

**Treatment methods in
orthodontics.
Classification of orthodontic
devices.
Devices of mechanical action.
Indications and
contraindications for their use**

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The teaching aid was reviewed and approved by the Academic Council of the Tashkent State Dental Institute.

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Secretary of the Academic Council, Doctor of Medical Sciences, Associate Professor **Yuldashev A.A.**

1. Chronological map 6.0 hour

practical lesson :

Stage of classes	Type of occupation
Type and form of the lesson	Practical lesson
Structure of the lesson	1. Introduction. 2. Theoretical part 3. Analytical part: -Business game "Dark Horse" -Tests - Situational tasks 4. Practical part
Objective of the lesson :	To reinforce the students' understanding of the concept of "norm" in orthodontics. • Teach how to identify deviations from the physiological norm. • Using clinical examples, demonstrate anomalies of individual teeth, dental arches and bite. • Analyze existing classifications of mechanical devices, their advantages and disadvantages. • Teach how to formulate an orthodontic diagnosis.
The student should know:	• orthodontic terminology. • have a clear understanding of the norm in orthodontics . • the most frequently used classifications of mechanical devices in the clinic, their advantages and disadvantages.
The student should be able to :	Be able to recognize anomalies of individual teeth, dental arches and bite. Be able to correctly formulate a diagnosis of an orthodontic patient
Tasks of the teacher: to introduce the concept of the norm in orthodontics \ • To train students in the ability to	Learning outcomes: - formation of a clinical concept of norm in students

characterize the clinical picture of various types of dental anomalies, dental arches and bite To introduce various types of classifications of mechanical devices.	- development of clinical thinking in students - have an idea of the different types of classifications of mechanical devices.
Teaching methods	Lecture, brainstorming, story, video method, practical lesson, work with a book, dialogue, educational games, pinboard, organizer.
Forms of training	Group work (“Let’s study together”, “Work together - exchange ideas”, “interactive games Chamomile, Hot potato”) , individual work.
Educational resources	Whiteboard , flipchart , video films , writing board, model , dummies , schedule , diagrams , scheme , notes, checklist, texts .
Study conditions	Specially technologically equipped rooms.
Monitoring and evaluation	Oral survey - express test, written survey: test

1. INTRODUCTION

Among the various methods of correcting anomalies and deformations of the dental system, active hardware treatment occupies a key place.

In this case, orthodontic devices are used both for treatment and for preservation, i.e. retention, of the results obtained and prevention of complications.

F. Ya. Khoroshilkina and Yu. M. Malygin (1977) classified the main designs of devices taking into account the biophysiological principles of their operation and design features.

Orthodontic devices can be divided into 3 main types:

1. Preventive – designed to prevent the formation of correction of dental arch deformations and normalization of the functions of the dental system.
2. Therapeutic – to eliminate existing dental anomalies.
3. Retention – to consolidate the achieved results and prevent the development of relapses.

2. Objectives and tasks of the lesson

An anomaly is a deviation from the norm, so knowledge of the "norm" in orthodontics is necessary to determine the existing deviations from it. Conventionally, the orthognathic bite is accepted as the norm in orthodontics as the most common physiological bite. The classification, which allows us to briefly express the essence of the existing deviation, facilitates diagnostics, the choice of treatment method, and promotes mutual understanding between doctors. For the treatment of anomalies of the dentoalveolar system, we use various types of devices. In the methodological manual, we will specifically consider therapeutic devices, we will specifically consider intraoral devices of mechanical action. The ability to use them in diagnosing anomalies of the dentoalveolar system is necessary for a general practitioner working as an assistant to an orthodontist. The methodological manual is intended for students of dental faculties, orthodontists, clinical residents

3. Theoretical part

ORTHODONTIC TREATMENT DEVICES

Medical devices can be divided into the following groups:

By operating principle:

- mechanically acting - are characterized by the fact that the force of their action is embedded in the design of the device itself and the source of force is the active part of the device: the elasticity of the vestibular arch, spring, elasticity of the rubber traction and ligatures, the force developed by the screw, etc.;
- functional – act when the muscles of the maxillofacial region contract, i.e. during function. With the help of bite pads, inclined planes, the force of contraction of the masticatory muscles is transmitted to an incorrectly positioned tooth, a deformed area of the dental arch or jaw;
- combined – combine elements of mechanical and functional devices.

