MINISTRY OF HIGHER EDUCATION, SCIENCE AND INNOVATIONS OF THE REPUBLIC OF UZBEKISTAN

TASHKENT STATE MEDICAL UNIVERSITY

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"BUGEL PROTESIS: MODERN APPROACHES AND CLINICAL PRACTICE"

For 4th-year students of the Faculty of Dentistry of medical universities

TEXTBOOK

Tashkent-2025

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This textbook was developed for the purpose of solving promising tasks of orthopedic dentistry, training personnel with such qualities as high universal and professional culture, creative and social activity, the ability to independently achieve goals in clinical practice and research activities, and stimulating their professional activity. Training preparation includes the entire complex of theoretical knowledge and practical skills and selects the educational process that ensures effective mastery of modern methods of splint prosthetics. In this textbook on orthopedic dentistry, all aspects of splint prosthetics are covered separately: from traditional approaches to innovative technologies.

The textbook plays an important role in improving the quality and effectiveness of classes on obtaining partial prosthetics, in the formation of clinical and practical skills of students, as well as in the development of modern dental culture and the introduction of advanced technologies in medical and preventive institutions of the regions.

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Preface

This textbook was developed for the purpose of solving promising tasks of orthopedic dentistry, training personnel with such qualities as high universal and professional culture, creative and social activity, the ability to independently achieve goals in clinical practice and research activities, and stimulating their professional activity. Preparation for classes includes the entire complex of theoretical knowledge and practical skills and selects the educational process that ensures effective mastery of modern methods of splint prosthetics. In this textbook on orthopedic dentistry, all aspects of splint prosthetics are covered separately: from traditional approaches to innovative technologies.

The textbook plays an important role in improving the quality and effectiveness of classes on obtaining partial prosthetics, in the formation of clinical and practical skills of students, as well as in the development of modern dental culture and the introduction of advanced technologies in medical and preventive institutions of the regions.

On the basis of the modular program, special attention is paid to the application of modern medical and pedagogical technologies in the educational process in teaching splint prosthetics, the study of biomechanical regularities of the activity of the dentoalveolar system in partial tooth loss. This takes into account the individual anatomical and physiological characteristics of patients, age-related changes, gender differences, the etiology and pathogenesis of partial adentia, topographical features of dental row defects, congenital anomalies and deformities of the maxillofacial region, the influence of modern materials and digital technologies on the quality of orthopedic treatment.

We hope that this manual will serve to improve the educational process for training dentist-orthopedists and will provide direct practical assistance to teachers of orthopedic dentistry departments and students of dental faculties of medical universities in mastering modern approaches to splint prosthetics.

I. CHAPTER. MODERN DEVELOPMENT AND CLINICAL SIGNIFICANCE OF BÜGEL PROTESES

§1.1. History and stages of development of Bugel prosthetics

Bugel prosthetics is an ancient method with a history of more than two thousand years. However, the history of modern crucible prosthetics began in the 19th century in Germany. This effective and painless treatment method allowed for the restoration of the dental arch. The first attempts at dental prosthetics date back to the 6th century BC [1,33]. At that time, the Egyptians used wire devices on healthy teeth. Since then, prosthetic technologies have been developing, and modern prostheses allow for the closure of the dental cavity. In this case, removable or non-removable dentures similar to their own teeth are installed[2,35].

Dental prosthetics was formed in ancient times. This process coincided with the formation of such ancient civilizations as Egypt, Assyria, and Babylon. In Ancient Egypt, in the 4th and 5th centuries BC, the casting of gold and silver on wax molds, the creation of a gold sheet by the method of drawing, and the printing of gold using a stamp and counter-stamp became widespread [5,34].

The ancient Greek historian and Egyptologist Herodotus wrote in his works that in the 6th century BC, there were medical specialists in Greece who treated various organs, including teeth. Objective evidence of this has not been found. It is known that the manufacture of dental prostheses was precisely carried out by the Etruscans living in the Apennine Peninsula. These prostheses are kept in the territory of present-day Italy[3,67,68]. There are findings proving that dental prostheses were made that replaced several teeth and were connected with gold wire. Teeth are taken from human teeth. The hammered straps were stretched with gold wire and fastened the natural teeth. These could be bridge-like, partially removable, and even fully removable prostheses. Such dentures are held in the jaws by the natural roots of the teeth, which are installed in depressions lined with epithelium[4,69].

The Arab civilization also contributed to the development of prosthetics. The prostheses used at that time were mainly made to improve appearance. They used materials taken from animal organs: they made base teeth from ivory and artificial

teeth from hippopotamus teeth. Many used removable dentures, including complete dentures. Arabs did not use human teeth due to their religious beliefs[6,36,70].
In the Roman Empire, dental prosthetics was also widespread. Gold, ivory, or ox bone, wood, and human teeth were used to make prostheses [7,80].

Dental prosthetics were known even before the Common Era. This is confirmed by artifacts discovered during the excavations of ancient monuments, mausoleums, and burial mounds. For example, in 1807, when the pyramid of the Egyptian pharaoh Hephres, who lived 4500 years ago, was opened, a prosthesis lying next to his mummy was found. According to Italian tourist Balzoni, it was made of wood. In the Roman Empire, dental prosthetics was widely used. Gold, ivory, or ox bone, wood, and human teeth served as the material for prosthetics. The manufacture of prostheses was carried out by artisans: jewelers, blacksmiths, metal carvers, barbers, bathhouse workers, and massage therapists [7,37,81].

The Renaissance, which began in the 15th century, is famous for the outstanding services in the field of practical dental treatment of Ambrouaz Paré (1510-1590), a major surgeon of the 16th century who lived in Paris. He replaced lost teeth (like his predecessors) with artificial teeth made of bull or ivory, reinforcing them with gold wire. However, he was the first to cut out several teeth in a block from a single bone fragment. The use of a clasp for securing the prosthesis is associated with the name Muton. Many medical scientists have dealt with the issue of prosthetics. This leads us to the question of what a buygel prosthesis is [8,90].

Such structures have a significant advantage - the arc holds all its parts more reliably, i.e., more stable than similar straight-line structures. Every person can see proof of this in their daily life. For example, when a cardboard, foil, or other material strip is placed on its edge, it immediately turns over, and if it bends into an arc, it remains very stable on any surface. The same is true with Bugel prostheses: when they are installed, the stability of the dental arch increases [9,86].

A Bugel prosthesis allows you to use not only the support of the gums, but also your own teeth, even if they are moving. In addition, in the treatment of periodontitis, it is precisely Bugel prostheses that are recommended, since one of its

symptoms may be tooth mobility. Thanks to the mutual support of adjacent teeth, the buygel prosthesis distributes the chewing load as needed, i.e., like healthy teeth[10,38,87].

The appearance of a crucible prosthesis is more compact, it is very convenient and serves for a long time. In orthopedic dentistry, the advantages of splint prostheses are clearly visible. However, like any structure, a splint prosthesis also has its drawbacks. For example, the main disadvantage of Bugle prosthetics was previously considered to be insufficient elasticity [11,39,89].

This is understandable: when a person smiles or opens their mouth, you can see some metal brackets on their teeth. Today, in the era of new materials and technologies, highly aesthetic versions of cruciate dentures have appeared. True, they also have a drawback - the price is high [12,40,92].

The reason for this is clear - high-precision casting, special materials, and the high cost of technologies for securing modern crucible prostheses. We consider this a high aesthetic assessment against the backdrop of the highest effectiveness of treatment [13,41].

Another disadvantage of a Bugel prosthesis is that it belongs to the category of "removable prosthesis." Therefore, like any other prosthesis, it needs to be periodically removed and reinstalled, as well as implement additional hygienic measures, albeit not complicated. However, unlike plate prostheses, crucible constructions do not require forced removal at night, which significantly simplifies their use. There are very few similarities between plate prostheses and Bugel prostheses [14,42].

For example, if the base of plate prostheses is made of large plastic, then crucible prostheses have only attachments in the form of artificial teeth, which are attached to a thin metal structure[15,44].

Bugel structures are very durable in the oral cavity, therefore in this respect they are much better and more convenient than plastic prostheses. They last longer and do not cause significant interference in the oral cavity. But all this is possible

only if there are several stable teeth in the mouth, with the help of which it is possible to secure a denture with a splint[16,83].

The choice of a Bugel prosthesis depends on many factors, and, as mentioned, the price can be a decisive factor. Thus, plate prostheses are considered the simplest and most inexpensive, followed by classic clasp dentures, then high-tech attachment (locked) clasp dentures. The doctor may recommend another type of prosthesis or even a temporary prosthesis, after which a permanent prosthesis is usually installed[17,45,88].

Modern crucible prostheses are high-tech designs that perform two functions simultaneously (tooth splinting and prosthetics), with many advantages and few disadvantages[18].

When a denture is in the mouth, the chewing load is partially distributed to the remaining teeth, and partially to the gums in the area where the teeth are absent. With the help of a Bugel prosthesis, it becomes possible to evenly redistribute the chewing load[19].

When indications for their use are available, patients are usually satisfied with their use, since they have therapeutic and prophylactic properties: restoring the structure of the dental arch and preventing further tooth loss[20,92].

Currently, one of the most pressing problems of orthopedic dentistry is the prosthetics of dental arch defects using Bugel prostheses. Correct assessment of the clinical situation is the basis for the correct choice of the optimal design of the future cruciate prosthesis. The functional, technological, and structural features of the Bugel prosthesis require high precision in the manufacture of the framework with supporting elements. This accuracy is ensured by applying special methods of manufacturing a working model on a parallelometer for studying and marking the relief of the prosthetic field on working models [21,46].

§1.2. Anatomical and physiological foundations of Bugel prostheses

Bugel prostheses are based on the principle of transmitting two types of loads when restoring chewing function: through the periodontium (through supporting elements)

and through the mucous membrane (through the denture base) [1, 32,95]. This combined load transfer system is one of the main advantages of splint prostheses. Studies of chewing force distribution show that Bugel prostheses provide 2-3 times higher chewing efficiency compared to plate prostheses [16, 62]. This indicator mainly depends on the hardness of the metal frame and the direct load transfer through the support teeth.

Consideration of the anatomical features of the oral cavity is one of the main conditions for the success of cruciate replacement [43, 47]. The anatomical structure of the hard palate in the upper jaw and the sublingual region in the lower jaw determines the design of the prosthetic frame. Depending on the degree of mobility and sensitivity of the mucous membrane, the boundaries of the prosthesis and the location of the framework elements are determined [39,47].

Currently, crucible prostheses are classified according to several criteria:

By fastening system:

• Clamp system - a traditional and widely used method

• Attashment system - with high accuracy and aesthetic indicators

• Telescopic crown system - provides maximum stability.

• Magnetic system - a modern and promising direction [5]

In terms of frame design:

• Trigeminal frame - the most common for the upper jaw

• Ring frame - used for wide defects

• Transverse palatine line - used for anterior defect

• Sublingual arch - the main option for the mandible [20, 34]

By functional purpose:

• Simple Bugel prostheses - tooth replacements

• Shining splint prostheses - in the treatment of periodontitis

• Combined prostheses - for complex defects [28, 87]

Modern classifications also distinguish Bugel prostheses based on the defect class, the condition of the abutment teeth, and the patient's age [9, 30].

§1.3. Advantages of Bugle Prostheses, Clinical Indications and Contraindications

The Bügel prosthesis (from the German Bügel - arch, bracket) is a type of removable partial prosthesis, in the structure of which there is a metal arch (framework) that unites all parts of the prosthesis as a single unit[22,50].

Bugel prosthetics is a high-tech method of restoring partial defects of the dental arch, based on the principles of biomechanics and modern materials science. This type of prosthetics occupies an intermediate position between removable plate and non-removable bridge prostheses and combines the advantages of both types of construction [23,51].

By the 21st century, due to the rapid development of dentistry worldwide, Bugel prostheses have become increasingly important in the treatment of partial adentia [1, 3]. Despite the development of dental implantology, Bugel prosthetics still remains one of the most important and widely used methods of treatment[23,52].

Bugel prostheses (German Bügel - belt, arch) are movable partial prostheses built on a metal frame and having an arched structure that unites all elements into a single structure [6, 27]. According to the literature, the need for treatment with splint prostheses occurs in 45-50% of patients with partial adentia, and is also used for splinting in 60-65% of patients with periodontitis [23, 42].

In cases where the use of classic plate prostheses is difficult due to changes in the hard tissues of the jaw and the level of the periodontium, cruciate replacement is the most optimal solution [83]. This type of prosthesis has high functional properties and significantly improves the patient's quality of life [32, 66].

The prevalence of partial adentia and various complex clinical situations increase the relevance of Bugel prosthetics. According to statistics, 40-45% of the population aged 35-45 have lost one or more teeth, while 70-75% of people aged 45-60 have the need for burr prosthetics [3, 4]. These indicators increase with age, and partial adentia is observed in 85-90% of the population over 60 years old [25,53].

Absolute indicators:

• Class I, II, III defects of the Kennedy classification

• Presence of 4-6 stable support teeth

• Necessity of tooth splinting in periodontitis

• Possibility of concealing clasps in the aesthetic zone [33, 56, 78, 102]

Relative indicators:

• Large dental row defects

• Recent defects in cases where implantation is impossible

• Low clinical crowns of canine teeth

• Excessive tooth wear [26]

Contraindications:

• Less than 4 stable support teeth

• Acute inflammatory processes

• Severe general diseases in the decompensation stage

• Mental illnesses [8, 25, 31, 68, 85]

• Today, there are a number of pressing problems in the field of splint prosthetics:

• Aesthetic problems: The appearance of traditional clasps, especially in the aesthetic zone, does not satisfy patients. To solve this problem, modern attachment systems and non-metallic materials are being developed [61].

• Technological complexity: The process of manufacturing Bugel prostheses requires high technical skills and specialized equipment. The implementation of CAD/CAM technologies contributes to solving this problem [26].

• High price: The cost of modern crucible prostheses is 3-4 times higher than that of plate prostheses. However, this investment is justified by long service life and high functionality [27,54].

Modern approaches are aimed at improving all stages of splint prosthetics: from diagnostics to observation and care. Digital technologies, new materials, and minimally invasive methods determine the future of splint prosthetics[28].

CHAPTER 2. BIOMECHANICS OF BÜGEL'S PROTESES

§2.1. Biomechanics of chewing in partial adentia

The successful application of Bugel prostheses is based on a deep understanding of the biomechanical properties of the chewing process. As a result of tooth loss, significant changes occur in the chewing system, which is the main factor in choosing a prosthesis design [15, 28, 41].

Distribution of chewing force

In a healthy dental row, chewing power is distributed as follows:

• Cutting teeth: 100-200 N

• Appetite teeth: 250-350 N

• Small precious teeth: 300-450 N

• Large precious teeth: 400-600 N

As a result of tooth loss, the functional load on the remaining teeth increases by 1.5-2 times, which creates excessive stress on periodontal tissues [22, 45, 89].

1. Transmission through the periodontium (40-60%):

• By means of clasps and attachments

• Vertical load along the tooth axis

• Due to the elasticity of periodontal fibers

• Depends on dental health

Transmission through the mucous membrane (40-60%):

• By means of the prosthesis base part

• Distribution into horizontal and vertical components

• Depends on the shape and density of the alveolar process

• Depends on the degree of mucosal mobility

Biomechanical consequences of tooth loss

The consequences of tooth loss are always the same: the absence of a load on the porous part of the hard tissue of the jaw (mechanical stimulation) leads to a gradual cessation of the activity of the blood vessels that nourish the jaw tissue, as a result of which bone atrophy begins to form in the area where the tooth is absent.

Stages of the atrophy process:

1. Initial stage (0-3 months): destruction of spongy bone and Sharpeev fibers

2. Middle stage (3-12 months): Vertical contraction of the alveolar process

3. Chronic stage (1+ years): continuation of horizontal and vertical atrophy

Factors affecting chewing efficiency

Prosthesis design:

• Frame hardness - metal frame is 3-4 times higher than plastic

• Fixation type - lock fixation is 20-30% more effective than clasp fixation.

• Number of supporting teeth - each additional supporting tooth increases the efficiency by 15-20%

Patient factors:

• Age - chewing power decreases by 10-15% every 10 years.

• Gender - 15-20% higher in men than in women

• General health status - reduces endocrine diseases by 25-30%

The correct placement of the elements of a Bugel prosthesis requires a deep understanding of the anatomical structure of the oral cavity. Each anatomical structure directly influences the design and function of the prosthetic framework [18, 51, 73].

§2.2. Mucosal mobility and its classification

The mobility of the mucous membrane is an important factor in the success of a splint prosthesis. Correct assessment is crucial in determining the limits of the prosthesis and ensuring its long-term serviceability [33, 58, 81].

Classification of partial defects of the dental arch

Kennedy Classification (1925):

Class I - bilateral terminal defects

Class II - unilateral terminal defect

Class III - unilateral intermediate defect

Class IV - anterior median defect

Applegate Rules (1960):

1. Classification is determined after tooth extraction

2. If there are additional defects, a subclass is added.

3. The third molar is not taken into account in the classification.

4. If there is no opposite tooth, the tooth is not counted.

5. The last defect determines the class

6. Additional defects are designated as subclasses.

7. The size of the subclass does not affect the classification

8. Only symmetrical defects are classified as Class I[28].

Classification by mobility level

Grade I (0.5-1 mm) - dense, less mobile:

• In young patients (20-40 years old)

• Good bone support

• Optimal prosthetic base

• Max retention capability

• Necessity of minimal correction

II degree (1-3 mm) - moderately mobile:

• In a middle-aged patient (40-60 years old)

• Bugel is optimal for prosthetics

• The most common variant (60-65%)

• A standard approach is applied

• Prognosis is positive

III degree (3-5 mm) - relaxed, highly mobile:

• In elderly patients (60+ years)

• Additional fixation required

• Restriction of prosthesis boundaries

• Requires custom frame design

• Careful approach required

IV degree (more than 5 mm) - pathologically mobile:

• Illness status

• Surgical preparation required

• Prosthetics is too complicated

• Review of alternative treatment methods

• Suspicious forecast

Methods for assessing mobility

Palpation method:

• Pressing with thumb and index finger

• Feeling the degree of mucosal displacement

• Identification of pain zones

• Distinguish between stationary and mobile zones

Instrumental estimation:

• Periodontal probe

• Use a pressure gauge (piezometer)

• Digital assessment capability

• Obtain accurate measurement results

Functional tests:

• Observation during mouthwashing

• Changes during chewing

• Actions while speaking

• Effect of facial expressions

Factors affecting mobility

Age factor:

• 20-30 years old: mainly I-II degree

• 40-50 years old: II-III degree

• 60+ years: Level III-IV

• Progressive change with age

Disease factors:

• Periodontitis - increases mobility

• Diabetes - deteriorates tissue quality

• Osteoporosis - weakens bone support

• Inflammatory processes - swelling and pain

Functional factors:

• Exposure to previous prostheses

• Traumatic factors

• Bad habits (brookism)

• Functional overload

§2.3. Periodont as a Supporting Apparatus

Periodontal tissues are the main support of splint prostheses, and their condition is a decisive factor determining the success of the prosthesis [25, 47, 79].

