

HE MINISTRY OF HEALTH OF UKRAINE
THE HIGHER STATE EDUCATIONAL INSTITUTION OF UKRAINE
"UKRAINIAN MEDICAL STOMATOLOGICAL ACADEMY"

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METHODICAL RECOMMENDATION
for independent work of students during the preparation
to practical lessons and the lessons

Academic discipline	Orthodontics
Module №1	Orthodontia. Diagnostic of dentognethic anomalies and deformations
The theme of the lesson №24	Instrumental method. Elements of orthodontic appliances. Ways of orthodontic appliances making.
Course	III
Faculty	Preparation of foreign students

Poltava 2016

1. The relevance of the topic:

Instrumental method is the main method among orthodontic treatments and is based on the purposeful redistribution of functional and mechanical load on teeth and other areas of dentoalveolar-facial area (the periodontium, the muscles, the alveolar processes of the jaw bones and temporomandibular joint). In Ukraine, the instrumental method for the treatment of malocclusion with a help of different designs of orthodontical appliances is the most common and affordable for wide segments of the population (child, adolescent and adult).

2. Specific objectives:

To explain the elements of orthodontic appliances, indications for their use and their method of manufacture.

To define the appliance method of treatment.

To know the types of appliances used for orthodontic treatment.

To know the principles of the elements of orthodontic appliances used for treatment.

To classify the appliance according to the mechanism of action.

To know the principles of the elements of orthodontic appliances used for treatment.

To know the borders of removable appliance basis on upper and lower jaw.

To explain the fixing elements of orthodontic appliances.

To classify the types of clasps that used in orthodontics.

To explain the structural elements of orthodontic appliances.

To explain the stages of designing and manufacturing of orthodontic appliances.

To know the types of forces used for orthodontic treatment.

3. Basic knowledge's, abilities, skills necessary for studying the topic (interdisciplinary integration)

Name of previous disciplines	Skills
1.Anatomy	To determine the period of development of the child, the proportionality of body parts during this period of child development
2.Normal physiology	Know the physiology of orofacial region (esthetics, functions and morphology)
3.Prevention of dental diseases	To choose the teeth for fixing the orthodontic appliance according the stage of root development
4.Biophysics,informatics and medical equipment	To determine the appropriate forces to move individual or groups of teeth. To consider the direction of the force that develops active elements of orthodontic

	appliance
5.Propaedeutics dentistry .	To determine the identity of teeth to temporary or permanent occlusion

4. Tasks for independent work in preparation to the lesson and on the lesson.

4.1. A list of key terms, parameters, characteristics that a student should learn in preparation for the lesson:

Term	Definition
1.The appliance method of treatment	The method of treatment of malocclusion by using special devices – orthodontic appliances.
2.Constructive bite	Such type of bite which we try to create at a patient after orthodontic treatment.
3.Functionally-acting orthodontic appliance	Type of appliances that create terms for normalization of functions of the mouth cavity (mastication, swallowing, breathing, speech, closing of lips) and renewal of myodynamic equilibrium in the maxillufacial region.
4.Functionally-directing appliance	Type of appliances that use the force created by skeletal muscles, which is passed through a guide plane, frontal bite plane, occlusal bite plane, directing loops that move teeth or the lower jaw. Such appliances normalize the functions of dentofacial system.
5. Mechanical active appliances	Type of appliances that use the force created by screws, bows, expansion springs, pushers (protracted springs), springs for the mesio-distal displacements, ligatures, hooks, beams, rods and other elements.

4.2. Theoretical questions to the lesson:

1. What are the elements of orthodontic appliances, indications for their use and their method of manufacture?
2. What are the types of appliances used for orthodontic treatment?
3. What are the principles of the elements of orthodontic appliances used for treatment?
4. How do we classify the appliance according to the mechanism of action?
5. What are the borders of removable appliance basis on upper and lower jaw?
6. What are the fixing elements of orthodontic appliances?
7. Classify the types of clasps that used in orthodontics.
8. What are the stages of designing and manufacturing of orthodontic appliances?

4.3. Practical works (task) which are executed at the lesson:

1. To describe the model in 3 plan.
2. To learn the types of appliances used for orthodontic treatment.
3. To learn the types of forces, used for orthodontic treatment.
4. To learn the elements of fixation of orthodontic appliances.

- 5 To make the C-clasp.
6. To activate vestibular arc.

The content of the topic:

Component parts of removable appliance are:

1. Plastic base.
2. Retaining elements (clasps, cup, crowns and rings) dent alveolar fixation.
3. Active elements (screws, extending and removing springs, arcs, blocks, etc.).
4. Passive functionally-acting and functionally directing elements (lip bumper, cheeks shield, anterior on posterior bite plane, guiding plane, etc.)

Base plate serves as basis of removable appliance. As independent appliance is used in the retentional period of treatment for fixing the attained results. The base can be made from plastic or metal.

The positive features of removable constructions:

1. Possibility of observance of hygiene of mouth cavity.
2. Comfort of sanitary care of construction.
3. There is a possibility to take off at appearance of negative signs (inflammation of mucous membrane, injuring of gingival papillae, etc.).
4. Simplicity and availability of activating the appliance by both doctor and parents of a patient.

Negative sides:

1. It is possible for undisciplined patients to take off appliance.
2. There is a possibility of allergic reaction.
3. It is impossible to use appliance during taking meals and school lessons and other.
4. There is still insufficient efficiency of removable appliance at difficult and sharply expressed deformations of bite, and also when treating malocclusion of adults and teenagers.

Requirements to the plastic base plate:

1. To attach the teeth densely.
2. Thickness of wax base must not exceed the thickness of waxen base plate (2,0-2,5 mm).
3. To correspond exactly relief of mucous membrane of the palate and alveolar sprouts.
4. Fixation of appliance or denture during rest and during functions.
5. To transfer the action of active elements on the teeth and dental rows.

The base of appliance is:

1. Place of fixing of all elements of the appliance.
2. Supporting part of the appliance, which counteracts the force of actively operating elements (screws, springs, etc.).

3. The supporting part at the transmission of the action to the opposite dental row by functionally-directing elements (guide plane, protective straps, posterior, anterior bite plate).