By method and place of action:

- single-jawed ;
- single-jaw intermaxillary action;
- two-jawed ;

By type of support:

- interacting (reciprocal) – the counteracting force is used not only for better fixation of the device, but also for moving the teeth (for example, support of two halves of the plate with an expansion screw)

- stationary – the supporting part of the device is immobile and does not cause displacement of the supporting teeth.

By location:

- intraoral – palatine, lingual and vestibular;
- extraoral – head (frontal-occipital, parieto-occipital , combined), cervical, jaw (upper labial , lower labial , chin, submandibular, angular);
- combined.

By fixation method:

- non-removable;
- removable;
- combined.

By type of design:

- arc;
- burl;
- plate;
- block;
- frame.

The characteristics of any orthodontic device or its modification are made up of its features according to the above scheme.

MECHANICAL ACTION DEVICES .

Mechanically acting devices are those in whose very design the source of force is embedded. Therefore, they are also called active, since the acting force is developed directly by the devices themselves. The source of force can be the elasticity of the arches and springs, the force of the screw, the elasticity of the rubber traction, the ligature for fixing the teeth to the arch. The force developed by these devices is regulated (dosed) by the doctor.

Mechanically-acting devices can be of removable and non-removable design. Removable mechanically-acting devices include plates with screws, springs, vestibular arches of various modifications. Non-removable mechanically-acting devices include Haas , Nance , McNamara , and Quad devices. Helix , Derichsweiler , bracket system.

Intraoral mechanical removable appliances

Removable plate devices allow for tilting and rotational movement of teeth, rotation of teeth, and vertical movement of teeth. The use of plate devices is indicated for narrowing of dental arches (in the transverse plane), protrusion or retrusion of teeth in the sagittal plane, and abnormal tooth position: distal and

mesial position, as well as oral (palatal or lingual). Plate devices allow for normalization of the shape and size of the dental arch: expansion (in the transverse plane), lengthening and shortening (in the sagittal plane). Such devices are used for protraction and retraction of the anterior teeth, as well as distal or mesial movement of teeth (along the dental arch). In addition, normalization of the position of teeth in their vestibular or oral position is possible. Plate devices allow for rotation of a tooth around its axis in case of its tortoanomaly . Good results are also achieved with the use of plate devices with occlusal pads for alveolar lengthening of lateral teeth, especially the upper jaw.

The devices can be used at any age, starting with the treatment of children with baby teeth, but the optimal option is the period of early mixed dentition, i.e. the age from 6 to 9 years. Orthodontic devices give a favorable effect when using weak short-term forces of medium magnitude of intermittent action.

The positive aspects of using removable orthodontic appliances are:

1. The ability to maintain oral hygiene.
2. Convenience of hygienic care of the orthodontic structure.
3. The ability to remove the orthodontic device if negative effects appear manifestations (inflammation of the mucous membrane, injury to the gingival papillae, etc.).
4. Simplicity and accessibility of activation by both the doctor and the patient's parents or the patient himself.

The negative aspects include:

1. The ability of unruly patients to remove the device.
2. The possibility of an irritating effect of the plastic base of the orthodontic appliance on the mucous membrane due to the action of the residual monomer.
3. Inability to use complex structures throughout the day (during meals, school activities, etc.).
4. Insufficient effectiveness of removable orthodontic devices in cases of complex and severe malocclusions, as well as in the treatment of adolescents and adults.

The basis of plate appliances is the appliance base, which is located in the palatine vault (plate for the upper jaw) or on the alveolar process (plate for the lower jaw). The plate base is made of plastic directly on a plaster model (direct method) or modeled from wax, after which the wax is replaced with plastic (indirect method). All elements of the orthodontic appliance (screw, arch, clasp, spring, loop) are inserted and fixed into the plate base. The base is adjacent to the lingual or palatal surfaces of the teeth. In the anterior section, the base is 2.0 mm below the cutting edge of the incisors, and in the lateral sections, 2.0–3.0 mm below the chewing surfaces of the teeth.