Anatomy and physiology of the periodontium

Composition of periodontal tissues:

• Tooth root cementum: Periodontal fiber attachment site

• Periodontal ligament: System of elastic fibers, load absorber

• Alveolar bone: The main supporting structure

• Tooth gingiva: Protective and trophic function

Characteristics of the periodontal space:

• Width: 0.15-0.38 mm (standard)

• Shape: Clock glass shape

• Function: Load distribution and absorber role

• Regeneration: High recovery capacity

Criteria for evaluating periodontal canvas

Clinical evaluation:

1. Mobility of the tooth (Miller classification):

o Level 0: Inactive (normal)

o Grade I: 0.2-1 mm (optimal for Bugel prosthesis)

o Grade II: 1-2 mm (cautious approach)

o Grade III: more than 2 mm (relative contraindication)

2. State of the gums:

o Color: Pink (healthy) or red (disease)

o Consistency: Dense or loose

o Bleeding: Absent or present

o Sediments: Soft or hard

3. Periodontal pockets:

o Depth: 1-3 mm (normal), 4+ mm (pathology)

o Bleeding: During probing

o Exudate: Serous or purulent

o Mobiles: Same or different around the tooth

Radiological assessment

Panoramic X-ray readings:

• Bone tissue density: Sclerotic or osteoporotic

• Dilation of the periodontal cavity: localization and severity

• Root length: Clinical crown/root ratio (optimal 1:2)

• Fractional zone: Injury in multi-rooted teeth

Benefits of intraoral X-ray:

• High accuracy: Detection of small changes

• Apex condition: Root tip and surrounding tissues

• Resorption: Changes in root surface

• Endodont condition: Condition of ducts and fillings

Bugel prosthetics for periodontal diseases

Principles of splinting:

1. Combining moving teeth: Combining several teeth into one block

2. Load distribution: Distributing power to the maximum number of teeth

3. Horizontal stabilization: Control of lateral forces

4. Vertical support: Proper distribution of functional load

The condition of the periodontium is the main factor in performing burette prosthetics, and correct assessment and preparation are the guarantee of long-term service of the prosthesis.

Bugel prostheses are maximally similar to natural teeth in color, size, and shape. Unlike partially removable plate prostheses, crucibles disrupt sensation, taste, temperature sensitivity, and speech clarity less. In addition, they have high chewing efficiency. This type of prosthetics is recommended in the absence of three adjacent teeth and posterior molars [2,56]. When examining the patient, it is necessary to pay attention to local changes in the oral cavity and general condition, as they are crucial in choosing one or another design of the burr prosthesis.

When examining the oral cavity, attention is paid to the strength, placement, severity, and shape of the remaining natural teeth. All this plays an important role in determining the design of a crucible prosthesis. All teeth must be thoroughly filled, the fillings should be polished, and there should be no retention points. If the crowns of natural teeth are not clearly expressed, low, or equatorial, it is necessary to prepare a crown for all antagonist teeth and raise the bite. The strength of the support teeth is of particular importance. In cases of periodontitis of I and II degrees, the design of the Bugel prosthesis should be specific - all natural teeth are inserted into the prosthesis, which perform a supporting and supporting function. In such cases, in addition to replacing missing teeth, the denture connects the remaining teeth into a single functional block and repairs them. When one or more supporting teeth, especially the lower jaw teeth, move, it is sometimes advisable to make veneers on moving and strong teeth and solder them together. The crowns should not penetrate the pathological dentoalveolar pocket, but should reach the tooth's neck; a clearly defined equatorial crown and an open neck are indicated. When examining patients with central occlusion, attention is paid to teeth lacking antagonists (the extent to which they alter occlusal curvatures). If the bite is deep or decreasing, it is advisable to lift it with a continuous clasp located on the anterior upper teeth. To assess the condition of the periapical tissues, radiography is performed on all supporting teeth with fillings. Teeth with chronic periodontitis, limiting the defect of the dental arch, are not used as a supporting tooth. In such cases, it is advisable to install the occlusal plate on healthy teeth.

To determine the indications for Bugel prosthetics, not only the characteristics of dental row defects, the size of crowns, and the condition of natural teeth are of particular importance, but also the general condition of the body, as it can have a certain influence on the functioning of supporting tissues. For example, in diabetes mellitus, the resistance of the capillaries of the mucous membrane of the prosthetic area decreases. In such cases, the prosthesis design must provide a load on the mucous membrane, observing strict rules for using the prosthesis.

Bugel prostheses are used when there are partial defects in the dental arch and when there are enough natural teeth to ensure a rational distribution of chewing pressure between the teeth and the mucous membrane of the prosthetic bed. The presence of 1-4 teeth, and sometimes even 5 teeth (especially front teeth), does not allow for a rational distribution of chewing pressure, therefore, in such cases, cruciate dentures are not recommended.

If there are 6-8 or more teeth left in the jaw, there are conditions for a rational distribution of chewing pressure. However, the location of natural teeth in the jaws, the number and size of defects bordering them, are also important in determining the prosthesis design. For this reason, various classifications of dental row defects have been proposed, indicating the procedure for performing buffalo prosthetics.

To simplify the design of a Bugel prosthesis, we developed a simple practical classification of partial defects of the dental arch. It is based on the number of teeth that limit major defects located in both halves of the jaw. The teeth that limit defects are considered supporting teeth and therefore schematically determine the general characteristics of the prosthesis. The final design of the prosthesis can be chosen after an objective examination of the supporting tissues and determination of the general condition of the body. The classification of dental row defects according to V. I. Kulazhenko is shown in Figure 1.

Grade I. A dental arch defect limited to a single tooth - a continuously shortened dental arch without distal support (according to Kennedy - Class II).

Grade II. Two defects bounded by two teeth - a shortened dental arch with bilateral defects without distal support (according to Kennedy - Class I).

Grade III. Two defects bordering three teeth - bilateral defects bordering three teeth, one defect without distal support (according to Kennedy - Class II, Subclass I).

Grade IV. Two defects limited by four teeth - bilateral defects with distal support (according to Kennedy - Class III, Subclass I).

If, in addition to the main defects, there are additional defects, these cases constitute a subclass of the main class. The absence of front teeth in the presence of lateral teeth also belongs to class II, but with a distal support, therefore, the structure of the prosthesis in this case is also different.

All proposed classifications describe only the topography of dental rows. As for soft tissues, alveolar processes, and the hard palate, chewing pressure is transmitted to them through the prosthetic base.

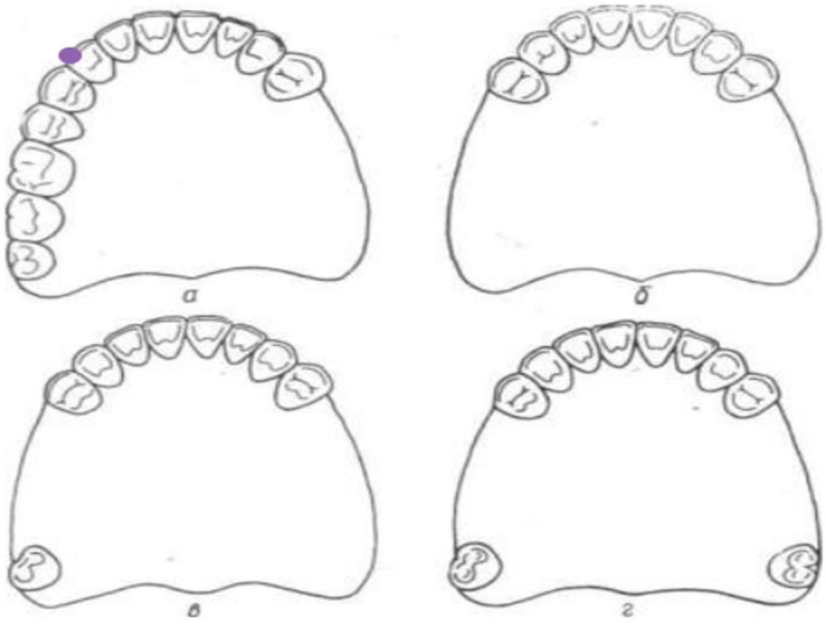

Figure 1. Classification of dental row defects according to V. I. Kulazhenko: a - Class I; b - Class II; c - Class III; d - Class IV.

With the help of anatomical and functional tests, we can characterize the state of the mucous membrane and underlying tissues. First of all, we should be interested in the condition of the peripheral vessels, which are regularly compressed by the base of the prosthesis during chewing. Their condition, resistance, and permeability are influenced by local and general factors. Local factors include inflammatory processes that reduce capillary resistance and lead to mucosal bleeding, especially

when the denture base is compressed. Common diseases include diseases that reduce capillary resistance (gastrointestinal diseases, capillary toxicosis, hypovitaminosis, chronic blood diseases, diabetes mellitus, etc.). Therefore, in addition to anamnesis data, it is necessary to take into account objective functional tests.

Before determining the size of the prosthesis base, it is advisable to determine the strength of the capillaries. In cases of decreased capillary resistance (chronic, incurable diseases), a base with a small area can lead to a number of complications (hemorrhage, inflammation of the mucous membrane, and even the appearance of ulcers). In such cases, in addition to expanding the base, it is necessary to limit the time of daily use of the prosthesis. Therefore, in addition to statistical data, it is necessary to take into account objective functional tests. To determine the size of the prosthesis base, it is advisable to determine the resistance of the capillaries before prosthetics. In cases of decreased capillary resistance (in chronic, incurable diseases), a small-area base can lead to a number of complications (hemorrhage, inflammation, and even ulceration of the mucous membrane).

Capillary resistance is determined using a vacuum apparatus designed for the treatment of periodontitis. A sterile glass tube with a diameter of 7 mm is placed on the mucous membrane of the toothless alveolar process (a vacuum up to 20 mm Hg is created in the system) and observed for two minutes. If no hemorrhages appear in the mucous membrane during this time, the functional state of the peripheral vessels is considered normal. If petechiae appear before two minutes, this is considered a decrease in capillary resistance. In such cases, expanded bases are introduced into the structure of the cruciate prosthesis. Using the method of determining capillary resistance, it is also possible to characterize the functional state of periodontal tissues of the abutment teeth. We found a decrease in the resistance of gingival capillaries in the area of their roots long before tooth movement. The method for determining the resistance of gingival capillaries in the root zone is similar, but the time for the formation of hemorrhages in the mucous membrane is normally 40-60 seconds. If, as a result of inflammatory processes, the resistance of the capillaries of the mucous membrane of the prosthetic area decreases, it can be increased by conducting 3-5

sessions of vacuum therapy (every four days). In this case, a complex of general strengthening therapy is also prescribed. The design of the prosthesis directly depends on the objective assessment of the degree of elasticity of the soft tissues of the prosthesis area and the durability of the capillaries of the mucous membrane. The degree of elasticity of the soft tissues of the alveolar process is important for the correct design of splint prostheses. Determination of the flexibility of the soft tissues of the prosthesis bed. The elasticity of the oral mucosa has been studied for more than 40 years. Scientists worked in two directions in their research. Morphological studies on cadaveric material to determine the structure of the oral mucosa in different parts of the prosthetic field were conducted by Lund (1924), Gross (1931), E. I. Gavrishov (1963), V. S. Zolotko (1965). Other scientists - Spreng (1949), M. A. Solomonov (1957, 1960), Korber (1957), Hekneby (1961) - studied the elasticity of the oral mucosa using functional methods using instruments they developed. The operating principle of these devices is based on recording the degree of penetration of a small ball or washer into the mucous membrane under the influence of an uncontrolled force. In our opinion, the main solutions of the instrument design do not fully correspond to the conditions in which the mucous membrane under the prosthesis is located. The indicated apparatus determines its susceptibility only to compression, while under the prosthesis, the supporting tissues are subjected to compression (during chewing) and tension (during removal or balancing of the prosthesis). When the prosthesis is removed and balanced, the mucous membrane shifts in the direction opposite to the chewing pressure. Heckneby (1961) studied the softness of the oral mucosa using functional methods using the instruments they developed, the principle of operation of which is based on recording the degree of penetration of a ball or small washer into the mucous membrane under the influence of uncontrolled force. From our point of view, the principal design solutions of the instruments do not correspond to the conditions of the location of the mucous membrane under the prosthesis. The indicated apparatus determines its susceptibility only to compression, while under the prosthesis, the supporting tissues are subjected

to compression (during chewing) and tension (during removal or balancing of the prosthesis).

Orthopedic treatment is the final stage of oral sanitation. Orthopedic treatment can be initiated only after therapeutic and surgical rehabilitation, and sometimes even orthodontic intervention. This violation of the generally accepted rule can lead to serious errors, especially in the case of splint prosthetics.

The peculiarity of Bugel prostheses lies in the complexity of their manufacturing technology, requiring the efforts of both a doctor and a technician. In cases of incomplete repair and forced tooth extraction, a previously made crucible prosthesis is usually unsuitable for restoration and must be completely reassembled. Considering the combined method of transmitting chewing pressure through the tissues of the teeth and alveolar processes of Bugel prostheses, as well as the complexity of the prosthesis structure, preparation for such orthopedic treatment should begin during oral sanitation.

Therapists and dental surgeons should take into account the specifics of orthopedic treatment, since prostheses put additional strain on the abutment teeth, alveolar processes, and the entire maxillofacial region. During rehabilitation, thorough cleaning of tooth deposits on the vestibular and oral surfaces of the tooth is necessary, as the continuous clasp is often located on these surfaces.

Clamps should adhere tightly to the teeth, not to dental plaque. When a patient applies to the therapeutic department for oral cavity sanitation (if there are defects in the dental arch), it is necessary to consult with an orthopedist. The orthopedist can give a number of recommendations aimed at creating optimal conditions for orthopedic treatment. For example, instead of cement fillings on teeth that limit defects, it is advisable to manufacture metal gaskets leaving space for the occlusal plate. Complications can also be observed when teeth with granulating periodontitis are loaded with a prosthesis. Therefore, the treatment of canine teeth should be carried out carefully and under the supervision of radiographs.

In addition to teeth, special attention should be paid to the treatment of mucosal diseases and periodontitis. According to our data, the timing of treatment of

stomatitis and periodontitis is accelerated by vacuum and electrovacuum therapy. Treatment of patients with periodontitis and dental defects should be comprehensive and include orthopedic methods (Bugel prosthetic tires). In such cases, orthopedic methods are the method of choice, as they immobilize the remaining teeth, combine them into a single chewing block, and reduce the load. The gingival border remains free, which allows for continued therapeutic treatment, in which case the treatment will be more effective.

As for chronic diseases of the oral mucosa (leukoplakia, leukkeratosis, flat iron, etc.), their treatment is often ineffective. Therefore, along with treatment, prosthetics should also be performed, but in this case, it is necessary to try to cover the mucous membrane with the prosthetic base as little as possible. During surgical rehabilitation, all teeth and roots that cannot be treated conservatively and are unsuitable for prosthetics must be removed. Also, teeth with IV and often III degrees of mobility should be removed, especially in patients with rheumatism, polyarthritis, diabetes mellitus, and other diseases, if there are deep bone pockets. After tooth extraction, the alveolar process should be smooth, oval-shaped, without bone tubercles and eroded edges. When removing several adjacent teeth or roots, it is necessary to smooth the bony prominences and, after carefully trimming the edges of the gums, apply sutures. This reduces the healing time and allows for faster initiation of prosthetics. Early functional loading of the alveolar process reduces or prevents its atrophy.

If, when preparing the oral cavity for prosthetics, indications for tooth replacement appear, the following should be taken into account. The cementum of replanted teeth often heals with the dental alveolus, the periodontium turns into a scar, as a result of which its amortizing properties are lost. The tooth becomes immobile. All this was observed after 700 dental replacements that we performed. If a supporting clasp of a Bugel prosthesis is placed on such a tooth, the tooth and jaw part will be in a state of constant functional strain, which leads to complications. Therefore, it is not advisable to replant teeth that should later serve as a support. The

same applies to teeth with root apex resections, but to a lesser extent. Such teeth, as a rule, cannot withstand additional chewing load.

CHAPTER 3. EXAMINATION OF PATIENTS WITH PARTIAL DEFECTS OF DENTAL ROWS. PROTECTION INSTRUCTIONS

3.1. The difference between a Bugel prosthesis and a simple removable prosthesis

Metal Base (Bugel) Unlike conventional removable prostheses, a Bugel prosthesis has a strong metal frame that acts as an arch connecting all elements of the structure. This arc provides:

Strength and stability of the prosthesis.

• Minimal thickness of the construction, which makes it more comfortable for the patient.

Table 1

The difference between a Bugel prosthesis and a simple removable prosthesis

Measure	Bugel prosthesis	Simple removable prosthesis
Metal base	The structure has a strong metal frame (arc) connecting the elements.	There is no metal frame, the base is made of acrylic or nylon.
Strength and stability	Thanks to the metal frame, it has high strength and stability.	It has lower stability and can change shape during long-term use.
Construction thickness	Due to its minimal thickness, it is convenient for the patient.	Due to its thicker structure, it sometimes causes discomfort.
Load distribution	The load is distributed to the supporting teeth and mucous membrane, preventing atrophy.	The main load falls on the mucous membrane and alveolar process.
Preservation of gingival tissue	Maintaining the height of the alveolar ridge prevents excessive pressure on the gums.	It can lead to atrophy of the alveolar ridge and pressure on the gums.
Fasten	Fastening is carried out using clamps or lock fasteners (attachments).	Adhesion to the gums and fixation through vacuum exposure.
Chewing stability	Has high stability and does not shift during chewing and talking.	Especially when chewing hard food, it can shift.
Beauty	It is aesthetically better, especially when using lock fasteners.	It has a slightly aesthetic appearance, but its voluminous structure is noticeable.
Convenience	Provides a high level of comfort due to precise fastening and minimal thickness.	Low comfort, friction, and discomfort may occur when worn for a long time.
Price	Due to the complex design and materials, the price is higher.	The price is cheaper.

1. Load distribution

Simple removable dentures transfer the chewing load mainly to the mucous membrane and alveolar process, which can lead to their atrophy. In Bugel prostheses, the load is distributed both to the mucous membrane and to the supporting teeth, resulting in:

• The height of the alveolar ridge is preserved.

• Avoids excessive pressure on the gums.

2. Fastening

Bugel prostheses are installed on the supporting teeth using clasps or lock fasteners (attachments), which ensure:

Stability of the prosthesis.

• Do not shift during chewing and speaking.

• High level of comfort for the patient.

Advantages of splint prostheses over plate prostheses:

• Allows the use of not only gums, but also teeth as support.