4. Retentional appliance after the termination of the period of active treatment.

Border of the base of the maxillary plate - when making a base plate for the maxilla the base of appliance covers the palate, alveolar sprouts and palatal surfaces of teeth to the level of their occlusal surface (lateral teeth) and cutting edges (frontal teeth). Sometimes close the vault of palate not fully, that a base had a less area and did not cause the irritation of root of speech.

Border of base plat mandibular is a base plate on the lower jaw that has front, lateral, back and low boundary. The low boundary which passes in the sublingual area and is situated at the place of the alveolar sprout and the lateral surface of the mouth. A back border passes behind the distal surfaces of the last molars.

The base of appliance covers alveolar sprouts to the occlusal surface of lateral teeth and cutting edges of frontal teeth. At inclination of lateral teeth in the lingual direction in these regions of base of appliance are thickened with the purpose of its next correction and fitting in the mouth cavity. A back border passes behind the distal surfaces of the last molars. In the frontal area of the base we make a dent for the frenulum of the tongue.

During orthodontic treatment by removable appliance and when substitution of defects of dental row it is necessary to decide the question of fixing and stabilizing appliance of appliances in the mouth cavity.

Fixing is strengthening of appliance in statics, and ***stabilizing*** is stability of appliance during functions (speech, mastication, swallowing).

One of the most widespread methods of fixing of removable appliance and dentures is the use of fixative appliance for example:

1. Clasps.
2. Crowns or rings.
3. Combined fixing.
4. Cap.

CLASPS IN REMOVABLE ORTHODONTICS

The success of removable orthodontic appliance mainly depends upon good retention of the appliance. Adequate retention of a removable orthodontic appliance is achieved by incorporating certain wire components, called clasp, which engages the undercuts on the teeth. Clasps are the retentive components of removable orthodontic appliances. There are various designs of clasps advocated for various clinical situations. This article presents an overview of various clasp designs with advantages and disadvantages of each type and their uses in particular clinical situations.

Clasps are wire components that aid in retention of a removable appliance. These are the retentive components that aid in keeping the appliance in place and

resist displacement of the appliance. Mode of action Clasps act by engaging constricted areas of the teeth, called undercuts.

There are two types of undercuts found in natural dentition.

1. Buccal and Lingual cervical undercuts
2. Mesial and Distal proximal undercuts .

The mesial and distal undercuts of the teeth begin below the contact points. These undercuts are accessible very soon after a tooth has erupted. The buccal and lingual undercuts are much less extensive and are not accessible until the teeth are fully erupted. Thus, a clasp that makes use of mesial and distal undercuts is more useful and more efficient than a clasp which makes use of buccal and lingual undercuts.

An ideal clasp should

- Offer adequate retention
- Permit usage in both fully and partially erupted teeth
- Be passive
- Be easy to fabricate
- Not impinge on the soft tissue
- Not interfere with normal occlusion

Different clasps are

1. 'C' clasp
2. Jackson's clasp
3. Arrowhead clasp
4. Adam's clasp
5. Delta clasp
6. Southend clasp
7. Triangular clasp
8. Ball-end clasp
9. Double ball-end clasp
10. Schwarz clasp
11. Crozat clasp
12. Duyzing clasp
13. Eyelet clasp
14. Plint clasp
15. Visick clasp

1. **‘C’ clasp** It is also known as three-quarter clasp (3/4 clasp) or Circumferential clasp. They are very simple clasp and engage bucco-cervical undercut.

Advantage:

- Easy to construct
- Simple design
- Prevent mesial migration of tooth

Disadvantage:

- It can't be used in partially erupted teeth.

2. **Jackson's clasp.** It is also known as Full clasp or 'U' clasp. It was introduced by V H Jackson in 1906. This clasp makes use of bucco-cervical undercut and also the mesial and distal proximal undercuts.

Advantages:-

- Simple to construct
- Offers adequate retention

Disadvantage:-

- Inadequate retention in partially erupted teeth.

3. **Arrowhead Clasp** This clasp was introduced by A M Schwarz in 1956. This clasp makes use of mesial and distal undercuts. This clasp is made using half round or round stainless steel wire of 0.7 mm diameter. This clasp is made by use of a special plier called 'Tischler's plier'.

Advantages:-

- Good retention on partially erupted tooth
- Eruption of tooth is not hampered

Disadvantages:-

- Occupies large amount of buccal surface
- Requires special plier and adequate skill for construction.

4. **Adam's clasp**

Advantages:-

- This clasp is strong, simple and easily constructed.
- It can be used on any tooth (deciduous or permanent, partially or fully erupted, incisors or premolars or molars).
- It is comfortable to wear and resistant to breakage.
- It is small and occupies minimum space.
- It can be modified in a number of ways.
- No specialized instrument is needed for construction of clasp.

Parts of Adam's clasp

- Two arrowheads
- Bridge
- Two retentive arms

5. **Triangular Clasp** It has a small triangular shape that engages the proximal undercut of two adjacent teeth. It provides excellent retention. It doesn't cause irritation of gingiva. It is used when additional retention is required.

6. **Ball End Clasp** This clasp is also known as Scheu anchor clasp. This clasp has a ball at the end which engages the proximal undercut between two adjacent teeth (interdental area). Preformed wires having a ball at the end are used

for making this clasp. The ball can also be made using silver solder. This clasp is used whenever additional retention is required

7. Schwarz Clasp

It is said to be predecessor of Adam's clasp. This clasp has a number of arrowheads that engage the inter-proximal undercuts of posterior teeth. This clasp is not routinely used because:-

- It needs special arrowhead forming pliers.
- It occupies a large amount of space in the buccal vestibule.
- The arrowheads can injure the interdental soft tissues.
- It is difficult and time consuming to fabricate.

8. Duyzing Clasp

This clasp has two wires emerging from the plate that cross the occlusion over the anterior and posterior contact point of the tooth clasped. Each wire then goes above the greatest circumference of the tooth to the middle of the tooth and again back below using undercuts. This clasp is used to engage the buccal undercuts of molars. If the situation demands, only half of the clasp can also be made.

9. Eyelet Clasp

This clasp can be constructed as a single eyelet or continuous eyelet clasp. An eyelet is made using a Young loop forming plier. Eyelets are placed in the embrasure. Three to four eyelets can be made depending upon the retention requirement. The size of the eyelet depends on the width of the interdental area of both anchor teeth.

EXPANSION ELEMENTS

Springs for expansion of the dental row.