Non- removable Dental orthodontic devices and their systems can be divided into the following:

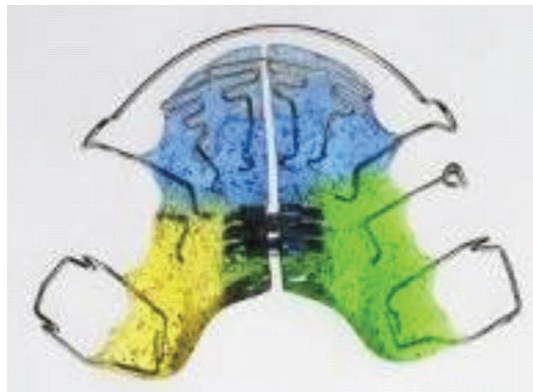
I. Crown (Katz guide crown , Pozdnyakova apparatus, Korkhaus apparatus for treating diastema, etc.).

II. Arc:

1. Angle's vestibular apparatus:
 - a) stationary arc,
 - b) expanding or expansive arc,
 - c) sliding arc,
 - d) sliding arc,
 - d) Angle's arch for intermaxillary traction.
2. Vestibulo -oral devices:
 - a) Simon beam arc apparatus.
 - b) Ainsworth apparatus .
 - Eisenberg-Herbst apparatus .
3. Edgewise technique:
 - standard,
 - straight-wire system according to Andrews and Alexander,
 - bioprogressive Ricketts technique ,
4. Johnson's apparatus (twin- arch technique).
- Begg's apparatus (light - wire technique).
6. Palatine (Gozhgarian arch or clasp Sattlina).
- III. Multiband technique.
- IV. Lip bumper.
- V. Clasp orthodontic appliances.

All the above-mentioned designs are distinguished by a high technological level and high labor intensity of clinical application. At the same time, these systems imply the implementation of principles traditional for orthodontics, but in more complex design solutions.

1. At uniform narrowing dental rows follows apply record With with a screw And sagittal sawing . So How the greatest narrowing top dental rows usually observed V areas premolars , screw at sagittal sawing records install V this areas . For the best fixations such records , her , like as a rule , they make with 4 clasps Adams or With occlusal with naklakami (when crosswise bite).



2. In those cases when the greatest narrowing dental rows observed areas frontal teeth , apply record with a screw for uneven extensions .

If narrowing dental rows more expressed With right or left sides , use records With lateral sectoral sawing .

3. Not infrequently place For palatine located frontal teeth top jaws create for check extensions dental rows With with help records With frontal sectoral sawing And screw .



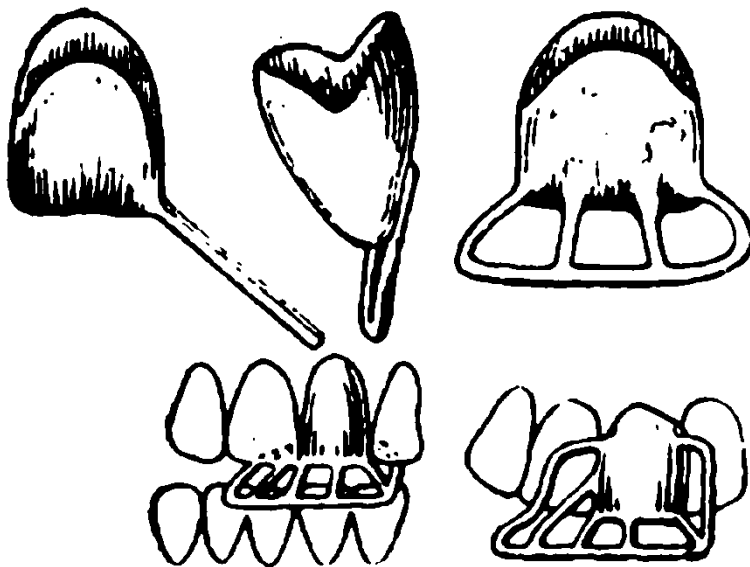
4. For extensions dental rows And distal movements side groups teeth are being manufactured record With two with screws And three sectoral sawing , that promotes moving front teeth V side lips , and chewing - distally .



5. For distal movements first permanent molar that has shifted on place prematurely remote second dairy molars applies plate with special distal screw , which provides one-sided moving teeth , so how another end screw a is closed .



Expanding plates , adjacent To alveolar offshoot And palatine vault , provide impact Not only on teeth , but And on jaws . Their Can assign V periods milky , replaceable And permanent bites . Screw follows unwind weekly by 1/4 - 1/2 turn . Activation screws on one full turnover (3600) allows expand dental row up to 1 mm , full disclosure screw a - by 6-8 mm . Activation screws is produced special with a key , by turning By direction , specified arrow .