• Compactness

• Strength

• Short learning period

• High aesthetics (when using locks)

• Best fixation and stabilization

Disadvantages of splint prostheses compared to plate prostheses:

• Insufficient aesthetics (when using clasps in the front section)

• Excessive load on the support teeth (especially when using locks)

• Presence of metal (in the manufacture of casting crucibles)

• Planning difficulty

• Complexity of preparation

• High price.

With the help of Bugel prosthetics, it is possible to quickly restore the chewing function of the jaw and make a smile attractive. Partial loss of teeth, as well as the impossibility of installing an implant or bridge, are indications for splint prosthetics.

Bugel prosthesis To understand how to use a Bugel prosthesis and its appearance, you need to look at the finished sample.

3.2. Main elements of the Bugel prosthesis

With the help of Bugel prosthetics, it is possible to quickly restore the chewing function of the jaw and make a smile attractive. Partial loss of teeth, as well as the impossibility of installing an implant or bridge, are indications for splint prosthetics. Bugel prosthesis To understand how to use a Bugel prosthesis and its appearance, you need to look at the finished sample.

According to the technology of manufacturing the framework of the Bugel prosthesis, arched support prostheses can be divided into:

1. Individual elements bent from wire using standard arcs and then welded.
2. Individual elements cast from metal and then welded.
3. Monolithic cast prostheses.
4. Casting from the model or casting according to melted models.
5. Casting on a refractory model.
6. Casting through plastic composition.

Types of Bugel prostheses:

• ordinary crucible;

• complex crucible;

• busbar;

• MK lock sleeve;

• dental prostheses with a solid cast buckle made of gold-platinum alloys. All types of cruciate dentures have the following structural elements:

• metal arc;

• supporting elements;

• artificial toothed base.

Components of a buckle prosthesis

Large connectors (arcs)

Function: connects the right and left parts of the prosthesis into a single whole.

Key elements:

1. Frame

2. Artificial-toothed saddle part

3. Supporting elements

Figure 2. Bugel prosthesis

Maxillary:

1. Palatine plate - in Class I and II defects

2. Transverse palatine line - in Class III and IV defects

3. Horseshoe arch - in Class IV defects

4. Ring arc - with multiple defects

For lower jaw:

1. Tongue arc - the main type of phrase

2. Lingual plate - when the frenulum of the tongue contracts

3. Labial arch - the frenulum of the tongue is attached superiorly.

Saddle-shaped elements are the main parts of the prosthesis, on the surface of which an artificial toothed plastic base is held and replenishes the lost tissue of the alveolar process. Retention elements are clasps, attachments connecting the bars, and other devices that hold the prosthesis in the supporting teeth and prevent its movement. Connecting elements are flat metal rods of curved profile, tightly connecting the two saddles of the prosthesis or the saddle and retention elements on

opposite sides of the dental arch. The arc should not touch the mucous membrane of the palate or the alveolar part along its entire length.

The main elements of dental prostheses are:

• Supporting clamps.

• Arc.

• Base with artificial teeth.

According to the technology of manufacturing the framework of the Bugel prosthesis, arched support prostheses can be divided into:

• Individual elements bent from wire using standard arcs and then soldered.

• Individual elements cast from metal, then soldered.

• Whole castings.

• Casting from the model or pouring according to melted models.

• Casting in a refractory model.

Casting through a plastic composition.

Supporting clamps

Clamps are the most common method of fixing splint prostheses. They are obtained from wire (stainless steel, metal alloys based on gold) by casting or bending. The shape of the clamp varies from the function it performs (support, holding, etc.) to its retention on the tooth. The correct placement of clasps on the crown of the tooth is based on the rational use of their shape. The line passing through the most convex part of the tooth crown is called the equator. The horizontal equatorial line divides the crown of the tooth into two parts: occlusal and retention (gingival), which are located below the equatorial line. The supporting elements of the clasps are located in the occlusal part, while the retaining elements are located in the retention part [57,58].

Arc- there are three main types of metal arches for the upper jaw, depending on the defect of the dental arch:

• horseshoe,

• in the form of a ring and transverse palatine band.

Taking into account the elastic properties of the mucous membrane of the prosthesis bed, to prevent the formation of bedsores, the arch is raised above it by approximately 0.5-1.0 mm.

The thickness of the arch on the upper jaw should be approximately 1-1.5 mm, and the width - 5-8-10 mm.

The narrower the arc, the thicker it should be, the wider the arc, the thinner it should be.

The Donders' space is the air cavity formed between the back of the tongue and the highest point of the palate.

horseshoe arch

If the palate is flat, the alveolar processes are poorly expressed, and there are terminal defects of the teeth, the arch appears as a thin and wide plate. Such a shape of the arc contributes to better distribution of chewing load Fig.4

Figure 3. horseshoe arch

Instructions for using a horseshoe arc:

• Increased vomiting reflex.

• Replacement of teeth in marginal defects.

• Inability to replace front teeth with bridge prostheses.

• Tooth splinting when teeth are pathologically mobile.

There are two forms of metal arc in the front parts:

☐ collar and

☐ you turn on.

In the collar shape, the base of the structure, like the collar, touches the edge of the gums of the incisors and canals and can lead to damage to the border periodontium.

This shape of the arch is contraindicated in the presence of low clinical crowns of the front teeth and is recommended in cases of deep occlusion.

In the collarless form, the prosthetic base does not contact natural teeth.

The annular arch is a rather rigid construction. It consists of two thin strips that touch the posterior and anterior parts of the palate.

Instructions:

• Absence of long teeth.

• The presence of anatomical barriers for the use of a separate arch.

The use of this type of arch is possible only in the absence of atrophic changes in the alveolar processes and by introducing a multi-joint clasp into the structure for better stabilization of the prosthesis.

Supporting elements - supporting legs, occlusal plates and other devices preventing the movement of the prosthesis in the direction of the gingiva:

• Clammer;

• Lock fasteners. Clamp-fixed crucible prosthesis. Such prostheses are attached to the teeth using cast clasps. They provide more precise fastening and more accurately distribute the load on the teeth (with proper placement), i.e., reduce the loosening of the support teeth. The main disadvantage is an unpleasant aesthetic appearance, especially if they are located in the front. A crucible prosthesis secured in lock fasteners or telescopic plates. Such prostheses not only ensure good aesthetics and functionality of the dental arch, but, most importantly, when used correctly, they can extend the lifespan of even weakened teeth with serious damage to the supporting apparatus. They are successfully used in the treatment of periodontitis, small and large defects of the dental arch in periodontitis, and give a reliable long-term result.

• Clamps are made of plastic and metal.

By shape, clampers are subdivided into:

• round;

• in the form of a semicircle;

• ribbon;

By method of preparation:

• bent

• casting.

By function: supporting, located above or below the tooth's equator, and supporting, where the supporting part is located below or above the equator, and the supporting part is located on the occlusal surface of the tooth. Ribbon clasps are rarely used because they do not spring well, corrode tooth enamel, and cause cavities (except when teeth are covered with metal crowns). Round single-arm support clamps are widely used. In a single-shoulder clasp, the following parts are distinguished: the shoulder surrounding the tooth from the cheek side; the appendix to be grafted onto the prosthesis base; the body - the middle or spring-like part connecting the clasp shoulder to the appendix. The larger the spring-like part of the clamp, the more elastic it is and the less harmful it is to the supporting tooth.

Continuous oral clasp. Used in the design of support prostheses, it performs two functions:

1) strengthens the prosthesis, therefore the thickness and width of the base of the splint can be smaller;

2) since the joints of the continuous oral clasp are located on the cusps of the front teeth, the clasp strengthens the support of the prosthesis and helps to transfer chewing pressure to a certain extent to all the teeth on which it rests. The continuous oral clasp does not have the properties of immobilization and splinting.

Support clamp. It is designed to secure the prosthesis and transfer the chewing pressure on the prosthesis body to natural teeth. Most often, the supporting clasp consists of a vestibular and oral shoulder, an occlusal pad, and an anchor section.

The direction of the clamp passing between the two clasps of the removable prosthesis depends on the location of the defects in the dentition. Clamps are placed diametrically, diagonally, or unilaterally relative to the tooth arch.

Clammer classification

Depending on the materials used, they are:

• metal (these include chromium-nickel, gold-platinum, and chromium-cobalt alloys);

• plastic;

• a mixture of metal and plastic.

By method of manufacture, clasps are subdivided into:

• stamped clasps;

• bent-cast clamps.

By functions performed:

• holding clasps;

• supporting clamps.

By shape, clasps are as follows:

• ribbon;

• round;

• semicircle.

By location:

• dentoalveolar clasps;

• tooth clasps;

• gingival clasps.

Depending on the degree of tooth engagement:

• single-armed;

• transitional;

• pair;

• two-shouldered;

• t-shaped;

• annular;

• multi-syllable.

According to the connection with the base of the prosthesis, the clasps are:

• stable or hard;

• semi-motile or flexible;

• mobile or articulated.

McCracken's classification of clasps:

I. Supporting clasps:

1. Circular (Aker) - for premolars and molars

2. T-shaped - for canines and premolars

3. Annular - in subgingival coronary defects

4. Double-shouldered (Aker type) - for molars

II. Supporting clasps:

1. Rod (Rouch) - for front teeth

2. Combined - a combination of cast and curved elements (figure 5).

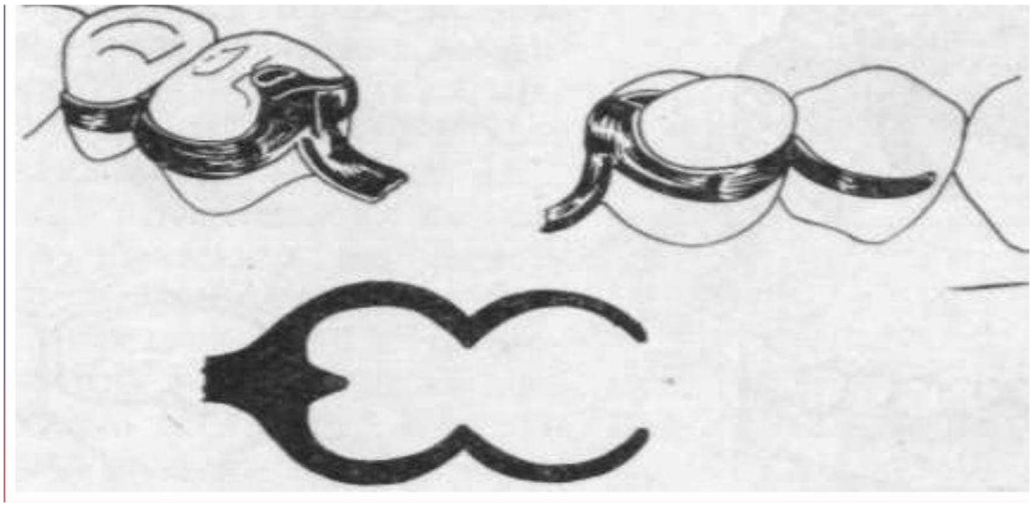

Figure 4. Clammers

Clammer system by Ney:

• Type I - circular one-shouldered

• Type II - combined

• Type III - Double Aker

• Type IV - reverse (reverse)

• Type V - annular

In 1949, the Ney system was created in the USA by a number of dentists, mathematicians, engineers, and metallurgists. This system includes 5 types of clasps.

Type 1 clasp consists of two shoulders and an occlusal covering. It is used when the border line is typically positioned, and the supporting and supporting parts of the tooth crown are represented almost identically. This allows placing the support part of the clasp without interfering with the closure of the teeth. The supporting part of the clamp, together with the occlusal covering, forms a support, preventing the denture from penetrating the mucous membrane of the alveolar process. The spring-loaded ends of the clamp enter the inner part, ensuring fixation. In this case, the length of the spring-loaded part of the clamp depends on the magnitude of the penetration: the less penetration, the longer this part of the clamp, and vice versa.

A type 1 clasp is not used in an abnormal position of the tooth, for example, with mesial inclination, when the boundary line on the inclined side approaches the occlusal surface of the tooth, and when it is impossible to place the clasp without disrupting the closure of the supporting part (Fig. 5).

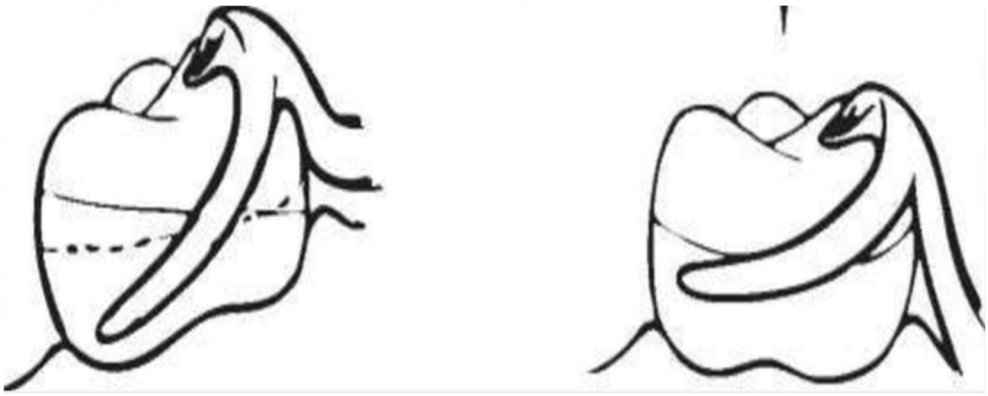

Figure 5. Position of the Akker Ney 1 clasp depending on the crown inclination of the tooth

Type 2 clasps (Rouch clasps) consist of two T-shaped shoulders connected by an occlusal covering and a prosthesis frame. The spring-loading properties of the shoulder change depending on the size of the protrusion attached to the denture framework (often its arch) of the clampmer shoulder. It is often called bifurcated. In this clasp, the occlusal coating acts as a support, and the spring-loaded arms provide good fixation and stabilization. Since the hard part of the spring shoulders is usually small, this type of clasp does not provide good transverse stability (stabilization) of the prosthesis. The Rouch clasp consists of spring-like T-shaped projections that

emerge from the prosthesis framework and are located inside the prosthesis. It belongs to the type of holding clasps.

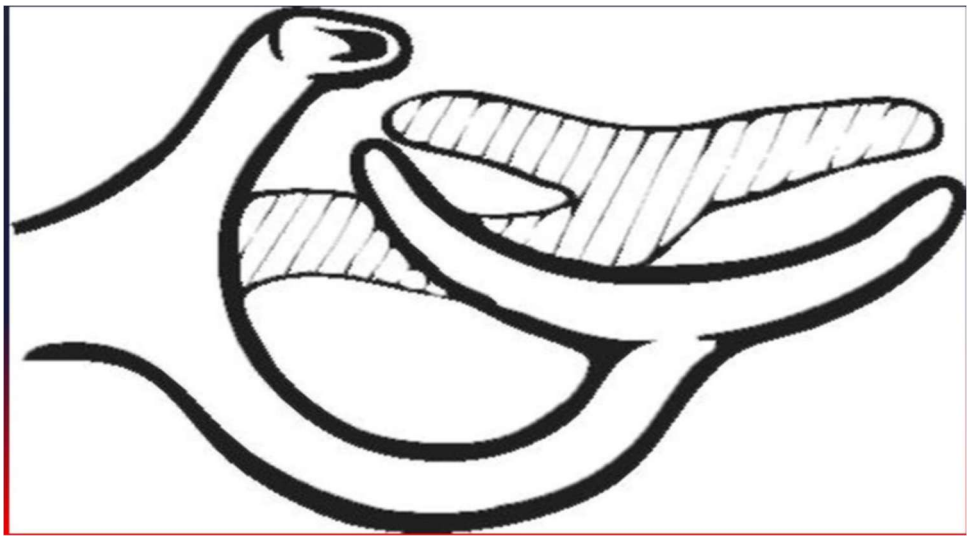

Figure 6. Type 2 Clammer (Rouch Clammers)

A type 2 clasp is used when the boundary line is abnormal, for example, when the tooth is tilted mesially. In this case, the boundary line passes high near the defect, and descends when moving away from it.

The Type 3 clasp (Akker and Rouchklammers) is often referred to as Type 1-2 clasp because one of its shoulders is derived from the Type 1 clasp, and the other from the Type 2 clasp.

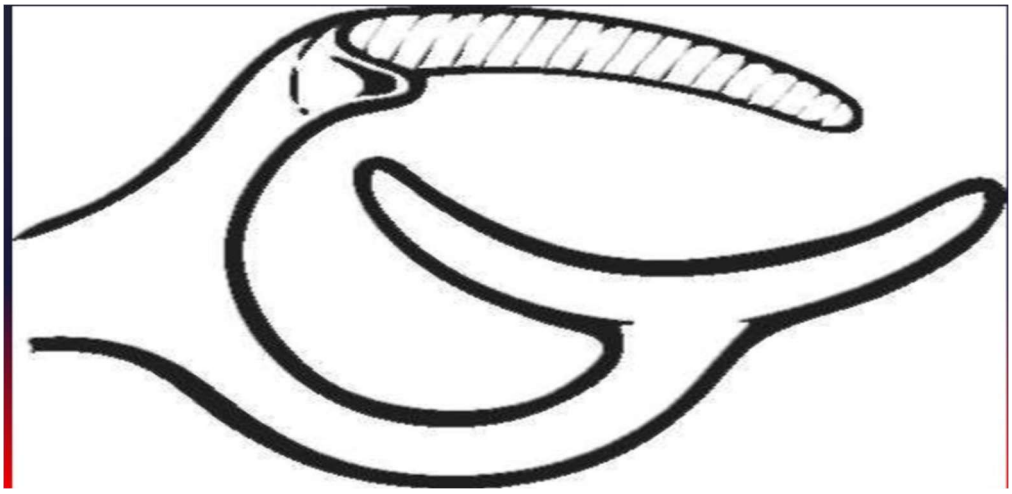

Figure 7. Type 3 clamp (Akker and Rouchclammers)

This clasp is used in rare cases, particularly when the border line on one surface of the tooth is normal, and on the other surface it is abnormal, i.e., it is high

near the defect and descends towards the posterior tooth. Such a position of the border line is observed with mesial deviation or rotation of the tooth.

The 4th type of clasp is called a single-arm reverse action clasp. It is used when the supporting teeth are tilted towards the tongue (palate) or cheek, when the border line takes an unnatural position. When the tongue is bent, the border line on the tongue surface of the tooth rises upwards and there is no space left for the hard part of the clasp. On the edge, on the contrary, the boundary line descends, and a large supporting surface appears, convenient for placing the supporting part of the clasp. Then the clasp passes around the distal contact surface of the tooth, where its occlusal part enters the fissure.