With the purpose of expansion of the dental row we apply different types of springs. **Types of springs:**

- spring of Koffin;
- pear shaper spring;
- English pin shaped spring;
- spring of Koller and so on.

Spring of Koffin is used for expansion of upper dental row, for its lengthening and mesio-distal moving of teeth. It consists of the round, oval or pear-shaped bend and two fixative sprouts. Springs are made single or double. Single springs are made from orthodontic wire by diameter 0,7-1,5 mm, double - springs are made from a wire by diameter 0,8-0,9 mm external bend and 0,6-0,7 mm internal.

If necessary to expand maxilla in distal areas the spring should open to the backside and if expansion of the frontal area is needed - ahead. If necessary to expand evenly the maxilla in lateral areas we apply two springs of Koffin. One is located by the open part ahead, the second – to the back. If necessary to lengthen

and to expand the maxilla we apply three springs of Koffin. Two - in the frontal area and the third, in the middle of the palatal arch.

English pin shaped spring: also is intended for expansion of the maxilla. It is made like spring of Koffin.

Pear-shaped spring – is intended for expansion of the maxilla, is made according to the above higher described rules, but has greater length and Koffin spring and has a pear shaped.

Spring of Koller the only spring intended **for even expansion of the lower dental row**. We define the spring of Koller for the even and uneven expansion. For the even expansion we use the right number of bends and for the uneven expansion we use the odd number of bends.

Lately for the change of form and sizes of dental arcs, corrections of position of separate and groups of teeth and bite we apply screws.

Expansion screw.

Screw is a factory produced, mechanically acting element, which is a component part of dental appliance.

Advantages of screws application consist as the follows:

1. Screws can be easily activated by both a patient and his/her parents.
2. Screws operate with the exactly dosed force.
3. Screws can operate both on single plane and on several planes simultaneously.
4. Two parts of the base plate with screw are more stable, then what applying the appliance with an extending spring.
5. Screws have different forms and sizes, which facilitate their fixing in the base of appliance.
6. Due to structural features screws can influence separate teeth, groups of teeth, dental rows, and this normalize the bite.

Depending on the purpose of the application and structural features orthodontic screws are subdivided into 3 groups:

1 group: screws for moving of separate or groups of teeth.

2 groups: screws for normalization of form of the dental row:

- a) for symmetric bilateral expansion or narrowing,
- b) even symmetric lengthening,
- c) uneven expansions of dental arch (expansion of frontal area: symmetric and asymmetrical),
- d) expansions and lengthenings (even and uneven; symmetric and asymmetrical).

3 groups: screws for normalization of bite.

A screw is usually made from German silver (nickel silver), and the drum (working part) of the screw - from steel.

According to sizes we distinguish: standard, middle, universal, micro screws and super micro screws, the point of activation on the screws of Ukrainian production is marked by a red point, and foreign by a pointer. In the base of

removable appliance screw is disposed by marking of activating part up, so that activation takes place from top to the bottom.

Screws with two directing sides we apply for even expansion of dental arc, and screws with one directing side – for the one-sided lengthening of the dental arc, moving of one or group of teeth. Placing of screw in the base of appliance depends on configuration of palate or alveolar sprouts and area of expansion. Most often screws are disposed so that the first directing stick protects between the middles of oral surfaces of the first premolars, first temporal molars. Rarely - between the middles of cuspids.

If we dispose both sided directing screw athwart to the palatal stitch, we will get the lengthening of frontal area of upper dental arc. The cutting in this case can be sectorial or transversal.

The cutting is vertical if necessary to lengthen, frontal area of lower dental arc in the construction of appliance we enter two screws, which are located in the area of cuspids or first premolar. The cutting is vertical from both sides.

If it is necessary to expand and lengthen the lower dental arc, we apply three screws, one of which is located above the bridle of the tongue, and second and third symmetrically to the area of cuspids and first premolar. The sawing up of the appliance is vertical at the place of screws.

Radial or windmill screws are applied for the expansion of the frontal area of upper dental arc. They can be symmetric and asymmetric. When we apply of such screws the distal border of the base plane of the appliance ends at the level of terminator hinge. Ukrainian and foreign firms produce two types of symmetric windmill screws. In one type the drum and a single block makes the terminator, and in the second type of construction the terminator goes separately. The paws of terminator of such screw a when we introduce to construction of appliance it is necessary to conduct on a width which is certain by a doctor.

Screws for simultaneous expansion and lengthening of the upper dental row are produced of two kinds: with two and three working drums. A screw with two working drums carries out even expansion and lengthening of the dental row, and when we apply a screw with three drums there is a possibility of uneven expansion of upper dental arc on the left and on the right.

According to the size of expansion during activating of a screw on a complete turn we define the following types of screws: with expansion of 0,8 mm, 0,7 mm, 0,4 mm and 0,35 mm and common expansion from 4 to 10 mm.

Unwinding of the drum carries out activation of dental screws. Begin activation after a child has son used to the appliance. The mode of activation is chosen individually – from 1 to 3-4 days.

Vestibular arcs.

Vestibular arcs are applied both for the correction of position of separate teeth or groups of teeth and as fixative elements.

Standart vestibular arc – can serve as a fixative element, it is used for the change of inclination of the frontal teeth (it moves them in the oral direction) and for the delay of growth of the frontal area of the jaw.

There are a few varieties of vestibular arcs.

The vestibular arc with a pressing loop (horizontal or vertical on one tooth) – is used at the vestibular location of one of the frontal teeth.

Multiple link vestibular arc – is used for the corpus kind of moving of the frontal teeth in the oral direction.

The vestibular arc with the M-shape bends in the area of cuspids is used for the correction of the vestibular located cuspids under the on condition that there is a place in the dental arc.

Vestibular arc with half-round bend – is used for the lateral moving of incisors, removal of asymmetric diastema (which is conditioned by the wrong location of one of incisors), moving of the lateral incisors into the place of the removed central incisors, for the distal moving of cuspids or premolar. The free end of the arc ends with a hook, which engulfs a tooth that is subject to moving.

Oral arcs.

Oral arcs are called lingual (on a lower jaw) and palatal (for the upper jaw). They are applied both for the vestibular moving of the frontal teeth and for the fixing of appliances, and with the purpose of retaining the results attained during the active treatment.