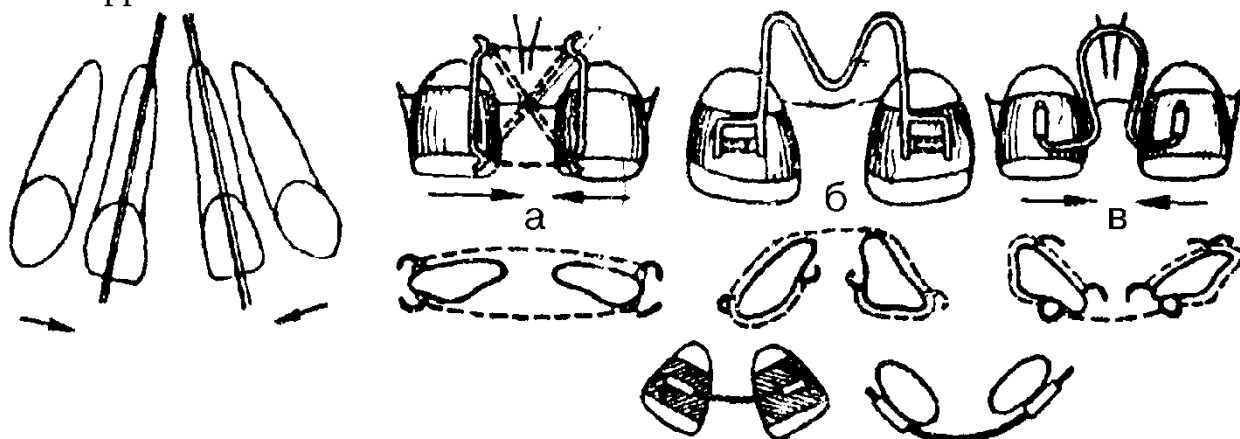


Katz guide crown .

Katz's guide crown is a non-removable orthodontic appliance (crown) for one of the upper incisors with a guide inclined plane soldered to it. It is indicated for the palatal position of one or more incisors, provided that there is space in the dental arch and sufficient depth of the reverse incisal overlap.

Korkhaus apparatus for the treatment of diastema has several modifications. Its technical implementation depends on the type of diastema. The main element of the device, which is typical for all varieties, are metal crowns or rings on the incisors.

For type 1 diastema (lateral deviation of the crowns of the central incisors with the correct positioning of the apices of their roots), the following types of Korkhauz apparatus are used :



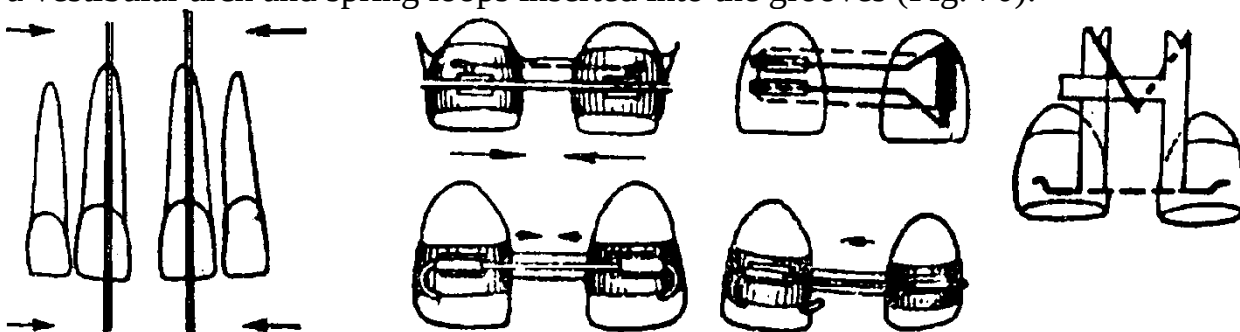
Varieties of the Korkhaus apparatus for the treatment of type I diastema.

a) metal rings on incisors with vertical rods with hooks open distally, soldered closer to the mesial surface and traction (thread or rubber). The force of contraction of the ligatures stretched between the hooks promotes the convergence of the incisors;

b) metal rings on the cutters with vertical tubes soldered to them and a Coffin spring for bringing the cutters closer together;