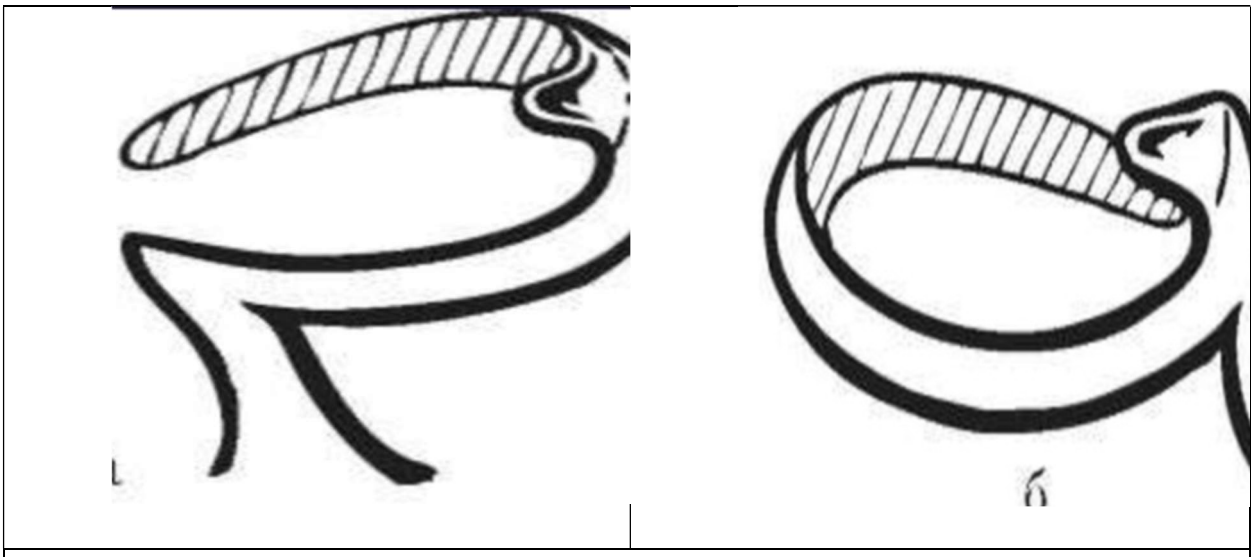

Figure 8. Type 4 clasp: a) reverse action clasp; b - reverse action clasp

The clamp extends towards the tongue, its spring-loaded part enters under the border line, its tip is located in the cervical region of the tooth, and provides fixation. There are two types of this clasp: one is called a reverse action clasp, and the other is called a reverse action clasp. If the clasp process articulates with the framework from the lingual side, it is called a reverse action clasp (Figure). If the clamp tumor is located on the vestibular surface, it is called a reverse-acting clamp (figure). Since the spring-loaded part of this clamp creates a one-sided retention to ensure good fixation, it is necessary to install the same clamp on the opposite side as well. Reverse-acting single-arm clasps are used for prosthetics of terminal defects of the dental arch.

The 5th type of clasp is called a single-shoulder ring clasp. Its body lies on the supporting surface of the tooth and surrounds it with a ring. It has two occlusal coatings simultaneously. To increase the stiffness of the clamp, a second parallel arm is formed on it. The fastening end of the clamp is located on the side of the slope, where it forms a holding point.

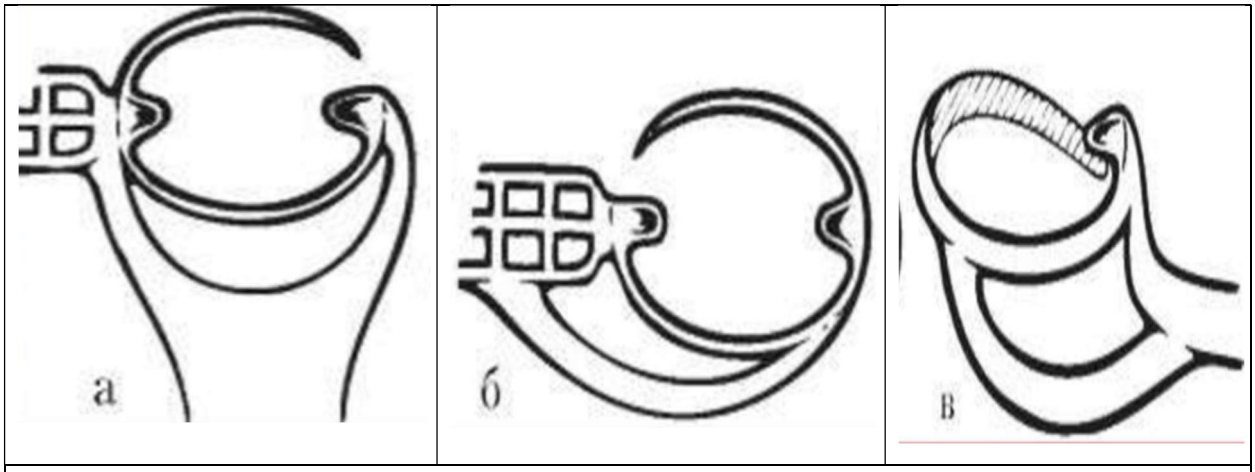

Figure 8. 5-type clasps. a - with two pads for the upper jaw; b - with two pads for the lower jaw; c - with one pad

Since the clamp's fixing effect is weak, a similar clamp is placed on the opposite side to enhance retention..

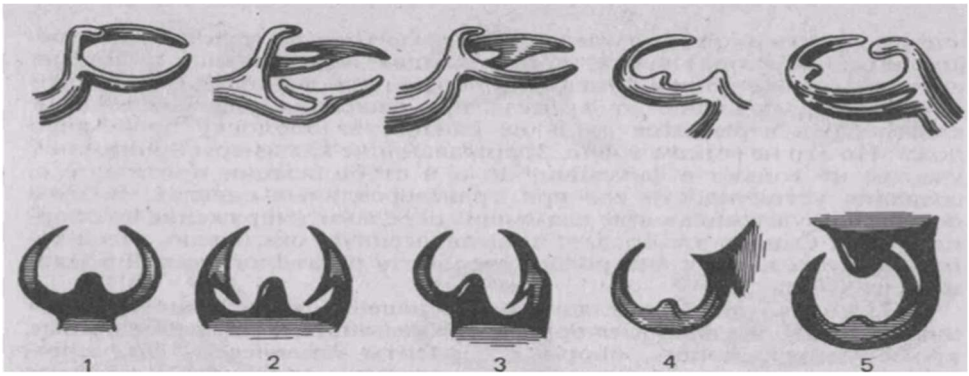

Figure 9. Clamps of the Ney system (upper row - side view, lower row - top view). 1 - rigid support-retaining, 2 - broken, 3 - combined, 4 - reverse-acting single-arm, 5 - circular.

A ring clasp is used for single standing teeth, most often when molars are tilted. In this case, the border line on the tilted side rises upwards and, conversely, descends on the opposite side.

The Bonwill clasp is often called six-armed because it has two occlusal rests, which are located in the adjacent fissures of molars or premolars, and each tooth has two arms on both sides. The clasp arms are positioned according to standard rules. The clasp is used for fixing and stabilizing the prosthesis in unilateral terminal defects of the dental arch, while the teeth on the opposite side are preserved. Appropriate occlusal indicators are also necessary for its application.

A continuous or multi-joint clasp consists of a chain of joints located on the supporting surface of the teeth, most often on the lingual or palatal side. This structure belongs to extended support clamps. The clasp starts from the denture frame, goes around the tooth, and rejoins with the frame on the opposite side, forming a closed system. Sometimes the clasp can serve as a load-bearing base (usually when 1-2 anterior lower teeth are missing, a fastener for acrylic facets is placed on it). Figure10.

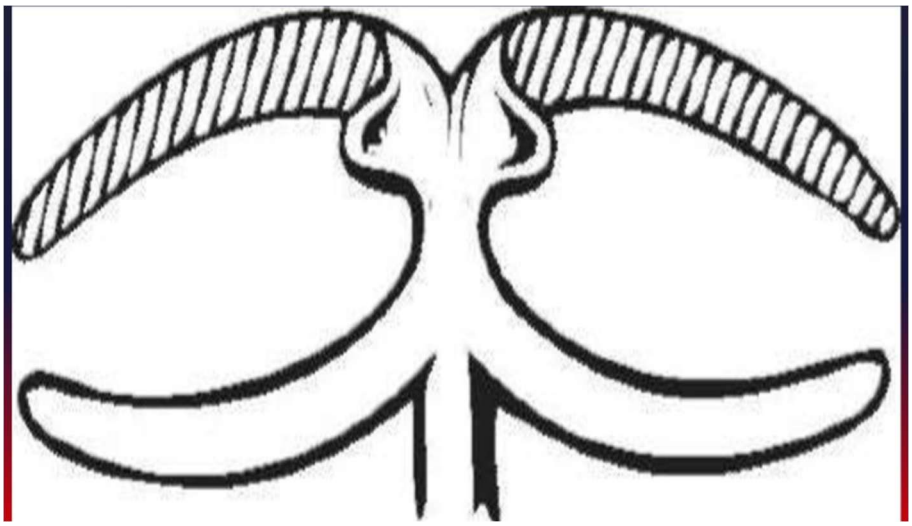

Figure 10. Bonville clasp

This design was proposed by Kennedy, hence it is often called the Kennedy Belt. The continuous clasp is used as a support element for distributing horizontal stresses arising from the lateral displacement of the prosthesis, as a means of protecting against splinting and the overturning of the last seat.

An extended clasp is a clasp with a shoulder located on two or three teeth, where the first two joints serve as a support, and only the third serves as a fastener (figure 13).

Figure 11. Stretched clasp

Jackson's throwable clasp is a supporting clasp in the form of a loop thrown over the vestibular surface of the tooth through the interdental spaces, located below the equator. The supporting elements in this clasp are the parts of the clasp located between the teeth, while the fixing parts are located on the vestibular surface. Thus, the fixing function is more pronounced in this clasp. Jackson clasps can be cast and wire. The latter is in the form of a continuous ring and can also rupture along the vestibular surface, which allows it to be activated.

The Reichelmann clasp belongs to the category of supporting clasps, but its peculiarity is that the occlusal covering is in the form of a transverse beam passing through the masticatory surface in the vestibulo-oral direction. Klammer's shoulders resemble the shoulders of a hanging wire. Like the Bonville clasp, it is used for unilateral terminal defects. The instructions for its use are limited due to the need for special tooth preparation, since it is necessary to create a cavity on the chewing surface of the tooth for transverse veneer.

Telescopic clasp. In its simplest form, this system consists of telescopic crowns - internal and external. The former has a cylindrical shape, covering the supporting tooth, while the outer one is connected to the prosthesis framework and has a distinct anatomical shape and normal occlusal relationships with its antagonists. In this way, a mechanical connection is formed, allowing the prosthesis to move only in one direction (see figure12).

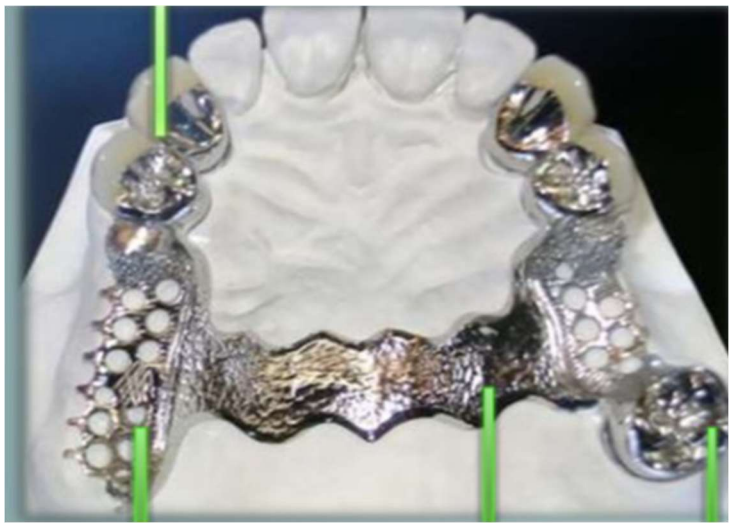

Figure 12. Telescopic clasp.

Telescopic crowns belong to the category of supporting clasps and are used for fastening arched and small saddle prostheses. Their design is diverse: fully metal stamped, cast crowns, ring-shaped outer crown. The exterior coating can also be mixed (for aesthetic reasons) (Figure 13).

Figure 13. Telescopic crowns

Preparation of teeth for telescopic coatings requires removal of a significant layer of hard tissues of the tooth, therefore, it is necessary to obtain an X-ray image of the tooth cavity before preparation. This requirement must be met when prosthetizing young patients. Telescopic crowns are most often applied to the lateral teeth and less often to the anterior teeth.

Dentoalveolar clasp. Invited by Kemeni. It consists of protrusions of the prosthetic base, which adhere to the teeth below the equator. Due to its high elasticity, the clasps slide across the equator and stop inside, ensuring fixation.

Prostheses fastened with clamps - Such prostheses are fastened with special hooks of various shapes and are made separately for each supporting tooth. The use of clamps ensures the firm attachment of the prosthesis to the enamel without damaging it. The disadvantage of this type of cruciate denture is that the clasps are visible during a smile.

Selection of supporting teeth for clamp fixation Several general requirements are imposed on supporting teeth. Firstly, they must be stable. If the teeth are pathologically mobile, it is necessary to connect them with adjacent teeth to form a stable system. Teeth with chronic inflammatory foci around the root apex can only be used as supports after successful canal filling. If the canal is not fully filled, it is dangerous to insert such a tooth into the clasp system.

Secondly, the tooth must have a distinct anatomical shape. Teeth with a low or conical crown, an open neck, and a sharply distorted ratio between the length of the clinical crown and the root are unsuitable for clasp fixation. However, these shortcomings are a relative contraindication. After special training, such teeth can be included among the supports of the clasp system.

Thirdly, it is necessary to take into account the relationship of the abutment tooth with the antagonist. This relationship can be so dense that even a small occlusive coating applied to a crack on the chewing surface increases occlusion. In such cases, it is necessary to choose a different tooth for placing the supporting element or to convert the occlusal coating into an occlusal insert, and to apply the coating to the supporting tooth. Coatings with protrusions on the neck can also be used. The listed conditions are not the only requirements for the correct placement of clasps. It is important to arrange the clamps in a certain order in accordance with the clamping lines.

The Clammer line refers to the hypothetical line passing through the support teeth. It is the axis on which the prosthesis can rotate. The Clammer line can be transverse, diagonal, or sagittal. Its selection is of great importance. The most unfavorable direction for this line should be considered the sagittal (one-sided) direction, as this can cause the denture to overturn and overload the supporting teeth.

Such placement of clasps is possible only if the remaining teeth are on one side. If the palate is deep and a well-defined alveolar ridge is preserved on the opposite side, then the fixation of the prostheses is somewhat easier.

The best method of securing a partially removable prosthesis is the bilateral arrangement of clasps. In this case, it is necessary to give preference to the diagonal direction of the clasp line on the upper jaw. On the lower jaw, the best fixation is provided when the clamp line is in a transverse direction. However, the direction of the clasp line does not always depend on the doctor's will, but is determined by the location of the defects and the condition of the periodontium of the remaining teeth.

In prosthetics with splint prostheses using supporting clasps, as a rule, the size of the prosthesis base is reduced. At the same time, the stability of the prosthesis also decreases. Multiple clasps are used to prevent its rotation or overturning and thereby reduce the harmful effects of the prosthesis on the supporting teeth. They are positioned so that the lines connecting the support teeth form closed geometric shapes. In this case, the support teeth should be located as far apart as possible, so that the shape can occupy the largest possible area.

When fastening a clamping system consisting of supporting elements, the load on the supporting teeth is greater than when using conventional sliding, i.e., supporting, clamps. Therefore, when prosthetizing with arcuate prostheses, it is advisable to build the fastening system more on supports. Such fastening of the prosthesis is called flat fastening, which differs from linear fastening when there are two supports or point fastening when the prosthesis is supported by only one clasp.

Creating a rational clamping system is a very complex task. This is hindered by a lack of teeth, their unfavorable placement, and sometimes by the unfavorable shape of the alveolar process or the poor condition of the mucous membrane covering it. The Clammer system can be considered satisfactory in the following cases:

1. ensures the same level of fastening on all support teeth,
2. excludes the overturning or rotation of the prosthesis,
3. does not increase the bite height in the occlusal coatings,

4. Minimal violation of aesthetic norms, as well as if the clasps

if it does not cause traumatic occlusion, one shoulder should secure the prosthesis, and the other should act against it, i.e., prevent its displacement to one side or the other (reciprocal effect). In plate prostheses, the prosthetic base has a reciprocal effect, which is adjacent to the tooth from the lingual side.

3.3. Basis for selecting clamp types and the patterns of their placement in the crown of the tooth

A Bugel prosthesis has three, four, or more clasps, which form a system of clasps. Each supporting clasp and its elements must be positioned according to a strict rule relative to the clinical equator of the tooth. Therefore, before determining the type of clasp and the placement of its parts in the tooth, it is necessary to find the largest parameter of each tooth. This line - the clinical equator - divides the tooth crown into occlusal and gingival (near the gums) parts.

Lock connections (Attachments)

An attachment is a locking connection consisting of two interconnected elements. The first part of the lock is located on the artificial tooth of the prosthesis, and the second on the patient's tooth.

The positive part - the patrices - is a round rod, a sphere, or a T-shaped protrusion located on the artificial crown of the supporting tooth. • Negative part - matrices - the inner cavity of which accurately reproduces the size and shape of the patch, located in the prosthesis from which the solid casting is made. The advantages of lock fasteners are as follows:

• Has high accuracy compared to clamps;

• The aesthetic quality of prostheses made using lock fasteners is higher, and the period of patient adaptation to such prostheses is shorter;

• Availability of standard interchangeable parts;

• The service life of prostheses made using lock fasteners is long (on average 7-10 years);

• It is possible to replace and reactivate matrices;

• Ensures strong fastening of the dental prosthesis;

• is considered aesthetically advantageous;

• Has high performance characteristics. It should be noted that high requirements are imposed on the quality of technical processes (modeling, casting of the prosthetic framework) in the manufacture of crucible prostheses with a lock fastener, which leads to a higher cost compared to clasps.

Figure 14. Bugel prostheses fastened with attachments

Unlike clasps, lock fasteners are more aesthetically pleasing, providing better fastening and comfort when removing and wearing the prosthesis. According to the method of attachment to natural teeth, attachments are divided into: intra-root, intra-crown, extracrown, intercrown, and other types.

CHAPTER 4. THE CONCEPT OF PARALLELOMETRY

In the removable prosthesis, in each case, the shoulders of the clasps should be located on the tooth surface in accordance with the vertical and horizontal equators. If there are more than two clasps, then the selection of stabilizing and retaining properties of the clasps is determined on the basis of a single clinical equator common to all surfaces of the teeth. This is referred to in specialized literature as the "prosthesis insertion pathway." A device called a parallelometer has been created to objectify a single, common clinical equator.