Oral arc is applied for fixing of appliance in the area of the lower frontal teeth and as a component part of regulators of Frankel functions I and II types.

Oral arc with one half-round bend – as well as vestibular arc with one half-round bend and free end, is used for the lateral moving of incisors. Its advantage lays its hidden position, that can't be easily seen.

Oral arc with three half-round bends is used for the removal of diastemas and thremas between incisors.

The springs for moving of teeth.

The moving of separate teeth or groups of teeth in vestibular and mesiodistal directions is carried out by springs. The springs for vestibular moving of teeth are also called a pusher.

There are a few types of springs for moving of teeth:

- 1.fingerlike,
- 2.Z spring,
- 3.handlike springs of Kalvelis
- 4.T-shape springs,
- 5.Spring with a coil.

Z spring or pusher is intended for the vestibular moving of teeth. Moving can be corpus like or with a turnabout the axis. It depends on the structural features of the spring. At odd amount of bends which are located in mutually opposite directions there takes place forward and rotator motions, at a pair amount of bends only forward, because forces which operate are rotator is counterbalanced.

Force, which a spring develops, depends on its length, diameter of wire, amount of bends and their width and also on resilient properties of wire. With the increase of diameter of wire and diminishing of operating shoulder length, radius of bend force of spring is multiplied. Springs with two half-round bends are often

applied. Producing of springs with the amount of bends more than three is not recommended purpose, because the operating part of the spring becomes long, elastic, easily slides off from the moved teeth and interferes with motions of corpus.

A finger shape spring is also used for the vestibular corpus moving of teeth mesio-distally.

Spring with a coil is also used for the mesiodistal moving of frontal teeth. It is made with a round crossed bend which is also opened to the opposite side to the direction of moving. Activation of springs is carried out by the increase of distance between bends.

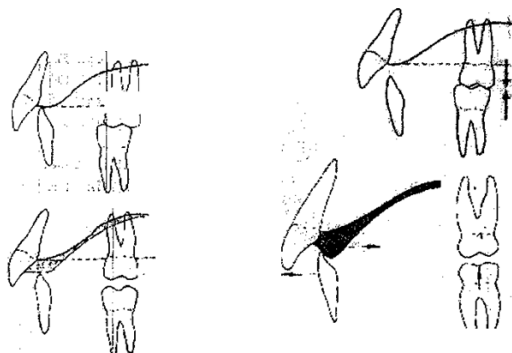
Functionally directing elements

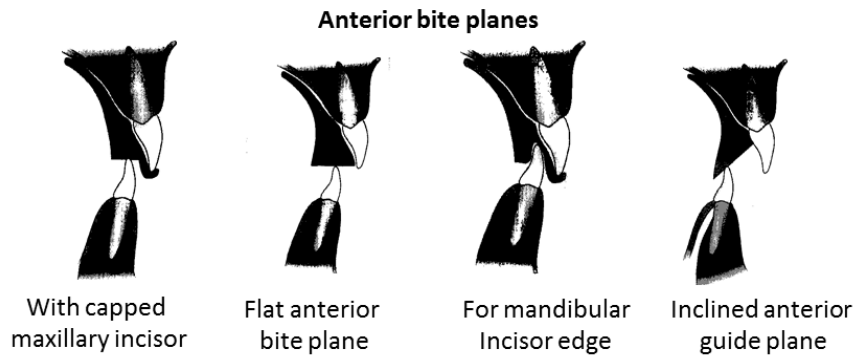
1. Flat anterior bite planet-

- A thickening of the acrylic base plate behind till the canine such that the lower anterior teeth extending usually till the canine such that the lower anterior may bite on it;
- The extension should be flat and parallel to the occlusal plane.
- The bite plane should high enough to disocclude the posterior teeth by about 2-3mm.
- It reduces deep bite by separating the molars allowing them to over-erupt and so decreasing the over bite.
- It can be used to free cuspal interferences to correct posterior crossbites of single teeth

2. Inclined anterior bite plane

- It is modification of the anterior bite plane used in case where there is severe retroclination of lower anterior teeth with increased overjet.
- The plane is inclined so that the lower anterior is proclined as it contacts the slopping bite plane. The lower incisions engage the bite plane when the patient closes the mouth and mandible is guided to be held in the forward position;
- It correct deep bite and increased overjet by allowing molars to over-erupt and proclining lower incisors.





Inclined anterior bite plane shifts position of lower jaw in relation to upper. At the location of ramp plane in the frontal area of lower jaw appliances there is displacement of lower jaw ahead (mesial), that is the distal location the last is removed. The presence of inclined anterior bite plane in the frontal area of mandibular appliances provides the distal shift of lower jaw at mesial location. If a ramp plane is found in the lateral area of orthodontic appliances, there is the shift of lower jaw aside. Except for foregoing action of inclined biting plane disjoins a bite, declines teeth vestibular and partly drives in the teeth of the opposite jaw. All transferred machineries of action of inclined anterior bite plane must be taken into account at medical treatment of dentomaxilla anomalies and deformations. Inclined anterior bite plane can be plastic or metallic (wire or poured - band), the width of which relies on the quantity of teeth which are subject to moving. The angle of slope of plane must be $30-45^{\circ}$. Activating of ramp plane takes place by stratification of plastic.

Inclined anterior bite plane with the angle of slope in 45° it is shown at retrusion frontal teeth, at their vestibular inclination of its making under a corner in 90° so that it touched the alveolar process of opposite jaw only, retaining a lower jaw in the displaced necessary position and did not shift inclination of teeth.