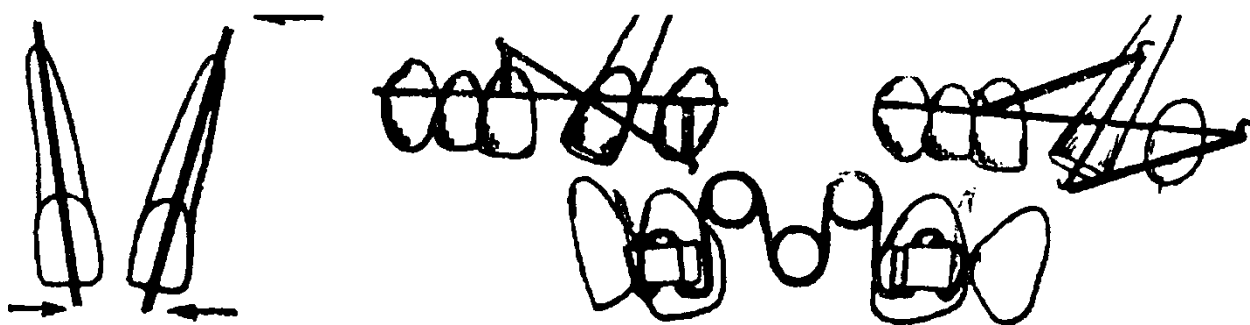
c) metal rings on incisors with hooks soldered to them, open distally and with ligature traction.

For type 2 diastema (body lateral displacement of incisors), the following types of Korkhaus apparatus are used : metal rings on the central incisors with soldered vertical beams with hooks open distally; metal rings on the incisors with vertical grooves soldered to them in combination with a removable plate apparatus with a vestibular arch and spring loops inserted into the grooves (Fig. 70).



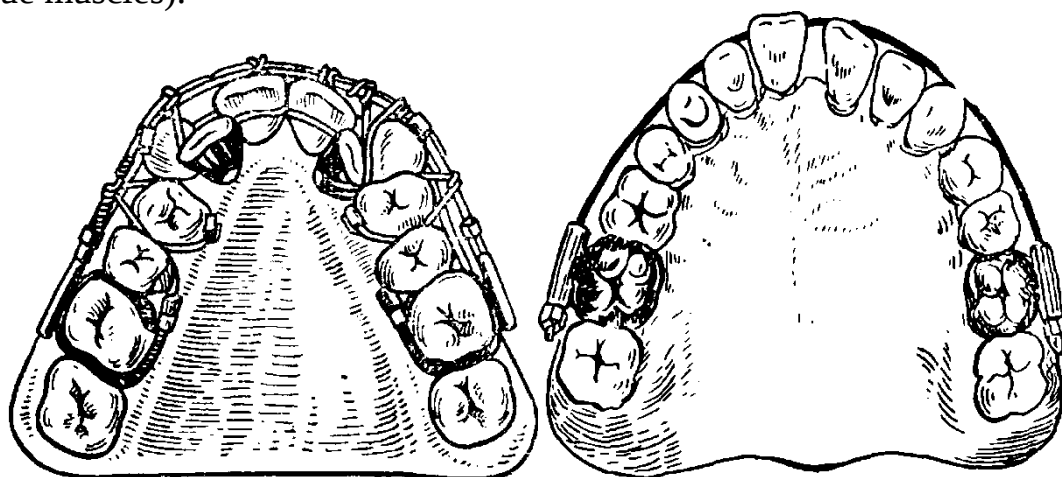
Varieties of the Korkhaus apparatus for the treatment of type II diastema.

For type 3 diastema (medial inclination of the crowns of the central incisors and lateral deviation of their roots), the following types of devices are used: rings for incisors with vertical rods and multi-directional rubber traction (modification by F.Ya. Khoroshilkina).



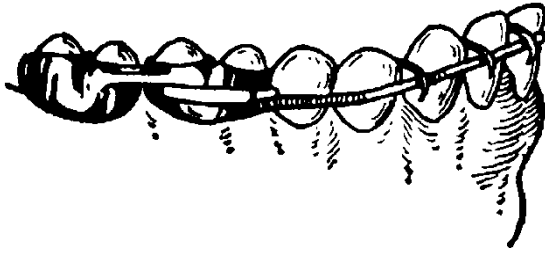
Varieties of the Korkhaus apparatus for the treatment of type III diastema.