The plane of the instrument base and the horizontal part of the moving part of the column are parallel to each other. Therefore, any diagnostic rod installed vertically on it will be in a position perpendicular to the base of the parallelometer. The model mounting table has a movable base with a mounting device. This allows the model to be given the desired position relative to the diagnostic metal rod and other instruments. Consequently, a parallelometer is a device for determining an infinite number of points located parallel to each other and in the same plane on the horizontal surfaces of the teeth and the alveolar processes of the jaws in a certain fixed position of the model relative to the diagnostic rod (vertical). Five positions of the model in relation to the vertical diagnostic rod have practical significance [12, 19].

4.1. Parallelometry

1. Horizontal - zero slope: the axis of the diagnostic rod is perpendicular to the occlusal plane of the chewing teeth;

2. posterior - when the posterior part of the dental arch is lowered;

3. front - when the front part of the dental arch is lowered;

4. left - when the model is tilted to the left;

5. right - when the model is tilted to the right.

The influence of tooth inclination on the position of the equator on the crown and the change in the line of sight on each tooth at the inclination of the diagnostic model is shown by the oval-bodied diagram. By changing the position of the model

relative to the diagnostic rod, it is possible to change the position of the equator, the area of the occlusal and gingival surfaces. This is done in order to ensure the necessary retention depth for the support teeth, to ensure the optimal placement of the clasp shoulders in accordance with the chosen design from the point of view of fixation and aesthetics. The latter condition is determined taking into account the analysis of the crowns of the abutment teeth, the clinical condition of the periodontium, its radiological assessment, and the type of occlusion.

Replacing the diagnostic metal rod with graphite, the surfaces of the teeth are drawn in the position of the model found and installed on the table. As a result, a graphical representation of points lying in different planes on all surfaces of the teeth is obtained on the given axis of the prosthesis insertion - the line of sight. This is called parallelography. This line of sight represents the largest convexity zone of each tooth on the single axis of the prosthesis insertion. As can be seen in the diagram with the oval body, this line of greatest convexity may not coincide with the anatomical formation in the crown of the tooth - the anatomical equator (which is often the case).

Depending on the model's inclination, the line of sight is located differently on the abutment teeth, both on the defect side and on the vestibular and oral sides [2, 12].

There are 5 variants of the transition of the visual line on the tooth surface.

The first variant - from the side of the defect, the line of sight approaches the gingival part, and from the side of the medially located tooth - the occlusal part of the tooth. As a result, quadrants I and IV have a larger area than quadrants II and III.

The second variant - from the side of the defect, the line of vision approaches the occlusal side, and from the side of the medially located tooth - the gingival part of the tooth. As a result, the area of the 1st quadrant is minimized or practically absent.

The third option - the line of sight runs along a sharp diagonal, as a result of which the areas of the I and IV quadrants become minimal.

The fourth variant - the line of sight approaches the occlusal part along the entire length of the vestibular or oral surface of the tooth. This is observed when the tooth bends in the corresponding direction. Quadrants I and II are practically absent. The fifth variant - the line of sight approaches the gingival part along the entire length of the vestibular or oral surface of the tooth. This is observed when the tooth is bent in the opposite direction, respectively, or when the tooth crown has a conical shape. Quadrants III and IV are practically minimal or absent altogether. The listed variants of the transition of the visual line change depending on the position of the model, i.e., the chosen axis of the prosthesis insertion, only in the fifth variant, where the visual line, from both the vestibular and oral sides, passes close to the edge of the gums (in the conical shape of the crown). To improve retention conditions, it is necessary to prepare an artificial coating for the supporting tooth corresponding to the chosen type of clasp. In parallelometry, we determine the entry zones around the teeth and in the area of the alveolar processes, creating an insulation to prevent the formation of a "encirclement" for the unimpeded insertion of the base part of the prostheses. Therefore, parallelometry and parallelography should be used in the treatment of all dental prosthesis constructions with a large number of different fixation elements.

The entry and exit path of the prosthesis, as well as the boundary line common to all support teeth where the supporting clasp elements are located, is determined using a special instrument - a parallelometer [60].

A parallelometer is an instrument designed to determine the maximum protrusion of teeth on jaw models, the relative parallelism of the surfaces of two or more teeth or other parts of the jaw, such as the alveolar process.

The device has a flat base, to which a bracket column is attached at a right angle. The bracket moves in both vertical and horizontal directions. The bracket arm forms a 90° angle with the column. The bracket arm has a clamp for interchangeable tools. This device allows moving the tools vertically [61].

Figure 15. Parallelometer and its set of instruments.

The device has a flat base, to which a bracket column is attached at a right angle. The bracket moves in both vertical and horizontal directions. The bracket arm aligns with the stand at a 90° angle. The bracket arm has a clamping device for replaceable tools. This device allows moving instruments vertically. Methods of prosthesis insertion and removal. The prosthesis insertion pathway is the movement of the prosthesis's clasp elements from the initial contact with the support teeth to the tissues of the prosthesis bed, after which the occlusal plates are installed in their places, and the base is precisely located on the surface of the prosthesis bed. The method of prosthesis removal is a movement in the opposite direction, i.e., from the separation of the base from the mucous membrane of the prosthesis bed until the complete loss of contact between the supporting and supporting elements with the supporting teeth. There can be several ways to put on a prosthesis, but it is necessary to choose the most convenient one. The best way to insert and remove a prosthesis should be considered to be one in which the prosthesis is easily inserted and removed, encounters minimal obstacles that cannot be excluded, and at the same time ensures the same retention on each tooth. The insertion route depends on the placement of the clasps, and the latter, naturally, affects the aesthetics. Therefore, it

is necessary to find a solution where the clasps are less noticeable and the shape of the front teeth is preserved. Taking into account the requirements of aesthetics, sometimes it is necessary to sacrifice other requirements, for example, fixation. The following methods of prosthetics are possible:

• Vertical (but with good retention, because sticky food can move the denture when teeth separate);

• Vertical right (movement slightly to the right of the actual vertical)

• Vertical left

• Vertical back

• Vertical front

The choice of insertion route is not random, but depends on certain conditions. These include interference with the insertion and removal of teeth and the cavities of the alveolar process. It is necessary to choose a path with minimal interference, and the topography of the boundary line should be the most convenient for placing the clasps. During function, it is necessary to take into account the fixation of the prosthesis. The clasps on the front teeth should not be visible, and the hind teeth should have the appropriate shape and color. The guiding planes must be parallel. Fulfilling all these conditions is not always possible. Often, to give parallelism to the guiding planes, i.e., to the distal contact premolars, and to the medial surfaces of the molars in combined defects, the teeth are covered with crowns, giving them the appropriate shape.

Parallelometry problems:

• Distribution of chewing load;

• determination of the pathway for inserting the prosthetic framework;

• ensuring the fixation and stabilization of the prosthesis framework;

• Achieving aesthetic standards.

The main methods of parallelometry are:

A) Methods for determining the average inclination of the long axes of all support teeth: using angle measuring mechanisms;

Novak - according to Berezovsky.

B) Optional method:

C) Method of selecting the model with types of slopes:

• previous

• -rear (the rear edge of the model is located above the front edge)

• - right side (the left half of the model is located above the right half)

• left side. The usual position of the border line (when it passes through the middle of the crown in the area approximately adjacent to the defect along the cheek or tongue surface of the tooth and slightly approaches the gums in the neck area) is a type 1 clasp.

Atypical location of the border line (when passing up in the zone closest to the defect and lowering in a separate zone) - type 2 clasp. The border line does not have the same direction on different surfaces of the tooth (often this is observed in the premolar or in the rotation of the 3rd type clasp). In cases of atypical location of the borderline (premolars, inclination of canines to the cheek or tongue, as well as conical or low clinical crown) - type 4 clasp. The boundary line is raised on the inclined side and lowered on the opposite side (in bent single molars) - type 5 clasp.

Indications and contraindications for the use of a Bugle prosthesis. Any orthopedic construction has a number of indications and contraindications; to determine which construction is most suitable in the clinical situation, it is necessary to examine the patient and prescribe appropriate treatment.

The design of the Bugel prosthesis is determined as follows:

• number and location of remaining teeth,

• height of the clinical crowns,

• condition of the periodontium of the remaining teeth,

• biophysical properties of the mucous membrane of alveolar processes,

• severity of anatomical retention points,

• the shape of the toothless parts of the alveolar process. Instructions for the use of a Bugel prosthesis.

• Bilateral terminal defects of the dental arch.

• Unilateral terminal defects of the dental arch

. • Combined dental defects with the absence of more than 3 teeth in the lateral section.

• Defects of the dental arch in the absence of more than 4 teeth in the anterior part. • Combination of dental row defects with periodontal diseases.

• Multiple defects of the dental arch. • Strong support teeth. • Absence of chronic inflammatory foci in the roots of the abutment teeth. • In treated abutment teeth, the filling material should not extend beyond the root apex.

The mucous membrane in the areas where the bases of Bugel prostheses are located should not be subjected to pathological processes.

The mucous membrane, especially where the bases are located, should be minimally soft.

The shape of toothless alveolar processes should not interfere with the insertion and removal of the prosthesis. Contraindications for the use of a Bugel prosthesis. Contraindications are subdivided into relative and general: Relative contraindications for prosthetics with Bugel prostheses: • 3rd-4th degree mobility of teeth, large defects of the dental arch with insufficient number of supporting teeth,

• high degree of attachment of the frenulum of the tongue in the lower jaw, sharply expressed torus in the upper jaw,

• extensive atrophy of the alveolar processes,

• presence of a flat palate on the upper jaw,

• significantly inclined supporting teeth in different directions,

• presence of a deep bite without preliminary reconstruction of the myostatic reflex, especially a deep traumatic bite;

• low clinical crowns of the abutment teeth.

General contraindications for prosthetics with Bugel prostheses:

• unsanitized oral cavity,

• somatic status of the patient, mental illnesses in the anamnesis,

• patient's refusal of the proposed design,

• lack of medical-biological, social-domestic conditions for the manufacture of a crucible prosthesis.

The clinical equator is determined on plaster models using a special instrument - a parallelometer. A bracket column is attached to the flat base of the instrument at a right angle. The bracket moves in both vertical and horizontal directions. The bracket arm forms a 90° angle with the column. The bracket arm has a clamp for interchangeable tools. This device allows you to move the tools vertically. The set of instruments includes: an analyzer, a pin with griffles secured with a sanga, retention level measuring pins No. 1, 2, and 3, and pin-knives. The set also includes a table for attaching the models. The table surface is hingedly connected to the base, which allows the models to be tilted and brought closer to the tools at different angles.

The anatomical equator corresponds to the maximum convexity of the tooth only when the longitudinal axis of the tooth crown is located vertically. Clinically, due to the deviation of the teeth, the line of the anatomical equator does not correspond to the maximum convexity of the tooth relative to the vertical plane, therefore, the clinical equator of the tooth is often referred to. If the tooth is inclined towards the oral cavity, the line of the clinical equator shifts from the lingual side to the occlusal surface and from the vestibular side to the gingival margin. A similar situation is observed at one or another slope of the model. By changing the model's inclination, it is possible to change the axis of inclination of the teeth and, consequently, determine the location of the greatest convexity relative to the vertical plane.

For the correct construction of clasps, in addition to changing the clinical equator, it is important to determine the general clinical equator line of the dental arch, or in other words, the line of sight. For this purpose, two methods have been developed using a parallelometer:

1) method for determining the average angle of inclination of the longitudinal axes of the teeth selected as supports;

2) method of model deflection.

According to the first method, two teeth are selected on one side, the axes of the crown part of which differ the most (for example, the canine tooth and molar

tooth). From the middle of the vestibular surface of these teeth, the long axis of the crown is marked with a pencil and extended to the base of the model. It is necessary to find the average deviation axis between these lines, indicating the degree of deviation of the teeth. The axes of two teeth are connected by parallel lines based on the model and bisected. By connecting the marked midpoints with a vertical line, the midpoint axis of the two teeth is formed. After that, the midslope axis of the other two teeth on the opposite side (e.g., the molar and premolar) and the midslope axis of the two teeth on the transverse plane (e.g., between the axes of the first molars of the right and left sides) are determined. Thus, three central inclination axes of three pairs of teeth are drawn on the model; two in the sagittal plane and one in the transverse plane of the model. Explanation is given in the text

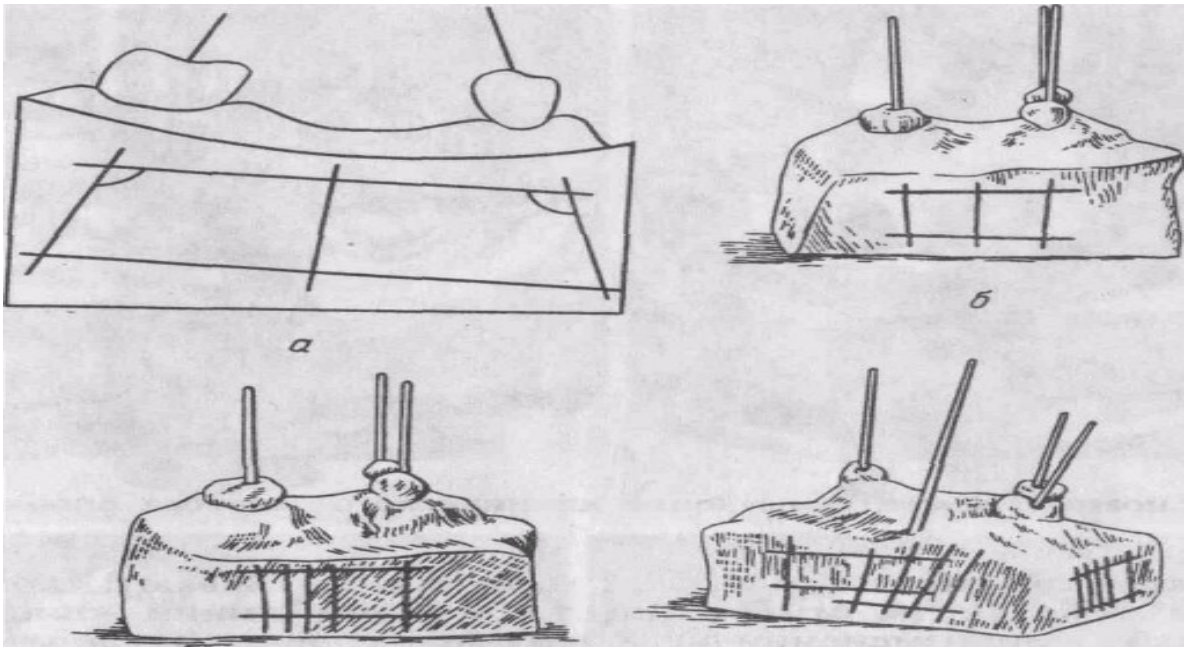

Figure 16. Total longitudinal axes of the support teeth by angle of inclination

To find the middle axes between them, the model is fixed on the parallelometer table and the vertical pin-analyzer is aligned with the direction of the middle axis of deviation of the right teeth. Having fixed the movable platform of the table in this position, this line is drawn to the left of the model and next to the left midline. Then, using the method described above, the midline between the center of inclination of the right and left teeth is determined in the sagittal plane. Then this line is transferred to the back surface of the base of the model and again the average slope axis is marked between the transverse average slope axis and the average slope

line of the right and left teeth in the sagittal plane. The resulting line serves as a guide for establishing and drawing the general equatorial line.

The jaw model, together with the movable platform, is moved until the common line coincides with the vertical pin, and the clamping screw of the parallelometer table is fixed. The vertical pin is replaced with a graphite marking rod, and a common equator line is drawn. The described method predetermines the vertical path of placing prosthetic clasps on the teeth.

The method of determining the common equatorial line by the average angle of inclination of the longitudinal axes of the teeth is labor-intensive. It is advisable to use it in the manufacture of a simple splint prosthesis with 2-3 supporting clasps. When manufacturing crucible prostheses with four or more clasps or removable splints for periodontitis, it is preferable to use the method of model curvature, or in other words, the logical method. It is based on the change in the location of the line of the clinical equator of the tooth, and consequently, the change in the crown of the teeth, when the angle of inclination of the model changes. By deflecting the model, it is possible to change the position of the largest circle in the crown of the teeth, as well as the location and area of the occlusal and gingival parts, i.e., the zone of location of the stabilizing and retention parts of the clasps. Thus, in each individual case, it is possible to find the most rational type of clasp, especially for teeth released from the vertical and horizontal components of chewing pressure.

By attaching the model to the parallelometer table, its inclination is changed, and the optimal position for all teeth is determined with a vertical rod: the crown of the teeth is divided into relatively equal occlusal and gingival zones. The following states of the model are distinguished:

1. Horizontal;
2. front slope (the back edge of the model is located above the front edge);
3. Back slope;
4. right slope (the left half of the model is located above the right half);
5. left slope.

For aesthetic reasons, a rear tilt of the model is chosen when the vestibular processes of the clasp in the anterior tooth group should be located closer to the gums. With such a deviation of the model, the general equatorial line passes from the vestibular side of the anterior teeth near the gingival margin, and from the lingual side rises above the dental tuberosity. To obtain the desired inclination, the parallelometer table is released from the clamp, the model is tilted, and with a vertical pin-analyzer, the degree of location of the equatorial line on each tooth from the vestibular and lingual sides is determined (in the diagnostic model, it is necessary to record the degree of tooth opening during a smile, which allows determining the degree of location of the vestibular shoulders and making them invisible during a smile). When studying a bent model, the edge of the vertical pin-analyzer is shifted at the level of the gingival margin. The points where the pin itself contacts the tooth surface form the location line of the clinical equator. With such a deviation of the models, the general equatorial line in the area of the masticatory teeth tends to rise from the gingival zone to the occlusal surface on the distal-approximal side, and on the medial-approximal side of the teeth - to descend to the gingival margin.

When the model tilts to the right, the common equatorial line rises to the occlusal surface from the vestibular side of the teeth in the right half of the jaw and from the oral side of the teeth in the left half. With this deviation, it descends to the gingival margin from the vestibular side of the teeth of the left half of the jaw and from the oral side of the teeth of the right half.

The inclination of the model on the parallelometer table also determines the route for splinting the dental arch in the case of periodontitis:

1) if the model is studied with a reverse tilt, the method of pre-reversal of the tire is chosen;

2) if the model is deflected to the left, the tire is placed in the tooth row from right to left, i.e., from the side opposite the deflection of the model.

This rule should also be observed by the dentist when adjusting the tire to the model after casting.

Having secured the movable table and the model mounted on it in the chosen position, a common equatorial line is drawn with a vertical pin fitted with a grille. Bring the grille close to each tooth so that its lower edge is positioned and displaced at the level of the gingival border, first draw a line on the vestibular surface of all teeth, and then on the oral surface. After removing the model from the parallelometer stand with a small table, the resulting common equator line is drawn with a thin marker or soft pencil, and the planning of the clamp construction and the drawing of the tire frame begin. The resulting line serves as a guide for placing the clasp parts. In this case, it is necessary to strictly observe the following rule: all non-flexible parts of the clasps (occlusion plates, stabilizing parts of the supporting clasps, each joint of the multi-joint clasp, and vestibular processes) are located behind the common equatorial line. Violation of the rules for placing the inelastic parts of a monolithically cast tire relative to the equatorial line makes it impossible to place the tire in the tooth row, since not everything inelastic can pass through the convex part of the tooth.