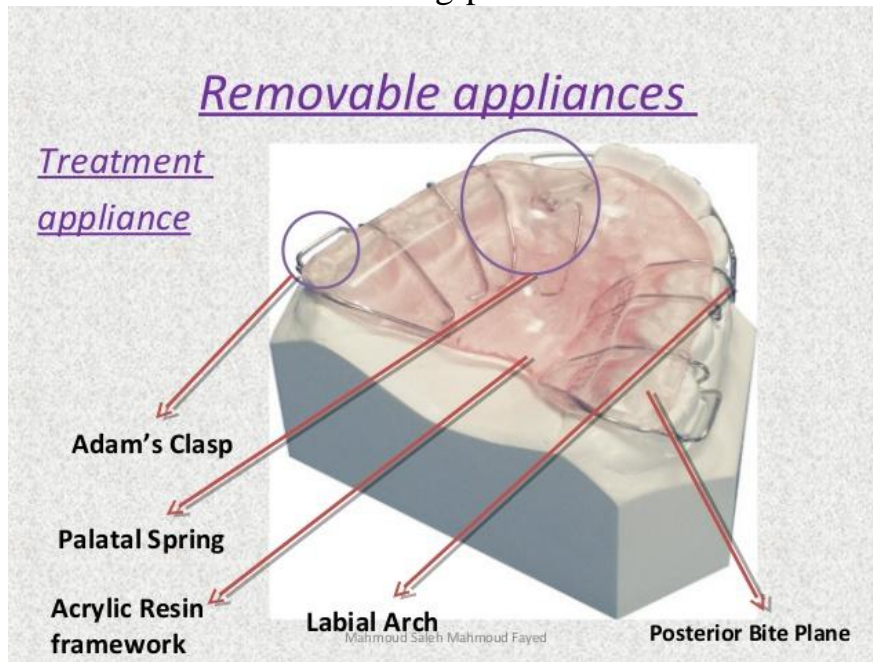
Inclined anterior bite plane is intended for strengthening of pressure on teeth and alveolar process in a frontal area and disjoining of bite in lateral areas, that is for correction of bite on a height. It is used for medical treatment of deep bite. The Biting plate must provide disjoining of bite no more, than on 2-4 mm. For the removal of the forced shift of lower jaw ahead, aside and its withholding in definite position do a biting plate not smooth, and with the imprints of cutting edge of teeth of opposite jaw. A smooth biting plate renders assistance to driving in the teeth.

3. Posterior bite plane:

- An extension of the acrylic base plate used to open the bite anteriorly and cover the occlusal surface of posterior teeth.
- It opens the bite anteriorly to allow correction of anterior crossbite.
- It should be trimmed to be as thin as needed;
- It frees posterior occlusion to facilitate posterior crossbite correction.
- The posterior bite plane should cover all the premolars and molars to prevent their over-eruption

The *Lateral Biting plate* is used for strengthening of pressure on teeth and alveolar process in lateral areas and disconnections of bite in a frontal area, correcting the height of bite. It can be smooth and with the imprints of teeth of opposite jaw.

Smooth occlusal biting plates are shown at medical treatment of the frontal



opened bite. Length of occlusal biting plates relies on the quantity of teeth of opposite jaw, which are subject to driving in. In area of frontal teeth, disjoining must not exceed 4 mm, that renders assistance to the dentoalveolar lengthening.

If necessity disconnecting of bite and saving of its height (at medical

treatment of oral position of separate or groups of teeth) occlusal biting plates with the imprints of teeth of opposite jaw are used.

Removable onejaw *functional-directing orthodontic* appliances of intermaxillary action. At reduction of muscles of jaw-facial field they affect dental sets and position of lower jaw. By such appliances it is possible to reconstruct miostatic reflex, stimulate or detain growth of jaw. Thanks to the simplicity and efficiency they found wide application in practice.

The functionally-acting elements are:

- lip pad (bumper);
- cheek shields;
- tongue guard.

The lip pad is disposed in the frontal area of jaws between an alveolar process and lips. They must not touch the alveolar process densely, and at distance of 2-2,5 mm. The lip pad must come to the transitional fold, to take off a lower or upper lip, assisting also to growth of apical basis.

Functionally-acting doublejaws vestibular and vestibulo-oral appliances

Vestibular plate (individual or standart) can be used not only like prophylactic appliances, but also as medico-prophylactic. Usually such appliances are used for the formed prognathic deep distal bite. In such case on the surface of plate touch to the vestibular surface of upper incisor, a small bite plane for their cutting edges. At presence of small sagittal gap (2-3 mm) and distal shift of lower jaw a child is forced to displace the lower jaw mesial, a biting plate disjoins a bite

in lateral areas and correct its height; reduction of circular muscle of mouth causes oral inclination of upper frontal teeth.

The prophylactic effect of appliances consists of prevention of harmful habits of suction of fingers, foreign objects, biting of cheeks, lips and mouth breathing.

Propulser Muhleman.

According to classification **propulser Muhleman** is:

By purpose - medico-prophylactic appliances.

By the mechanism of action - functionally-directing.

By the purpose of the use - removing the lower jaw mesial, which inclines upper frontal teeth oral by and correct bite on the height.

By a method and place of action - intraoral, twojaws.

By the type of the support - stationary.

By localization of support - in the cavity of mouth (teeth, dental set, alveolar process).

By the method of fixing - removable.

By the type of construction - combined (plate and shield).

By the field of the use - orthodontic.

By the character of action of force - briefly action forces on the basis of action of guide plane and biting plate.

By the force - small or middle forces.

By the method of activating - not requiring activating.

Propulser retains a lower jaw in the neutral position (correlation of first permanent molars) and disconnects a bite in the area of lateral teeth. Greater advancement of lower jaw is assumed ahead (hypercorrection) that strengthens action of muscles which displace a jaw backwards. Thus pressure which is passed through appliances on a lower jaw renders assistance to its growth and at action on upper frontal teeth - retrusion renders assistance of them. Vestibular part of appliances drives back cheeks, insulates their pressure on the lateral areas of upper jaw. Thanks to disjoining of lateral teeth there is the dentoalveolar lengthening which renders assistance to reduction of depth overbite.

Propulser hinders to the mouth breathing, helps a break the harmful habit of suction of tongue, lip, finger or other objects. Structural advantage of this appliance is that palate and palatal surface of upper teeth remain opened. It is pre-condition to normalization of position of tongue and strengthening of its pressure on an upper dental set.

For making orthodontic appliances of functional or combined action of any construction it is necessary to conduct determinations of **constructive bite**. A **constructive bite** is such type of bite which we try to create at a patient. A structural bite is determined by wax templates, preliminary teaching to displace a patient lower jaw in necessary position. The shift of lower jaw at medical treatment of prognathic distal bite is possible from 2 to 5 to mm according to R.Frenkel and from 5 to 7 by mm according to Vares (method of hypercorrection). At determination of structural bite by the method of hypercorrection by the Vares the

necessary condition - to 12 years and the TMJ – the absence of dysfunction. At medical treatment of prognathic mesial and cross bite with the shift of lower jaw aside at determination of structural bite displace a lower jaw no more, than on 2-3 mm.

