guide is the most widely known and used preformed functional orthodontic device, especially in interceptive orthodontic cases. It belongs to the recent category of so called "elastodontics", since it consists of elastomeric silicone.

The device was so called "Occlus-o-guide" because it has the function of guiding the eruption of permanent teeth leading them to an ideal occlusal relationship and alignment, preventing the development of a malocclusion. The mechanism of action is a combination of a functional device, a positioner and a myofunctional therapy device.

The purpose of this study is to describe the appliance, in particular its structural characteristics, its mechanism of action and clinical indications.

Introduction

The "Occlus-o-guide" was designed by Dr. Bergersen in 1975, who developed the first removable preformed elastomeric device, which he called: "Eruption Guidance Appliance" (1) (Fig. 1).

Initially it was recommended in addition to the orthodontic fixed treatment, but soon it was proven to be as effective as comprehensive orthodontic treatment (2).

Indeed, Occlus-o-guide can be considered as a device that combines the features of a functional device with those of a positioner, since it brings the mandible forward to correct second class sagittal discrepancies, and simultaneously produces a frontal opening that allows a greater vertical growth of the posterior teeth, as a functional appliance does. Moreover, it also performs minimal tooth movement through the elastomeric material, like a positioner does (3) (4).

Discussion

Structural Features: Occlus-o-guide is a removable, preformed in various series and sizes appliance. It consists of a single block which contacts both arches, and it is built on a head-to-toe incisal relation (3) (4). The device is made of a transparent soft plastic material (elastomeric silicone), containing inside a special substance called "Cooperation Detector", which, when it is in contact with the oral fluids, undergoes a gradual color and opacity change. Indeed, based on the hours of use, the device, initially transparent, assumes a milky color and gets more and more opaque the longer it is carried on, so that the dentist can easily control the patient's cooperation. The color change is reversible: If the device is not applied in a constant manner, a further color change to the initial transparency will be observed.

Occlus-o-guide exists commercially grouped in specific series, depending on the stage of dental eruption sequence and the clinical features case of the patient (3) (4) (5) (6) (7).

The G series is hence considered, since it is the most widely used. It is suitable for not extractive cases in mixed dentition, until the eruption of the second permanent molars starts (from 8 to 12 years of age). It is constructed in various sizes (ranging from 1G to 7G), with half measure sizes, for a total of 13 measure sizes. The device has some specific niches that concerns premolars of both dental arches, and is posteriorly discharged to facilitate the eruption posterior dental elements (Fig. 2).

Indications: The following therapeutic indications are referred to the G series. It has extensive indications of treatment, but it is generally recommended for mild to moderate malocclusions (4). Clinical experience has shown, however, that if the treatment is started at an early mixed dentition, the severity of the malocclusion is rarely a contraindication.

Therapy may begin at any age, but the ideal treatment, that gives the best results in less time, starts in mixed dentition: from 8 to 12 years old. Delaying treatment timing to an older age may extend the period of retention and decrease the stability of final results.

Indications:

1. Increased overbite of any grade severity, provided there is sufficient residual vertical growth of the face;

2. Increased overjet of any severity, provided there is sufficient residual horizontal growth of the face;
3. upper and lower malpositioned (buccal or lingual) or rotated incisors, as long as there is or could be created sufficient space;

4. anterior crowding or spacing, up to 4 mm in mixed dentition;

5. severe curve of Spee;

6. upper interincisal diastema, up to 3 mm;

7. dental crossbite of premolars;

8. interception of Class II malocclusions;

9. interception of bad oral habits;

10. any Class II (unilateral or bilateral) molar relation, or head-to-head relationship between molars;

11. midlines not coincident;

12. Most joint problems associated with overbite in the growing child, provided that the disc can be reduced or recovered during mandibular movements;

13. pseudo-III class (up to 1-2 mm).

The device can be used also in adult patients, with more restricted indications and less effectiveness.

The choice of size Measure: The choice of the appropriate size measure is made through the use of a special pink ruler (Fig. 3), measuring the four upper or lower incisors, on the model casts or directly into the mouth.

The tip of the ruler is placed on the distal side of the (upper or lower) left incisor. The ruler is then folded along the incisal edges to the distal side of the (upper or lower) right incisor, and the measure is read directly on the ruler. It shows the scale of measures for the upper and lower dental arch (Fig. 4).

The G-series is available in 13 graduated sizes, ranging from 1G to 7G. Each half size varies 1.5 mm for the upper dental arch and 0.8 mm for the lower dental arch, from the precedent number size (Fig. 5).

The serial number and size of the device are printed on each device in the upper left corner (Fig. 6).

Once the correct size is chosen, the device must be tried in the mouth, and inserted first on the upper teeth, then on the lower ones, always insert direction proceeding from anterior to posterior teeth.

The correct size of the device, if there is no dental spacing or crowding, must fit perfectly on the teeth. The distal portion of lateral incisors must fit perfectly, or nearly so, in their specific slots, while it is not necessary that the posterior elements fit precisely.

If dental crowding is present, the device chosen has a bigger size, while if dental spacing is present the device size chosen is inferior: thus ensures the creation of space in the first case, and the closure of spaces in the second case (Fig. 7).

It is important to ask the patient if he feels pain and to check that the edges of the device do not sink into soft tissues when the child grits his teeth. If so, it is necessary to adjust the margins of the device with a cutter.

Instructions and Recommendations for Patients: It is necessary to instruct the patient to use the device gradually increasing the time of application, up to 2-4 hours during the day and all night long.

The application will be active during daylight hours, and passive throughout the night.