Only the retaining parts of the clasps intersect the general equatorial line. To determine the location of the retention part, a special stepped rod - a retention level meter with numbers 1, 2, and 3 - is installed on the parallelometer. The rod is attached to the arm of the parallelometer and positioned so that it touches the equator line. At this moment, the rod step touches the tooth point below the equator line. By moving the rod along the tooth, a mark indicating the location of the retention part is created: at the I degree of retention - 0.25 mm below the general equatorial line, at the II degree - 0.5 mm, and at the III degree - 0.75 mm.

The location of the equatorial line on the crown after parallelometry, its ratio to the occlusal and gingival parts of the crown, determines the need to choose one of the supporting clasps of the described type for each tooth. The choice of clamp type depends on the topography of the equatorial line, the area of the occlusal and gingival parts.

If the crown of the equatorial tooth is divided into equal occlusal and gingival parts, the Akker clasp can be used. If the doctor sets the task of reducing the visibility of the vestibular arm of the clasp, a semi-separated clasp can be used.

A partially separated clasp is indicated if the vestibular or occlusal (support) part on the oral surface is reduced by the defect due to the bending of the tooth adjacent to the defect. In such cases, the space for the stabilizing part of the shoulder is significantly reduced or absent, which limits its thickness and leads to a fracture of the shoulder. A retaining (gingival) surface is used to secure the prosthesis using a semi-separated clasp.

If the deviation of the tooth leads to simultaneous reduction of the supporting part from the vestibular and oral surfaces of the tooth on the side of the defect, a split type of clasp is used.

The "reverse" action clasp is used in a bushing prosthesis that replaces a defect in a group of chewing teeth without a distal support. The occlusal covering can be located on the medial side of the tooth. Such a clamp has an amortizing property, reducing the overturning force on the supporting tooth. However, it should be remembered that the fastening part of the clamp frame should be sufficiently manufactured in terms of width and thickness, as it bears a large load. The arm attached to this part is inelastic, so it should be located in the occlusal part of the crown up to the found equator.

The fifth type of clamp is used when there is one retention zone on the oral or vestibular surface of the tooth located closer to the defect.

There are three ways to determine the prosthesis insertion pathway:

• Optional.

Method for determining the average inclination of the long axes of the support teeth.

• Selection method.

1. Method of arbitrary orientation of the model in a parallelometer

The model is installed on the parallelometer table so that the occlusal plane of the teeth is perpendicular to the grain bar. After recording the model's position on the

parallelometer table, a grille is brought to each support tooth, and the line of sight is drawn. In this parallelometry method, the boundary line may not coincide with the anatomical equator of the tooth, as its position depends on the natural inclination of the teeth. Therefore, the placement of clasps on some support teeth is unfavorable. This parallelometry method is indicated only when the vertical axes of the teeth are parallel, their slight inclination and the number of clasps are minimal.

2. Method for determining the average inclination of the long axes of the support teeth

The edges of the model's base are cut to achieve their parallelism. Then the vertical axis of one supporting tooth is found, the analyzing rod must coincide with the long axis of the tooth, its direction is shifted to the lateral surface of the base. Then the vertical axis of the 2nd support tooth, located on this side, is determined and transferred to the lateral surface of the base. Then, the midpoint axis of the support teeth is found. Similarly, the middle axes of the teeth on the other side of the model tooth row are determined. The resulting "averages" are transferred to the free edge of the base, and among them, the "averages" of all support teeth are determined. A small table with a model on a parallelometer is placed on the found "average."

The analytical rod is replaced with a graphite rod, and a boundary line is drawn on each support tooth. This method does not take into account the aesthetic requirements of the clasp arrangement.

3. Selection method

The model is installed on the parallelometer table so that the occlusal plane of the teeth is perpendicular to the grain bar. The last tooth is brought to each tooth in turn, and the size of the supporting and holding zones is studied. The model is studied at different inclinations, selecting one that provides the best holding zone on all support teeth. After marking the boundary lines and determining the prosthesis insertion path, the position of the arch, supporting clasps, continuous clasp, and claw-like processes is examined. Then the frame of the prosthetic prosthesis is drawn on the model.

When determining the path of prosthesis insertion and removal, it is advisable to proceed from the topography of dental row defects:

• when there are no teeth in the distal sections (Class I according to Kennedy) or in the anterior section (Class IV), the model should be bent in the direction of the defect;

• if there are two or more defects simultaneously in the anterior and lateral parts of the dental arch, the model bends towards the defect, which may cause the denture to sag or be less stable;

• in the presence of a unilateral defect and distal support (Class III), it is advisable to tilt the model towards a more stable tooth to create the most favorable conditions for fixation;

• In Class IV defects, the front slope of the model provides better fixation, while the back slope is only aesthetically desirable.

4.2. Parallelometry Errors

Ignorance of parallelometry leads to the following negative consequences:

• complex fitting of the frame;

• incorrect determination of the clasp zone;

• fracture of the vestibular part of the clasp;

• incorrect assessment of the topography of the support and retention zones.

Complex frame testing

This occurs due to improper insulation of the model, i.e., the insulation areas are concave inward, and the teeth prepared for the clasps are not insulated in parallel. This makes it difficult to find the way to insert the prosthesis.

4.3. Methods of manufacturing the frames of Bugel prostheses

Welded frames should be considered only from a historical point of view, since this method has a number of drawbacks:

• insufficient adhesion of clamps to the tooth surface;

• Electrolysis at the grafting site can lead to fracture of the prosthesis;

• Inability to manufacture complex structures

• Preparation of a solid cast frame for a Bugel prosthesis:

A. Preparation of a solid casting frame for casting without a model.

After removing the molds, the model is cast from high-strength autoclave plaster. With the help of a parallelometer, the model is studied to determine the location of the clasps. Then a drawing of the prosthetic prosthesis is drawn on the model. The prosthesis framework is modeled using standard wax preparations. Upon completion of modeling, casting channels with wax balls are attached to the prosthesis model, the wax is removed from the base model and carefully coated with marshallite containing ethyl silicate. The marshallite mixture is applied 2-3 times and coarsely ground quartz sand is sprinkled. After the mixture hardens, the wax preparation is placed in a pouring cuvette with a refractory mass.

The cuvette is installed on an electric stove, the wax is melted, then placed in a muffle furnace, where the wax is fired at a temperature of 800-1200 degrees, and the cuvette is prepared for casting metal. Metal is poured into the apparatus with centrifugal force. The cuvette is cooled in air, the prosthesis is removed, smoothed, and polished. The preparation of the prosthesis concludes with the installation of the teeth.

B. Preparation of a monolithic casting frame during casting on a refractory model.

After removing the molds, the model is cast from high-strength autoclave plaster. The model is studied on a parallelometer. A model is prepared for copying, for which all retention points on the teeth are filled with moldin. The model is filled with a heated hydrocolloidal mass in a special prefabricated cuvette. After the mass is cooled, the model is taken from the cuvette. A hollow metal cone is placed in the center of the mold, and then a model is cast from a refractory mass. Hydro colloidal mass is separated from the mold.

The cast model is dried in a muffle furnace at a temperature of 200 degrees. By fixing the model in a special solution, the prosthesis frame is modeled from wax. The drainage channels are installed so that they form a cone.

The walls of the cuvette are covered with sheet asbestos. The cuvette is heated to 1200 degrees and filled with molten metal. The frame is removed from the cooled cuvette, smoothed, and polished [3, 19].

If the prosthesis insertion path is undefined, the clasps will not be able to accurately perform their functions. The insulation zone should be equal to "0" for all support teeth.

Incorrect determination of the clamp zone

Incorrect designation of the clamp zone usually leads to the breakage of the clamp during operation or the attachment of the frame to the support teeth with excessive tension. Parallelometry provides a clear picture of the clamp location, as the clamp zone is measured from 0 to 25 μm. The clamp should be evenly thinned so that it works like a "whip" - 1/3 of the clamp should be involved in the work.

If parallelometry is performed correctly, it will not cause difficulties when testing a crucible prosthesis.

Fracture of vestibular portion of supporting clasp

This problem arises from the incorrect placement of the clasp. Many technicians draw the model visually, and therefore the clasp is placed in an inclined position. With such a clamp arrangement, the working point is very close to the occlusal plate. As a result, the part of the clamp with maximum thickness, i.e., elasticity equal to "0," operates. Over time, the material wears out, and it is at the point of maximum load that the clamp breaks. Incorrect assessment of the topography of the Clammer support zone. The most common error is the complete or partial placement of the continuous clasp on the teeth of the lateral group in the retention zone [12].

4.4. Clinical and laboratory stages of preparation.

The technological process of manufacturing Bugle prostheses differs from the process of manufacturing plate prostheses only in the part of manufacturing the metal framework. It can be made in monolithic or combined form. The parts of the frame consist of cast and bent parts welded together.

• Obtaining molds;

• manufacture of a working model from strong gypsum and an auxiliary model from plain gypsum, marking the boundaries of the frame;

• Parallelometry of models, measurement of internal parts, drawing the general equator;

• Preparation for dubbing and dubbing;

• Drawing of clasps on the supporting teeth;

• Draw an arc drawing of the supporting part of the base frame and the boundaries of the saddle parts;

• Applying an insulation layer to the areas where the arch and supporting parts are located;

• Modeling of the prosthesis frame from standard wax preparations on a refractory model;

• Preparation for casting, installation of casting pins;

• Wax copying of the model;

Installation of the copy under the opak cone and in the drainage system (drainage channels);

• Laying the coating layer of the casting mold;

• Formation of the model with refractory filler mixtures;

• Melting, drying, and firing the mold;

• Pouring process;

Removal of the casting system and frame processing;

• Inserting the frame into the working model. Processing, grinding, polishing of the prosthesis frame;

• Checking the design of the prosthesis frame;

• Making saddle parts from wax and installing artificial teeth;

• Replacement of wax with plastic, polymerization and plastic processing;

• Handing over a prosthesis at the clinic.

Features of fixing dental prostheses

1. Beam - several implants are connected to each other with a metal beam. The matrix part of this fastener is installed on the prosthesis. When two metals

combine, a reliable connection is formed, which contributes to the longevity of the product.

A non-removable beam structure with a width of 2 to 4 pieces, especially in cases where the prosthesis allows for the insertion of implants only into the anterior sections of the mandibular alveolar portion, provides significantly better fixation of the removable prosthesis compared to button fastening. The beam can support additional locking and telescopic fastening elements. In addition, the cantilever extension can be filled with a beam in such a way that the prosthesis relies only on implants, preventing the fusion of the mucous membrane under the prosthesis base. Thanks to the good fastening of the prosthesis to the beam, it is possible to reduce the borders of the base.

The main disadvantage in the application of beam structures is the need for a large volume of space required for beams, which is often not only a clinical, but also a technical problem. The manufacture of a removable prosthesis with beam fixation requires careful maintenance of the prosthesis, since rebasing or replacing the defective matrix is much more complex than with beam attachments.

2. Through attachments. This fastening method is less expensive, but the service life of products with such fasteners is shorter than with beam fasteners.
Locks in the form of a cheek and a coupling with 2 implants are mainly used to improve the fixation of existing plastic removable prostheses and to improve the poor functional capabilities of removable prostheses, which cause difficulties in adapting to new prostheses. In the vestibule of the oral cavity, for example, in the bar system, due to the use of attachments and vertical protrusions, they often cannot perform their functions correctly, which requires large costs and additional resources.

3. Application of magnetic fixation of removable prostheses. Magnetic fixation is distinguished by its relative simplicity in practice. However, this method of fixation improvement often requires more space than spherical heads of implants. In addition, the degree of magnetic fixation cannot be adjusted. It is known that magnets do not stabilize well, and this leads to insufficient fixation of the prosthesis.

Among the magnets used for the above purposes, the most commonly used are iron-boron and samarium-cobalt magnets. A pair of magnets up to 250 grams in size in the assembly can develop gravitational force. Fixing magnets are glued to special heads of implants or laser welded or placed in the thickness of the removable prosthesis base.

4. Telescopic systems. When using a telescopic design of a removable prosthesis, 1 or 2 implants are provided, to which the removable prosthesis is attached with tips or cylindrical plates. Compared to other methods of fixing the suprastructural structure for the toothless lower jaw, prosthetic plates are more massive, i.e., a large interalveolar space is required for the application of this method. The pre-implant part of the removable prosthesis can be formed as high as possible. Consequently, this method relies on the gums and is located only in the distal parts of the alveolar process. This type of prosthesis can be indicated in the unsatisfactory condition of the soft tissues surrounding the implant, as well as in additional mandibular criteria. It is necessary to eliminate the damage to the mucous membrane of the preimplant, which begins when the prosthesis is firmly pressed against the gums.

If implants are not installed in parallel, they are often insufficient in cases of pronounced atrophy, despite precise planning. In such cases, parallelism can be achieved using small cylindrical locks manufactured at the factory. Suprastructures with four conical crowns or cylindrical locks can structurally perform the function of both implants-supporting and removable restorative prostheses, if anatomical conditions allow placing 2 implants on each side of the lower or upper jaw. When using multiple implants, the size of the fastening material can increase significantly.

The use of cylindrical locks of animal origin significantly simplifies clinical and laboratory stages due to individually manufactured cone crowns.

Manufacture of crucible prostheses from modern materials (valplast, cadrolite). Their positive and negative characteristics. Clinical and laboratory stages.

Thanks to the development of new materials and equipment, the range of possible solutions that determine the success of treatment is significantly expanding.

The selection of necessary materials in each specific case, as well as the individual characteristics of the patient, allows the use of new materials in practice. This significantly affects the level of primary equipment of the medical institution.

The main material used in the manufacture of removable prostheses is plastic.

Plastics are polymers representing a large group of high-molecular-weight compounds obtained chemically from natural materials or by chemical synthesis from low-molecular-weight compounds. One of the properties of polymers is their high technological capability, ability to form under heating and pressure, and ability to maintain stable shape.

All plastics consist of powder and liquid.

Liquid: monomer - methyl methacrylate - is a colorless, volatile liquid with a pungent odor and easily flammable. It is packaged in a non-transparent container with a polished lid and stored in a cool place, since the spontaneous polymerization reaction can occur under the influence of heat, light, and air. Monomers can include: catalysts, activators, inhibitors (which slow down the self-polymerization process), substances that increase hardness and heat resistance, and substances that reduce solubility. A monomer - an ester of methacrylic acid - is a low molecular weight reagent, i.e., a potential pathogen, which combines with simple monomers to form a gel. Its toxic effect on the cells of the oral mucosa includes suppression of the cells that protect against dehydration and leads to a state of high dehydration due to certain changes that occur under the influence of temperature.

Powder: acrylate - a solid transparent product (contains emulsifiers, dyes, starch). Depending on the use: retardants, coloring pigments, plasticizers, initiators are added.

By spatial structure, plastics are subdivided into:

• Linear polymers - chemically unbound single chains of monomer units (cellulose, rubber);

Branched polymers with a structure similar to starch and glycogen;

• Hollow (stitched) polymers, mainly structured as copolymers.

Branched and non-branched linear polymers readily dissolve in organic solvents, and plastics harden when cooled without changing their basic properties. Since plastics are high molecular weight substances of organic origin, under certain conditions and in combination, these polymeric materials can be different: thermoplastic (thermoplastics) and thermosetting plastics.

Thermoplastic (thermoplastics) high-molecular compounds have increasing viscosity under the influence of light temperature, which leads to their melting. When cooled, it returns to various solid states. This property is the result of thermodynamic processes of heating and cooling.

Thermoreactive (reactive) polymers and resins readily convert to high molecular weight upon heating and, upon prolonged exposure to high temperatures, form thermoreactive structures, resulting in a change in their structure.

High-molecular-weight thermocompressible compounds, when heated, transition to a plastic state, and up to temperature, these binder properties are higher.

Plastics are used for the manufacture of prosthetic bases:

• acrylic;

• vinyl-cloplastic;

• based on modified polystyrene;

• copolymers or pepper-plastic mixtures.

Acrylic plastics.

The most common structural material of orthopedic dentistry is acrylic plastic. From 1938, acrylic plastic replaced rubber, which had been used as a base for many years, and acrylates naturally surpassed the old material in their properties. However, acrylic plastic can cause allergic reactions manifested by the weakening of the oral mucosa. The main etiological factor in the development of acrylate allergy is the residual monomer, present in the plastics in the amount of 0.2%, which increases to 8% with a violation of the polymerization regime.

Another significant disadvantage of acrylic-plastic prostheses is the presence of micro-grains of bases due to shrinkage that occurs during the polymerization process for technological reasons.

The third disadvantage is the resistance of acrylic plastics to variable loads during chewing.

Nevertheless, acrylic plastics are currently the only material for the production of basic removable prostheses in many clinics, as they are inexpensive, have a simple production technology, and do not require expensive equipment.

Thermoplastic plastics.

Recently, new technologies for the production of orthopedic structures made of thermoplastic materials have appeared in the domestic dental market, a process that has been going on in world dentistry for more than 30 years.

Artificial structures gradually began to be implanted into the human body. Nylon was first introduced in 1983 as a plastic for the manufacture of denture bases with the property of flexibility. It is assumed that it will replace acrylic combinations with metal alloys used as fixative removable dentures. Since then, many countries have started using this material.

In terms of chemical structure, thermoplastics lack the main negative properties characteristic of acrylic plastics, and in terms of strength indicators, they are several times better. When processing thermoplastics, a reactive monomer is not used in the product. Thermoplastics, after heating at a temperature from 160 to 200 °C, transition to a viscous-flow state and are introduced into a pre-closed mold through a pouring channel under pressure up to 50 atm.

Five types of thermoplastics are used in dentistry:

• polycarbonate;

• nylon (polyester sulfide);

• polyethylene;

• ethylene vinyl acetate;

• Acrylic monomerless (polymethyl methacrylate).

These materials are widely used in the manufacture of removable clasps based on acrylic, which are more effective in the absence of teeth, in aesthetic indications for the manufacture of prostheses from thermoplastic materials.

1. Toothless jaw type I according to Sherder (under any conditions in the oral cavity);

2. Toothless jaw type II according to Keller (under any conditions in the oral cavity);

3. Indications for patients with partially plastic, dull elastic and fungal, as well as infectious diseases;

4. Mancy, heart;

5. In partial dental injuries in individuals with anterior obturators;

6. When resolving the hard and soft palate...

8. As splinting in case of periodontal tissue disease;

9. For patients with exostoses, thin, acute alveolar ridges, etc.;

10. When there is an alveolar ridge, when it is impossible to make an acrylic prosthesis.

Advantages of thermoplastic prostheses:

1. The material has high accuracy and uniformity due to hot casting under a pressure of 12 atmospheres.

2. There is no residual monomer in the dentures at all, therefore it does not cause allergic reactions.

3. Prostheses are flexible and have high strength, therefore they do not break even under strong compression. Moreover, their reduction is minimal. On the contrary, prosthetic bases made of acrylic plastic make up an average of 80% of the number of prostheses produced.