Bynin cap is used for medical treatment of mesial bite with the shift of lower jaw ahead, for vestibular declining of upper frontal teeth and delay of growth of lower jaw. Appliance is disposed on a lower jaw and consisted of cap on the lateral group of teeth and inclined bite plane in a frontal area, is indicated when sagittal gap is small (no more 2-3 mm) small depth of the reverse overlap. Activating of appliances is carried out by means of polishing occlusal protective bite plane.

According to classification **Bynin cap** is:

By purpose – a medical appliances.

By the mechanism of action - functional-directing appliances.

By the purpose of the use - moving a lower jaw distally, and upper frontal teeth vestibular.

By a method and place of action - intraoral, onejaw intermaxillary action.

By the type of support - stationary.

By localization of support - in the cavity of mouth (teeth, dental set, alveolar process).

By the method of fixing - removable.

By the type of construction - cap.

By the character of action of force - briefly action forces on the basis of action of guide plane and occlusal protective bite planes.

By the force - small or middle forces.

By the method of activating - activated by a doctor.

The Brukl-Reihenbah appliances is a plate for a lower jaw with a guide plane, by a vestibular arch and clasps on lateral teeth. It is indicated at the sagittal gap space no more 2-3 mm and middle or large depth of the reverse incisor contact. Unlike cap Bynin, the Brukl appliance has some advantages. Absence of occlusal protective bite plane in the area of lateral teeth renders the assistance to the dentoalveolar lengthening and, accordingly, medical treatment of deep bite.

After medical treatment cut away a ramp plane by a milling cutter and a plate can serve by a retentional appliances.

According to systematization of the department the Brukl-Reihenbah appliances is:

By the purpose - medical appliances.

By the mechanism of action - functionally-directing, if a vestibular arch is not activated, and is used how a fixative element is.

By the purpose of the use - removing a lower jaw distally, and upper frontal teeth vestibular, correcting bite on a height.

By the method and place of action - intraoral, intermaxillary action.

By the type of support - stationary.

By the localization of support - in the cavity of mouth (teeth, dental set, alveolar process).

By the method of fixing - removable.

By the type of construction - plate.

By the field of the use - orthodontic.

By the character of action of force - interrupted briefly action forces on the basis of action of ramp plane.

By the account of force - small or middle forces.

By the method of activating - activated by a doctor.

Appliances for moving of lateral teeth and lower jaw in transversal directions

Cap or plates with a lateral biting plane apply at medical treatment of cross bite with the shift of lower jaw. They allow setting the lower jaw in correct position. A biting plane is disposed in the lateral area of appliances on the side of shift of lower jaw with determination of structural bite. At reduction of masticatory muscles she slides on the palatal surface of upper lateral teeth and displaces a lower jaw in an opposite side.

Maxillary cap or plates with a lateral biting plane which abuts against the tongue surface of lower lateral teeth. The structural difference of these appliances is that a biting plane is located in the lateral area of appliances on a side opposite to the shift of lower jaw. Under the influence of ramp plane there is a normalization of position of lower jaw.

Functional-action doublejaws framework orthodontic appliances.

Frankel offered the method of medical treatment of anomalies of bite the essence of which is found in the removal of pressure of musculature of lips and cheeks on alveolar processes and teeth; in normalization of closing of lips and position of the tongue, their functions and mutual relations. For achievement of this purpose an author made a vestibular plate. Introduction to construction of hard metallic framework allowed to promote its durability; it is considerably to decrease the acconats of the shields made from a plastic; to facilitate a appliances, to make it by opened in a frontal area for providing of swallowing and motions of the tongue. An appliances is named as a regulator of functions. This is a functional-action twojaws vestibular removable framework appliance. Thanks to such construction the regulator of functions has the educationally-training meaning and renders physiotherapeutical action of the tissues of cavity of mouth.

The basic task of medical treatment by the regulators of functions consists of influencing on a neuromuscular function. Pressure of perioral and intraoral muscles is passed through the regulator of functions on dental sets and alveolar process of jaws and thus renders assistance to correction of bite in sagittal, transversal and vertical directions. Thus there is adaptation of a new form to a new functional state, the growth of remote in development areas of jaws.

The regulators of the Frankel functions according to systematization of orthodontic appliances are:

By the purpose - medical appliances.

By the mechanism of action - the combined action; as allow a presence in construction of mechanically action elements (vestibular and oral arch, loops on canines), lip pads and cheek shields to deliver it to the number of appliances of the combined action.

By the purpose of the use - stimulating or staying growth of separate areas; correcting bite on a height; restoring functions.

By the method and place of action - intraoral appliances of twojaws action.

By the type of support - stationary.

By the localization of support - in the cavity of mouth (teeth, hard palate).

By the the method of fixing - removable.

By the type of construction - framework.

By the application domain - orthodontic.

By the character of force - briefly action forces.

By the acconat of force - small and middle forces.

By the method of activating - not requiring activating.

The regulator of functions of a 1 type (RF-I) is applied for the removal of anomalies of position of frontal teeth or distal bite in combination with narrowing of dental sets and protrusion upper frontal teeth.

It is important at the receipt of prints of jaws that soft tissues did not get between an impression spoon and alveolar process. An alveolar process must be protaken off from a vestibular surface to the transitional fold of mucous membrane. The gips models of jaws must answer the following requirements: it is well to represent dental sets, hard palate, cusps of upper jaw, sublingual area of alveolar process and tissue of bottom of cavity of mouth in particular case in a front area and retromolar field.

The regulator of functions of a 1 type consists of lip pads, cheek shields, vestibular arch on upper frontal teeth, lingual arch, loops on canines, palatal arch and supports on first molar.

At the anomalies of bite development of jaws in transversal direction, as a rule, stays too long, therefore lateral shields must not touch the alveolar process of upper and lower jaws and defend from them on 2-2,5 mm, that is achieved due to making of waxen lining. The low border of lateral shield is found in the deepest part of transitional fold of mucous membrane and in a distal area she gradually passes to the high border. The high border of lateral shield is found in the deepest part of transitional fold, rounds the place of attachment of cheek muscles, passes at back of area of model and roundly passes to the front border.