Fixed arch devices were proposed **by Angle** at the end of the 19th century. The universal Angle arch (Angle's apparatus) consists of crowns with horizontal tubes on the first permanent molars, tubes, an elastic arch with nuts, and ligatures. The Angle appliance of simple design and its varieties are non-removable mechanically acting appliances that operate due to the spring properties of the dental vestibular arch, ligatures, nuts, and elastic rubber traction. In combination with the Angle appliance, removable or non-removable appliances can be used to separate the bite and restore impaired functions of the oral cavity (closing the lips, chewing, swallowing, breathing, and parafunctions of the chewing, facial, and tongue muscles).

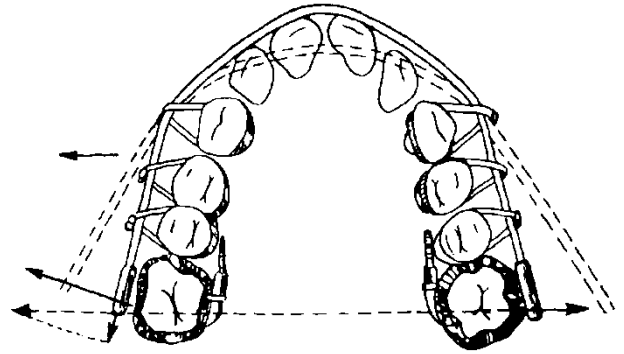


Stationary Angle arc .

Stationary Angle's arc it is possible to move teeth in the vertical direction. Crowns for fixing the arch are made for the first or second permanent molars. To "drive" teeth into the alveolar process (dental-alveolar shortening or intrusion), the arch is bent not parallel to the necks of the teeth, but closer to the transitional fold in the root area and fixed to the teeth at the necks with rings with stops put on the "driven-in teeth". The advancement of teeth - "traction" (dental-alveolar lengthening or extrusion) is carried out by bending the arch to the cutting edge of the teeth, and it is fixed in the area of the necks of the teeth with ligatures to the rings with stops (hooks). The device is activated by unscrewing the nuts with a special key.



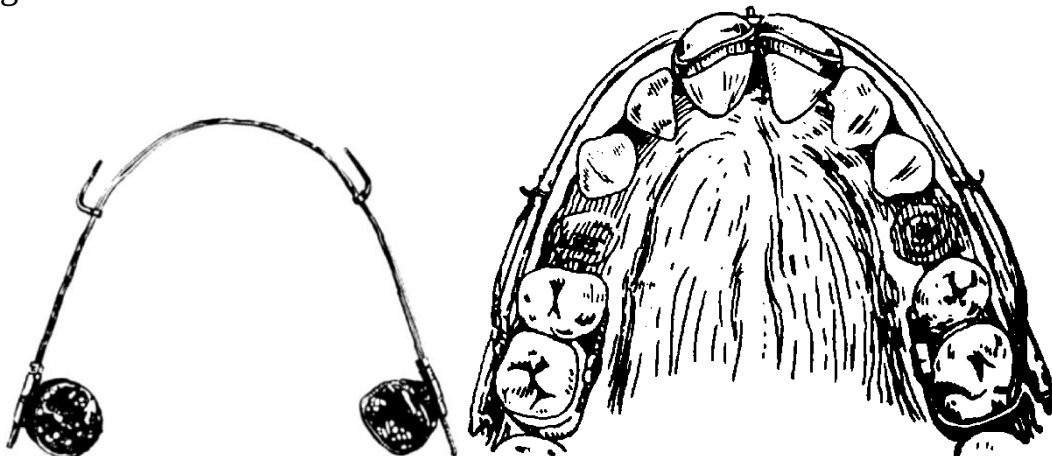
Angle's arch for extrusion of anterior teeth.



Angle's expanding or expansive arc .

Angle 's expanding or expansive arch : these are crowns with horizontal tubes that are fixed on the first or second permanent molars. The arch is bent so that it fits the vestibular surface of the front teeth and lags behind the lateral teeth - is wider than the dental arch. When the arch is inserted into the tubes, the arch , having elasticity, moves the lateral teeth tied to it with ligatures. The device is activated by straightening the previously removed arch, tightening the ligatures, and unscrewing the nuts.