4. Thermoplastics retain a stable color that gives prostheses a beautiful appearance even after prolonged use.

5. Prostheses are manufactured using the hot casting method, so they fit precisely and are securely fastened.

6. Prostheses are very lightweight.

7. When using prostheses made of thermoplastics, the supporting teeth cannot be seen.

8. The absence of metal clasps does not lead to excessive pressure associated with negative exchange (galvanism). Prostheses made of acrylic plastics have metal

clasps that do not aesthetically connect the prosthesis with missing teeth and make the teeth wobble.

9. The thermoplastic material does not lose moisture and does not require additional moistening, which significantly improves the possibility of creating new designs.

10. Thermoplastic materials do not encounter hygienic problems because they are easier to manufacture.

However, there are also disadvantages: the chewing load is distributed unevenly, rebasing, night and tooth placement are practically impossible, it is not smoothed well after correction, micropores are formed with improper care. In addition, after about six months, the color of the prosthesis changes and becomes rough. To care for such structures, dentists recommend the use of special toothpastes and very soft hair brushes, which can reliably remove the coating from the surface and not damage the top material in the thermoplastic.

In fairness, it should be noted that thermoplastic dentures can be a suitable alternative to acrylic (plastic) structures, only in cases where they are used to fill relatively small defects of the dental arch. However, the preparation of soft dental prostheses for the treatment of intermediate defects (defects limited by natural teeth) does indeed have its advantages. For example, such prostheses are the only way to restore the teeth of patients who have missing teeth immediately according to medical indications. Soft prostheses are used for prosthetics of teeth that wobble due to damage to periodontal tissues (the soft tissues surrounding the teeth).

Among the most famous companies producing polymer thermoplastic bases for removable prostheses with low heat resistance are Germany's Flexiplast and Bredent, as well as Israel's Flexy-Nylon and Acetal. Flexy-Nylon, Acetal;

In addition, thermoplastics have entered the dental practice of our country.

Supplied by DuoTri and Walsan.

In recent years, prostheses made of acrylic plastic have been widely used due to their lightness and affordability. These materials can withstand high mechanical loads (including impacts) due to improved strength and wear resistance. In addition, the material is resistant to solvents and organic oils and is easily processed.

It is advisable to produce acetate with a wide color range. Some of them can be found in the "Vita" tooth elements. Three pink colors were also added to mimic the gums and palatal parts.

Currently, new technologies allow for the full production of all parts, including the acetate frame. Such a structure is considered lighter and more flexible. The advantages of using acetate in the manufacture of Bugel prostheses are not related to its properties inherent in thermoplastics. It should be noted that acetate is practically not inferior to metal in strength, since structures made of this material can easily and unchangingly withstand chewing and other loads. Rapid adaptation of patients to the new structure and fullness of the oral cavity reduces the rehabilitation period. Absolutely non-hygroscopic thermoplastic material prevents the penetration of bacteria and other harmful factors into the prosthesis cavity, therefore, end prostheses made from T.S.M. Acetal Dental are preferable to acrylic prostheses. Another advantage is that these T.S.M. Acetal Dental prostheses require less labor in production due to the absence of a metal casting stage.

As for the disadvantages, first of all, it is necessary to note the low elasticity. In very thin sections, this can sometimes lead to the loss of orthopedic properties. In addition, the high price can also be cited as a disadvantage. Processing the structures is very complex, and in some cases, it turns into an overly complex dental prosthesis. Bugel prostheses made of white "Dental D" plastic are special artificial teeth made on the basis of polymethyl methacrylate resin and "QuattroTi" fiber.

They possess the highest physical and mechanical properties. In addition, their unique physiological properties allow for the replacement of metals and acrylic plastics used in many areas of dental prosthetics. Dental D ("QuadroTi") material has an aesthetic appearance and is produced in 10 colors close to the VITA scale.

Dental D properties include 1.5 times higher strength (3200 units compared to 200 units) than acrylic plastic, crack resistance, and impact resistance. It has an optimal combination of rigidity and flexibility, corrosion resistance, and a low coefficient of linear and dynamic friction. The stability of size retention, elasticity and depreciation capacity, compliance with the ISO 10993 standard ("Biological Compliance

Assessment") are important advantages. This standard is the main version of the ISO 10993 standard and serves as a guide for the selection of methods for assessing biological impact.

Tests conducted in Europe, the USA, and Canada over the past 10 years, including revolutionary improvements, have shown that the effectiveness of dentures made of Dental D material prevents the occurrence of allergies to monomers, expands the possibility of choosing aesthetic teeth, and their properties do not change under cryogenic influence.

However, the results observed in the manufacture of anatomical objects and other materials are still insufficient. An important task in this direction is the creation of a more simplified version of this material, the final result of which must meet important requirements. In addition, it is advisable to study the properties of prostheses made of this material under conditions of extended use and high functional loads.

However, it should be noted that these prostheses are not suitable for very heavy loads, which usually lead to the loss of their teeth. Although this shortcoming is relative, it must be taken into account. Another disadvantage - the high cost of the material due to production characteristics - does not always correspond to the patient's financial capabilities. Finally, the maintenance of these prostheses presents certain difficulties.

It is recommended to carry out the storage and care of prostheses using special solutions, which extends their service life. For this, it is necessary to use special means for the care of thermoplastics, such as Corera, Flexi-Nylon Clean, or Val-Clean. They contain oxidizing agents, oxygen-releasing compounds, mineralizing substances and detergents, as well as dyes and fragrances. All components are selected so that the processing of the prosthesis is safe and does not damage the structure and color of the prosthetic structures.

In the most extreme cases, ordinary soap can also be used for cleaning, but not abrasive substances, as caution should be exercised when using them. In addition to home remedies, it is recommended to send prostheses made of thermoplastics for

further processing to specialized dental technology laboratories where thermoplastic prostheses are manufactured. For more professional cleaning, it is recommended to apply once every 6 months.

It should be noted that ultrasonic cleaning in combination with disinfectant solutions has the best effect on silent orthopedic structures at home.

Clinical and laboratory stages of manufacturing prostheses from thermoplastics:

Among thermoplastics, the most common are clinical and laboratory prostheses made of ordinary plastic, which, as is known, are processed by the compression method. In contrast, thermoplastics are manufactured by casting.

Method of making plastics by casting.

A casting press is the process of inserting mold material into a pre-sealed mold through a casting channel. The method of bulk pressing of basic plastics is not new. The expediency of its use in orthopedic dental practice was discussed and experimentally confirmed as early as the last century. In Russia, V.N. Kopeykin proposed a syringe press in 1961, which, although not without its drawbacks, allows for the formation of a group of prostheses. Since then, the apparatus has been continuously improved, as dentists have identified the disadvantages of the classic forming method - compression pressing, which is widespread in practice.

Disadvantages of the compression method:

1. Increased height of the lower part of the face due to improper attachment of the jaw segments and the presence of a grata. Since the thickness of the base has increased and a vertical displacement of the artificial teeth relative to the plane of the prosthesis occurs at this expansion, the dentist must perform dental correction of the prosthesis, which is a gross violation of the technology. This is the main drawback of the method.

2. With an increase in pressure during pressing, the movement of any basic plastic to decorate the gypsum shape stops. The direct pressing method ensures the versatility of the design and allows easy correction of dimensions that violate the

basic shapes compared to the height (density) of the base of thermoplastic materials without additional processing on site.

3. The formation of excess material as a result of pressure on the base leads to its redistribution. This will require additional costs to increase the weight of the finished product.

4. It is impossible to apply additional pressure to the base material in the mold after final pressing, as a result of which the plastic cannot be compacted to prevent pore formation.

5. Polymerization occurs in an aqueous medium, as a result of which the water permeability of plastics increases, which negatively affects the strength of the prosthesis. Casting pressing method

the plastic does not have the aforementioned drawbacks, since it allows for the application of non-detachable forging at intermediate stages, which can be combined with polymerization, in which the heated element has direct contact with the forging plane, which contributes to the implementation of effective directed polymerization.

Positive aspects of the casting pressing method:

1. The molding material is introduced into the closed cavity, and excess remains in the drainage channel.

2. The shape does not undergo a significant deforming effect. The channel fluid can exert constant pressure on the forming mass until its solidification, so the internal stress can be significantly reduced to a minimum.

3. When manufacturing prostheses from thermoplastics, the clinical and laboratory stages are carried out according to the usual method, up to the stage of installing artificial teeth, since their pre-preparation is carried out. After inspecting the structure in the oral cavity, the models are plastered into special cuvettes, and drainage channels are installed on each model. The cuvettes are heated in hot water, the wax for them is leveled and coated with an insulating liquid.

4. A working lubricating cartridge filled with material is placed in the heated cuvette, and the cuvette is closed by an injector under a pressure of 6 bar. Then it is cooled and the cuvette is opened, the finished prosthesis is processed and polymerized in the oral cavity.

5. Finishing prostheses begins with removing the drainage channels - they are cut with fissured boron or a disc. Further processing of the prosthesis is carried out according to the standard method.

Conclusion. Tooth loss (adenitis) is a serious medical and social problem. In adentia, chewing function is impaired, resulting in various gastrointestinal diseases. When teeth fall out, appearance and facial proportions may change, and speech may be impaired. Even the removal of one tooth causes a number of problems due to the displacement of neighboring, defective teeth. This can lead to improper closure and proportion of dental rows during chewing, functional strain, and disease of the remaining teeth. This is a kind of "chain reaction," as a result of which, when one tooth is removed, there is a risk of losing many teeth. Thus, the absence of one or more teeth is not only a deterioration of chewing or a cosmetic problem. This is a real danger to the normal functioning of the entire dentoalveolar system and the human body. This is a problem requiring timely and rational treatment, the goal of which is the restoration of the anatomical integrity of the dental arch and the loss of chewing functions. A Bugel prosthesis is the most reliable, expensive, and convenient construction. When manufacturing such prostheses, all elements of the prosthesis are precisely calculated and modeled. An important advantage of the Bugel prosthesis is that it does not cover the palate. Thus, adaptation to the Bugel prosthesis occurs much faster, pronunciation does not change, prosthetic stomatitis, vomiting reflex does not activate, and there is no discomfort in eating.

4.5. Prosthesis Care.

Before releasing the patient, they are explained how to use the prosthesis (it is advisable to provide printed rules for using the prosthesis). Removable dentures must be kept in perfect cleanliness, without dust or traces of food residue; the

dentures must be cleaned or rinsed after each meal. In the conversation with the patient, it is necessary to emphasize that it is forbidden to boil prostheses. There is no consensus among specialists on the relative necessity of removing dental prostheses during nighttime sleep. On the one hand, in the presence of a single preserved tooth in the oral cavity with damage to surrounding tissues, removal of removable dental prostheses at night can lead to deterioration of tissue trophism, exacerbation of atrophic processes. Therefore, in each specific case, the doctor must choose the most optimal option for the patient. It is advisable for the patient to wear a prosthesis on the first day only with careful hygienic care of the oral cavity and prosthesis.

The patient should consult a doctor at least twice a year to check the condition of their remaining teeth and mucous membranes. Bugel prostheses attached to teeth not covered with artificial coatings require careful hygienic care to prevent bending and disease.

Every day after meals, teeth and prostheses should be thoroughly cleaned with a toothbrush. Patients with general diseases should not go to the hospital to clean their prostheses, but should start using the prosthesis long before completing the course of treatment and, in particular, take it to reduce the load on the supporting tissues. The daily frame should not be damaged. If a regulated crackling of the prosthesis occurs during meals, it should be reduced.

Thus, during the fastening of prostheses, only gross defects in the structure and ribs of the structure itself should be eliminated. This applies only to frame parts and artificial teeth. The tubes should be removed on the second day when it is possible to perform the prescribed non-bugellate prosthesis framework. Thus, on the day of fixation, it is necessary to care for the health of the placenta, after which it is necessary to focus on similarity, instinctively bring the trachea with dental prostheses. This phenomenon is explained by the physiological mobility of teeth and the expediency of storing them in an aqueous environment with an antiseptic elixir. The patient should be aware that in the first few days, cruciate dentures can cause nausea, vomiting, increased salivation, impaired speech and taste perception, and

difficulty in biting and chewing food. The patient should be warned that they need to get used to the prosthesis and that this will take some time. It is necessary to be patient with the unpleasant feelings that are inevitable when wearing a prosthesis. However, one should never expect pain in the area of the prosthetic area; the patient should immediately consult a doctor who can correct this discomfort with appropriate guidance.

In the presence of severe pain, the prosthesis should be removed, but at the dentist's appointment, the patient must bring the prosthesis and mouthpiece in full (wearing for at least 2 hours). The unclear pronunciation of sounds is corrected by pointing out the teeth located in the area of all teeth, which creates a square, prosthesis in the area of line A and simultaneously eliminates the desire to vomit. However, reduction in the size of the posterior teeth during a high prosthesis can lead to a decrease in its functional adaptability. Moreover, it rarely needs to be approached. For patients who adapt more quickly, it is recommended to remove splint prostheses within 3-4 days, observing a hygienic approach.

Speed. The capillaries in the area of the mucous membrane of the prosthesis area narrow, and the blood supply to the tissues increases 2-3 times after removal at night. All this indicates that such a situation has a positive effect once it occurs.

When using splint prostheses, the adaptation period is significantly shorter. Good adaptation really quickly restores chewing efficiency.

DISCUSSION

Despite advances in dentistry, caries and periodontitis remain the main causes of partial or complete tooth loss. 70 percent of people aged 40-50 need orthopedic treatment, and partial defects in the dental arch are often observed at this age. After removing the teeth or their roots, the interconnection between the dental rows is disrupted. The necks of the teeth limiting the defect become exposed, the teeth lose their proximal support, the chewing load on them increases, and the antagonist teeth do not participate in the chewing process - their articulatory balance is disrupted, the teeth shift towards the defect, which leads to a disruption of the occlusal curves. All this makes prosthetics difficult to a certain extent. The loss of teeth in the anterior part leads to a cosmetic defect and speech impairment. When there are few antagonist teeth in the oral cavity, their excessive wear is observed as a result of functional strain, bites decrease, and the function of the temporomandibular joint is impaired.

Partial absence of teeth is one of the most common diseases: according to the World Health Organization, up to 75 percent of the population in various regions of the world is affected by this disease.

In our country, this disease occurs in the total structure of medical care provided to patients in dental treatment and prevention institutions from 40 to 75 percent and is observed in all age groups of patients. Partial secondary adentia directly affects the patient's quality of life. It leads to a complete disruption of the vital function of the body - chewing, which negatively affects the digestive processes and the intake of necessary nutrients into the body, and also causes the development of gastrointestinal diseases, which often have an inflammatory nature. Partial absence of teeth also leads to serious consequences for the social status of patients: impairment of articulation and diction affects the patient's communication abilities, these disorders, along with a change in appearance due to tooth loss and developing atrophy of the masticatory muscles, can cause a change in the psycho-emotional state, even mental disorders.

In the case of partial absence of the integrity of the dental arch, untimely restoration leads to such functional disorders as overload of the periodontium of the remaining teeth, the development of pathological erosion, and disruption of the biomechanics of the dentoalveolar system. Timely or poor-quality treatment of partial secondary adentia leads to the development of diseases of the dentofacial system, such as periodontal diseases, and in the long term - to complete tooth loss - complete secondary adentia of both jaws. Periodontal diseases constitute 86% in the age group 35-44. Without timely and qualitative treatment, these diseases can lead to spontaneous tooth loss due to inflammatory or dystrophic pathological processes in periodontal tissues, as well as the removal of untreatable teeth or their roots in cases of deep caries, pulpitis, and periodontitis.

The main characteristic of partial adentia is the absence of one to fifteen teeth in one of the jaws. The clinical presentation is characterized by the absence of one or more natural teeth or their roots. The manifestations of partial absence of teeth depend on the location of defects and the number of missing teeth and are distinguished by their diversity.

A characteristic feature of this pathology is the absence of pain syndrome in patients. In the absence of one or two, sometimes even several teeth, patients often do not experience discomfort and do not consult a doctor.

With a noticeable absence of lateral teeth, "submersion" of the soft tissues of the cheeks and lips is observed. Even if there is no single front tooth in the upper and/or lower jaw, dictional impairment may be observed.

In each group of functionally oriented teeth, with the absence of paired antagonist teeth, the partial absence of teeth on both jaws leads to a decrease in the height of the lower part of the face, the development of angular cheilitis ("zaedlar"), pathology of the temporomandibular joint, a change in facial configuration, pronounced manifestation of the nasolabial and chin folds, and a drop in the corners of the mouth. Partial absence of masticatory teeth causes disruption of chewing function, patients complain of poor chewing. Sometimes a noticeable partial adentia is accompanied by a typical partial dislocation or dislocation of the temporomandibular joint. After

the loss or removal of teeth, atrophy of the periodontal ligaments occurs in the corresponding parts of the jaws, and with the loss of more than two teeth, atrophy gradually develops in the alveolar processes themselves and increases over time.

This pathology is considered an irreversible process. Restoration of the integrity of the dental arch can be carried out only by orthopedic treatment methods using non-removable and/or removable dental prosthesis designs.

Thus, defects in the dental arch lead to a decrease in the functional value of the masticatory apparatus, which, in turn, affects the functioning of the gastrointestinal tract and the body as a whole. I.P. Pavlov's experiments showed the influence of the chewing process on the digestive function and gastric motility. Diseases of the gastrointestinal tract, in turn, cause pathological changes in the tissues and organs of the oral cavity. This feedback is also observed in many common diseases (measles, scarlet fever, influenza, blood diseases, hypovitaminosis, capillary toxicosis, diabetes mellitus), which reduce the resistance of blood capillaries in periodontal tissues, lead to symptomatic stomatitis, and reduce the compensatory capabilities of the periodontium.

The doctor should keep all this in mind when examining the patient, since making a diagnosis, determining the indications for orthopedic treatment, and choosing the correct design of the prosthesis directly depend on an objective assessment of the compensatory capabilities of the entire masticatory apparatus. The peculiarity of orthopedic treatment is that the replacement of defects in the dental arch with prostheses is associated with an increase in the functional load on the supporting tissues. Bugel prostheses transmit chewing load to the mucous membrane in a combined manner - through the periodontium (by means of a supporting clasp along the tooth axis) and through the prosthetic base. Removable prosthetic bases alter blood circulation, disrupt metabolism and the structure of supporting tissues. When chewing loads fall on the prosthesis, a temporary oxygen deficiency may develop in the tissues underneath it. Even more noticeable changes in periodontal tissues begin with excessive load on the abutment teeth, especially with marginal defects and clasps. In such cases, dilation of the periodontal fissure, formation of a bone capsule,

loosening and loss of teeth are observed. All this must be taken into account when making a diagnosis and prosthesis. For a functional diagnosis, it is necessary to carefully study the compensatory capabilities of the supporting tissues.