At making lower lip pads waxen lining are not made, because at the shift of the lower jaw pulled ahead out there is an interval between pilots and alveolar process.

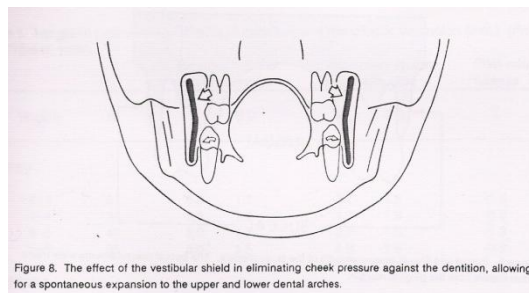


Figure 8. The effect of the vestibular shield in eliminating cheek pressure against the dentition, allowing for a spontaneous expansion to the upper and lower dental arches.

The thickness of pads and must not exceed shields 2-2,5 mm. Pads and shields unite between each other by a wire staple which in the middle incurve on a form the bridle of lower lip.

The lingual arch serves by a reference point for a lower jaw at its moving ahead (misially) in position of structural bite and for vestibular rejection of lower chisels at the proper testimonies.

A vestibular arch passes pressure of the lower lip through pads and lower jaw through a lingual arch on upper chisels which are contributes their palatal inclination.

Loops on upper canine serve for the supporting and fixing regulator of functions and pass pressure of lower lip through lip pads and lower jaw through a lingual arch on upper canine and premolar, which contribute to the delay of growth of upper jaw and distal inclination of these teeth. Loops must be opened backwards.

The palatal arch is intended for fixing of cheek shields; it hinders their compression and deformation under pressure of perioral muscles, and also passes pressure on the upper dental set in distal direction in area of molars. Earlier in the middle of palatal arch there was the Koffin spring which allowed during its activation to regulate standing lateral cheek shields from alveolar processes. However, then it was determined, that it affects stability of appliances, therefore lately do arch to the lines or replace the loop of palatal arch by the flat rounded compensative bend.

Supports are disposed on the masticatory surface of first permanent molars in a forest between cheek tubercles. They must defend from the masticatory surface of teeth and hinder not to their dentoalveolar lengthening.

The regulator of functions of the Frankel 1 type can be applied at medical treatment of two-sided cross bite which is conditioned by excessive transversal development of lower dental arch. In these case lateral shields must densely adjoin to the external surface of alveolar processes of lower dental arch for the delay of growth, and on an upper jaw - to defend on 2-2,5 mm and also render assistance to their transversal growth.

The regulator of functions of the II type (RF-II) is used for medical treatment of distal bite in combination from retrusion upper chisels. From the regulator of a 1 type differs to those, that to it add a palatal arch for protrusion upper frontal teeth and shift the form of loops on canine-teeth, which thanks to that are opened ahead, do not detain growth of frontal area of upper jaw. Other details and clinical stages of making similar to those which are described higher.

The regulator of functions of the III type (RF-III) is shown for medical treatment of mesial bite. He removes the braking influencing of tissues which surround dental sets, on growth and development of upper jaw and detain growth of lower jaw. Unlike the regulators of other types its structural features consist of the following: the lip pads are disposed in area of upper lip, a vestibular arch is made for lower frontal teeth, palatal arch - for protrusion of upper frontal teeth, occlusal biting planes on lateral teeth - for disjoining of bite and delay of growth of

lower jaw.

The regulator of functions of the IV type (RF-IV) consists of two lateral shields, lower lip pads, upper vestibular arch, palatal arch and occlusal biting planes. It can have a lower vestibular arch additionally. The palatal arch passes after last molar. It has additionally tongue guard. Making of all other wire and plastic elements is the same, as for RF- II. Apply RF-IY for medical treatment: the open bite, in particular case prognathic, at a neutral removable or permanent bite; bialveolar protrusion.

Materials for self-control:

A. Task for self-control (tables, diagrams, drawings, graphs):

1. Write down the determination of appliance method of treatment.
2. Draw in album elements of removable orthodontic appliance.
3. Draw in album types of clasps.
4. Draw in album functionally acting and directing elements.
5. Draw in album mechanically acting elements.

B. Tasks for self-control:

1. By purpose all orthodontic appliances are divided into?
 - a) therapeutic, retentive, preventive, therapeutic and preventive
 - b) retentive
 - c) preventive
 - d) therapeutic and preventive
 - e) appliances of combined action
2. By mechanism of action all orthodontic appliances are divided into?
 - a) appliances of mechanical action, functionally directing appliances, the appliances of combined action, functionally acting appliances
 - b) functionally directing devices
 - c) the appliances of combined action
 - d) functionally acting appliances
 - e) functionally directing and functionally acting appliances
3. Functionally acting and functionally directing elements are?
 - a) don't have their own source of power, don't have active elements
 - b) have their own source of power
 - c) have active elements
 - d) don't have active elements
 - e) don't have their own source of power
4. The models of the jaws are classified as follows?
 - a) control models, diagnostic models, working models, additional,

training models, museum models

- b) control models, working models, educational models
- c) working models, educational models, control and diagnostic models
- d) working model, museum model, diagnostic model
- e) diagnostic models, control models, additional models

5. In orthodontic practice are used next types of impressions?

- a) anatomical, duplicate, functional, compression
- b) double (duplicate)
- c) functional
- d) compressive
- e) anatomical

6. Diagnostic models of the jaws are used for the following purposes?

- a) for carrying out of biometric studies
- b) for determining the constructive occlusion
- c) for making wax reproductions of orthodontic appliance
- d) for appliance correction
- e) for demonstration

7. Control models of the jaws are used for?

- a) monitor the dynamics of treatment
- b) for the fabrication of orthodontic appliances
- c) for correction of the orthodontic appliances
- d) for the fabrication and correction of orthodontic appliances
- e) for determining the constructive occlusion

8. The additional models of the jaws are used for?

- a) for determining the constructive occlusion
- b) for the fabrication of orthodontic appliances
- c) for correction of the orthodontic appliances
- d) for the fabrication and correction of orthodontic appliances
- e) monitor the dynamics of treatment

9. Central occlusion is characterized by?

- a) closing of dental arches with maximum number of teeth-antagonists contacts
- b) closing of dental arches in the maximum number of contact teeth-antagonists, and extension of the lower jaw forward
- c) moving the lower jaw to the right or to the left
- d) closing of dentition with maximum number of teeth-antagonists contacts, moving the lower jaw to the right or left and moving of lower jaw forward
- e) moving of the mandible forward