The patient is asked to perform active exercises: to bite symmetrically, more energetically possible, into the device for a period of 1 to 5 minutes, until a sensation of muscle fatigue is felt, then relax for ½ minute, always keeping lips in contact (Fig. 8).

These active exercises alternating compression and relaxation should be repeated several times a day, from 20 minutes to 1 hour at a time, until reaching a total of 2-4 hours per day. After about the first 5 days of adaptation, in which the patient will gradually increase the active exercise time, he will reach the total of hours required (Fig. 9).

The appliance will be used only at home and should not be brought to school or elsewhere, even to minimize the risk of losing or damage it.

It is necessary to recommend the patient not to bite the device in a manner different from the one prescribed, for example munching its edges, or playing with the appliance.

It is recommended to ask the patient to fill out a table, shown at each subsequent appointment, on which the child must note the hours of daily use, in order to encourage his collaboration (Fig. 9).

The first clinical monitoring is performed one month after the first application.

The patient will then be checked every month for the first 5 months, and then every 2-3 months.

At each visit, clinicians check that the color of the device is opaque white, view the details of daily collaboration table, measure the improvements
obtained, and check temporomandibular joints.

In case clinical progresses are insufficient in the first two months, usually due to insufficient collaboration, treatment should be interrupted and patient discharged or subjected to a fixed appliance. In most cases, however, the cooperation tends to improve about 3 months after starting the treatment.

If it is correctly and regularly applied, even after 2-6 months it is possible to appreciate clinical improvements.

The treatment period is usually between 4 and 10 months of active treatment: about three or four times faster than with fixed appliances (5).

The same device can then be used as a orthodontic retainer.

**Concepts of Functioning:** The fundamental principle of the device is that of being an "eruption guidance", hence its name "Occlus-o-guide". Therefore, the device presents eruptive niches, both in the upper and lower dental arches, which, exploiting the natural eruptive force of permanent dental elements, allows their correct positioning, preventing the development of a disalignment or malocclusion, before the dental eruption sequence is completed.

Dental elements are gradually guided in the ideal first-class occlusion, with normal overjet and overbite values, and then maintained in this position until the proper dental sequence is completed, as a positioner does (9). Occlus-o-guide is built according to a head to head wax bite construction, bringing the mandible forward, likewise other functional appliances, hence allowing it to act as an activator (Fig. 10).

In this way, Occlus-o-guide is able to stimulate mandibular growth and improve sagittal spatial relationship between dental arches, helping to correct the overjet and leading to first class ideal occlusion. In fact, its design acts as a stimulus on the condylar cartilage, which leads to a significant increase in both length and mandibular advancement (10), improving intermaxillary spatial relationships, without any effect on maxillary growth (10) (11).

The orthopedic effect is more significant if it is applied close to the pubertal growth peak, with an average mandibular growth of about 1.2 mm per year (12), provided the treatment time is sufficiently long.

The design of the device develops **differential forces**:

- Intrusive (anteriorly) and extrusive (posteriorly).

The presence of anterior niches, combined with the patient's active myofunctional exercises, generates intrusive forces on the anterior teeth, especially on the upper dental arch, which contribute to the correction of overbite and gummy smile. It also determines a lingual inclination and linear retrusion of upper incisors, and a linear protrusion of lower incisors, contributing to correct overbite and dental crowding in the lower arch (14).

In contrast, the absence of niches on molars creates extrusive forces on posterior elements, especially on lower molars. Therefore, the device promotes their eruption in the optimal vertical position, allowing to stabilize the overbite within minimum values (15), and also giving a significant increase of anterior facial height (12).

Finally, the presence of **oral screens** and channels constitute a muscular corridor that acts as a myofunctional regulator, balancing muscle function. Indeed, it encourages a proper tongue posture, and avoids both the interposition of lips and tongue, and the stabilization of bad habits, stimulating a proper swallowing and breathing function.

**Conclusions**

The orthodontic preformed appliance "Occlus-o-guide" is a valuable therapeutic aid for the resolution of Class II, Division 1 malocclusion cases, in subjects in mixed dentition. The effectiveness of this device is, however, subject to certain variables, such as the compliance of the patient, who must follow orthodontist's instructions and indications, and the duration of treatment, which should be about two years, and should cover the patient's pubertal growth peak.

**References**

5. EO, Bergersen. Preventive and interceptive orthodontics in the mixed dentition with the myofunctional eruption guidance appliance: correction of crowding, spacing, rotations, crossbites and TMJ. J
Illustrations

Illustration 1

Figure 1: Occlus-o-guide appliance

![Occlus-o-guide appliance](image1)

Illustration 2

Figure 2: Occlus-o-guide, G series

![Occlus-o-guide, G series](image2)
Illustration 3

Figure 3: Measurement with a special ruler to choose the measure size of the appliance

Illustration 4

Figure 4: Measures of the device shown on the ruler, for the upper and lower jaw
Illustration 5

Figure 5: In the transition from size 3 to 31/2, the device is enlarged of 1.5 mm for the upper arch, and 0.8 mm for the lower.

Illustration 6

Figure 6: Size and series shown on the device.
Illustration 7

Figure 7: Occlus-o-guide in a patient with 3 mm of crowding, and in a patient with diastema: the device is well suited to the incisors only after their alignment

Illustration 8

Figure 8: active exercises: biting for 1-5 minutes, and relax for ½ minutes
Illustration 9

Figure 9: Table compiled daily by the patient

Illustration 10

Figure 10: Occlus-o-guide intraoral view shows how the incisors are placed in head to head position and the mandible is advanced