Nevertheless, until now, the diagnosis of the disease is often made based on medical history, clinical and radiological data, and in some cases, taking into account the results of some laboratory tests. At the same time, examination of organs and tissues at rest often allows for the detection of only significant organic changes. Such a diagnosis is insufficient to determine the state of the function of the affected organs and to judge the state of adaptation or compensatory mechanisms. Anatomical diagnosis characterizes the chewing apparatus only at rest and does not solve the main question - what will happen to the supporting tissues after prosthetics, whether their reserve capabilities are sufficient or insufficient to compensate for the additional load, how the natural teeth and mucous membrane respond to one or another prosthesis. When chewing loads fall on the prosthesis, temporary hypoxia can develop in the tissues underneath it. Even more pronounced changes in periodontal tissues begin with support teeth, especially with marginal defects and excessive load on the clasps. In such cases, dilation of the periodontal fissure, formation of a bone capsule, loosening and loss of teeth are observed. All this must be taken into account when diagnosing and designing prostheses.

The diagnosis made at rest does not characterize the functional capabilities of connective tissue and other structures of peripheral circulation, their flexibility in various parts of the prosthetic bed, on which the chewing pressure of the prosthesis actually rests and passes. Consequently, the treatment of patients, the determination of indications for one or another design of prostheses, is carried out mainly without taking into account the functional state of the supporting tissues. When manufacturing plate and splint prostheses, the elasticity of the soft tissues of the prosthetic bed is not taken into account, while bridge prostheses often lead to excessive strain on the supporting teeth. As a result of this, complications after orthopedic treatment often occur: poor fastening of prostheses, inflammation of the

mucous membrane of the prosthetic area, loosening of the supporting teeth, mucosal proliferation, and others.

The diagnosis made at rest does not characterize the functional capabilities of connective tissue and other structures of peripheral circulation, the chewing pressure of the prosthesis does not actually characterize their softness in various parts of the prosthetic bed on which it rests and passes. Consequently, the treatment of patients, the determination of indications for one or another design of prostheses, is carried out mainly without taking into account the functional state of the supporting tissues. When manufacturing plate and splint prostheses, the elasticity of the soft tissues of the prosthetic bed is not taken into account, while bridge prostheses often lead to excessive strain on the supporting teeth. As a result, complications often occur after orthopedic treatment: improper fastening of prostheses, inflammatory processes of the mucous membrane of the prosthetic area, loosening of the supporting teeth, proliferative growth of the mucous membrane, and others.

If the clinical diagnosis were supplemented with modern functional examination methods, it would be possible to prevent most of these complications. This is also important because a person is never in a state of absolute peace, but is constantly interacting with the external environment. In orthopedic dentistry, prostheses are among such factors, which significantly change the function of the biological substrate on which they are based.

Consequently, for a deeper understanding of the reserve capabilities of the body and local tissues, it is necessary to characterize them not only in a state of rest with a particular pathology, but also in conditions close to the functional load that tissues experience under the influence of a prosthesis. Only then can a functional diagnosis be made, which is a necessary and important part of modern clinical diagnostics. In various pathological processes, much attention was paid to changes in connective tissue, since the development and course of the disease, and in this case, complications associated with their overload, depended on the functional state of this tissue.

The main biological substrate on which prostheses rest and in which various complications develop are connective tissue structures and peripheral blood vessels. Pathological effects on these tissues can have general and local characteristics.
Therefore, the objective study of functional and anatomical changes in the connective tissue and peripheral blood vessels is of great theoretical importance for the correct justification of orthopedic treatment and the prevention of complications. As for the morphological studies of these tissues, they are far ahead of the functional methods of diagnosis. Despite the fact that modern methods of histochemistry and electron microscopy allow for research at the cellular and molecular levels, objective tests for determining the functional state of peripheral blood circulation and connective tissue are rarely used in the clinic.

The obtained numerical data will serve as a basis for clinical diagnostics and the selection of the correct design of prostheses, taking into account the general condition of the body and local tissues. In addition, functional examination methods should characterize not only the effectiveness of chewing, but also the tissues on which the prostheses rest. Tests to study the degree of disruption of the chewing process (X. Xristiansen, S. Ye. Gelman, I. S. Rubinov), and to determine the functional state of supporting tissues, some objective tests have recently been developed that allow characterizing the state of their peripheral blood circulation and connective tissue structures. Early detection of functional insufficiency is the basis for prevention and effective treatment. One of the theoretical foundations of functional diagnostics is the doctrine of functional systems (P. K. Anoxin, 1947).

This theory is based on the idea that the most important functional tasks of the organism are performed not by individual organs, but by systems of organs and tissues whose functions are closely interconnected (integrated).
All known orthopedic research methods can be divided into two groups:
Group I - methods describing supporting tissues and the masticatory apparatus at rest (anatomical methods).
. Group II - methods characterizing periodontal tissues and the masticatory apparatus in a state of functional or close to it load (functional methods).

Currently, one of the most pressing problems of orthopedic dentistry is the prosthetics of dental defects using splint prostheses. Correct assessment of the clinical situation is the basis for the correct choice of the optimal design of the future needle prosthesis.

The functional, technological, and structural features of the buckle prosthesis require high precision in the manufacture of the framework with supporting elements. This accuracy is ensured by applying special methods for preparing a working model on a parallelometer for studying and marking the relief of the prosthetic area in working models.

CONCLUSION

Bugel prosthetics is one of the most advanced methods of restoring partial defects of the dental arch. The success of treatment depends on the correct design, the high-quality execution of all clinical and laboratory stages, and the patient's adherence to the doctor's recommendations.

The use of modern materials and technologies, including CAD/CAM systems, 3D printing, and artificial intelligence, significantly expands the possibilities of splint prosthetics, which increases the quality and effectiveness of orthopedic treatment. Mastering this topic requires not only theoretical knowledge, but also practical skills, which are formed in the process of clinical work under the guidance of experienced teachers.

I.CONTROL QUESTIONS

1. Explain the mechanism of load transfer in crucible prostheses and indicate the percentage ratio of each path.

Answer: Bugel prostheses transfer the load in two ways:

• Through the periodontium (40-60%): with the help of clasps and attachments, vertical loading along the tooth axis

• Through the mucous membrane (40-60%): through the base of the prosthesis, divided into horizontal and vertical components

2. How does the distribution of chewing forces change when teeth are lost?

Answer: When teeth are lost, the functional load on the remaining teeth increases by 1.5-2 times. This causes excessive strain on periodontal tissues and activates compensatory mechanisms.

3. List the main anatomical indications for placing the arch of a Bugel prosthesis on the upper jaw.

Answer: Main targets:

• Hard palate (main support of the bow)

• Height of the palatal arch (determines the arch design)

• Line "A" (posterior border of the prosthesis)

• Palatine torus (20-25% of patients)

• Maxillary tubercles (lateral support)

4. Indicate the anatomical structures that determine the path of arch insertion in the mandible.

Answer:

• Sublingual region - the main passage of the arch

• Jaw-sublingual line - defines the boundaries of the prosthesis.

• The sublingual gland area - taken into account in the design of the arch

• Lower jaw torus - limits the position of the arch

5. Describe the mobility levels of the mucous membrane.

Answer:

• Grade I (0.5-1 mm): Dense, less mobile, occurs in young patients

• Grade II (1-3 mm): Moderately mobile, most suitable for cruciate replacement

• Grade III (3-5 mm): Looser, requires additional fixation

• Grade IV (5+ mm): Pathologically mobile, requires surgical preparation.

6. Explain the composition of periodontal tissues and the function of each component.

Answer:

• Tooth root cement: periodontal fiber attachment site

• Periodontal ligament: a system of elastic fibers, acting as a load shock absorber

• Alveolar bone: the main supporting structure

• Gingiva: provides protection and nutrition

7. Explain the degrees of tooth movement according to Miller's classification.

Answer:

• 0 degree: Immobile (normal)

• Level I: 0.2-1 mm (optimal for buckle prostheses)

• Grade II: 1-2 mm (careful approach is required)

• Grade III: more than 2 mm (relative contraindication)

8. Explain the differences in the processes of maxillary and mandibular atrophy.

Answer: The rate of reformation of the hard tissues of the upper jaw is 4 times slower than that of the lower jaw. Due to the more porous structure of the maxilla, atrophy proceeds more slowly. Since the lower jaw has a denser structure, atrophy occurs faster and more pronounced.

9. List the types of maxillary arches and the instructions for their use.

Answer:

• Horseshoe-shaped arch: for Kennedy Class I, II defects, most universal

• Ring arc: for large defects, provides maximum stability.

• Transverse palatine bridge: Class III defects, in the presence of high aesthetic requirements

10. Group the main factors influencing the effectiveness of chewing.

Answer:

Factors of the prosthesis: rigidity of the framework, type of fastening, number of supporting teeth

Patient factors: age, sex, general health

Anatomical and physiological factors: mucosal condition, periodontal health

11. Explain the principles of splinting in periodontal diseases.

Answer:

1. Connection of moving teeth

2. Distribution of the load by the maximum number of teeth

3. Horizontal stabilization - control of lateral forces

4. Vertical support - proper distribution of functional load

12. Indicate the distribution of chewing forces by teeth in a healthy dental arch.

Answer:

• Cutting teeth: 100-200 N

• Canines: 250-350 N

• Small molars: 300-450 N

• Large molars: 400-600 N

13. List the methods for assessing mucosal mobility.

Answer:

• Palpation method: finger pressure to detect movement

• Instrumental assessment: using a probe and piezometer

• Functional tests: observation during rinsing, chewing, and speaking.

14. Describe the stages of the atrophic process after tooth extraction.

Answer:

1. Initial stage (0-3 months): destruction of spongy bone and Charpy fibers

2. Middle stage (3-12 months): vertical contraction of the alveolar process

3. Chronic stage (more than 1 year): continuation of horizontal and vertical atrophy

15. Explain the biomechanical consequences of tooth loss for the masticatory system.

Answer: Loss of teeth leads to the cessation of mechanical impact (load) on the cancellous part of the jaw bones. This leads to a gradual decrease in the activity of blood vessels that nourish bone tissue, and bone atrophy begins in the area of missing teeth.

II. TEST TASKS (15 tests)

Test 1

What percentage of the load is transmitted through the periodontium in Bugle prostheses?

a) 20-30%

b) 40-60% ✓

c) 70-80%

d) 80-90%

Test 2

How many times does the functional load on the remaining teeth in partial adentia increase?

a) 1.2-1.4 times

b) 1.5-2 times ✓

c) 2.5-3 times

d) 3-4 times

Test 3

Which anatomical structure serves as the main support for the arch of the maxillary Bugel prosthesis?

a) Alveolar process

b) Palatine tubercle

c) Hard palate ✓

d) line "A"

Test 4

Where does the main pathway for inserting the arch in the mandible pass?

a) Over the tongue

b) From the sublingual region ✓

c) Along the alveolar process

d) from the retromolar region

Test 5

What degree of mucosal mobility is considered optimal for Bugel prosthetics?

a) I degree (0.5-1 mm)

b) II degree (1-3 mm) ✓

c) III degree (3-5 mm)

d) IV degree (5+ mm)

Test 6

What degree of tooth mobility according to Miller is optimal for Bugel prosthetics?

a) 0 degree

b) Level I ✓

c) II degree

d) III degree

Test 7

How many times slower does atrophy occur in the upper jaw compared to the lower jaw?

a) 2 times

b) 3 times

c) 4 times ✓

d) 5 times

Test 8

What chewing force develops in the area of the molars?

a) 100-200 N

b) 250-350 N

c) 300-450 N

d) 400-600 N ✓

Test 9

What percentage of the population has a palatine tubercle?

a) 10-15%

b) 20-25%

c) 30-35%

d) 40-45%

Test 10

What type of arch is most commonly used for the upper jaw?

a) Circular

b) horseshoe-shaped ✓

c) Transverse conjunction

d) Mixed

Test 11

What is the main function of the periodontal ligament?

a) Tooth feeding

b) Pressure reduction ✓

c) Root protection

d) Cementation

Test 12

At what stage of atrophy does bone tissue lose the most?

a) 0-3 months ✓

b) 3-12 months

c) 1-2 years

d) after 2 years

Test 13

What percentage of bone tissue is lost in the first 3 months after tooth extraction?

a) 20-30%

b) 40-60% ✓

c) 60-80%

d) 80-90%

Test 14

Which anatomical line marks the posterior border of the maxillary prosthesis?

a) Tooth line

b) Line of premolars

c) Line "A" ✓

d) Molar line

Test 15

Which of the following principles does not apply to splinting in periodontal diseases?

a) Connection of moving teeth

b) Pressure distribution

c) Increasing the pressure on one tooth ✓

d) Horizontal stabilization

III. SITUATIONAL PROBLEMS (15 problems)

Problem 1

A 45-year-old patient applied for a prosthesis. At examination: No teeth 36, 37. Mobility of the 35th tooth is I degree, the 38th tooth is 0 degree. The mucous membrane in the defect area is moderately mobile.

Questions:

1. Determine the Kennedy class of the defect.

2. Evaluate the mobility of the mucous membrane.

3. Is it possible to use a Bugle prosthesis?

Answers:

Kennedy Class II (one-sided terminal defect)

2. II degree of mobility (1-3 mm)

3. Yes, cruciate replacement is indicated.

Problem 2

38-year-old patient. Complaints of difficulty chewing. No teeth 14, 15, 16, 24, 25, 26. All other teeth are strong. The height of the palatine arch is average.

Questions:

1. Kennedy Defect Class

2. Maxillary arch type

3. Cargo Transfer Route

Answers:

1. Class I according to Kennedy (two-sided terminal defects)

2. horseshoe arch

Combined: through the periodontium (40%) and mucous membrane (60%)

Problem 3

52-year-old man. No 23rd tooth. Teeth 22 and 24 are strong. There are high aesthetic requirements. The mucous membrane in the defect area is dense.

Questions:

1. Defect class

2. Features of prosthesis planning

3. Type of fixation

Answers:

Class III according to Kennedy

2. Transverse palatine septum for minimal visibility

3. Atttachments or telescopic crowns for aesthetics

Problem 4

Patient with periodontitis, 60 years old. Mobility of teeth: 31, 32 - II degree, 41, 42 - I degree. No teeth 33, 43, 44, 34.

Questions:

1. Possibility of using mobile teeth as a support

2. Principles of Tireing

3. Design features

Answers:

1. Grade I mobile teeth are acceptable, Grade II can be used with caution.

2. Unification into a block, load distribution

3. Tongue arch splinting splint prosthesis

Problem 5

35-year-old woman. No teeth 46, 47. Palpation of the mucous membrane reveals a 4 mm displacement in the area of the defect. Tooth 45 is strong.

Questions:

1. Degree of mucosal mobility

2. Influence on the choice of construction

3. Necessary additional measures

Answers:

1. Grade III (3-5 mm) - relaxed, highly mobile

2. Additional fixation, limitation of boundaries is necessary.

3. Tissues can be corrected surgically.

Problem 6

A 28-year-old patient after the injury. No teeth 11, 21. Neighboring teeth are healthy. The mucous membrane in the area of the defect is dense and immobile.

Questions:

1. Defect class
2. Biomechanical properties
3. Selection of construction

Answers:

Class IV (anterior part defect) according to Kennedy

2. High aesthetic and functional requirements
3. Bugel prosthesis with an attachment or circular arch

Problem 7

48-year-old man. The chewing force in the molar region is 350 N instead of the normal 500 N. Teeth 36 and 46 are absent.

Questions:

1. Evaluation of chewing efficiency
2. Reasons for the decrease in strength
3. Prosthetic Prognosis

Answers:

1. Decreased by 30% from the norm
2. Compensatory decrease due to support loss
3. Bugel prosthetics restore function by 80-85%.

Problem 8

A 55-year-old woman is sick. On the radiograph: the periodontal fissure of teeth 13 and 23 is widened by 0.5 mm. Clinically, mobility was not detected.

Questions:

1. Assessment of periodontal status
2. Suitability of teeth as support
3. Additional inspections

Answers:

1. Initial changes in the periodontium

2. Optimal as supporting teeth

3. Control radiography after 6 months

Problem 9

Patient 42 years old. The palatine torus is 8 mm high and 15 mm wide. No teeth 15, 16, 17.

Questions:

1. Influence of the torus on the structure

2. Modify the design

3. Alternative solutions

Answers:

1. Significantly limits the location of the arc

2. Bypass the torus, change the direction of the arc.

3. The torus can be removed surgically.

Problem 10

50-year-old woman. Alveolar process atrophy is 8 mm in the lower jaw and 3 mm in the upper jaw (2 years after tooth extraction).

Questions:

1. Explain the difference between atrophy.

2. Effect on prosthetics

3. Constructive solutions

Answers:

1. The lower jaw atrophies 4 times faster.

2. Difficult to secure and stabilize the prosthesis.

3. Expansion of the base area, additional retention

Problem 11

Patient 36 years old. Sublingual area: depth 12 mm, width 8 mm. No teeth 35, 36, 37, 45, 46, 47.

Questions:

1. Assessment of anatomical conditions

2. Possibility of placing a lingual arc.

3. Alternative options

Answers:

1. There is enough space to place the arc

2. Yes, you can insert a standard lingual arc

3. If necessary - double bow (Kennedy bar)

Problem 12

44-year-old man. In functional tests, the mucous membrane shifts 2.5 mm during chewing and 1.5 mm at rest.

Questions:

1. Degree of mucosal mobility

2. Functional properties

3. Consideration in the manufacture of prostheses

Answers:

1. Level II-III (boundary)

2. Different mobility at rest and function

3. Obtaining a functional template, boundary correction

Problem 13

A 58-year-old patient with diabetes mellitus. Healing of the 16th dental socket after 4 months: residual alveolar height 4 mm.

Questions:

1. Features of healing in diabetes

2. Effects on atrophy

3. Protective tactics

Answers:

1. Delayed healing, increased atrophy

2. 25-30% faster loss of bone tissue

3. Early prosthetics, regular monitoring

Problem 14

Patient, 31 years old. Bruckism. Its chewing power reaches 800 N. No teeth 26, 27.

Questions:

1. Influence of parafunctions on prosthetics

2. Features of the structure

3. Additional measures

Answers:

1. Overload of the support teeth and prosthesis

2. Reinforced frame, additional supports

3. Shelter for protection, fixing the occlusion

Problem 15

47 years old woman. Periodontal pockets with a depth of 4 mm on teeth 13, 23, bleeding during probing.

Questions:

1. Assessment of periodontal status

2. Preparation for prosthetics

3. Design features of the prosthesis

Answers:

1. Chronic periodontitis of moderate severity

2. Anti-inflammatory treatment, curettage

3. Load-sharing splint prosthesis

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