10. Definition of "occlusion"?

- a) closing of dental arches or separate groups of teeth-antagonists
- b) all movements of the lower jaw towards the upper, with the assistance of the masticatory muscles
- c) moving of the lower jaw to the right or to the left
- d) closing of dental arches with maximum number of teeth-antagonists contact, moving of the lower jaw to the right or left and forward
- e) moving of the mandible forward

11. Definition of "articulation"?

- a) all kinds of position and movement of the lower jaw relative to the upper carried by the chewing muscles
- b) closing of dental arches or separate groups of teeth-antagonists
- c) moving of the lower jaw to the right or to the left
- d) closing of dental arches with maximum number of teeth-antagonists contact, moving of the lower jaw to the right or left and forward
- e) moving of the mandible forward

12. What type of impressions is usually used in orthodontics?

- a) anatomical
- b) functional
- c) compressive
- d) double
- e) decompressive

13. Impressions in orthodontics usually are taken with such impressive materials?

- a) alginate
- b) gypsum
- c) thiolic
- d) silicone
- e) epoxy

14. Standard vestibular plate of Shonher made according to?

- a) dimensions and anatomic features of the oral cavity
- b) malocclusion
- c) the presence of certain bad habits
- d) disorders of the oral cavity function
- e) age period of development of occlusion

15. Fixation by Napadov refer to the following form?

- a) denta-alveolar
- b) cap

- c) clasp
- d) crown
- e) rings

16. For fixation of appliances for upper jaw are used next clasps line?

- a) diagonal
- b) vertical
- c) transversal
- d) sagittal
- e) vertical and transversal

17. Factors that contribute to orthodontic movement of the tooth after the use of force?

- a) method of movement, anatomical conditions, biological and social conditions, individual conditions, the timing of the move
- b) anatomical, biological, and social conditions
- c) special terms and conditions
- d) the timing and the way of movement
- e) method of movement, anatomical terms

18. Bodily tooth movement includes?

- a) extrusion, intrusion, parallel movement
- b) intrusion
- c) parallel movement
- d) rotation
- e) extrusion

19. There are next types of teeth movement under the action of orthodontic forces?

- a) tipping and rotational movement of the tooth, rotation of the tooth, bodily movement of the tooth
- b) rotation of the tooth
- c) bodily movement of the tooth
- d) rotation and bodily movement of the tooth
- e) tipping and rotational movement of the tooth

20. How many degrees of severity of the tissue changes under the influence of orthodontic appliances Kalvelis D. A. distinguished?

- a) 4
- b) 2
- c) 3
- d) 1
- e) 5

21. What movement refers to the vertical movements of the teeth?
- a) extrusion and intrusion
 - b) intrusion and rotation
 - c) rotation and tipping
 - d) extrusion and tipping
 - e) extrusion and rotation
22. According to the classification by Khoroshilkina F.Y. and Malygin J.M. orthodontic appliances according to the principle of action divided into?
- a) mechanical, functionally acting, functionally directing, combined action
 - b) functionally directing, combined action
 - c) interjaws and combined action
 - d) one jaw and two jaws action
 - e) mechanical, functionally acting
23. A device for determining the location of the bracket on the tooth is called?
- a) positioner
 - b) simmetrography
 - c) caliper
 - d) anthropometr
 - e) rhinopneumonitis
24. Choosing a method of treatment with fixed appliances should be considered?
- a) patient's age, stage of root development of permanent teeth, periodontal status, the hygiene of the oral cavity
 - b) stage of roots formation of permanent teeth
 - c) condition of parodontium tissues
 - d) hygiene of the oral cavity
 - e) age of the patient
25. Korkhaus appliances by mechanism of action is?
- a) mechanical acting appliance
 - b) functionally acting appliance
 - c) appliance of combined action
 - d) functionally directing appliance
 - e) preventive
26. Stationary arc of Angle by mechanism of action is?
- a) mechanical acting appliance
 - b) functionally acting appliance
 - c) appliance the combined action

- d) functionally directing appliances
- e) preventive

27. According to the purpose the stationary arc of Angle is an appliance for?

- a) therapeutic
- b) prevention
- c) retention
- d) therapeutic and prevention
- e) functionally directing appliance

28. The expansive arc of Angle by mechanism of action is?

- a) mechanical acting appliance
- b) functionally acting appliance
- c) appliance of combined action
- d) functionally directing appliance
- e) retentive

29. According to the purpose the expansive arc of Angle is an appliance for?

- a) therapeutic
- b) preventive
- c) therapeutic and preventive
- d) retention
- e) combined action

30. According to the classification of Khoroshilkina F.Y. and Malygin J.M. orthodontic appliances according to location is divided into?

- a) extraoral and intraoral
- b) functionally directing, combined action
- c) interjaws action and combined action
- d) mechanical, functionally acting
- e) vestibular, oral, vestibulooral

31. According to the classification of Khoroshilkina F.Y. and Malygin J.M. orthodontic appliances according to construction divided into?

- a) arc, cap, plate, beam, frame, elastic
- b) functionally directing, combined action
- c) interjaws action and combined action
- d) arc, kappa, plate, beams
- e) mechanical, functionally acting

32. According to the classification by Khoroshilkina F.Y. and Malygin J.M. orthodontic appliances according to the method of fixation are divided into?

- a) fixed, removable and combined
- b) functionally directing, combined action

- c) fixed and removable
- d) removable and combined
- e) mechanical, functionally acting

33. According to the classification by Khoroshilkina F.Y. and Malygin J. M. extraoral orthodontic appliances are divided into?

- a) head, neck, jaw, combined
- b) neck and jaw
- c) head and jaw
- d) head and neck
- e) jaw, head, and combined

34. Schwartz divided the forces that applied during orthodontic treatment?

- a) small, medium, large, extra large
- b) intermittent
- c) constant and intermittent
- d) low, high, narrow, wide
- e) optimal and sub-optimal

35. What periods of orthodontic treatment is divided into?

- a) period of active orthodontic treatment, support and retention period
- b) period of active orthodontic treatment and retention period
- c) period of active orthodontic treatment, support period, additional and retention
- d) active and reactive
- e) active, reactive and retention

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