Aigle's Sliding Arc is designed for distal displacement of the front teeth or changing their inclination. When making crowns for the first permanent molars, a space free of solder is left on the distal side of the tube. Hooks open to the front are soldered onto the arch in the canine area, and in the area of the front teeth, hook loops thrown over the cutting edges (loop width 2 mm, thickness 0.5 mm) are soldered. The arch is inserted into the tubes and the rubber traction is secured to the hooks in the canine area and to the solder-free rear edge of the tube on the molars. The arch, shifting backwards under the influence of the rubber traction, changes the inclination of the front teeth.



4 . Scenario of interactive games

Using the Dark Horse Method.

To work you need:

print the question options on sheets of paper
numbers by the number of question options
numbers for the student draw

Progress of work:

1. The group is divided by lot into two subgroups of 5-6 students each.
 2. One student from each subgroup approaches the teacher, chooses the number of the question option and receives a protocol sheet.
 3. In each subgroup, the date, group number, full names of the students in the subgroup, the name of the game, and the topic of the lesson are written down on the protocol sheet.
 4. Students are given 5 minutes to discuss the question, then they begin the competition.
 5. Of the two subgroups, the first asks a question, the second answers.
 6. In the subgroup asking questions, three consultants are selected:
 - asks questions
 - marks the number of correct answers on the sheet
 - keeps track of time
 7. answer as many questions as possible within 10 minutes.
 8. The teacher monitors the correctness of the answer.
 9. Each correct answer is worth 0.1 point. Based on the number of correct answers, the entire subgroup receives the same number of points.
 10. Then the students of the second subgroup begin to ask questions of their 11th option to the students of the first subgroup.
 12. At the end of the competition, the results are summed up and the questions are discussed for 15 minutes.
- The points received by students are taken into account when setting the current rating of the lesson.
13. A record is made in the group journal about the conduct of this business game in the lower free part of the sheet with the signature of the group leader.
 14. The game protocol is kept by the group teacher.

Choose one correct answer

1. PREVENTIVE ORTHODONTIC DEVICES INCLUDE:
 - 1) devices used to treat dental anomalies
 - 2) devices that prevent the development of deformations of the dental arches and jaws
 - 3) devices used to stabilize the achieved treatment results
2. ACTIVE ELEMENTS
 - 1) screw and vestibular arch
 - 2) Adams clasp

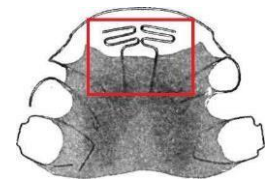


- 3) basis
- 4) Adams clasp and base

3. THE THREE-DIMENSIONAL BERTONI SCREW ALLOWS
 - 1) expand and lengthen the dental row at once or one by one
 - 2) distalize the teeth in the lateral sections of the upper dental arch
 - 3) expand the dental arch in the anterior section
 - 4) open the palatine suture
 - 5) eliminate protrusion



4. PICTURED
 - 1) protracting spring
 - 2) Hand-shaped spring for distalization of tooth 12
 - 3) button clasp
 - 4) orthodontic screw
 - 5) vestibular arch



- | | | | |
|-----------|-----------|----|-----------|
| 5. | APPARATUS | BY | MECHANISM |
| OF ACTION | | | |

- 1) functional
- 2) functionally active
- 3) mechanical
- 4) combined
- 5) functional-mechanical



6. THE APPARATUS IS PRESENTED
 - 1) palatal arch
 - 2) pendulum
 - 3) quadhelix 4) nance
 - 5) north



- | | | | | |
|-----------------------------|-----------------|-------|------------|------|
| 7. | OPTIMAL MODE OF | SCREW | ACTIVATION | IN A |
| MECHANICAL ACTION APPARATUS | | | | |

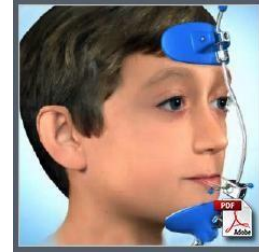
- 1) once a day
- 2) once every two weeks
- 3) once every 5 days

8. MEDICAL DEVICES ARE USED
 - 1) to eliminate bad habits
 - 2) to normalize nasal breathing
 - 3) to correct the position of teeth, the shape and size of the dental arch and to normalize the relationship of the dental arches

