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DEVICES USED IN ORTHODONTIC TREATMENT OF NARROWED DENTITION

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Abstract: The results of the studies give grounds to recommend the use of a removable single-jaw mechanical orthodontic appliance based on an elastic base polymer in the treatment of narrowing and shortening of the dentition of the upper and lower jaws during the period of temporary and mixed dentition. Observation and treatment of 35 patients using this device showed that the most effective in this age period is the use of the named device with a layer of soft plastic “Elastacryl-R”. The device is not difficult to manufacture, allows for quick correction and repair in case of breakdown, and is relatively easy and quickly mastered by children aged 6 to 10 years. It is recommended that the child wear the device constantly, removing it only during hygienic care of the oral cavity and the device. Using the device according to the developed method reduces the treatment time by 1.5 times and eliminates the development of relapse at the stage of physiological replacement of temporary teeth.

Keywords:anomalies and deformations of dental arches, removable orthodontic appliances.

The narrowing of the upper arch of the dentition is associated with the genetic predisposition of patients, as well as with respiratory dysfunction (when nasal breathing is replaced by oral breathing). To quickly expand a severely narrowed upper jaw, orthodontists often use the Biederman apparatus. The design consists of a screw attached to orthodontic rings placed on the canines and molars. Activation occurs by turning the screw. The activation mode is determined by the doctor.[1] As a rule, for rapid expansion of the palatal segments, daily (up to twice a day) tightening of the screw is recommended. Thus, the dentition diverges by 0.2–0.4 mm every day. The duration of treatment in this mode is about two to three weeks [2].

When treating narrowing and shortening of the dentition of the upper and lower jaws during the period of temporary and mixed dentition, the primary goal is to expand or lengthen the dental arches and activate the growth of the apical bases. For this purpose, removable functional and mechanically operating devices are used.[1] Analyzing removable appliances used in orthodontic practice to expand and lengthen the dentition, it should be said that during the period of temporary and mixed dentition, the action of these appliances does not give the desired result, and even, on the contrary, negatively affects the course of orthodontic treatment, since the point of application of force is in Such devices are, first of all, the coronal part of temporary teeth [18]. This leads to a rotation of the tooth, in which its root part deviates in the direction opposite to the deviation of its coronal part [3]. As a result of this, the roots of temporary teeth cause an undesirable displacement of the primordia of permanent teeth. Thus, when eliminating the anomaly in the position of temporary teeth, conditions are created for the development of an abnormal position of permanent teeth during their eruption [4].

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The developed method for treating narrowing and shortening of the dentition of the upper / lower jaw makes it possible to more effectively use the possibilities of mechanical expansion with a removable orthodontic apparatus, optimizes the treatment process, reduces its duration and prevents the development of relapse.[1] Manufacturing the base of the device using an elastic polymer increases the effectiveness of treatment and reduces the traumatic and toxic effects on the hard and soft tissues of the dental system [5].

During active treatment, the upper suture of the median arch opens, therefore, after completion of the active part, the structure is not removed, but is left as a retainer while the bone tissue grows (usually 2–3 months). After removal of the device, as a rule, narrowing occurs and up to 75% of the expansion obtained by this method is lost. In this regard, cases of so-called overexpansion are not uncommon in orthodontics [6].

Removable orthodontic appliances are structures for correcting the bite, position of teeth or muscle function, which the patient can easily remove if necessary and put on at a convenient time. Removable orthodontic appliances are structures for correcting the bite, position of teeth or muscle function, which the patient can easily remove if necessary and put on at a convenient time. Depending on the goals of treatment, the doctor uses different types of devices, which we will introduce you to in more detail in this article [7].

Therapeutic orthodontic systems are aimed directly at eliminating already formed anomalies and rebuilding the defective dental system. Such devices are used for:

• Expansion and contraction of dental arches (a conventional line passing along the occlusal surface of the teeth);

• Shifting the jaw to the correct position and correcting the bite;

• Movement of teeth with alignment of the dentition;

• Delays and stimulation of the development of the apical base (a conditional line passing along the apex of the dental roots);

• Delay and stimulation of the development of the jaw, or a certain part of it;

• Restoration of impaired functions: chewing, swallowing, etc.

• Removable devices for the treatment of adults

For the treatment of malocclusion in adults, non-removable structures - braces - are mainly used. A classic removable plate intended for children will not be able to correct the bite when all the permanent teeth have erupted [8].

For adults, there are 2 types of removable appliances to correct the bite and consolidate the treatment result:

• aligners - a set of transparent individual trays that gradually move teeth into the correct position.

• retention guards are transparent night guards that keep teeth straight after braces or aligners are removed.

Removable devices for treating children

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In most cases, orthodontists and patients refer to removable orthodontic appliances as plates or mouth guards that are used to correct bites in children. Removable appliances are most effective in early mixed dentition (from 6 to 9 years), since active jaw growth is observed during this period [9]. At this age, the orthodontist can influence the following parameters of the dental system:

• position of erupting permanent teeth,

• strengthening or inhibiting jaw growth to form a harmonious profile of the child.

Treatment in mixed dentition is the first stage of orthodontic treatment, which allows you to avoid the formation of bite pathologies associated with disproportionate sizes of the upper and lower jaws [10].

The plates are a device consisting of a plastic base and metal wire elements. The metal elements perform two main functions: they hold the device in the child's mouth and put pressure on the teeth to move them. The design of children's plate devices also includes a screw, which parents independently tighten according to the regimen prescribed by the doctor. When the screw is loosened, forces are created to direct and change the growth of the jaws and the position of the teeth. Plates that are used for the upper and lower jaw at the same time [11, 12, 13, 14, 15, 16, 17, 20, 21]. They can be separate (for example, as in the Twin-Block device) or "fastened" together (for example, in the Andresen-Goipl monoblock device, Klampt activator, etc.). Plates for two jaws at once are used to correct distal bite and retardation of the lower jaw in growth and development. These plates hold the lower jaw in the correct position, which guides and activates the growth of the lower jaw [1, 2, 3].

The action of lamellar devices is based on a balancing mechanism located on the palate or on the alveolar process. It includes important adjustable elements - screws, springs, arcs. Vestibular and lingual arches and clasps with fixation on the 6 permanent upper teeth or 5 temporary teeth are used as support and fastening of the plate devices on the teeth. Using this device, you can change the shape and size of the jaw, shorten or lengthen the dentition, as well as move individual teeth or get additional space for them.

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