9. EXTRAORAL RUBBER TRACTION IS USED
- 1) for muscle training
 - 2) for the introduction of an additional element of the device: face bow, chin sling
 - 3) to increase the strength of the current apparatus

10. BY LOCATION OF THE APPARATUS:

- 1) head
- 2) vestibular
- 3) occipital
- 4) intraoral
- 5) extraoral



11. THE DEVICE IS USED FOR :
- 1) distalization of the first permanent molars
 - 2) constrictions
 - 3) shortenings
 - 4) retentions
 - 5) extensions



12. OCCLUSION TREATMENT DEVICE:
- 1) distal
 - 2) mesial
 - 3) vertical incisor disocclusion
 - 4) cross
 - 5) vestibulo-occlusions

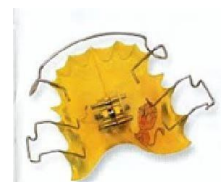


13. BY DESIGN THE APPARATUS:
- 1) plate
 - 2) kappa
 - 3) block
 - 4) frame
 - 5) arc



14. SCREW ACTIVATION ALLOWS TO EXPAND THE TOOTH ROW:

- 1) upper
- 2) lower
- 3) upper and lower
- 4) extend the top
- 5) lengthen the bottom



15. ELEMENT MARKED: 1)



vestibular arch

- 2) button clasp
- 3) Adams clasp
- 4) round clasp
- 5) protruding spring

16. FIXING ELEMENTS IN REMOVABLE ORTHODONTIC APPLIANCES ARE

- 1) protruding spring
- 2) clasps
- 3) tongue guard
- 4) inclined plane
- 5) screws

17. THE CLAMP CONSISTS OF:

- 1) from the shoulder, working angle, process for fixation in the base of the apparatus
- 2) from the shoulder, body, working angle, process for fixation in the base of the apparatus
- 3) from the shoulder, a process for fixation in the base of the apparatus
- 4) from the shoulder, body
- 5) from the body, a process for fixation in the base of the apparatus

18. REMOVABLE DENTURES IN CHILDREN DURING THE MIXED BITE PERIOD SHOULD BE REPLACED:

- 1) in 2-4 months
- 2) in 4-6 months
- 3) in 8-10 months
- 4) in a year
- 5) more than 1.5 years later

19. THE DESIGN OF FUNCTIONAL DEVICES NECESSARILY INCLUDES:

- 1) screw
- 2) rubber traction
- 3) inclined plane, bite platform, pellet
- 4) spring
- 5) rubber band hooks

20. FOR A MECHANICALLY OPERATED APPARATUS IT IS CHARACTERISTIC TO HAVE:

- 1) bite pad
- 2) screw, ligature, spring, arch, rubber ring
- 3) inclined plane
- 4) tongue protectors
- 5) lip pads

21. EXTRAORAL DEVICES INCLUDE:

- 1) removable plate appliance for the upper jaw with a sector screw
- 2) vestibular plate
- 3) chin sling with head cap
- 4) trainer
- 5) LM-activator

22. FOR THE BEST FIXATION OF THE CLAMP DEVICE, IT SHOULD BE POSITIONED

GAT:

- 1) on one side of the dental row
- 2) on both sides of the dental row
- 3) asymmetrically
- 4) diagonally

23. FAN-SHAPED SCREW IS INTENDED FOR

- 1) lengthening of the upper dental arch
- 2) uniform expansion of the upper dental arch
- 3) expansion of the upper dental arch in the anterior section



- 4) opening of the palatine suture
- 5) protrusions of the upper incisors

24. BY DESIGN THE APPARATUS:

- 1) plate
- 2) kappa 3) block
- 4) frame
- 5) arc



25. A DEVICE WITH A SCREW, SPRING, AND LIGATURE IN ITS STRUCTURE

CALLED APPARATUS

- 1) mechanical action
- 2) functional action
- 3) combined action

26. THE BERTONI-SOLOVEITCHIK (BERTONI-ANATOMIK) SCREW IS USED FOR THE PURPOSE OF:

- 1) expansion of the dental arch in the transverse plane
- 2) lengthening of the dental arch in the sagittal plane
- 3) simultaneous expansion and lengthening of the dental arch

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